Rotana Alsaggaf, M.S.

Pre-doctoral Fellow - Clinical Genetics Branch, Division of Cancer Epidemiology & Genetics, National Cancer Institute, NIH

PhD Candidate – Department of Epidemiology & Public Health, University of Maryland, Baltimore

Contact Information

Business Address	9609 Medical Center Drive, 6E530 Rockville, MD 20850
Business Phone	240-276-6402
Emails	rotana.alsaggaf@nih.gov ralsaggaf@umaryland.edu

Education

University of Maryland – Baltimore, Baltimore, MD

Ongoing	**Ph.D.**	Epidemiology *Expected graduation: May 2018*
2015	**M.S.**	Epidemiology & Preventive Medicine Concentration: Human Genetics
2014	**GradCert.**	Research Ethics

Colorado State University, Fort Collins, CO

2009	**B.S.**	Biological Science Minor: Biomedical Sciences
2009	**Cert.**	Biomedical Engineering Interdisciplinary studies program

Professional Experience

Research Experience

2016 – present

Pre-doctoral Fellow
National Cancer Institute, National Institutes of Health
Clinical Genetics Branch, Division of Cancer Epidemiology and Genetics
Mentor: Dr. Shahinaz Gadalla
Main Research Projects:

- Assessing benign and malignant tumor risks in patients with myotonic dystrophy
- Understanding clinical factors associated with cancer development in myotonic dystrophy
- Data management activities related to the project: the United Kingdom Clinical Practice Research Datalink (CPRD)

2015 – 2016 **Graduate Research Assistant**
University of Maryland, Baltimore
Infectious Disease & Hospital Epidemiology rotation
Mentor: Dr. Anthony Harris

- Conducted a systematic review of quasi-experimental studies in infection control and antibiotic resistance
- Performed data validation for a large cohort study*: "Epidemiology of Acinetobacter baumannii: An Emerging Nosocomial Pathogen"*

2013 – 2014 **Assistant Clinical Research Coordinator**
King Faisal Specialist Hospital & Research Center Jeddah, Saudi Arabia

- Assisted in preparation, implementation, and evaluation of clinical research performed at the hospital
- Developed, evaluated, and translated case report/informed consent forms
- Collaborated on regulatory and ethical submissions, and communicated with relevant authorities
- Aided in recruitment and coordination for clinical trials. Responsibilities included: obtaining informed consent, screening and inclusion of subjects, ensuring adherence to safety and compliance
- Performed data collection, management, and analysis

2009 – 2010 **Graduate Student Researcher**
University of Northern Colorado
Biotechnology and Genomics research
Mentor: Dr. Chhandak Basu

- Performed genetic modification of cells and vector construction
- Analyzed transgenic cells for production of biofuel and other economically important compounds in plants

2005 – 2006 **Undergraduate student researcher**
Colorado State University
Ecological and Evolutionary Research
Mentor: Dr. Elizabeth Pilon-Smits

- Studied the effects of selenium hyper-accumulation in soil on feeding behavior and predator-prey interactions

Teaching Experience

2015 – 2016 **Teaching Assistant**
University of Maryland - Baltimore

Fall 2016 Environmental and Occupational Health (PREV 668)
Spring 2016 Observational Studies in Epidemiology (PREV 659)
Fall 2015 Biostatistical Methods (PREV 621)

Responsibilities included:

- Delivered select lectures
- Lead in-class discussions and tutorial sessions
- Graded homework assignments
- Assisted in constructing assignments and exams
  Provided assistance with course materials to students, individually and in small groups

2006 – 2007 **Statistics tutor**
Colorado State University, Science & Mathematics Tutorial Hall, Ft. Collins, CO

- Provided assistance to students individually and in small groups
- Reviewed course materials, texts, and provided support with homework assignments

Administrative experience

2010 – 2013 **Assistant General Manager**
Alsaggaf Sons Co Ltd., Jeddah, Saudi Arabia

- Oversaw daily operations
- Developed, analyzed, and managed the company's budgets and financial plans
- Served as primary liaison with international manufacturers and international dealers/distributors

Leadership/Service Activities

2017-Present **Member**
Division of Cancer Epidemiology & Genetics, Fellows' training symposium planning committee

- Planned the event with fellow committee members
- Selected and invited speakers and event hosts
- Recorded minutes of meetings

2017 **Facilitator**
Division of Cancer Epidemiology & Genetics, National Cancer Institute, Rockville, MD

- Lead 2 ethics discussion sessions

2017-Present **Reviewer**
International Journal of Chronic Diseases

2016 **Coordinator**
Division of Cancer Epidemiology & Genetics, National Cancer Institute, Rockville, MD
- Coordinated the February Fellows' colloquium

2016 – Present **Student representative**
University of Maryland, Graduate Student Association, Baltimore, MD
- Serve as primary representative for the department of epidemiology and human genetics
- Serve on the finance committee
    - Review and score student travel award applications

Awards & Honors

2017	IDMC-11 Young Investigator Travel Award ($1,500)
2016	Phi Kappa Phi Honor Society
2005	Golden Key International Honour Society (invitation)
2005	National Society of Collegiate Scholars
2004	Dean's List, College of Natural Sciences, Colorado State University
2004	President's List, Tallahassee Community College

Skills

- Statistical software: SAS, SPSS, MYSTAT, R
- Database management software: Microsoft Access, Refworks, Endnote
- Foreign language: Arabic

Training

- Short Course: Introduction to Causal Inference. Harvard University T.H. Chan School of Public Health, June 2017
- R Programming. Johns Hopkins University, Coursera, March 2017
- CITI and HIPPA Compliance

Memberships

- Society for Epidemiologic Research (SER)
- American Association for Cancer Research (AACR)

Publications

Alsaggaf R, O'Hara L, Stafford K, Leekha S, Harris AD. Quasi-experimental studies in the fields of infection control and antibiotic resistance, 10 years later: A systematic review. *Infection Control and Hospital Epidemiology.* 2018; 39:170-176.

Wang Y, Pfeiffer RM, **Alsaggaf R,** Meeraus W, Gage JC, Anderson LA, et al. Risk of skin cancer among patients with myotonic dystrophy type 1 based on Primary care physician data from the United Kingdom Clinical Practice Research Datalink. *Int J Cancer.* 2017.

Alsaggaf R, Wang Y, Marini-Bettolo C, Wood L, Nikolenko N, Lochmüller H, Greene M, Gadalla S. Benign and Malignant Tumors in the UK Myotonic Dystrophy Patient Registry. *Muscle & Nerve.* 2017.

Zwenger SR, **Alsaggaf R**, Basu C. Does an expressed sequence tag (EST) library of *Salsola iberica* (tumbleweed) help to understand plant responses to environmental stresses? *Plant Signaling & Behavior.* Nov 2010; 5(11): 1330–1335.

Platform Presentations

Alsaggaf R, St. George DM, Pfeiffer RM, Wang Y, Zhan M, Wagner KR, Greene MH, Amr S, Gadalla S. Benign and Malignant Tumors in Patients with Myotonic Dystrophy Type I: A UK-CPRD Double Cohort Study. Presented at: International Myotonic Dystrophy Consortium Meeting (IDMC-11); Sep 2017; San Francisco, CA.

Poster Presentations

Alsaggaf R, O'Hara L, Stafford K, Leekha S, Harris AD. Quasi Experimental Studies in the Fields of Infection Control and Antibiotic Resistance, 10 Years Later: A Systematic Review. Poster presented at: IDWeek 2017; October 2017; San Diego, CA.

Wang Y, Pfeiffer RM, **Alsaggaf R**, Meeraus W, Gage JC, Anderson LA, Bremer RC, Nikolenko N, Lochmuller H, Greene MH, Gadalla SM. Risk of skin cancer among patients with myotonic dystrophy type 1: data from the United Kingdom Clinical Practice Research Datalink. Poster presented at: 33rd International Conference on Pharmacoepidemiology & Therapeutic Risk Management Meeting; August 2017, Montreal, Canada.

Alsaggaf R, Khincha P, Aubert G, Dagnall C, Katki H, Spellman S, Hicks B, Jones K, Savage S, Gadalla S. Correlation and agreement of qPCR and flow-FISH lymphocyte telomere length measurements in healthy adults. Poster presented at: Cold Spring Harbor Laboratory Meeting - Telomeres & Telomerase; May 2017; Cold Spring Harbor, NY.

Alsaggaf R, Wang Y, Marini-Bettolo C, Wood L, Nikolenko N, Lochmüller H, Greene M, Gadalla S. Benign and Malignant Tumors in the UK Myotonic Dystrophy Patient Registry. Poster presented at: Myotonic Dystrophy Foundation Annual Conference; September 2016; Washington DC.

Abstract

Title of Dissertation: Neoplasms and Factors Associated with Their Development in Patients Diagnosed with Myotonic Dystrophy Type I

Rotana Alsaggaf, Doctor of Philosophy, 2018

Dissertation Directed by: Diane Marie M. St. George, PhD; Associate Professor, Department of Epidemiology and Public Health, University of Maryland, Baltimore (co-chair) and Shahinaz M. Gadalla, MD, PhD; Principal Investigator, Clinical Genetics Branch, Division of Cancer Epidemiology and Genetics, National Cancer Institute, National Institutes of Health (co-chair)

Background. Recent epidemiological studies have provided evidence that myotonic dystrophy type I (DM1) patients are at excess risk of cancer, but inconsistencies in reported cancer sites exist. The risk of benign tumors and contributing factors to tumor development in these patients remain unknown.

Methods. From the United Kingdom Clinical Practice Research Datalink, we identified a cohort of 927 DM1-affected and a matched cohort of 13,085 DM1-free individuals. We used Cox proportional hazards regression models to calculate the hazard ratios (HRs) and 95% confidence intervals (CIs) of tumor risks (benign or malignant), overall and by anatomic site, comparing DM1 patients and their matched DM1-free cohort. Cancer risk analyses were stratified by disease severity into: congenital/childhood (age-at-DM1-diagnosis: 0-10 years), classic (11-40 years), and late-onset (>40 years). We also assessed the association between benign tumors and subsequent cancers in each cohort, and the associations between tumor risk and sex, as well as selected disease-related phenotypes (cataracts, thyroid disease, and type 2 diabetes) in DM1.

Results. Elevated cancer risk was restricted to patients with classic DM1, driven by cancers of the thyroid (HR=15.9, 95%CI=2.4-103.6), uterus (HR=26.8, 95%CI=2.3-

309.3), and cutaneous melanoma (HR=6.0, 95%CI=1.2-28.8). DM1 patients, regardless of their disease severity, were at excess risk of benign skin tumors (HR=1.5, 95%CI=1.1-1.9), uterine fibroids and polyps (HR=4.7, 95%CI=2.2-9.9), colorectal/anal polyps (HR=2.7, 95%CI=1.1-6.9), and benign tumors of the nervous system (HR=9.9, 95%CI=2.9-28.8). Having these benign neoplasms was associated with a significantly increased cancer risk only in patients with classic DM1 (HR=3.34, 95%CI=1.14-9.83). In DM1, cancer was not associated with sex, thyroid disease, diabetes, or cataracts; female patients and those with cataracts were more likely to develop benign tumors.

Conclusions. Our study shows that DM1 patients are at increased risk of tumors (both benign and malignant), with the skin, uterus, endocrine, and lower digestive systems as possible targets for tumorigenesis, but only cancer risk was modified by disease severity. Our results also suggest that cancers in DM1 may have a distinct underlying biologic mechanism from the phenotypes under study. If confirmed, these findings may guide future investigations of DM1-tumorigenesis and inform the clinical management of these patients.

Neoplasms and Factors Associated with Their Development in Patients Diagnosed with Myotonic Dystrophy Type I

by
Rotana Alsaggaf

Dissertation submitted to the Faculty of the Graduate School of the University of Maryland, Baltimore in partial fulfillment of the requirements for the degree of Doctor of Philosophy
2018

To my family. For your unconditional love and support, Thank you!

To my beloved father, Mr. Mohammed Alsaggaf, who believed in me every step of the way and pushed me to be the best version of myself. You left too soon, but I hope you can rest peacefully and proudly. I know you would have read every single word! I miss you.

To my incredible mother, Dr. Azizah Linjawi, who set the bar way too high and lead by example. Thank you for your prayers, words of wisdom, and for always reminding me to enjoy the journey. I could not have gotten here without your support.

To my one and only Ms. Leah Vansciver, for being my rock, and putting up with all the sleepless nights! Your love, sense of humor, and beautiful energy have been the driving force behind my success. Thank you for inspiring me and for always being front and center, nodding and smiling.

To Dr. Rania Alsaggaf, Dr. Ahmed Alsaggaf, and Ms. Lubaba Alsawwaf, thank you for being my sounding boards and for your endless support and motivation.

To my brothers, Dr. Khalid Alsaggaf, Eng. Rayan Alsaggaf, and Eng. Yasir Alsaggaf, thank you for your humor and for always being there. I know I can always count on you.

I love you.

Acknowledgements

First and foremost, I would like to acknowledge my incredible dissertation committee for their time, input, and continuous support. I have learned so much from each member and cannot thank them enough for their belief in me and this project. I would like to thank my mentor, Dr. Shahinaz Gadalla for providing me with this opportunity, for sharing her brilliance and encouraging me every step of the way, for her passion and commitment to this field, and for always pushing me to think outside the box. More importantly, I would like to sincerely thank her for the compassion and understanding she has shown me through the ups and downs of this PhD journey; her kindness is refreshing and truly inspiring. I would like to thank Dr. Sania Amr, for making all of this possible, for believing in me, for her expertise that made all of the hurdles as pain-free as can be, for her meticulous, detailed, and timely feedback, and for being such a caring and reliable advisor. I thank Dr. Diane Marie St. George, for agreeing to take me on as her student, for sharing her epidemiological expertise, and for being a supportive and kind-hearted mentor. I thank Dr. Min Zhan for her time, brilliant analytical perspective, statistical expertise, and support of this work. I thank Dr. Kathryn Wagner, for her time, insight, and for helping me see the broader context for this project.

I would like to acknowledge the Intramural Research Program of the Division of Cancer Epidemiology and Genetics at the National Cancer Institute for funding this work and supporting me as a pre-doctoral fellow. I would like to thank my mentors at the Clinical Genetics Branch, Dr. Youjin Wang, Dr. Mark Greene, and Dr. Ruth Pfeiffer for their time, insight, and contributions to this work. I would like to thank my colleagues Dr. Maisa Pinhiero, Ms. Fernanda Fortes, Ms. Jenni Young, Dr. Payal Khincha, Ms. Cecilia

Higgs, Ms. Renee Bremer, Ms. Megan Frone, Dr. Lisa McReynolds, Mr. Kelvin DeAndrade, Dr. Maria Demarco, Dr. Talia Wegman-Ostrosky, and Dr. Ana Best for keeping me on track, for their advice, for all the much-needed ice-cream breaks, for encouraging me and always offering to help, and for their friendship.

I would also like to thank Ms. Emily Carver and Mr. David Ruggieri from the Information Management Services Incorporation for their contributions to the database management.

Finally, I would like to thank the faculty, staff, and students of the Department of Epidemiology and Public Health, University of Maryland, Baltimore for their guidance, support, and for everything I have learned from them. I would especially like to thank my classmate and dear friend Dr. Sarah Jackson, for being my partner throughout this entire PhD journey, for brainstorming all the difficult epidemiological and analytical questions with me, and for making me a much better student.

Table of Contents

List of Tables

List of Figures

List of Abbreviations

AD:	Autosomal dominant
AR:	Autosomal recessive
BCC:	Basal cell carcinoma
BMI:	Body mass index
CDM:	Congenital myotonic dystrophy
CI:	Confidence interval
CIC1:	Chloride channel-1
CLEF1:	CUG-binding protein/Elav-like family member 1
CNBP:	CCHC-type zinc finger nucleic acid binding protein
CPRD:	Clinical Practice Research Datalink
CTNNB1:	Catenin Beta 1
cTNT:	Cardiac troponin T
DM:	Myotonic dystrophy (*Dystrophia myotonica*)
DM1:	Myotonic dystrophy type 1
DM2:	Myotonic dystrophy type 2
DMPK:	Dystrophia myotonica protein kinase
DMWD:	Dystrophia Myotonica, WD Repeat Containing
FSHD:	Facioscapulohumeral dystrophy
GP:	General practitioner
HES:	Hospital Episodes Statistics
HNPCC:	Hereditary nonpolyposis colorectal cancer
HR:	Hazard ratio

List of Abbreviations (continued)

ICD:	Implantable cardioverter defibrillator
ICD-10:	International classification of disease, 10th revision
IMD:	Index of multiple deprivation
IR:	Insulin receptor
IRB:	Independent review board
ISAC:	Independent scientific advisory committee
LGMD:	Limg-girdle muscular dystrophy
MBNL:	Muscleblind-like
MRI:	Magnetic resonance imaging
NCDR:	National cancer data repository
NCI:	National Cancer Institute
NHS:	National Health Services
NIH:	National Institutes of Health
OMIM:	Online Mendilian Inheritance in Man
ONS:	Office of National Statistics
OPMD:	Oculopharyngeal muscular dystrophy
OR:	Odds ratio
PCP:	Primary care practitioner
PPV:	Positive predictive value
RNA:	Ribonucleic acid
RR:	Relative risk
SAS:	Statistical analysis software

List of Abbreviations (continued)

SD: Standard deviation

SIR: Standardized incidence ratio

UK: United Kingdom

US: United States

UTS: Up-to-standard

X-R: X-linked recessive

ZNF9: Zinc Finger 9

Chapter 1: Introduction & Literature Review

1.1 Introduction

Myotonic dystrophy type I (*dystrophia myotonica I;* DM1), also known as Steinert's disease, is an autosomal dominant multisystem disorder, primarily affecting the muscular system. While muscle weakness and myotonia are the most prominent clinical features of DM1, dysfunction of other organ symptoms including the heart, eye, brain, skin, respiratory, gastrointestinal, and endocrine systems is also prevalent.[1] Although rare, it is one of the most common forms of adult-onset muscular dystrophy, and in populations of European descent, one of the most common fatal monogenic disorders.[1, 2] Published case reports have suggested that DM1 patients may be at excess risk of various benign and malignant tumors.[3, 4] Recent epidemiological studies provided evidence that DM1 patients are at excess risk of various cancers including cutaneous melanoma, basal cell carcinoma, and cancers arising in the brain, ovary, endometrium, testis, colorectum, and thyroid.[3, 5-9] Nonetheless, this literature remains scarce, and inconsistencies related to cancer-sites were observed. In addition, systematic evaluation of the risk of benign tumors in DM1 is lacking. The mechanism of DM1-related tumorigenesis is still unknown; possible mechanisms include missplicing of downstream oncogenes or tumor suppressor genes, altered protein-coding mechanisms, and/or upregulation of β-catenin.[4, 10-15] It is possible that certain patient characteristics and DM1-related clinical factors inform cancer risk in DM1 patients, but the association between these characteristics and tumor development is unclear. To better understand tumor risk and factors that impact tumorigenesis in DM1 patients, we conducted a retrospective cohort study to 1) evaluate the risk of tumors, malignant and benign separately, in the full clinical spectrum of DM1 patients compared with a matched DM1-free cohort; and 2) investigate associations between selected patient/clinical characteristics and tumor development in DM1 patients. We utilized the United Kingdom (UK) Clinical Practice Research Datalink (CPRD), a large primary care longitudinal database, to address these questions.

1.2 Background & Literature Review

Muscular dystrophies are a group of over 30 inherited diseases that are clinically and genetically heterogeneous.[16, 17] They result in progressive weakness and wasting primarily in the skeletal muscles, but vary in the distribution of affected muscles, age of onset, severity, and rate of progression. In some forms, cardiac muscles and other organ systems can be involved. Based on age of onset and main clinical findings, muscular dystrophies can be classified into nine major types (Table 1): Duchenne, Becker, congenital, distal, emery-dreifuss, facioscapulohumeral (FSHD), Limb-girdle (LGMD), Oculopharyngeal (OPMD), and myotonic dystrophy (*dystrophia myotonica*; DM). While Duchenne muscular dystrophy is the most common form of childhood muscular dystrophies, DM and FSHD are the most common forms of adult onset muscular dystrophy.

DM is an autosomal dominant neuromuscular disorder characterized by progressive muscle wasting, myotonia (sustained muscle tensing after contraction), and multi-system involvement.[1, 18] There are two major types of DM: myotonic dystrophy type 1 (DM1, Online Mendelian Inheritance in Man (OMIM) #160900), and myotonic dystrophy type 2 (DM2, OMIM #602668). Both DM types are caused by unstable nucleotide repeat expansions that occur in two unrelated genes. DM1 is caused by an abnormal CTG trinucleotide repeat expansion in the 3' untranslated region of the *Dystrophia Myotonica-Protein Kinase (DMPK)* gene on chromosome 19;[19-21] whereas DM type 2 (previously known as proximal myotonic myopathy) results from a CCTG tetra-nucleotide expansion in intron one of the *Zinc Finger 9* (*ZNF9*) gene (also known as the CCHC-type zinc finger nucleic acid binding protein (CNBP)) on chromosome 3.[13, 22] Although DM1 and DM2 share similar clinical and genetic features, they are two distinct disorders and require different diagnostic and management strategies.[14] In general, DM1 is thought to be more prevalent and more severe than DM2, affecting an estimated 1 in 8,000 individuals globally.[1]

1.2.1 Epidemiology of DM1

Due to the lack of a large-scale population-based genetic screening, the true prevalence of the DM1 genetic mutation is still unknown. Most reported prevalence rates rely on clinical ascertainment of DM1 patients, which is dependent on the quality of diagnostic services. Additionally, these rates could underestimate the true prevalence as mild cases may go undetected. Point prevalence estimates vary widely across populations, ranging from 0.5 per 100,000 in Taiwan[23] to 182 per 100,000 in the founder population of Northeastern Quebec.[24] The largest DM1 genetic screening to date was performed among 4,532 anonymous blood donors in Finland; it showed a prevalence rate of approximately 44 in 100,000.[25] While the Finnish population is expected to be relatively representative of other Caucasian European populations with respect to dominant disorders,[25] DM1 prevalence rates in other European countries were significantly lower. Rates as low as 3.8 and 5.3 per 100,000 were reported in

Serbia,[26, 27] 6.75 per 100,000 in the Republic of Ireland,[28] 12 per 100,000 in Northern Ireland,[29] and relatively high prevalence rates in western Sweden (18 per 100,000 adults)[30] and the Basque region of Northern Spain (26 per 100,000).[31] In northern UK, the point prevalence for myotonic dystrophies was reported to be approximately 11 in 100,000, making DM the most common genetic disorder of skeletal muscle in that population; DM patients accounted for almost 29% of the population in a large muscle clinic.[32] In the US, systematic evaluation of the epidemiology of DM1 has not been performed; however, a 1984 study reported an estimated point prevalence of 2 per 100,000 for DM.[33]

1.2.2 Molecular genetics of DM1

DM1 was clinically discovered more than a century ago,[34] but the genetic mutation underlying the disease was not identified until 1992, making it the third disease caused by tandem repeat expansions to be found in humans, after fragile X syndrome and Kennedy's disease.[19] In healthy individuals, the number of CTG repeats in the *DMPK* gene range from 5 to 37; whereas DM1-affected individuals may carry 51 to upward of several thousand repeats.[2, 14] Individuals with 38 to 50 repeats are considered to be carriers of unstable premutation alleles (while they do not show the clinical phenotype, their affected offspring may). Repeat lengths of 51 to 100 are considered protomutations, and like premutation alleles, they are at elevated risk of instability towards expansion and may or may not have symptoms characteristic of DM1.[14] Additionally, repeat lengths are moderately associated with age at onset and disease severity in DM1; however, these associations are not very robust, due to the wide variability of repeat size in classical adult-onset DM1.[2, 35] DM1 patients diagnosed in adulthood usually have more than 100 repeats, whereas those with congenital DM1 (diagnosed within the first year of life) carry thousands.[14] Individuals with repeat sizes between 70-100 usually present with a mild phenotype, while those with thousands have a severe phenotype.[1]

In DM1, the CTG expansion is highly unstable in both germline and somatic cells, where new alleles with varying repeat lengths are frequently generated with a bias for further expansion.[2, 14, 36] Germline instability in DM1 causes CTG expansions to increase by more than 200 repeats through successive generations, leading to pronounced anticipation where symptoms appear at an earlier age, and a more severe form in the next generation.[2, 14] Interestingly, repeat contraction was observed with paternal transmission in approximately 6% of parent-child pairs, whereas maternal transmission was likely to result in expansion, and is almost exclusively associated with the transmission of congenital DM1.[37, 38] On the other hand, CTG expansions seem to have greater instability when transmitted through male germlines; and they are more likely to result in a transmission from small expansions with few symptoms to larger expansions with classic symptoms, suggesting sex-specific germline instability.[2, 39] Furthermore, in approximately 5% of DM1 families, CCG or GGC triplets are found interrupting the CTG repeat sequence and seem to result in higher stability and lower anticipation; they may also result in variant phenotypic manifestations.[40] Unstable rates of CTG expansions in somatic cells lead to varying repeat sizes in different tissues, resulting in somatic mosaicism throughout the DM1 patient's lifetime. Surprisingly, somatic instability seems to affect non-dividing cells including those in skeletal muscles, heart, and brain more so than frequently-dividing cells such as hematopoietic cells. CTG expansions can grow to more than 2,000 repeats by age 20 and to more than 4,000 by age 40 in skeletal muscle, which is significantly (~ 3 to 25 times) longer than those observed in the blood.[2, 41] Somatic instability in DM1 has also been shown to affect age at onset; patients in whom CTG repeats expand quickly are likely to develop symptoms early.[42] The level of somatic instability seems to be a highly heritable trait suggesting that individual-specific *trans*-acting genetic modifiers may play a role, and possibly contribute to the development of cancer and aging-related symptoms in DM1.[42] In DM patients, tumor tissue has been shown to express increased triplet repeat expansion compared with surrounding tissue within the same organ or blood and/or muscle tissue from the same patient, suggesting that the genetic instability underlying the disease may play a role in tumor susceptibility.[4, 43-47]

1.2.3 DM1 pathogenesis

Pathophysiological mechanisms underlying DM are complex and yet to be fully understood.[14, 48, 49] The discovery of the *DMPK* and *ZNF9* mutations causing DM1 and DM2, both of which are located in non-protein coding regions, were puzzling because these genes are functionally unrelated, yet clinical manifestations of the two diseases are similar.[2] These complexities have made DM the subject of extensive research, which led to the conclusion that pathogenesis of both DM types is largely RNA-mediated and generally results from the accumulation of toxic RNA repeats.[2, 11]

1.2.3.1 RNA toxicity in DM1

The location of the CTG triplets in the terminal region of the *DMPK* gene allows for the synthesis and production of *DMPK* RNA, even when the sequence is highly expanded, resulting in mutant mRNA strands comprising large sequences of CUG repeats.[2] Studies have shown that the transcription of mutant CTG repeats into RNA is both necessary and sufficient to cause DM.[14, 50, 51] These mutant transcripts aggregate in the nucleus into clusters or "foci", and they are most prominent in cells related to *DMPK* expression that contain large expansions, such as those in the skeletal muscle, heart, and brain.[2, 52-54] These foci are thought to act in an antagonistic manner by interacting with RNA binding proteins resulting in dominant negative effects.[55]

Proteins in the *muscleblind*-like (MBNL) family have a key role in regulating tissue-specific alternative splicing, as well as RNA transport and decay.[56, 57] These proteins have a high affinity to bind to CUG repeat RNA and are therefore sequestered by the nuclear foci, resulting in loss of function and dysregulation of mRNA splicing, transcription, and microRNA metabolism.[58] In addition, splicing dysregulation is further aggravated by the activation of signaling pathways through altered *DMPK* RNA, which induces phosphorylation and stabilization of another splicing factor (CUGBP/Elav-like family member 1; CLEF1). Upregulation of CLEF1 results in altered mRNA splicing, translation, and protein turnover.[14] Over 30 effector genes have been identified as targets of the MBNL and CLEF proteins, and the resulting missplicing and loss of function of these gene products are likely to be the mechanisms underlying the multisystemic features of DM1.[14] For example, abnormal splicing of the muscle chloride channel (ClC-1) produces myotonia through reduced chloride conductance in muscle fibers.[59, 60] Spliceopathy of various target transcripts, including insulin receptor (IR), cardiac troponin T (cTNT), dystrophin, and L-type calcium channels are thought to lead to the clinical manifestations of DM1.[2, 4, 14]

Moreover, studies have shown that aberrant translation of mutant RNA repeats can occur despite their location outside of protein coding regions. This is thought to occur through abnormal interactions with protein synthesis machinery and can lead to cellular toxicity.[2, 61]

1.2.3.2 Other mechanisms of DM1 pathogenesis

The retention of mutant *DMPK* transcripts in the nucleus also leads to inefficient translation and approximately 50% reduction in the protein product; however, this haploinsufficiency does not seem to be a key determinant of disease in DM1.[2, 62, 63] Similarly, it is hypothesized that altered chromatin structure caused by the tandem repeats may alter neighboring genes including *SIX5* (a transcription factor coding gene) and *DMWD* (a protein coding gene), and thus may contribute to the DM1 phenotype.[64]

1.2.4 Presentation & clinical phenotypes

DM1 can manifest at any age (median= 20-30 years), with a congenital form displaying the most severe phenotype.[3, 65] Almost all affected individuals develop symptoms by age 50, indicating high penetrance; however, mild cases may go undetected.[66] While muscle weakness and myotonia are the most prominent clinical features of DM1, other manifestations include early-onset cataracts, cardiac conduction defects, respiratory insufficiency, testicular atrophy, and cognitive impairment. Endocrine abnormalities such as thyroid dysfunction and type II diabetes mellitus are also prevalent.[18, 65] The spectrum of DM1 severity varies widely resulting in great clinical heterogeneity.

1.2.4.1 Classifications of DM1

Based on the age at onset, DM1 can be classified into:

1. **Congenital DM1 (CDM):** CDM is the most severe type of DM1 affecting approximately 15% of DM1 patients.[2] It is diagnosed during the first year of life and usually occurs with more than 1,000 repeats.[2] Manifestations of CDM can be pre- or post-natal:
   - ***Pre-natal:*** They include in utero excess amniotic fluid, decreased movement, and/or several possible deformities such as talipes equinovarus (clubfoot) or borderline ventriculomegaly (dilated lateral ventricles in the brain).[2]
   - ***Post-natal:*** They involve muscular features such as severe generalized weakness, hypotonia, respiratory complications that may require ventilator support, and poor feeding requiring nasogastric feeding.[2, 14] CDM is characterized by tent-shaped upper lips, facial paralysis, slurred or slow speech, and impaired expressive communication.[2] A mortality rate of approximately 18% is reported for CDM within the first month of life; however, this may be an underestimation as some DM1 deaths may go unrecognized if no family history is present.[2] Children born with CDM who survive to infancy and childhood experience developmental delays and

learning disabilities; however their motor function tends to gradually improve, and they eventually achieve milestones and the ability to walk independently.[34] Nonetheless, myotonia and progressive muscle wasting ultimately occur in the second to the third decades of life.[2, 14, 34] Approximately, 50% of children with CDM survive into their mid-30's, with an average life expectancy of 45 years.[67, 68]

2. **Childhood DM1:** Childhood DM1 manifests between the ages of one and 10.[2] Children with this form of DM1 tend to develop conspicuous cognitive and behavioral impairments, including anxiety, attention deficit, and mood disorder, but no obvious muscle pathologies;[2] like CDM, muscle disease manifestations occur later in life.[14]

3. **Classical DM1:** For approximately 75% of DM1 patients, symptoms will appear within the second to the fourth decade of life. Patients with classical DM1 usually present with myotonia, muscle weakness or cataracts as their initial symptom.[2, 14]

   Muscular features of DM1 patients:

   - Myotonia, or delayed muscle relaxation, which is almost always present in this form of DM1, but can be clinically subtle.[14] Myotonia symptoms exhibit a "warm-up phenomenon" in which these symptoms can be improved by repeat activation.[2]
   - Weakness in distal limb muscles that results in gait abnormalities such as foot drop and reduced dexterity.
   - Weakness in the neck and facial muscles which results in the characteristic myopathic appearance of the face and drooping of the eye lids.[14]

- Skeletal muscle weakness, which is often the cause of disability in DM1 leading to immobility, respiratory insufficiency, slowed or slurred speech, and difficulty swallowing.[14]

Non-muscular features and systemic manifestations prevalent in DM1:

- **Cardiac:** Conduction defects and arrhythmias are a leading cause of early mortality and sudden death in DM1.[69] They are caused by fibrosis in the sinoatrial node and the conduction system of the heart.[69] A population-based study reported a relative risk of 60 (95% CI= 29.9-108.6) for conduction disorders in DM1 compared with the general population.[70] Another study reported an SIR of 7.7 (95% CI=5.8–10.0) for cardiac disease within the first year following DM1 diagnosis, and an SIR of 3.0 (95% CI=2.6-3.4) a year or longer after diagnosis.[71] In one case series, 90% of DM1 patients had disruptions in cardiac conduction.[18] Prolonged PR intervals and QRS duration are observed in approximately 65% of the cases.[2] Atrioventricular block and dilated cardiomyopathy have been shown to occur in 11% and 7% of DM1 patients, respectively.[72]
- **Eye:** Premature cataracts that develop before the age of 50 may be suggestive of DM1. Located in the posterior lens capsule of the eye, DM1-related cataracts are characterized by the birefringent "Christmas tree" appearance. Cataracts are thought to occur in approximately 85% to 100% of DM1 patients;[2, 14, 18, 34, 73, 74] however, different frequencies have been reported in the literature. A study of 106 French DM1 patients found 43% of them to have cataracts,[75] while another study of Korean DM1 patients found 71% to be

affected.[76] On the other hand, of the 556 DM1 patients registered in the UK DM registry, 26% reported having cataract surgery.[77] These inconsistencies are likely due to ascertainment bias. A population-based study of DM1 patients in Utah reported a relative risk of 6.2 (95% CI=4.08, 9.15) for developing any cataract compared with the general population.[70]

- **Central Nervous System:** Structural and functional abnormalities of the brain are present in some DM1 patients.[14] These symptoms vary widely, with cognitive, behavioral, and sleep issues as the most common presentations.[2] Changes associated with DM1 include anxiety, avoidance, memory impairment, decreased awareness of disease symptoms, visuospatial problems, apathy, and mild cognitive impairment.[2, 14] Daytime sleepiness is present in approximately 80% of DM1 patients.[2] Additionally, MRI scans of a DM1 patient's brain can show diffuse white matter alterations.[2, 14]
- **Gastrointestinal:** Abnormalities of the gastrointestinal tract are frequently reported in DM1 due to smooth muscle dysfunction; they include constipation, diarrhea, intestinal pseudo-obstruction, and incontinence.[2, 14, 18] Cholelithiasis, or gallstones, and other gallbladder disease,[2, 14, 34] as well as esophageal abnormalities, such as dysphasia that can lead to aspiration and pneumonia are also observed.[14, 34]
- **Endocrine:** DM1 patients can develop a wide range of endocrine pathologies, including insulin resistance and diabetes mellitus, thyroid disease (hypothyroidism is known to increase and may conceal symptoms of DM1),[14, 65] testicular atrophy accompanied by male infertility, and miscarriages in

female patients.[14, 34] In a study of 97 DM1 patients, 5% had diabetes and 7% had thyroid disorder.[78] Another study of 106 French DM1 patients reported that 17% of patients had diabetes.[75] More recently, a large French study reported the prevalence rates of thyroid disease (females=26.9%; males=10.6%) and diabetes (females=8%; males=9.4%) among adult DM1 patients.[79]

- **Skin:** Skin abnormalities, including frontal baldness and cutaneous neoplasms are common in DM1 patients.[4, 14, 65]
- **Cancers:** The inclusion of cancer as part of the DM phenotype is a relatively new finding reported in approximately 5-10% of DM1 patients.[3, 5-8] Tumors in DM are discussed in more detail below.

4. **Late-onset DM1:** This form of DM1 usually manifests after the age of 40, is associated with CTG repeat lengths between 51-100, and presents with mild symptoms including muscle weakness, myotonia, cataracts, and diabetes.[2]

1.2.5 Diagnosis of DM1

The clinical diagnosis of DM1 can be a complex process as many DM1 symptoms mimic those of more common diseases. DM1 is suspected in patients presenting with the characteristic pattern of muscle weakness and myotonia (described above). In many DM patients, electromyography can detect myotonia in distal muscles;[18] however, DM1 is one of several myotonic disorders including DM2, myotonia congenita, and paramyotonia congenita. Other diseases resembling myotonic dystrophy include hypokalemic periodic paralysis, hereditary inclusion body myopathy, myofibrillar myopathy, spinal muscular atrophy, Andersen-Tawil syndrome, cerebral palsy, as well as other dominantly inherited muscular dystrophies such as FSHD and LGMD described in Table 1.[80] Depending on the patient's physical examination, test results, and family history, genetic testing may be offered. Also, when symptoms point strongly towards a diagnosis of DM1, genetic confirmation may be sought out. In cases where a family member is affected, unaffected parents and siblings may be tested. Prenatal genetic testing is also available.[18]

1.2.6 Clinical complications & mortality

Mateos-Aierdi *et al.* (2015) suggested that the DM1 phenotype resembles an accelerated aging syndrome, with an average life span of 48-55 years in affected individuals.[18, 64] Life expectancy is 60 years to normal in DM1 patients with a mild phenotype, and 45 years in patients with congenital disease.[18] Primary causes of death in DM1 patients include respiratory complications, cardiac arrhythmias, and malignancies.[68, 81] A longitudinal study of adult-onset DM patients from the Netherlands reported the frequencies of death to be 31% from pneumonia, 29% from arrhythmias and 10% from malignancy. This study also reported a median age at death of 56 years (males=54; females=58).[68] Another study found that cancer-related deaths made up 10% of all deaths.[81] This study also reported absolute cancer mortality risks of 2% (95%CI=1-4.5%), 4% (95%CI=2-6%), and 6% (95%CI=4-9%) by ages 50, 60, and 70 years, respectively. Interestingly, the study found no gender differences in cancer-specific mortality (p=0.6).[81] While it is likely that the majority of the population in both studies have DM type 1, the disease subtype was not known, and therefore patients with DM2 may have been included.

1.2.7 Gender differences in the DM1 phenotype

A recent large study of 1,409 DM1 adults enrolled in the French DM registry (DM-Scope) found that gender is an important factor that may modify DM1 phenotype, disease severity, and mortality.[79] This study found that among DM1 patients, males are more likely than females to have severe muscular disability, including myotonia, weakness, facial dysmorphism, cardiac, and respiratory involvement, as well as cognitive and developmental abnormalities. Hospitalization and mortality rates were higher in men than in women. On the other hand, female DM1 patients were more likely than male patients to suffer from thyroid disorder, digestive tract dysfunction, incontinence, obesity, dysphagia, and cataracts.

1.2.8 Clinical management of DM1 patients

There is currently no treatment that significantly alters the course of disease in DM1 patients.[2] Current clinical care is mainly symptom-management; however, efforts to discover restorative treatment are ongoing. Results from randomized trials of anabolic agents, such as testosterone and insulin-like growth factor, did not show any improvements in muscle function but did show some improvement in muscle mass.[82, 83] The use of antisense oligonucleotides to treat DM is currently being tested.[84, 85] Antisense oligonucleotides are single-stranded synthetic DNA molecules that bind to a specific mRNA sequence, thereby inhibiting or reducing its expression. In DM1, they can be used for post-transcriptional silencing and knockdown of toxic RNA caused by the triplet repeats.[85] Jauvin et al. reported that the use of an antisense oligonucleotide, targeted to the 3' untranslated region of the *DMPK* gene in mouse models, led to a 70% decrease in expanded RNA and foci in skeletal muscles and 30% decrease in the heart muscle. They also reported improved body weight, muscle strength, and muscle histology, with no apparent toxicity.[85]

Current management strategies include genetic counseling, maintaining function and independence, preventing complications (e.g. the use of pacemakers and implantable cardioverter-defibrillators (ICD) to prevent cardiac dysfunction[86]), and providing symptomatic relief for muscular, behavioral, and pain symptoms.[2] In addition, surgical removal of cataracts, the use of hormone replacement therapy to treat hypothyroidism, and treatment of diabetes with metformin and other anti-diabetic drugs are also common in DM1.[87, 88]

1.2.9 Tumors and DM1

Over the years, multiple case reports have suggested that DM patients may be at elevated risk of various benign and malignant tumors, with pilomatricoma (a rare benign calcifying cutaneous neoplasm) being the most commonly reported.[3, 4] More recently, epidemiological studies have shown that cancer susceptibility is in fact increased in DM1 patients; however these studies have several limitations including 1) the inability to adjust for confounding factors, 2) the lack of a direct comparison group with which exchangeability related to important factors can be examined, 3) ascertainment bias towards a more severe DM phenotype, and 4) limited sample size in most cases.

1.2.9.1 Benign Tumors

To our knowledge, the risk of benign tumors in DM1 has not been systematically evaluated. Case reports as early as 1965 have suggested an association between certain benign tumors and DM, most commonly pilomatricoma.[4] Cross-sectional studies of Italian and United Kingdom (UK) DM1 patients reported overall benign tumor frequencies of approximately 21% and 12%, respectively, with female reproductive tumors being the most commonly noted in both studies.[89, 90] A small study of 90 DM1 patients found that they had more dysplastic nevi and pilomatricoma compared with 103 age- and sex-matched controls.[91] Another study, conducted in Spain, found increased risk of pilomatricoma in 102 DM1 patients compared with age and sex matched controls.[92] Other benign tumors described in DM patients include tumors of the parotid gland, parathyroid, thyroid, and pituitary, as well as thymoma, meningioma, uterine fibroids, and insulinoma.[4, 90, 93] Whether DM1 patients are truly at elevated risk of developing these benign tumors needs to be examined.

1.2.9.2 Malignant Tumors *(excluding non-melanoma skin cancers)*

To date, only five studies evaluated the risk of cancer other than non-melanoma skin cancer in patients with DM.

In 2011, Gadalla et al.[3] published the first epidemiological evidence of excess cancer risk in DM patients. Risk estimates were compared with those of the general population from which DM cases were ascertained. With a population-based design, the authors used the Swedish and Danish population registries, and examined 1,658 DM patients (males=861 and females=797) diagnosed between 1977 and 2008; disease subtype was not available. Within the Swedish and Danish patient registries, they identified DM patients, primarily from inpatient hospitalization registries. Cancer status was determined through the corresponding national cancer registry. They found a standardized incidence ratio (SIR) of 2.0 (95% CI=1.6-2.4) for all cancers combined; the high overall risk was attributed to excess risks in cancers of the endometrium (SIR=7.6, 95% CI=4.0-13.2), ovary (SIR=5.2, 95% CI=2.3-10.2), brain (SIR=5.3, 95% CI=2.3-10.4), colon (SIR=2.9, 95% CI=1.5-5.1), all of which met the statistical significance level after adjustment for multiple testing. The study also suggested a possible excess risk of cancers arising in the eye (SIR=12.0, 95% CI=2.0-39.6), thyroid gland (SIR=7.1, 95%CI=1.8-19.3), and pancreas (SIR=3.2, 95% CI=1.0-7.6), where findings were not statistically significant after adjustment for multiple comparisons. The main limitations of this study included 1) the inability to distinguish between DM1 and DM2, and therefore, contributions of the different genotypes to carcinogenesis could not be tested, 2) the identification of DM patients was mainly from hospital registries, which may have resulted in an overrepresentation of severely affected DM patients, and 3) the absence of data on lifestyle factors such as smoking, alcohol, BMI, and female reproductive factors, did not allow for adjustment for these potential confounders.

A subsequent US study by Win et al. (2012)[8] identified 307 DM patients (males=142, females=165), admitted to the Mayo Clinic between 1993 and 2010. The authors were able to replicate the findings of an elevated risk of thyroid (SIR=5.5, 95% CI= 1.8-12.9) and eye (SIR=27.5, 95% CI=3.3-99.5) cancers. This study suggested increased risk, albeit not statistically significant, of testicular and prostate cancers. No associations were found for lymphoma, leukemia, multiple myeloma, or cancers of the brain, breast, colorectum, lung, renal system, bladder, endometrium, or ovary. In their subsequent analysis, stratified by DM type, the SIRs were 7.4 (95% CI=0.9-26.7) for thyroid cancer and 92.9 (95% CI 11.3-335.7) for choroidal melanoma in DM1 patients. This study also lacked information on possible confounders and was subject to possible selection bias related to non-exchangeability between the hospital-based cohort and the general population. Another limitation was its small sample size that may explain the null results for previously observed associations.

In 2013, Mohamed et al.[7] examined 109 French DM1 patients (males=50, females=59) seen at a single center between 1998 and 2011, and replicated the finding on endometrial cancer (RR=21.7, 95% CI=2.4-78.5). The authors also reported increased risk of thymoma (RR=100, 95%CI=11.2-361) and lung cancer (RR=6.0, 95%CI=1.2-17.7). Similarly, this study was limited by the same shortcomings observed in Win et al. (2012).

More recently in 2016, Abbott et al.[5] conducted another study of 281 US DM patients (gender distribution unknown), utilizing data collected from 1994 onward within the Utah population database and cancer registry. This study found excess risks of Non-Hodgkin lymphoma (RR=4.25, 95% CI=1.16-12.43), and cancers of the testis (RR=10.74, 95% CI=1.91-38.79) and endometrium (RR=6.98, 95% CI=1.24-

25.22). While the threat to exchangeability is reduced in this homogenous population-based study, all other limitations mentioned for the previous studies still hold.

Another study by Fernandez-Torron et al. was published in 2016.[6] This study was conducted in the province of Gipuzkoa within the Basque Country of Spain, where the prevalence of DM is relatively high. Medical records of 424 DM1 patients (males=210, females=214), seen between 1985 and 2013, were examined to assess the risk of cancer. Patients in this study were all genetically confirmed to have DM1. Findings included increased risk of overall cancer (SIR=1.81, 95% CI=1.37-2.36), which was more pronounced in females (SIR=2.71, 95% CI=1.7-3.97) than in males (SIR=1.40, 95% CI=0.94-2.01). Elevated risks of cancers arising in the ovary (SIR=8.33, 95% CI=1.72-24.31), endometrium (SIR=6.86, 95% CI=2.23-16.02), thyroid (SIR=23.33, 95% CI=9.38-48.08), and brain (SIR=9.80, 95% 3.18-22.88) were reported in DM1 patients.[6]

Although most of the DM1 studies consistently reported elevated risk of cancer in some sites, such as endometrium and thyroid, inconsistencies related to other cancer sites are observed. Because none of these studies adjusted for potential confounding factors, it is difficult to postulate whether there are differences within the underlying DM1 disease or if these inconsistencies are due to variable distributions of important confounding factors across the different populations.

1.2.9.3 Skin cancers

Cross sectional studies in DM1 patients from the US, Italy, and the UK found that skin cancers are the most commonly reported malignancies.[90, 93, 94] A small study of 90 DM1 patients identified via the Italian League for the Fight Against Myotonic

Dystrophy registry (Unione Italiana Lotta per la Distrofia Muscolare) found that DM1 patients had more frequent cutaneous melanoma compared with 103 age- and sex-matched controls; no association between DM1 and basal cell carcinoma (BCC) was observed.[91] On the other hand, a recent study evaluating the risk of skin cancers in 1,061 UK DM1 patients identified from primary care physician records showed an increased risk of skin cancer overall (HR = 5.44, 95% CI = 3.33-8.89, $p < 0.0001$), and BCC (HR = 5.78, 95% CI = 3.36-9.92, $p < 0.0001$) compared with a matched DM1-free cohort.[95] Another study, conducted in Spain, reported early BCC development in 102 DM1 patients.[92]

1.2.9.4 Correlates of tumor development

Following the discovery of an increased cancer risk in DM, three cross-sectional studies examined the correlates of neoplasia in DM.[90, 93, 94]

Das et al. (2012)[94] examined data collected from 911 genetically and/or clinically confirmed DM patients (DM1=781; DM2=130) enrolled in the US *National Registry of Myotonic Dystrophy and Facioscapulohumeral Muscular Dystrophy Patients and Family Members.* The authors found that older patient age (OR=1.08, 95% CI=1.06-1.11), female gender (OR=1.92, 95% CI=1.2-3.1), and DM type (OR=2.11, 95% CI=1.1-4.1) were associated with neoplasia. However, smoking, BMI, age at DM diagnosis, and repeat expansion size were not associated with tumor development in DM. This study assessed associations with neoplasia - both benign and malignant combined - in patients who have either type of DM.

In 2016, Bianchi et al.[90] performed a study of 255 Italian DM1 patients treated at one of the four main DM treating hospitals in Rome. Similar to Das' study, significant associations were found between female gender and both benign and malignant tumors combined (OR= 5.71, 95% CI=2.90–11.22). Old patient age was also associated with increased benign and malignant tumors (OR= 1.02, 95% CI=1.00–1.05). This study also suggested that DM1 patients with a history of thyroid disease may have an increased risk of neoplasia (crude assessments showed an association between thyroid disease and malignancy with a p-value <0.01). Similar to Das et al., this study showed no associations between disease duration, repeat size, smoking, BMI, or alcohol and neoplasia. Null results were also reported for DM1 patients with a history of diabetes (OR= 0.61, 95% CI=0.19–1.99).

More recently in 2017, Alsaggaf et al.[93] assessed associations of several variables with benign and malignant tumors, separately, among 198 genetically and/or clinically confirmed DM1 patients enrolled in the UK DM registry. As in previous studies, no significant associations between smoking, alcohol consumption or BMI and benign or malignant tumors were found. Significant associations between age and both benign and malignant tumors were reported (OR=1.13, 95%CI=1.05-1.21 and OR=1.20, 95% CI=1.10-1.30 for benign and malignant tumors, respectively). Female gender was associated with benign tumors only (OR=6.43, 95% CI=1.79-23.04), and unlike previous studies, significant associations were found between younger age at DM1 diagnosis and benign (OR=1.06, 95%CI=1.00-1.13) or malignant tumors (OR=1.08, 95%CI=1.01-1.15).

While these studies provide some insight into potential risk factors for tumor development in DM1, their cross-sectional nature and the voluntary nature of registry enrollment pose significant limitations. Larger and more comprehensive DM populations such as the CPRD cohort proposed here may better address these shortcomings.

1.2.9.5 Possible mechanisms of tumorigenesis in DM1

Biological pathways underlying tumorigenesis in DM1 are not yet clear. It has been previously hypothesized that abnormal accumulation of β-catenin through the Wnt/ β-catenin signaling pathway may play a role in DM-related tumorigenesis, possibly because of the sequestration of MBNL or CUG-BP, known to occur in DM1.[4] Mutations in the β-catenin (*CTNNB1*) gene were previously reported to be associated with Pilomatricomas.[4, 96, 97] In addition, several benign and malignant tumors commonly found in DM1 patients, including those arising in the salivary glands, thyroid, pituitary, and skin (BCC and melanomas), have been shown to accumulate β-catenin, suggesting a potential role for this protein in DM1-related tumorigenesis.[4] The dysregulation of the Wnt/ β-catenin signaling pathway has also been implicated in other syndromes, including Gardner syndrome and Rubinstein-Taybi syndrome, both of which are known to be associated with increased risk of pilomatricomas and other neoplasms. Other proposed hypotheses include modified expression of downstream oncogenes or tumor suppressor genes as a result of abnormal RNA-splicing, and/or altered protein-coding mechanisms.[10-12, 14] In 2016, a study suggested that cancer susceptibility in DM1 may be associated with downregulation of the microRNA 200c/141 tumor suppressor family, because of the observed differences between a small subset of DM1 patients and healthy controls.[6] More recently, one study reported an inverse correlation between vitamin D levels and dysplastic nevi in DM1, suggesting a role for Vitamin D homeostasis in DM1-related skin abnormalities.[98]

1.3 Rationale and significance

Elevated cancer risk in DM1 is a fairly novel observation, and the literature remains very limited with inconsistencies in organ-specific risk estimates. Additionally, the systematic evaluation of benign tumor risks, and longitudinal evaluation of possible risk factors for tumor development in the DM1 population have not yet been studied. Understanding the risk of developing tumors and factors associated with their development is important to guide clinical management and etiology-related research in DM1. Therefore, we conducted the present study to address these questions and previous limitations by examining primary care data in a large cohort of DM1 patients, spanning the full clinical spectrum of the disease. Our specific aims are as follow:

1.4 Specific Aims

Aim 1. To evaluate the risk of cancer overall, and by anatomic site, in a cohort of DM1 patients compared with a matched cohort of DM1-free individuals.

Hypothesis: Patients with DM1 have a higher risk of cancer overall, driven by excess risk in certain organs (reported in 4 out 5 studies, including female genital organs, thyroid, skin, and colon), compared with DM1-free individuals.

Aim 2. To evaluate the risk of benign tumors, overall, and by anatomic site, in a cohort of DM1 patients compared with a matched cohort of DM1-free individuals.

Hypothesis: Patients with DM1 have a higher risk of benign tumors overall, and in certain organs (possibly those with cancer predisposition if common risk factors exist), compared with DM1-free individuals.

Aim 3. To investigate the associations between demographic and clinical characteristics of DM1 patients and their risk for developing tumor (benign or malignant).

3.1. To evaluate gender differences in tumor development (benign/malignant) among DM1 patients.

Hypothesis: Female DM1 patients are at higher risk of tumors compared with male DM1 patients.

3.2. To investigate the associations between clinical conditions, including cataracts, type II diabetes mellitus, and thyroid disease, and tumor development (benign or malignant) in DM1 patients.

Hypothesis: DM1 patients exhibiting the selected clinical characteristics (common chronic conditions in DM1 that do not significantly contribute to patient death) are at an increased risk of developing tumors compared with DM1 patients who do not exhibit those characteristics.

Table 1: Muscular Dystrophies[16, 17, 99-101]

Muscular Dystrophy	**Mode of Inheritance**	**Age of onset**	**Frequency**	**Main Characteristics**	**Life expectancy**
Duchenne	X-R	Early childhood. Usually ages 3-5 years	~1 in 5,000 males	Delayed motor skills, progressive muscle weakness and wasting leading to disability by adolescence, and cardiomyopathy	Late teens to early 20's In US, ~24 years
Becker	X-R	Usually ages 5-15 years, but can occur as late as 25 years	1 in 18,000 to 30,000	Similar to Duchenne, but typically milder. Progression is variable.	40's and beyond
Congenital	AR	Birth to 2 years	1 in 16,000 to 21,500	Low muscle tone, muscle weakness, delay or arrest of motor function, joint contractures, spinal deformities, and respiratory compromise.	Varies by type. Can be lethal in infancy (Walker-Warburg syndrome) or normal life span
Distal	AD AR	AD: Usually 40 to 60 years AR: Before 30 years	~1 in 100,000	Muscle weakness in lower arms, hands, lower legs, and feet. Progression is usually slow and can affect proximal muscles.	Normal
Limb-girdle (LGMD)	AD AR	Varies by type, ranging from early childhood to late adulthood	~1 in 14,500 to 123,000	Wasting and weakness in hip and shoulder muscles, that progresses in a proximal to distal pattern. Severity and progression vary by subtype.	Normal; some types at high risk of sudden death.

Table 1 continued

Muscular Dystrophy	Mode of Inheritance	Age of onset	Frequency	Main Characteristics	Life expectancy
Emery-Dreifuss	X-R AD AR	Usually 5-15 years	X-R: 1 in 100,000 AD: Unknown, thought to be more common than X-R AR: very rare	Early contractures of Achilles tendons, elbows, and posterior cervical muscles, slow progressive muscle wasting and weakness (proximal in upper limbs, and distal in lower limbs), and cardiomyopathy.	Normal; at high risk of sudden death due to cardiac abnormalities
Facioscapulohumeral (FSHD)	AD	Usually in the teens, but can vary from infancy to adulthood	~ 1 in 8,333 to 1 in 20,000	Slowly progressive weakness in muscles of the face, shoulder, and upper arms.	Normal
Myotonic Dystrophy	AD	Usually 20-30 years, but can vary from congenital to late-onset (>40 years)	~1 in 8000	Progressive muscle weakness and myotonia. Weakness in distal limbs, neck and facial muscles. Early-onset cataracts, and cardiac conduction defects.	Varies by type. Average 48-55 years
Oculopharyngeal (OPMD)	AD	After age 40 years	1 in 100,000 Europeans. More common in French-Canadians (1 in 1,000) and Bukaran Jewish (1 in 700)	Weakness of both eyelids (ptosis) and throat muscles (dysphagia). Progressive weakness of proximal muscles including shoulders, upper legs, and hips	Normal

X-R= X-linked recessive; AD= Autosomal dominant; AR= autosomal recessive

Chapter 2: Study Design & Methods

2.1 Study Design

This study was a retrospective cohort study. We constructed a cohort of DM1 patients and a cohort of DM1-free individuals matched on year of birth, sex, clinic where they receive care, and clinic registration year (up to 20 DM1-free for each DM1-affected patient) using the October 2016 release of the UK's primary care physician database, CPRD.

2.2 Data sources

We used primary care records from the UK, where healthcare is predominantly provided by the National Health Service (NHS), a public health service of England, Scotland, Northern Ireland, and Wales. Over 98% of the population is registered with an NHS general practitioner (GP), who serves as the main provider for non-emergency primary care needs and specialist referral.[102]

2.2.1 Clinical Practice Research Datalink (CPRD)

Established in 1987, CPRD is a repository of anonymized primary care medical records of more than 11.3 million patients treated by GPs within 674 practices in the UK.[103] It is one of the largest longitudinal primary care medical record databases in the world, with practices providing electronic health record data on a monthly basis. CPRD contains information on patient demographics, clinical diagnoses, prescription records, specialty referrals, immunizations, and selected health-related lifestyle characteristics. Additionally, information from secondary care is reported back to GPs, such that GP records encompass both primary and secondary care data. Although CPRD includes data on patients from across England, Wales, Scotland, and Northern Ireland, the majority of participating clinics are from England (~82%). Active patients, who are alive and currently registered, constitute approximately 6.9% (4.4 million patients) of the UK population and are representative of the general population with regards to age, sex, and ethnicity.[103] The average duration of follow-up is 5.1 years for all CPRD patients and 9.4 years for those with an active status.[103] Within CPRD, the data are recorded using Read codes, a hierarchical clinical classification system used by the UK NHS. Data quality measures include patient-level acceptability criteria and practice-level up to standard (UTS) time. Patient acceptability is based on validity of age and gender, registration status, and recording of events; whereas UTS is a practice-level metric relating to continuity of recording of events and deaths.[103]

Studies of the CPRD data have shown high validity in the reporting of neoplasms (based on 26 studies, the median proportion of cases confirmed was 95.25%), diabetes (positive predictive value [PPV]=98.6%), cataracts (PPV=96.9%), and endocrine disorders (based on 17 studies, the median proportion of cases confirmed was 87.7%); therefore, the potential for misclassification of these conditions is reduced. [104-106] A study assessing the validity of cancer diagnoses (excluding non-melanoma skin cancers) in CPRD compared with the National Cancer Data Repository (NCDR), found that the former reported 94% of the cancers found in in the latter.[107] Additionally, 90% of the cancers reported in NCDR but not in CPRD, were also reported in hospitalization records (Hospital Episode Statistics; HES) or death records

(Office of National Statistics; ONS),[107] indicating that missing cancer cases is exceedingly unlikely using data from CPRD, HES, and ONS together. Another study examining the reporting of lung, colorectal, gastro-esophageal, and urological cancers found that only 9% were listed in the cancer registry but not in CPRD; these 'false negatives' were sometimes accounted for by the patient's last collection date falling shortly before his/her cancer diagnosis date.[104] This study also found 99% of death records to be reported in both CPRD and the cancer registry.[104]

Linkage to other patient-level data sources, including hospitalization records (HES), mortality data (ONS), socio-economic status (Index of Multiple Deprivation; IMD), and disease registries such as the NCDR, is available for over half of the CPRD practices (~57%);[103] linkage is available for English practices only, of which approximately 75% are linked.[108]

In this study we used the October 2016 release of CPRD, with data available until October 31st, 2016, and linkage data from HES and ONS as described below.

2.2.2 Hospital Episode Statistics (HES)

HES records contain data related to all patient admissions into English NHS health care providers, including private patients admitted to NHS hospitals and patients residing outside of England but receiving care in treatment centers funded by the NHS.[108] In CPRD, linked data are available for all patients who are registered in clinics that have agreed to participate in the linkage scheme, with the exception of individuals who revoked their consent for data collection.[108] Clinical diagnoses in HES are recorded using the International Classification of Diseases, tenth revision (ICD-10) coding framework, and data are available from April 1997 to February 2016.

2.2.3 The Office for National Statistics (ONS)

ONS provides mortality data including the date and causes of death (primary and up to 15 secondary causes). Like HES, mortality data are recorded using ICD-10 codes and are available for English practices who have consented to participate in the linkage scheme. ONS records are available from January 1998 to March 2016.

2.3 Study population

2.3.1 DM1 cohort

Eligible individuals included all patients with a diagnostic code for DM1 (Read codes from CPRD include "F392000: Dystrophia myotonica (Steinert's disease)" and "F392011: Steinert's disease") within CPRD's October 2016 data release. Males and females of all ages, whose records have been deemed acceptable by CPRD and indicate at least one DM1 clinical (n=1,047) or referral (n=14) entry were eligible for inclusion in our DM1 (exposed) cohort. The total number identified was 1,061.

2.3.2 Comparison cohort (DM1-free individuals)

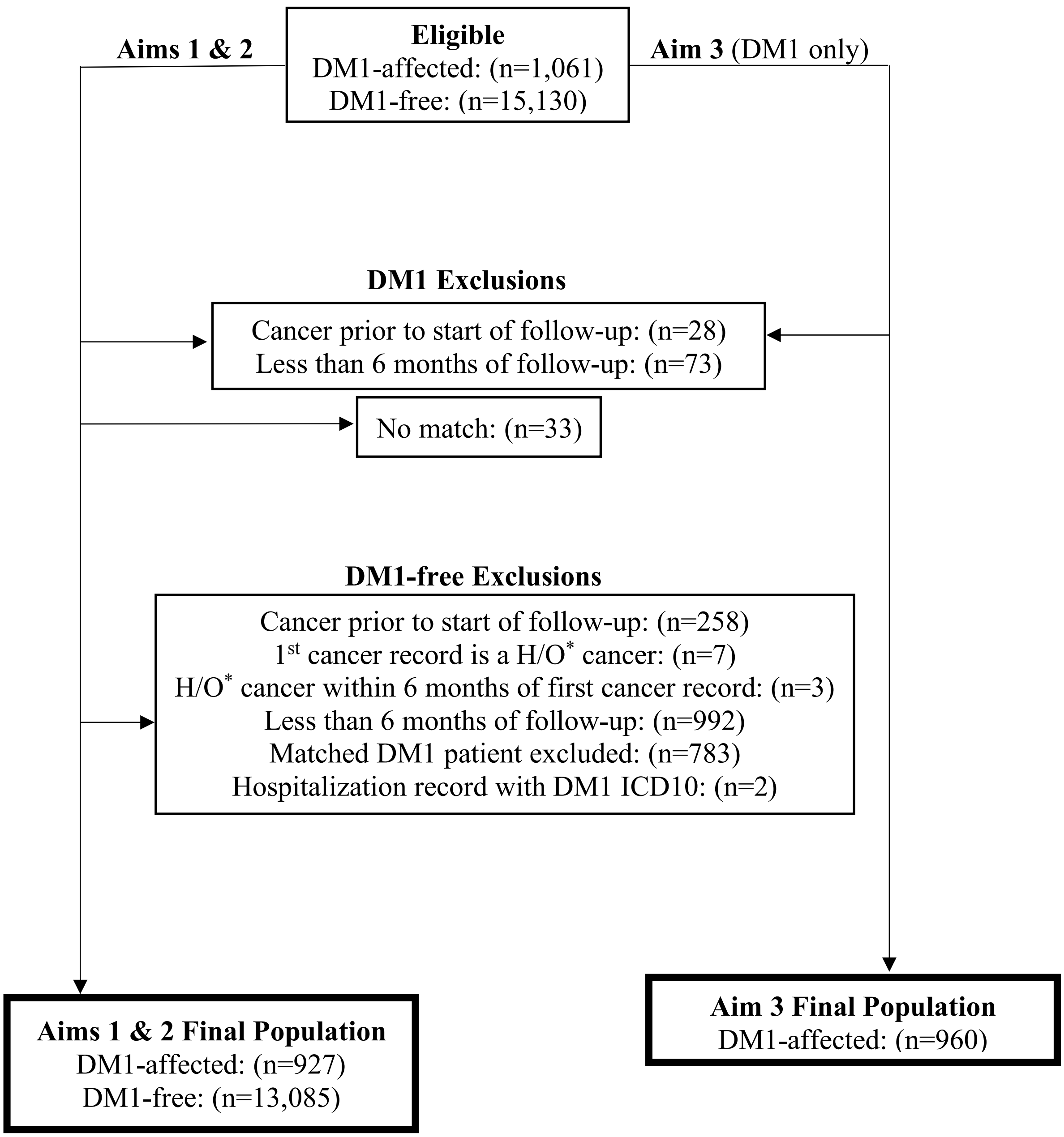
For each DM1 patient, we selected up to 20 DM1-free (unexposed) individuals from the pool of patients who received their care in the same clinic, never had a record of DM1, and were alive and actively registered at the index date for their respective exposed patient (DM1 patient). Index date was defined as the date of first DM1 record or current registration with the clinic, whichever is latest. DM1 patients and the comparison cohort were matched on year of birth (+/- 2 years), sex, clinical practice, and clinic registration year (+/- 1 year). DM1-free individuals with the exact year of birth and registration year as DM1 patients were preferentially selected. A total of 15,130 DM1-free individuals were eligible for inclusion.

2.3.3 Exclusion criteria

Of the 1,061 DM1-affected and 15,130 DM1-free individuals identified from CPRD to be eligible for inclusion in this study (Figure 1), we excluded:

- Patients who developed cancer prior to the start of follow-up
- Patients who had a record of "history of cancer" as their first cancer event during follow-up, or within six months of their first cancer event, as this may refer to a prior cancer of unknown date
- Patients who had less than 6 months of follow-up time; it is likely that within 6 months of registration with a clinic, a patient's medical records are transferred, and prevalent conditions may be reported
- Patients identified as DM1-free in CPRD, but had a DM-related hospitalization record in HES
- Patients with no matches were excluded from analyses for aims 1 and 2, however, because aim 3 was restricted to the DM1 cohort only, they were not excluded from that analysis.

Figure 1: Flow Chart of The Study Population



* H/O: History of

2.4 Study variables

In CPRD, variables were extracted from patient medical records and defined using the Read coding framework (the standard clinical terminology system used in CPRD). Read codes for each condition were compiled using the CPRD code browser and the NHS browser. Read codes are entered by GPs or staff during each visit or consultation, with the requirement of a single entry for each episode of illness or occurrence of a new symptom.[106, 109]

Patients with at least one clinical record with relevant Read codes were considered as having the condition under study. The event date associated with the first record of the corresponding Read code was considered as the date of diagnosis. The absence of Read codes was considered as absence of the corresponding condition. Besides cancer, variables for all aims were ascertained from CPRD records only. Cancer was ascertained from CPRD, HES, and/or ONS records as detailed below.

2.4.1 Study outcomes

Aim 1: The primary outcome for this aim was all cancers combined. Incident cancer was defined as the first record of a cancer event during the follow-up period. We also assessed the risk of developing site-specific cancers as secondary outcomes.

The first primary cancer event was selected for the anatomic site. In cases where the first cancer was a secondary, metastatic, or unspecified cancer, the patient's record (in CPRD and HES, when applicable) was reviewed to determine the primary cancer site. If patient records did not clearly identify the primary cancer site, then the cancer was categorized as a cancer of unknown/unspecified site, with a corresponding date of diagnosis of the first cancer event.

Aim 2: The primary outcome for this aim was all benign tumors combined. Incident benign tumor was defined as the first record of a clinically diagnosed benign tumor during follow-up. As secondary outcomes, we assessed the risk of developing benign tumors by anatomic site; we focused on sites previously reported to have excess benign tumors, or to be known at high risk of cancer in DM1 patients. These included the skin, thyroid, uterus, colorectum, meninges, and salivary glands.

Aim 3: For this aim, the primary outcome was the risk of developing benign or malignant tumors overall (as defined above); and the secondary outcomes were the risks by anatomic site.

2.4.1.1 Outcome ascertainment

Cancers cases were identified from CPRD, HES, and ONS records to avoid misclassification, because cancer treatment may not take place at the primary care level. Benign tumors were identified from CPRD, as they are unlikely to result in hospitalizations or death.

Using CPRD, we compiled all neoplasm-related Read codes into a comprehensive list (Appendix A) as follows:

- Read codes for neoplasms designated as (B….); per the NHS code browser, codes beginning with B0-B6 correspond to malignant neoplasms, and codes beginning with B7 correspond to benign neoplasms

- Read codes corresponding to the morphology of neoplasms (BB…) for both benign and malignant neoplasms
- Read codes indicating cancer-related clinical or therapeutic events e.g., cancer history, excision of organ due to cancer, chemotherapy and other cancer-related therapies (do not begin with B…).

Using this comprehensive code list, we categorized neoplasms into benign, malignant, in-situ and uncertain or unknown behavior. We then extracted the related records within the study population from CPRD. Codes for malignant and benign tumors found in the study population are available in Appendix B and C, respectively.

Using HES, and ONS, we identified cancers using ICD-10 codes C00 to C96 (except C44 and C4A, for non-melanoma skin cancer). For individuals who are not linkage eligible, cancer status was determined using CPRD records only, as HES and ONS data are not available for those patients. For those who are linkage eligible, hospitalization and mortality records (HES and ONS) were used to obtain cancer events. Incident cancer was defined as the earliest recorded cancer event in CPRD or HES (among all eligible individuals, the numbers of cancer cases reported in CPRD were 64 and 841 for DM1and DM1-free patients, respectively; whereas those reported in HES only were 10 and 239, for DM1 and DM1-free patients, respectively). Individuals who did not have a record of cancer in CPRD or HES but whose primary cause of death, as reported by ONS, was cancer were considered as cancer cases (DM1=3; DM1-free=13), with their date of death as the cancer event date.

2.4.2 Independent variables

Aims 1 & 2: Patients with myotonic dystrophy type I (Read codes from CPRD: F392000, F392011) were compared with DM1-free individuals (did not have any record with the aforementioned Read codes in CPRD, or DM-related hospitalization records (ICD-10 code: G71.1). To reduce the potential for misclassifying non-DM1 patients as DM1, only patients with diagnostic Read codes specific to DM1 were included.

Aim 3: This aim was restricted to the DM1 cohort only. Among those with DM1, we compared the following groups with respect to developing benign or malignant tumors, separately:

Aim 3.1 exposures:

- Gender: classified as a binary variable (male vs. female). Gender information was provided by CPRD.

Aim 3.2 exposures: The following variables were classified as binary (yes/no) and defined using Read codes (available in appendices D-F)

- Cataracts (Appendix D)
- Type II diabetes mellitus (Appendix E)
    - In cases where a patient had a diabetes code without a specified type:

1. Patient's with "insulin-dependent diabetes" were considered type I and those with codes indicating "non-insulin-dependent diabetes" were type II, otherwise,
2. The patient's age at diabetes diagnosis (first diabetes record) was used to impute the type based on previous literature:[110]
    - Type I: Age of diabetes first record < 35 years
    - Type II: Age of diabetes first record 35 years or older

- Thyroid disease including hypothyroidism, hyperthyroidism, goiters, and thyroiditis (Appendix F)

The dates of diagnosis (first record) of the clinical conditions studied in aim 3.2 were used to classify exposure status for the relevant analysis. This means, prior to diagnosis, individuals contributed person-time as unexposed during follow-up, and once they developed the relevant condition, they contributed person-time as exposed. Individuals who developed these conditions prior to the start of follow-up were considered exposed at baseline and continued as such.

2.4.3 Covariates

In addition to the matching variables mentioned above, other important variables were considered.

Because of the potential for DM1-related disability, DM1 patients may be more likely to have low socioeconomic conditions compared with their DM1-free counterparts; and people with low socioeconomic status are more likely to be diagnosed with cancer at a later stage compared to those with high socioeconomic status.[111] **Socioeconomic status** was considered and defined using the Index of multiple deprivation quintiles. Practice-level relative deprivation data were available for the entire study population and categorized into quintiles (1=least deprived to 5=most deprived). Because patients were matched on practice, socioeconomic status was adjusted for in an indirect way in analyses comparing DM1-affected to DM1-free individuals. Confounding by this variable was assessed for aim 3 analyses.

Given the chronic nature of DM1, it is likely that DM1 patients visited their healthcare provider more often, resulting in an increased chance of outcome detection. To account for this possible increase in detection, we adjusted for the **average number of primary care provider visits per year,** calculated as the total number of visits to healthcare provider (maximum of 1 per day) from index date to one year prior to outcome development or censoring date, divided by the number of follow-up years. This covariate was considered as a continuous variable

Because cancer ascertainment included data from both CPRD and HES, and HES data were only available for patients who were linked, these patients were possibly more likely to have a cancer diagnosis, compared to those who were not linked since cancer was ascertained from two sources. Although linkage is based on the clinical practice, and DM1 and non-DM1 patients were matched on clinic, patients could have elected not to be included, and therefore **linkage status** may be of importance. This binary (yes/no) variable was included in cancer-related analyses only.

The severity of DM1 may modify the effect of the disease on developing the outcomes, and thus we stratified our analyses by **disease severity** to assess heterogeneity. Age at DM1 diagnosis (defined as age at first DM1 record) was used as a proxy for disease severity and classified based on published literature[2] into: 1) congenital/childhood onset DM1 (age at diagnosis ≤ 10 years), 2) classic DM1 (age at diagnosis 11-40 years), and 3) late onset DM1 (age at diagnosis > 40 years).

Finally, known risk factors for several cancers may be differentially distributed among DM1 and non-DM1 patients. Therefore, to better understand the effects of the exposures, independently of these factors, on tumor development, we extracted data on smoking status (current, former, never), body mass index (Underweight <18.5, normal=18.5-24.99, overweight=25-29.99, and obese=30+), and alcohol consumption (current, former, never). Records closest to the index date (+/- 2 years), and at least 12 months prior to outcome development/censoring date were assessed for these variables. For patients with less than 2 years of follow-up, status relative to the aforementioned covariates was not considered if it occurred after outcome or censoring date, or within 12 months prior to the outcome. However, because of the large number of missing data, we were unable to adequately assess the effect of these factors on the association between DM1 and tumor risk. Notably, previous cross-sectional studies suggested a limited role for these variables in DM tumor predisposition.[89, 90, 94]

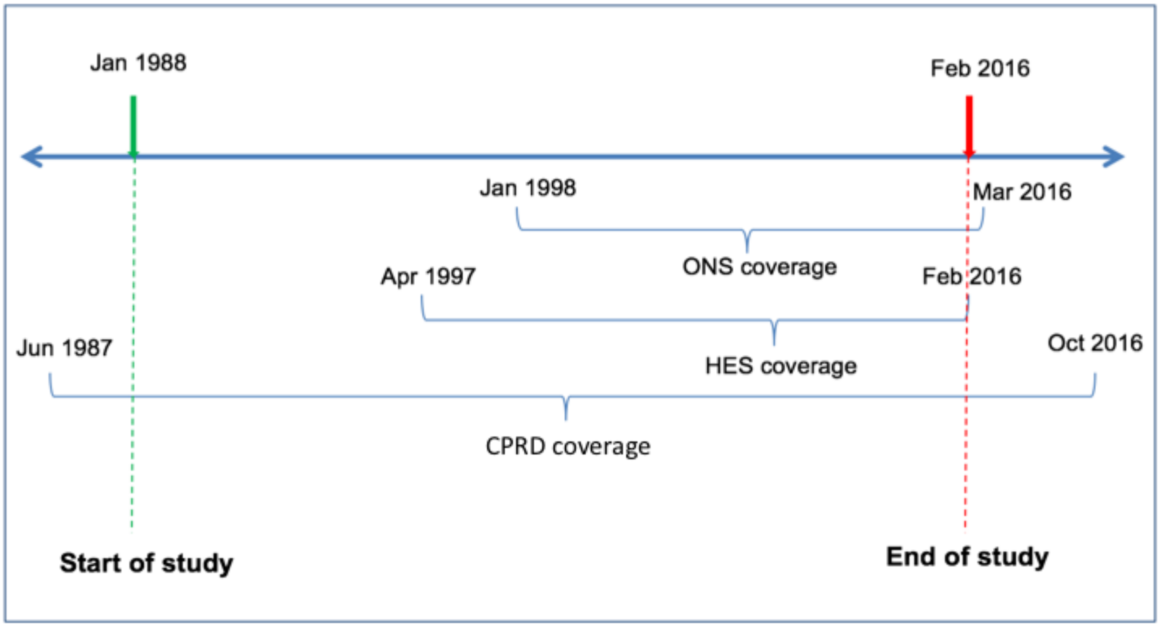
2.5 Follow-up and database coverage

Although CPRD was established in June of 1987, to ensure data quality, the study spanned from January 1st, 1988 to February 29th, 2016. Figure 2 describes the follow-up time and database coverage periods. Follow up started at the later of 1) the study start date (1 January 1988/ after the start of CPRD recording), 2) the patient's registration date within his/her clinic (In DM1 patients, this was for those whose first DM1 record was dated before the date of registration in the clinic). This date is available from CPRD as the "current registration date", or 3) the DM1 diagnosis date for DM1 patients diagnosed after clinic registration (date of selection for the matched cohort).

Follow-up ended at the earlier of 1) the diagnosis date of the outcome of interest (date of first record during follow-up), 2) the date of transfer out of CPRD clinic (available from CPRD), 3) the last data collection date in CPRD (available from CPRD), 4) the date of death ascertained from ONS for patients with linkable records and from CPRD otherwise, or 5) the end of study date (29 February 2016/end of HES coverage).

For cancer-related analyses only, those who were linked were followed until the earlier of cancer diagnosis, death date, or end of study date (this ignores CPRD transfer out/last collection). Linked patients who exited CPRD prior to the start of HES/ONS coverage and did not have any hospitalization or death records were censored at their CPRD exit date. Additionally, in analyses of female reproductive tumors, patients who have undergone surgical removal of organs of interest (e.g. hysterectomy, oophorectomy) were excluded from the relevant analysis, if the procedure occurred prior to start of follow-up; they were censored at the date of surgery, if dated during follow-up.

Figure 2: Follow-up time and database coverage



2.6 Statistical analysis

For all aims, we used Cox proportional hazards models to calculate hazard ratios (HRs) and 95% confidence intervals (CI) for the association of interest. Because this method of analysis assumes proportional hazards over time for exposure categories, we examined this assumption using Schoenfeld residuals. In cases where a violation was suggested, other methods including graphical inspection of hazards over time and the Kolmogorov-type supremum test (based on a sample of 1,000 simulated residual patterns) were explored to assess the validity of the suggested violation (Appendix G). No consistently significant violations were observed. Age was used as the time-scale in all analyses to ensure proper age adjustment. For aims 1 and 2, the baseline hazards in both crude and multivariable models were stratified by the matched sets using the strata statement in PROC PHREG, to account for the matched study design. Left truncation due to late entry into the cohort (starting follow-up at the later of study start date, DM1 diagnosis, 1988 or at registration) was accounted for using the counting process, in all models. The counting process allowed specification of two time variables to indicate at risk periods (start of follow-up and end of follow up), in addition to the censoring variable in the PROC PHREG modeling statement. For all cancer-related analyses, linkage status was included as a time-varying covariate to adjust for our cancer ascertainment methods. When tumors appeared in one subgroup only, we used Fisher's exact test to examine inter-group differences.

Two-sided tests were used with statistical significance defined as p-value <0.05. Analyses were conducted using SAS version 9.4 (Cary, NC, USA) and R version 3.3.1.

2.6.1 Specific considerations

Aim 1: *Comparing the risk of cancer in DM1-affected and DM1-free patients*

DM1 and matched DM1-free cohorts were followed over time to evaluate their risk of developing cancer, overall and by anatomic site. Site-specific hazard ratios were only assessed in sites with 2 or more cancers in each cohort (DM1 and DM1-free). In addition to stratifying the baseline hazards by the matched sets, the final models were adjusted for average number of primary care visits per year (continuous) and linkage status (time-varying covariate). Due to the small number of events in uterine cancer model, the baseline hazards for this model were stratified by region (England, Scotland, Wales, Northern Ireland) and categorical registration year (<1988, 1988-1999, 2000+), and adjusted for the average number of primary care visits per year (continuous).

To assess for potential effect measure modification, we ran our main analysis separately in strata defined by disease severity (described above). We further stratified the analysis by sex. Heterogeneity of estimates across strata was assessed using a Wald test.

Aim 2: *Comparing the risk of benign tumors in DM1-affected and DM1-free patients*

As in aim 1, DM1 and matched DM1-free cohorts were followed over time to evaluate their risk of developing benign tumors, overall and by anatomic site. Potential effect measure modification was assessed by running separate cox models in strata defined by sex and disease severity categories separately. Heterogeneity of estimates across strata was tested using a Wald test. In addition to the stratification of baseline hazards by the matched sets, final models for this analysis were adjusted for the average number of primary care visits per year only.

In addition, we used cox proportional hazards regression models to estimate HRs and 95% CIs for the association of benign tumors with subsequent cancer risk in DM1 patients and the DM1-free cohort, separately. For these analyses, benign tumor was considered as a time-dependent variable, where study participants belonged to the benign tumor-free group until they developed the benign tumor. In this analysis, similar to cancer models above, we adjusted for cancer ascertainment from multiple databases for linked patients by following those linked to HES until the earliest of age-at-first-cancer-record, death, or end of HES coverage/study; the models were also adjusted for linkage status as a time-varying covariate.

Aim 3: *Evaluating differences in tumor development by selected demographic/clinical phenotypes among DM1 patients*

Aim 3 analyses were restricted to the DM1 cohort only. Each phenotype was assessed separately. Clinical phenotypes (cataracts, thyroid disease, and type II diabetes) were treated as time-dependent exposure variables, where patients were considered unexposed until they developed the relevant exposure event, if at all. If a patient developed an exposure event, he/she was considered exposed starting at age-at-first-record and for the remainder of follow-up, for each respective analysis. Patients who developed the relevant conditions prior to start of follow-up were considered exposed at the start of follow-up.

Sex, age at DM1 diagnosis (continuous), year at clinic registration (categorized into: <1988; 1988-2000; >2000), region (England *vs.* others), index of multiple deprivation quintiles (as a proxy for socioeconomic status), and average number of primary care visits per year were assessed for confounding. Covariates that resulted in a greater than 10% change in the exposure HR when added to the model were considered confounders. Potential effect measure modification was assessed by running separate cox models in strata defined by sex and disease severity categories, separately. Heterogeneity of estimates across strata was tested using a Wald test. Final models were adjusted for sex. Cancer analyses were also adjusted for linkage status as a time-varying covariate.

For analyses comparing females to males, we assessed the risk of overall benign or malignant tumors both including and excluding tumors of reproductive organs. Similarly, in analyses of type II diabetes, we conducted a sensitivity analysis excluding patients with type I diabetes from the analysis.

2.6.2 Sensitivity analyses

To assess the robustness of our findings, we conducted several sensitivity analyses using more stringent definitions of DM1. For aims 2 & 3 we repeated the analysis in the following cohorts using the corresponding matched individuals for each DM1 patient:

- Restricted to DM1 patients who had a DM1 records in at least two of the three data sources: CPRD, HES, and ONS (DM1=376; DM1-free=5,541)
- Restricted to DM1 patients diagnosed after their clinic's "up to standard" date (DM1=454; DM1-free=5,936)
- Restricted to DM1 patients diagnosed in 1995 or later (after DM1 gene discovery in 1992 and subsequent implementation of DM1 genetic testing in the UK[77]) (DM1=530; DM1-free=6,988)
- Ending follow-up at the maximum of 8 years (aim 1) or 3 years (aim 2) for all patients to assess if differential follow-up time for the DM1 and DM1-free cohorts affected our results.

Additional sensitivity analyses for aim 1:

- Restricted to patients eligible for linkage to HES (DM1=558; DM1-free=7,426).
- Restricted to DM1 patients diagnosed after their registration with their CPRD clinic (DM1=494 DM1; DM1-free=6,449). These patients were prospectively-recorded to have DM1 and cancer diagnoses; hence, the date of their first diagnosis was accurate.
    - For this subgroup, we also conducted the analysis starting follow-up at clinic registration date (DM1=350; DM1-free=5,127), to evaluate if cancer exclusions differentially affected our results in patients with late-onset DM1.

2.7 Power considerations

For all power calculations, we assumed a type I error probability of 5% and a minimum power of 80%.

Aims 1 & 2: Given our final sample size of 927 DM1-affected and 13,085 DM1-free individuals, and an average rate of cancer (~0.5% per person-year) and benign tumors (~0.6% per person-year) based on our observed frequencies of 5% and 6% respectively within an average follow-up time of 10 years in the DM1-free cohort, our study had 80% power to detect a minimum hazard ratio of 1.3.

Aim 3: Similarly, with our final sample size of 960 DM1 patients, our study had 80% power to detect hazard ratios ranging from 1.5 to 2.4 for analyses in this aim. Details used in power calculations for each exposure are described below:

- Males *vs.* females: given that 49% of the DM1 cohort are males, and the rate of benign and malignant tumors is approximately 0.4% to 0.6% per person-year in male DM1-free patients, respectively, we had power to detect hazard ratios ranging from 1.7 (cancer) to 2.0 (benign tumors).
- Clinical phenotypes (yes *vs.* no): given that 7-8% of DM1 patients had thyroid disease or diabetes, and 26% had cataracts, we had power to detect hazard ratios ranging from 1.9 to 2.4 for cancer or benign tumors assuming an average rate of ~0.5% per person-year in the reference group.

2.8 Ethical considerations

This study is based on data from the CPRD database October 2016 release, obtained from the UK Medicines and Healthcare Products Regulatory Agency, HES database (Copyright © (2016)), and ONS database (Copyright © (2016)) reused with the permission of The Health & Social Care Information Centre. All rights reserved. The interpretation and conclusions contained in this study are those of the authors alone. This study was approved by the CPRD Independent Scientific Advisory Committee (ISAC; protocol # 16_005RA2).

The use of CPRD database was exempt from full Institutional Review Board (IRB) review by the National Institutes of Health (NIH) Office of Human Subject Research and the University of Maryland’s IRB due to the anonymized nature of the data.

Chapter 3: Cancer Risk in Myotonic Dystrophy Type I: First Evidence of a Role for Disease Severity[1]

ABSTRACT

Importance. Myotonic Dystrophy type 1 (DM1) is an inherited tri-nucleotide repeat disorder in which specific cancers have been implicated as part of the syndrome phenotype. Identifying DM1 patients at highest risk of cancer is essential to effective patient management.

Objective. To assess the risk of cancer in the full clinical spectrum of DM1 patients.

Design. Retrospective cohort study with observation period from January 1st, 1988 to February 29th, 2016.

Setting. The United Kingdom Clinical Practice Research Datalink, an electronic primary care database.

Participants. A cohort of 927 DM1 and a matched cohort of 13,085 DM1-free individuals. All patients were cancer-free at the start of follow-up. DM1-affected and DM1-free patients were matched on birth year, gender, clinic, and registration year.

Exposure: A clinical record of Myotonic Dystrophy Type I (Read codes: F392000, F392011).

Main Outcomes and Measures: We used Cox regression models to calculate the hazard ratios (HRs) and 95% confidence intervals (CIs) of organ-specific cancer risks comparing DM1 patients with their matched DM1-free cohort. Analyses were stratified by age at

---

[1] Rotana Alsaggaf, Diane Marie M. St. George, Min Zhan, Ruth M. Pfeiffer, Youjin Wang, Kathryn Wagner, Mark H. Greene, Sania Amr, Shahinaz M. Gadalla. Submitted to: *Annals of Neurology.* 2018

DM1 diagnosis as a surrogate for disease severity into congenital/childhood (0-10 years), classic (11-40 years), and late-onset (>40 years).

Results. No cancers were observed in patients with congenital/childhood DM1 *versus* 1% of DM1-free subjects (p=0.6). Patients with classic DM1 were at elevated risk of cancer overall (HR=1.8; 95% CI=1.1-2.9); cancers of the thyroid (HR=15.9; 95% CI=2.4-103.6), uterus (HR=26.8; 95% CI=2.3-309.3), and cutaneous melanoma (HR=6.0; 95% CI=1.2-28.8) accounted for the excess. In late-onset DM1 patients, a reduced overall cancer risk was observed (HR=0.5; 95% CI=0.3-0.9), possibly driven by the deficit in hematological malignancies (DM1=0 cases, DM1-free=54 cases; p=0.02). The difference between the observed HR for classic and late-onset DM1 was statistically significant (p=0.0002).

Conclusions. The observed difference in relative cancer risk between classic and late-onset DM1 patients compared with their DM1-free counterparts provides the first evidence that more severe disease increases DM1-related cancer susceptibility. Our data also provide valuable additional support for the association between specific cancers and DM1. Validation is needed; if confirmed, these novel findings may guide clinical management and scientific investigations for the underlying molecular mechanisms in DM1-carcinogenesis.

Introduction

Myotonic Dystrophy type I (*dystrophia myotonica* I; DM1; Steinert's disease) is an autosomal dominant, neuromuscular disorder characterized by progressive muscle wasting, myotonia, and multi-system involvement.[1, 18] It is caused by an unstable CTG tri-nucleotide repeat expansion in the 3' untranslated region of the *Dystrophia Myotonica-Protein Kinase (DMPK)* gene on chromosome 19.[13, 22] Although rare, DM1 is one of the most common forms of adult-onset muscular dystrophy.[2] The spectrum of DM1 severity varies widely, with a notable inverse correlation with age-at-onset, ranging from fatal outcomes in some congenital presentations to mild symptoms in late-onset disease.[2]

Recently, five epidemiological studies have documented elevated cancer risk in DM,[3, 5-8] making it the first inherited nucleotide repeat disorder found to increase cancer susceptibility. Although most of the studies consistently reported elevated risks of cancers arising in the uterus and thyroid gland, inconsistencies related to other sites including the brain, ovary, colon, testis, and lung were observed. A recent study found DM1 patients to be at high risk of skin cancers, specifically melanoma and basal cell carcinoma.[112] The molecular mechanism underlying DM1-related carcinogenesis remains unclear; hypotheses include RNA spliceopathy possibly resulting in modified expression of downstream oncogenes or tumor suppressor gene, altered protein-coding mechanisms, and/or upregulation of β-catenin (a protein wherein mutations are associated with various cancers).[10-12, 14] A possible explanation for the conflicting results of site-specific cancer risk in DM1 patients, is that cancer risk maybe modified by disease severity. Therefore, we utilized primary care medical records from the United Kingdom to evaluate the risk of cancer in the full clinical spectrum of DM1 patients, compared with a matched cohort of DM1-free individuals.

Methods

Data Sources

Established in 1987, the Clinical Practice Research Datalink (CPRD) is one of the largest electronic repositories of anonymized primary care medical records, including information from > 11.3 million patients from general practitioners (GPs) within 674 practices in the United Kingdom.[103] Within CPRD, data are recorded using "Read" codes, a hierarchical clinical classification system used by the UK National Health Services (NHS). Linkage to practice level Indices of Multiple Deprivation (IMD; a socioeconomic status proxy measure) is available for all CPRD practices. Additional patient-level linkable data sources including inpatient hospitalization records (Hospital Episodes Statistics (HES); April 1997-February 2016), and mortality data (Office of National statistics (ONS); January 1998-March 2016), are available for ~57% of the CPRD practices.[103] Clinical diagnoses in HES and ONS are recorded using the International Classification of Diseases, tenth revision (ICD-10) coding framework.

This study is based on data from the CPRD database October 2016 release, obtained from the UK Medicines and Healthcare Products Regulatory Agency, HES database (Copyright © (2016)), and ONS database (Copyright © (2016)) reused with the permission of The Health & Social Care Information Centre. All rights reserved. The interpretation and conclusions contained in this study are those of the authors alone. This study was approved by the CPRD Independent Scientific Advisory Committee (ISAC; Protocol # 16_005RA2). This use of the CPRD database was exempted from full Institutional Review Board (IRB) review by the National Institutes of Health (NIH) Office of Human Subject Research and the University of Maryland's IRB due to the irrevocably anonymized nature of the data.

Study Population

Details regarding study design and patient selection are available elsewhere.[112] Briefly, we identified all patients with a DM1 diagnostic code (CPRD Read codes: "F392011: Steinert's disease", and "F392000: Dystrophia myotonica [Steinert's disease]") within CPRD's October 2016 data release (n=1,061). For each DM1 patient, we randomly selected up to 20 DM1-free individuals from the pool of patients who received their care in the same clinic, never had a record of DM1 in CPRD, and were alive and registered at the index date of their respective DM1 patient (n=15,130). Index date was defined as the later date of first DM1 record (a proxy for age at DM1 diagnosis) or registration with the clinic if the patient's first DM1 record was prior to enrollment. DM1 patients and the comparison cohort were matched on year of birth (± 2 years), sex, clinic, and clinic registration year (± 1 year).

For the current analysis, we excluded patients who 1) developed cancer prior to the start of follow-up (DM1=28; DM1-free=258); 2) had a code for "history of cancer" as their first cancer record or within six months of their first cancer record (DM1-free=10); 3) had less than six months of follow-up time (DM1=73; DM1-free=992); and 4) had no matches after other exclusions (DM1=33; DM1-free=783). Two individuals classified as DM1-free in CPRD had a myotonic dystrophy hospitalization record (ICD-10 code G71.1) and were excluded. This resulted in 927 DM1-affected and 13,085 DM1-free individuals for this analysis (Figure 3).

Cancer Ascertainment

First incident cancer was defined as the earliest recorded cancer event (excluding non-melanoma skin cancers) identified from CPRD for patients not eligible for linkage (n=5,777), or CPRD or HES records for those eligible for linkage (n=8,235). Individuals who did not have a record of cancer in CPRD or HES but whose primary cause of death was cancer, as reported by ONS, were considered as cancer cases, with their date of death as the cancer diagnosis date. From CPRD, a comprehensive list of cancer-related Read codes (available upon request) was used to identify all cancer events. For linkage-eligible individuals, ICD-10 codes C00 to C96 (except C44 and C4A, for non-melanoma skin cancer) were used to identify cancer events from HES and ONS. If the first cancer record was a secondary, metastatic, or unspecified cancer, the patient's records (in CPRD and HES, when applicable) were reviewed to determine the primary cancer site.

Statistical Analysis

We used Cox proportional hazards regression models to compare the risks of developing cancer (overall, and by anatomic site) for DM1 patients and their matched cohort. The proportional hazards assumption was assessed using Schoenfeld residuals; no significant violations were observed. Age was the time scale used for all analyses. Follow-up started at the latest of age-at-DM1-diagnosis/DM1-free selection, practice registration, or study start date (January 1st, 1988; after the start of CPRD). Patients who were eligible for linkage to HES were followed to the earliest of age-at-first-cancer-record, death, or end of HES coverage (February 29, 2016). Dates of death were ascertained from ONS for patients with linkable records, and from CPRD otherwise. Patients who were not eligible for linkage, were censored at the earliest of age at death, transfer out of the CPRD practice, last data collection in CPRD, or end of study (February 29, 2016). To accommodate the study design, baseline hazards were stratified on the matched sets, and late entry into the cohort was accounted for in the PROC PHREG procedure in SAS.[113] Models were adjusted for the average number of primary care visits per year, calculated as the total number of clinical visits after start of follow-up to one year prior to cancer or censoring date, divided by the number of follow-up years. To adjust for cancer ascertainment from multiple databases for linked subjects, models were further adjusted for linkage status as a time-varying covariate. When cancers appeared in one subgroup only, we used Fisher's exact test to examine inter-group differences.

Our main analysis was run separately in strata defined by age-at-first-DM1-diagnosis (0-10 years: congenital/childhood; 11-40 years: classic; and >40 years: late-onset), a known proxy for disease severity.[2] We further stratified the analysis by sex. Heterogeneity of estimates across strata was tested using a Wald test.

Finally, we conducted various sensitivity analyses to evaluate the robustness of our findings. First, we used several more stringent definitions of DM1 to optimize the validity of the diagnoses, and restricted the analysis to: 1) DM1 patients who had a DM1 record in at least 2 data sources and their matched cohort (DM1=376; DM1-free=5,541); 2) DM1 patients diagnosed after their clinic's "up-to-standard" date (a CPRD practice-level recording quality metric)[103] and their matched cohort (DM1=454; DM1-free=5,936); 3) DM1 patients diagnosed in 1995 or later (after DM1 gene discovery in 1992 and subsequent implementation of DM1 genetic testing in the UK[77]) and their matched cohort (DM1=530; DM1-free=6,988). Second, we restricted the analysis to patients who were eligible for linkage to the HES database (DM1=558; DM1-free=7,426). Third, we conducted a sensitivity analysis ending follow-up at a maximum of 8 years for all patients to assess if differential follow-up time for the DM1 and DM1-free cohorts affected our results. Fourth, we conducted a subgroup analysis in patients diagnosed with DM1 on or after their registration with their current CPRD clinical practice and their matched cohort. These patients had prospectively-recorded DM1 and cancer diagnoses, and thus provide more certainty about the exact date of first diagnosis. In this subgroup, we first repeated the analysis using the previously mentioned follow-up timeline in 494 DM1 and 6,449 DM1-free individuals. In a second analysis, we started follow-up at clinic registration date (DM1=350; DM1-free=5,127), to evaluate if cancer exclusions differentially affected our results in patients with late-onset DM1.

Two-sided tests were used with statistical significance defined as p-value < 0.05. Analyses were conducted using SAS version 9.4 (Cary, NC, USA) and R version 3.3.1.

Results

Of the 927 DM1 patients, 132 (14%) were diagnosed between ages 0-10 years, 500 (54%) between 11-40 years, and 295 (32%) after age 40, with an overall mean age-at-DM1-diagnosis of 31.2 years (standard deviation [SD]=18). There were more females than males in DM1 patients with congenital/childhood (56%), and classic (53%) disease, whereas patients with late-onset DM1 were more frequently males (55%). Overall, median follow-up time was similar in the DM1 (8.8 years) and DM1-free (8.7 years) cohorts. As expected, DM1 patients visited their primary care clinics more often than their DM1-free matched cohort (mean primary care visits per year=10.3 [SD=11] *versus* 5.0 [SD=8.3], respectively), an observation that remained consistent after stratification by disease severity. Table 2 summarizes baseline demographic and clinical characteristics of the study population, stratified by disease severity.

During 140,554 person-years of follow-up, 41 (4%) DM1 patients developed cancer, compared with 708 (5%) DM1-free individuals (median age at cancer= 56 years *versus* 61 years, respectively). Zero cancers were observed in patients with congenital/childhood DM1 *versus* 1% of matched DM1-free subjects (Fisher's exact p-value=0.6). Compared with matched DM1-free individuals, patients with classic DM1 were at elevated risk of cancer overall (HR=1.8; 95% CI=1.1-2.9, p=0.02); cancers of the thyroid (HR=15.9; 95% CI=2.4-103.6, p=0.004), uterus (HR=26.8; 95% CI=2.3-309.3, p=0.01), and cutaneous melanoma (HR=6.0; 95% CI=1.2-28.8, p=0.03) accounted for the excess. Elevated risks of cancers in the ovary (HR=6.1, 95% CI=0.5-77.7, p=0.16), brain (HR=5.0, 95% CI=0.5-53.8, p=0.19), pancreas (HR=3.0, 95% CI=0.3-29.4, p=0.36), kidney (HR=2.3, 95% CI=0.2-23.5, p=0.50), and colorectum (HR=1.8, 95% CI=0.3-10.3, p=0.50) were also observed, but did not reach statistical significance. In late-onset DM1 patients, a reduced overall cancer risk was observed (HR=0.5; 95%CI=0.3-0.9), the deficit likely driven by hematological malignancies (DM1=0 cases, DM1-free=54 cases; p=0.02), and possibly female breast cancers (HR=0.2, 95% CI=0.0-1.7, p=0.15), lung (HR=0.4, 95% CI=0.1-1.4, p=0.14), and prostate (DM1=0 cases *versus* DM1-free=27 cases; p=0.16) (Table 3). The difference between the observed HR of all cancers combined in patients with classic and late-onset DM1 was statistically significant (p=0.0002). Stratification by sex within categories of disease severity showed no statistically significant sex difference in overall cancer risk in classic DM1 (HR=2.1, 95% CI=1.2-4.0 in females *versus* HR=1.5, 95% CI=0.7-3.3 in males, p-heterogeneity=0.22), or late-onset disease (HR=0.45, 95% CI=0.2-0.9 in females *versus* HR=0.61, 95% CI=0.3-1.2 in males, p-heterogeneity=0.74).

In the sensitivity analysis restricted to DM1 patients with DM1 events recorded in multiple data sources, results for the classic group were consistent with the main analysis (HR for all cancers combined=1.9, 95% CI=1.0-3.5, p=0.05). In patients with late-onset DM1 the HR was slightly higher than observed in the main analysis (HR for all cancers combined=0.8, 95% CI=0.4-1.7, p=0.61). Results were similar in patients with late-onset DM1 when restricted to patients with their first DM1 record at or after clinic registration, with follow-up starting from age at clinic registration (HR=0.8, 95% CI=0.4-1.5). Results from all other sensitivity analyses were consistent with our main findings (Table 4).

Discussion

Using a cohort of 927 DM1-affected patients, spanning the full clinical spectrum of the disease and a matched cohort of 13,085 DM1-free individuals, we showed that excess cancer risk in DM1 was restricted to those with the classic form, driven by previously-reported DM1 site-specific cancers including uterine, thyroid, and cutaneous melanoma.

Classic DM1 patients had an approximately two-fold increase in overall cancer risk when compared with the DM1-free cohort. This observation is strikingly similar to risk ratios reported by previous studies evaluating this association in Swedish/Danish[3], Spanish[6], and Utah[5] populations. In the current study, this finding was specific only to classic DM1 patients, suggesting that this more severe disease subset is associated with increased DM1-related cancer susceptibility in adolescent/adult-onset DM1 patients. Of note, DM patients included in the Scandinavian and Utah studies were primarily identified from inpatient records, thus likely over-representing more severe cases. Interestingly, previous attempts to test this hypothesis using leukocyte repeat size as a marker of disease severity showed no significant associations with cancer. [6, 7, 90, 94] In contrast, tumor tissue in DM1 patients has been shown to have longer repeat expansions compared with surrounding tissue.[4, 43-47] The high level of somatic mosaicism related to CTG repeat length in DM1 patients may explain this lack of association.[41] Molecular studies of paired normal and tumor tissues from genetically-confirmed DM1 patients are warranted to better elucidate the association between repeat size and cancer risk in DM1.

Excess cancer risk in this study was driven by previously-reported affected cancer sites; at least three of the five previous studies reported significant elevated risks of endometrial[3, 5-7] and thyroid[3, 5, 6, 8] cancers, as well as cutaneous melanoma, albeit not achieving statistical significance,[3, 6-8] suggesting that the female genital organs, endocrine system, and possibly skin may be target tissues for carcinogenesis in DM1. Our data also suggested elevated risks of cancers of the ovary, brain, pancreas, and colorectum, all of which were reported as excessive in prior studies.[3, 5-8] The molecular mechanism behind DM1-carcinogenesis is still unknown, but data from Fernandez-Torron *et al.*[5] suggested a possible etiologic role for the microRNA 200c/141 tumor suppressor family. Also, it was previously suggested that altered mismatch repair mechanisms may play a role in the DM1/cancer association based on the close similarities between the cancer profiles of DM1 and the hereditary non-polyposis colorectal cancer (HNPCC; Lynch syndrome).[3] Further investigations are needed to answer this question.

Our observation of no cancers in congenital/childhood DM1 patients may be a consequence of small sample size or driven by the high competing mortality in those patients, who may not live long enough to develop cancer. Our results and those of a previous study[114] showed that cancer is an adult phenotype in DM patients (median age-at-first-cancer in this study= 54 years, range=34-96 years). Previous literature reported that only 50% of children with congenital DM1 survive to their mid-thirties, with 30-40% dying within the first year of life, most commonly due to respiratory insufficiency.[18, 67, 68, 115, 116] In the current study, 10% of congenital/childhood DM1 patients (50% of whom were diagnosed within the first year of life) died during follow-up at an average age of 38 years, compared with less than 1% of the DM1-free cohort.

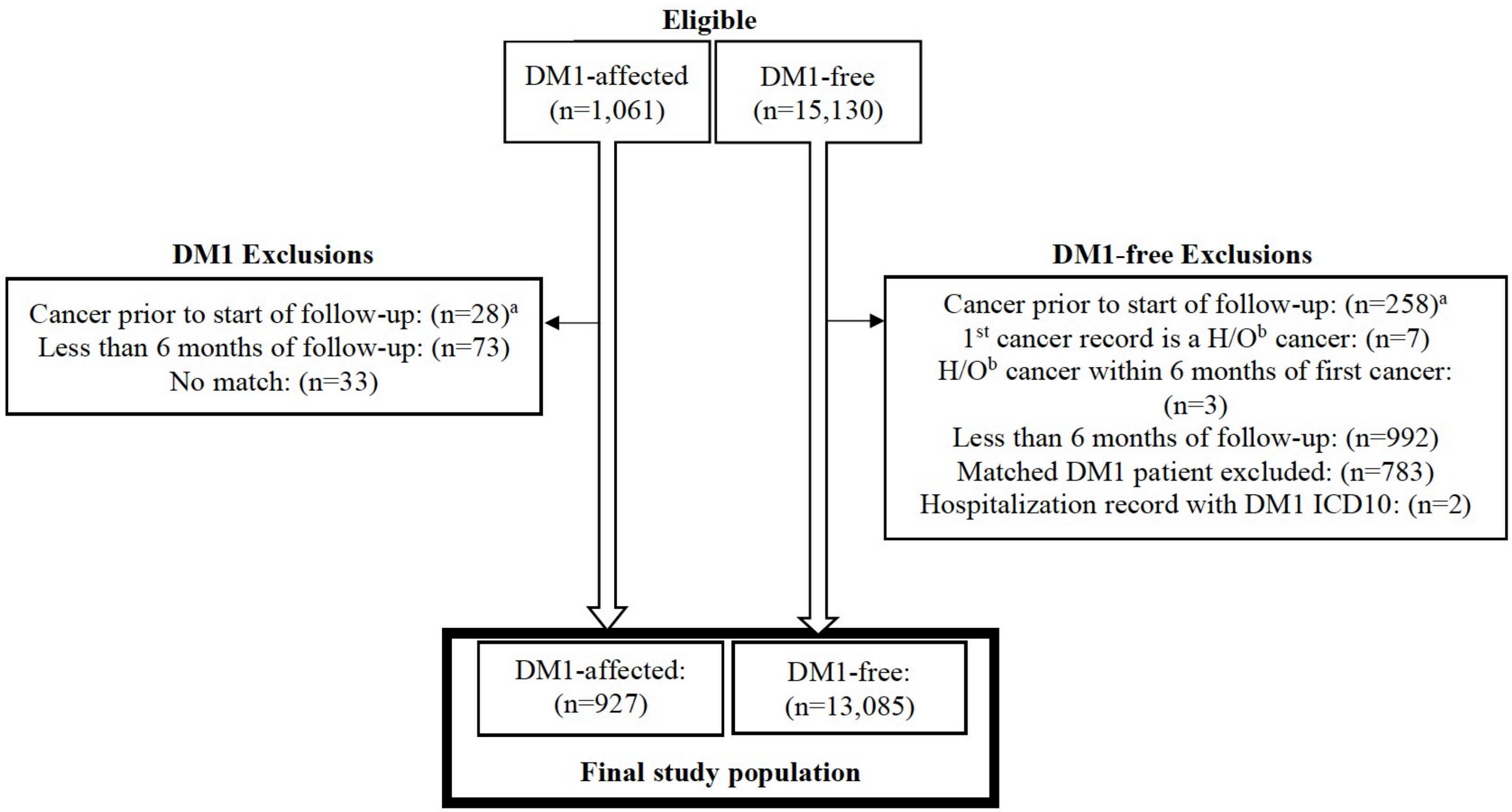
Surprisingly, we observed a lower than expected cancer risk in patients with late-onset DM1 compared with their matched DM1-free cohort. These results should be interpreted with caution because an attenuation of effect size was observed in the analysis restricted to patients with a record of DM1 in more than one data source, in which we aimed to reduce potential misclassification of DM1 diagnosis (HR=0.5, p=0.01 in the main analysis, and HR=0.8, p=0.61 in the sensitivity analysis). It is important to note that the HRs for most cancer sites were greater than one in this group, compared with DM1-free individuals, except for deficits of hematological, female breast, lung, and prostate cancers which drove the inverse association. Lifestyle factors such as smoking and/or body mass index (BMI) may explain some of these inverse associations; we were not able to adjust for those variables due to missing information.

A major strength of this study is that it utilized one of the largest primary care medical records databases in the world. This allowed us to evaluate incident cancer in a large DM1 cohort, spanning the full clinical spectrum of the disease compared with a matched DM1-free cohort, thereby minimizing selection bias associated with identifying cases from tertiary care facilities or hospital records, and improving the generalizability of the findings. Studies of CPRD have shown high validity in the reporting of neoplasms and other chronic conditions. [104-106] To optimize the validity of DM1 diagnoses, we conducted multiple sensitivity analyses and our conclusions remained unchanged, demonstrating the robustness of our findings. Nonetheless, our study faced several limitations. It is possible that cancers were more frequently detected in DM1 than in DM1-free patients due to the chronic nature of the disease requiring more frequent clinic visits. To address this possibility, we adjusted for the average number of primary care visits per year. We also conducted an analysis stratified by calendar time to ascertain potential detection bias in recent years, due to emerging evidence that cancer is part of the DM1 phenotype; we found no significant heterogeneity. Unfortunately, data on repeat expansion size were not available for CPRD patients, thus future studies in genetically well-characterized DM1 patients are warranted. Finally, while large HRs were detected for some cancers, the low frequency of cancer resulted in wide CIs and conclusions about some cancer sites cannot be made.

Conclusion

Our findings in patients with classic DM1 are remarkably consistent with the previous literature, providing further evidence for the increased cancer susceptibility in DM1. The differences in relative cancer risk between classic and late-onset DM1 patients reveals for the first time that disease severity modifies DM1-related cancer susceptibility. If confirmed, these novel findings may guide clinical management and scientific planning for investigating the underlying molecular mechanisms in DM-related carcinogenesis.

Figure 3: Flow chart of the study population



[a] There were 383 DM1-free and 36 DM1 cases who had a record of cancer among those who had been excluded; however, some of these cancers (DM1=8; DM1-free=125) occurred after start of follow-up.
[b] H/O: History of

Table 2: Characteristics of the 927 DM1-affected and 13,085 DM1-free individuals selected for this study, stratified by age at DM1 diagnosis

Characteristics	**Congenital/Childhood DM1** (0-10 years)		**Classic DM1** (11-40 years)		**Late-onset DM1** (>40 years)	
	DM1-free (n=2,203)	**DM1** (n=132)	**DM1-free** (n=7,538)	**DM1** (n=500)	**DM1-free** (n=3,344)	**DM1** (n=295)
Mean age at diagnosis, *mean (SD)*	-	2.8 (3.3)	-	26.6 (7.8)	-	51.7 (8.4)
Gender, *n(%)*						
Male	967 (44%)	58 (44%)	3,633 (48%)	234 (47%)	1,874 (56%)	163 (55%)
Female	1,236 (56%)	74 (56%)	3,905 (52%)	266 (53%)	1,470 (44%)	132 (45%)
Cancer						
Yes, *n(%)*	18 (1%)	0 (0%)	221 (3%)	21 (4%)	469 (14%)	20 (7%)
Mean age at diagnosis, *mean (SD)*	33.1 (17.5)	-	52.7 (11.2)	47.5 (8.9)	65.7 (9.5)	65.1 (13)
Death during follow-up						
Yes, *n(%)*	22 (1%)	13 (10%)	230 (3%)	109 (22%)	587 (18%)	123 (42%)
Mean age at death, *mean (SD)*	37 (21.5)	37.7 (15.7)	50.8 (11.8)	48.6 (10.3)	68.8 (11.4)	64 (8.8)
Country, *n(%)*						
England	1,786 (81%)	104 (79%)	6,385 (85%)	410 (82%)	2,653 (79%)	233 (79%)
Other	417 (19%)	28 (21%)	1,153 (15%)	90 (18%)	691 (21%)	62 (21%)
IMD (practice), *n(%)*						
1 (least deprived)	225 (10%)	13 (10%)	1,159 (15%)	74 (15%)	454 (14%)	39 (13%)
2	316 (14%)	19 (14%)	1,265 (17%)	88 (18%)	617 (18%)	59 (20%)
3	474 (22%)	30 (23%)	1,419 (19%)	91 (18%)	532 (16%)	43 (15%)
4	615 (28%)	38 (29%)	1,603 (21%)	111 (22%)	552 (17%)	46 (16%)
5 (most deprived)	573 (26%)	32 (24%)	2,092 (28%)	136 (27%)	1,189 (36%)	108 (37%)

Table 2 continued

Baseline Smoking Status, *n(%)*												
Ever	488	(22%)	22	(17%)	2,856	(38%)	177	(35%)	1,448	(43%)	132	(45%)
Never	358	(16%)	32	(24%)	1,697	(23%)	143	(29%)	552	(17%)	66	(22%)
Missing	1,357	(62%)	78	(59%)	2,985	(40%)	180	(36%)	1,344	(40%)	97	(33%)
Baseline Alcohol Consumption, *n(%)*												
Ever	449	(20%)	28	(21%)	2,917	(39%)	191	(38%)	1,327	(40%)	116	(39%)
Never	202	(9%)	16	(12%)	632	(8%)	49	(10%)	227	(7%)	35	(12%)
Missing	1,552	(70%)	88	(67%)	3,989	(53%)	260	(52%)	1,790	(54%)	144	(49%)
Baseline Body Mass Index, *n(%)*												
Underweight/Normal (<25)	540	(25%)	40	(15%)	2,073	(28%)	163	(8%)	665	(20%)	77	(26%)
Overweight/Obese (≥25)	260	(12%)	16	(15%)	1,645	(22%)	102	(25%)	1,047	(31%)	89	(30%)
Missing	1,403	(64%)	76	(58%)	3,820	(51%)	235	(47%)	1,632	(49%)	129	(44%)
Avg. PCP visits per year, *mean (SD)*	4.6	(8)	11.3	(15.3)	4.5	(8.5)	9.6	(9.8)	6.2	(8)	11.0	(10.6)
Follow-up time in years, *median (range)*	8.7	(0.5-28)	10.0	(0.5-28)	8.6	(0.5-28)	9.3	(0.5-28)	9.0	(0.5-28)	7.6	(0.5-27)
Total follow-up time, *person-years*	23,064.10		1562.4		74,912.70		5,300.60		33,164.70		2,549.90	

IMD = Index of multiple deprivation; Avg. = Average; PCP = Primary care provider

Table 3: Adjusted hazard ratios and 95% confidence intervals of cancer risk comparing DM1-affected and DM1-free individuals selected for this study, stratified by disease severity.

	Classic DM1 (Age at diagnosis 11-40 years) DM1=500; DM1-free=7,538				**Late-onset DM1 (Age at diagnosis > 40 years)** DM1=295; DM1-free=3,344			
Outcome	**HR[a]**	**95% CI**		**p-value**	**HR[a]**	**95% CI**		**p-value**
Overall	1.8	1.1	2.9	0.02	0.5	0.3	0.9	0.01
Thyroid	15.9	2.4	103.6	0.004	-	-	-	-
Salivary	-	-	-	0.12[b]	-	-	-	0.08[b]
Melanoma	6.0	1.2	28.8	0.03	1.1	0.1	14.1	0.9
Brain	5.0	0.5	53.8	0.19	2.0	0.2	17.7	0.52
Kidney	2.3	0.2	23.5	0.50	2.1	0.2	21.8	0.53
Pancreas	3.0	0.3	29.4	0.36	1.8	0.2	15.2	0.59
Ovary	6.1	0.5	77.7	0.16	1.0	0.1	8.3	1.0
Colorectum	1.8	0.3	10.3	0.50	1.1	0.4	3.5	0.84
Esophagus	-	-	-	1.0[b]	1.6	0.4	6.4	0.53
Uterine[c]	26.8	2.3	309.3	0.01	-	-	-	0.62[b]
Lung	1.2	0.1	10.2	0.86	0.4	0.1	1.4	0.14
Female Breast	0.5	0.1	2.2	0.38	0.2	0.0	1.7	0.15

[a]Baseline hazards stratified on matched sets, model adjusted for average number of primary care visits per year,
and linkage status except when indicated.
[b]p-value obtained from Fisher's exact test
[c]Baseline hazards stratified country and categorical registration year, model adjusted for average number of primary care visits per year.

Table 4: Sensitivity analyses of cancer risk estimates comparing DM1-affected and DM1-free individuals selected for this study, stratified by disease severity.

Sensitivity Analysis[a]	Classic DM1 (Age at diagnosis 11-40)				Late-onset DM1 (Age at diagnosis > 40)			
	HR[b]	95% CI		p-value	HR[b]	95% CI		p-value
1	1.9	1.0	3.5	0.05	0.8	0.4	1.7	0.61
2	1.8	0.5	6.0	0.36	0.5	0.3	0.97	0.04
3	2.1	0.8	5.4	0.10	0.5	0.3	1.0	0.04
4	1.9	1.1	3.3	0.02	0.6	0.3	1.0	0.06
5	1.9	0.9	4.0	0.08	0.7	0.4	1.2	0.17
6	1.9	0.9	4.0	0.11	0.5	0.3	0.96	0.03
7	-	-	-	-	0.8	0.4	1.5	0.50

HR=hazard ratio; CI=confidence interval

[a]Analyses:

1. Restricted to DM1 patients with DM1 records in at least 2 data sources and their matched cohort
2. Restricted to DM1 patients diagnosed after their clinic's "up to standard" date and their matched cohort
3. Restricted to DM1 patients diagnosed in 1995 or later and their matched cohort
4. Restricted to patients eligible for linkage to HES and their matched cohort
5. Ending follow-up at a maximum of 8 years for all patients
6. Restricted to DM1 patients diagnosed after their registration with their CPRD clinic. Follow-up started at age at DM1 diagnosis.
7. Restricted to DM1 patients diagnosed after their registration with their CPRD clinic. Follow-up started at age at clinic registration in late-onset DM1.

[b]Baseline hazards stratified on matched sets, adjusted for average number of primary care visits per year, and linkage status.

Chapter 4: Risk of benign tumors in patients with myotonic dystrophy type I and their association with subsequent cancers[1]

ABSTRACT

Background. Case reports have speculated that patients with myotonic dystrophy type I (DM1) may be at elevated risk of developing benign and malignant tumors. Recently, cancer was found to be associated with DM1, however the risk of benign tumors has not been systematically evaluated.

Methods. From the UK Clinical Practice Research Datalink (CPRD) database, we identified a cohort of 927 DM1 patients and a cohort of 13,085 DM1-free individuals matched on sex, year of birth, clinic, and clinic registration year. We used Cox proportional hazards regression models to estimate hazard ratios (HRs) and 95% confidence intervals (CIs) of benign tumors (overall, and by anatomic site) comparing the two cohorts. We also assessed the association between benign tumors and subsequent cancers in each cohort.

Results. DM1 patients were at elevated risk of benign tumors overall (HR=1.8, 95% CI=1.4-2.2, $p<0.001$), driven by excess risks of pilomatricoma and other skin tumors (HR=1.5, 95% CI=1.1-1.9, $p=0.006$), uterine fibroids and polyps (HR=4.7, 95% CI=2.2-9.9, $p<0.001$), colorectal/anal polyps (HR=2.7, 95% CI=1.1-6.9, $p=0.03$), salivary gland adenomas (found only in DM1 patients, $p<0.001$), as well as pituitary adenomas and other tumors of the brain and nervous system (HR=9.9, 95% CI=2.9-28.8, $p<0.001$). An

[1] Rotana Alsaggaf, Diane Marie M. St. George, Min Zhan, Ruth M. Pfeiffer, Youjin Wang, Kathryn Wagner, Mark H. Greene, Sania Amr, Shahinaz M. Gadalla.

elevated risk of subsequent cancer comparing those with benign tumors to tumor-free individuals was observed in patients with classic DM1 (HR=3.34, 95% CI=1.14-9.83 *vs.* HR=1.04, 95% CI=0.59-1.83 in the matched DM1-free cohort, p-heterogeneity <0.001). This difference was not observed in patients with late-onset DM1 (HR=0.63, 95% CI=0.13-2.99 *vs.* HR=1.81, 95% CI= 1.34-2.44 in the matched DM1-free cohort, p-heterogeneity =0.15).

Conclusion. The similarities between benign and malignant tumor profiles identify the skin, uterus, endocrine and lower digestive systems as possible targets for tumorigenesis in DM1. Our findings also suggest that classic DM1 patients with benign tumors may be at increased risk of cancer development.

Introduction

Myotonic dystrophy type I (Dystrophia Myotonica I; DM1; Steinert's disease) is an autosomal dominant multi-system disorder, primarily presenting with progressive muscle weakness and myotonia.[2, 18] It is one of the most common forms of adult muscular dystrophies, with an estimated prevalence of 11 in 100,000 in Northern England.[25] DM1 results from a CTG tri-nucleotide repeat expansion in the 3' untranslated region of the Dystrophia myotonica protein kinase (DMPK) gene on chromosome 19q13.3.[19-21] Recent studies have shown that DM1 patients are at increased risk of cancers arising in the skin, thyroid, female reproductive organs, and possibly colon and brain.[3, 5-8, 95, 117]

Case reports as early as 1965 have suggested an association between certain benign tumors and DM1; most commonly reported is a rare calcifying cutaneous neoplasm known as pilomatricoma.[4] Other reported tumors included those of the parotid gland, parathyroid, thyroid, and pituitary, as well as thymoma, meningioma, uterine fibroids, and insulinoma.[4] Cross-sectional studies of 255 Italian[90] and 231 United Kingdom (UK)[89] DM1 patients reported overall benign tumor frequencies of approximately 21% and 12%, respectively, with female reproductive tumors as the most commonly reported in both studies. Another Italian study in which dermatological examinations were conducted in 90 DM1 patients and 103 age- and sex-matched controls found that DM1 patients were more likely to have dysplastic nevi and pilomatricoma.[91] Finally, a study conducted in Spain found an increased risk of pilomatricoma in 102 DM1 patients compared with age- and sex-matched controls.[92]

To our knowledge, the risk of benign tumors in DM1 has not yet been systematically evaluated, and whether these benign tumors are associated with cancer risk is unknown. In this study, we aimed to evaluate benign tumor risk (overall, and by anatomic site) in a large cohort of DM1 patients compared with a matched DM1-free cohort. We also evaluated the risk of developing cancer comparing patients with and without benign tumors in both cohorts.

Methods

Detailed methods were previously described.[117] Briefly, we utilized the UK Clinical Practice Research Datalink (CPRD) to identify 927 patients with a record of DM1 (defined using Read Codes "F392011: Steinert's disease", and "F392000: Dystrophia myotonica [Steinert's disease]") from the October 2016 CPRD release, and up to 13,085 DM1-free individuals matched on year of birth (± 2 years), sex, clinic, and clinic registration year (± 1 year). With the exception of cancer, all study variables were identified from CPRD using Read codes (available upon request). Incident benign tumor was defined as its first record in CPRD during follow-up; incident cancer cases were identified from CPRD, or linkable inpatient records from the Hospital Episode Statistics database (HES); and cause of death data from the Office of National Statistics (ONS) as previously described.[117]

Statistical Analysis

We used Cox proportional hazards regression models to estimate the risk of developing benign tumors (overall, and by anatomic site) in DM1 patients compared with the DM1-

free matched cohort. Age was the time scale used for all analyses. Follow-up started at the latest of either age at DM1-diagnosis/DM1-free selection, practice registration, or study start date (January 1st, 1988; after the start of CPRD). Patients were followed to the earliest of either age-at-1st benign tumor, death, transfer-out of the CPRD practice, last data collection in CPRD, or end of study (February 29, 2016). To accommodate the study design, baseline hazards were stratified on the matched sets, and late entry into the cohort was accounted for in the PROC PHREG procedure in SAS 9.4. Potential effect measure modification was assessed by running separate cox models in strata defined by sex and age at DM1 diagnosis categories (0-10 years=congenital/childhood, 11-40 years= classic, and >40 years= late-onset). Heterogeneity of estimates across strata was tested using a Wald test. Final models were adjusted for the average number of primary care visits per year, calculated as the total number of clinical visits beginning at the start of follow-up and ending one year prior to outcome or censoring date, divided by the number of follow-up years. The proportional hazards assumption was assessed using Schoenfeld residuals, and no significant violations were observed. When tumors appeared in one subgroup only, we used Fisher's exact test to examine inter-group differences.

To assess the robustness of our findings, we conducted several sensitivity analyses using more stringent definitions of DM1. We repeated the analysis using only: 1) DM1 patients diagnosed after their clinic's "up-to-standard" date (a CPRD practice-level data quality metric);[105] 2) DM1 patients diagnosed in 1995 or later (after DM1 gene discovery in 1992 and subsequent implementation of DM1 genetic testing in the UK);[77] and 3) DM1 patients who had a DM1 record in at least two of the three data sources (CPRD, HES, and

ONS). Additionally, we conducted a sensitivity analysis ending follow-up at the maximum of three years for all patients, to assess if differential follow-up time for the DM1 and DM1-free cohorts affected our results. In all analyses, we only used the corresponding matched DM1-free individuals for each DM1 patient.

Finally, we used cox proportional hazards regression models to estimate hazard ratios (HRs) and 95% confidence intervals (CIs) of the association between benign tumors and cancer risk, in DM1 patients, and DM1-free cohort, separately. Benign tumor was considered a time-dependent variable, where study participants belonged to the benign tumor-free group until they developed the first benign neoplasm. To adjust for cancer ascertainment from multiple databases for patients eligible for linkage, the regression models were additionally adjusted for linkage status as a time-varying covariate.

We conducted all analyses using SAS version 9.4 (Cary, NC, USA) and R version 3.3.1, and defined statistical significance as $p\text{-value} < 0.05$ using two-sided tests.

This study was approved by the CPRD Independent Scientific Advisory Committee (ISAC; Protocol # 16_005RA2). The use of CPRD database was exempted from full Institutional Review Board (IRB) review by the National Institutes of Health (NIH) Office of Human Subject Research and the University of Maryland's IRB, because of the irrevocably anonymized nature of the data. This study is based on data from the CPRD GOLD database October 2016 release, obtained from the UK Medicines and Healthcare Products Regulatory Agency, HES database (Copyright © (2016)), and ONS database

 The interpretation and conclusions contained in this study are those of the authors alone.

Results

Table 5 summarizes the characteristics of the study cohorts, which were previously described.[117] Briefly, 14% of DM1 patients were diagnosed within the first decade of life, 54% between ages 11 and 40 years, and 32% after age 40. In both cohorts, 51% were females, and 49% were males.

During 80,294 person-years of follow-up, 126 (14%) of DM1 patients and 788 (6%) of DM1-free individuals developed benign tumors. Skin tumors were the most commonly diagnosed in both cohorts (DM1=67%; DM1-free=77%), followed by female genital tumors (DM1=11%; DM1-free=9%), digestive tract tumors (DM1=7%; DM1-free=5%), and brain and nervous system tumors (DM1=6%; DM1-free=2%). In DM1, over 92% of female genital tumors were uterine fibroids and polyps; all digestive tumors were colorectal/anal polyps, and all salivary gland tumors were pleomorphic adenomas. Tumors of the brain and nervous system comprised of meningiomas, neuromas, neurofibromas, tumors of the pituitary gland, and other unspecified brain neoplasms; while skin tumors included pilomatricomas, nevi, moles, papillomas, and other benign neoplasms.

Compared with matched DM1-free individuals, DM1 patients were at elevated risk of developing benign tumors of all sites combined (HR=1.8, 95% CI=1.4-2.2, p=<0.001); tumors of the skin (HR=1.5, 95% CI=1.1-1.9, p=0.006), uterus (HR=4.7, 95% CI=2.2-9.9, p<0.001), colorectum and anus (HR=2.7, 95% CI=1.1-6.9, p=0.03), and brain and nervous system (HR=9.9, 95% CI=2.9-28.8, p<0.001) accounted for the observed excess (Table 6). Pilomatricoma and benign tumors of the salivary glands were found only in DM1 patients, with corresponding Fisher's exact p-values <0.001. In analyses stratified by sex, no differences were noted except for colorectal and anal polyps, where an elevated risk was noted in men (HR for DM1 *vs.* DM1-free=5.7, 95% CI=1.8-17.9, p=0.003) but not women (HR=0.9, 95% CI=0.2-4.7, p=0.89). No differences were noted in strata defined by age at DM1 diagnosis. Results from all sensitivity analyses were consistent with our main findings (Table 7).

Finally, we found that classic DM1 patients with benign tumors were significantly more likely to develop subsequent cancer (HR=3.34, 95% CI=1.14-9.83, p=0.03), a finding that was not observed in their matched DM1-free cohort (HR=1.04, 95% CI=0.59-1.83, p=0.89) (p-heterogeneity < 0.001). On the other hand, in late-onset DM1 patients, the relationship between benign tumors and subsequent cancer was not statistically significantly different from that observed in the matched DM1-free cohort (HR in DM1 patients=0.63, 95% CI=0.13-2.99, and HR in matched DM1-free individuals=1.81, 95% CI= 1.34-2.44; p-heterogeneity =0.15). No cancers were observed subsequent to benign tumors in congenital/childhood DM1 patients or their matched cohort.

Discussion

With this large retrospective cohort study, we showed that DM1 patients were at elevated risks of developing benign neoplasms, including pilomatricoma and other skin tumors, uterine fibroids and polyps, colorectal polyps, pituitary adenomas, salivary gland adenomas, as well as tumors of the brain and nervous system. We also found that classic DM1 patients with benign tumors were more likely than those who were tumor-free to develop subsequent cancer; a finding that was not present in their matched DM1-free cohort.

Previous studies found DM1 patients to be at elevated risk of developing certain cancers including cancers of the skin, thyroid, female reproductive organs, and possibly colon and brain.[3, 5-8, 95, 117] The similarities between DM1 benign and malignant tumor profiles suggest that DM1 pathogenesis could include proliferative advantage in specific organs. Prior research in trinucleotide repeat disorders showed that somatic instability is tissue-selective.[118] In DM1 patients, skeletal muscles, skin fibroblasts, and parts of the brain have longer repeat expansions compared with the peripheral blood of the same patients.[119-122] Repeat size elongation has been reported in tumor tissue samples from DM1 patients when compared with adjacent normal[43-47] but the association between blood repeat size and cancer was null in previous studies.[90, 94] Findings of this study shed light on target tissues to be evaluated in future studies that will aim at understanding tumorigenesis in DM1.

The high risk of colorectal polys observed in this study may explain previously observed inconsistencies related to colon cancer risk in DM1 patients; excess risk was observed in four of the five published studies, but only one reached statistical significance.[3, 5-7] Colon polyps are known to be precursors of colon cancer, and their removal was deemed an effective measure in reducing colon cancer risk and mortality.[123, 124]

Interestingly, unlike our previous findings of different relative cancer risks across DM1 severity categories based on age at onset, we observed no heterogeneity by these categories in the overall risk of benign tumors. However, we found classic DM1 patients with benign tumors were at increased risk of developing cancer compared with those who were tumor-free; an observation that was not true for their matched cohort (p-heterogeneity <0.001). In late-onset DM1 patients, the relationship between benign tumors and subsequent cancer was not significantly different than that observed in the matched DM1-free cohort (p-heterogeneity =0.15). These findings suggest that classic DM1 patients who present with benign tumors may need close monitoring because of their elevated risk of developing subsequent cancer.

The molecular mechanism underlying tumorigenesis in DM1 remains unknown. It has been previously hypothesized that abnormal accumulation of ß-catenin through the Wnt/ß-catenin signaling pathway may play a role in DM-related tumorigenesis.[4] Mutations in the ß-catenin (*CTNNB1*) gene were previously found to be associated with pilomatricomas.[4, 96, 97] Other proposed hypotheses include modified expression of downstream oncogenes or tumor suppressor genes as a result of abnormal RNA-splicing, and/or altered protein-coding mechanisms.[10-12, 14] Further studies to investigate molecular mechanisms underlying DM1-related tumorigenesis are needed to better understand tumor etiology as well as guide clinical management and therapeutic interventions in those patients.

To our knowledge, this study is the first to systematically quantify the risk of developing benign tumors in DM1. The use of primary care medical records enabled us to capture the full spectrum of DM1 patients, minimizing selection bias associated with identifying patients from tertiary care facilities, or voluntary registries. Additionally, primary care records captured data on benign tumors, which are not routinely collected in inpatient hospitalization records or cancer registries. Our large sample size, longitudinal design, and the use of a matched comparison group represent some of the major strengths of this study. Nonetheless, several limitations existed including lack of information on genetic testing or repeat expansion size, which may have led to the misclassification of DM1 status. To minimize this possibility, we only included patients with diagnostic codes specific to DM1 (described above). Additionally, we conducted several sensitivity analyses with more stringent definitions of DM1, and our conclusions remained unchanged, suggesting that misclassification was unlikely and demonstrating the robustness of our findings. It is also possible that the higher frequency of detected benign tumors in DM1 patients compared with DM1-free individuals may be the result of the close medical care for DM1 patients. To address this possibility, all models were adjusted for the average number of primary care visits per year. We also observed the occurrence of pilomatricomas in several patients before their first DM1 record, providing reassurance that our results are not likely driven by detection bias.

Conclusion

Our study is the first to quantify the risk of benign tumors in DM1 patients. We identified the skin, uterus, endocrine and lower digestive systems as possible targets for tumorigenesis in DM1. We also identified benign tumors as a possible risk factor for developing cancer in classic DM1 patients. Validation of these results in other DM1 cohorts is warranted. These findings may guide future studies aiming at understanding mechanisms of DM1-related tumorigenesis and inform clinical management of DM1 patients.

Table 5: Characteristics of the DM1 patients and their matched DM1-free cohort

Characteristics	**DM1-free** (n=13,085)		**DM1** (n=927)	
Age at DM1 diagnosis, *n(%)*				
Congenital/childhood (0-10 years)	-	-	132	(14%)
Classic (11-40 years)	-	-	500	(54%)
Late-onset (>40 years)	-	-	295	(32%)
Mean age at diagnosis, *mean (SD)*	-	-	31.2	(17.8)
Gender, *n(%)*				
Male	6,474	(49%)	455	(49%)
Female	6,611	(51%)	472	(51%)
Benign Tumor				
Yes, *n(%)*	788	(6%)	126	(14%)
Mean age at diagnosis, *mean (SD)*	41.7	(15)	43.5	(14.6)
Tumor Status				
None	11,667	(89%)	768	(83%)
Benign only	710	(5%)	118	(13%)
Malignant only	630	(5%)	33	(4%)
Benign and malignant	78	(1%)	8	(1%)
Average number of primary care visits per year, *mean (SD)*	4.9	(8.4)	9.8	(11.1)
Follow-up time				
Median (range)	3.7	(0-28.2)	5.6	(0-28.2)
Total, *Person-years*	73,148.80		7,145.10	

Table 6: Adjusted hazard ratios and 95% confidence intervals of benign tumors risks comparing DM1-affected with matched DM1-free individuals

Site	Frequency		HR[a]	95% CI		p-value
	DM1	DM1 -free				
Overall	788	126	1.77	1.42	2.21	<0.001
Skin[b]	608	84	1.46	1.12	1.91	0.006
Pilomatricoma			-	-	-	<0.001[g]
Other			1.35	1.02	1.78	0.03
Female genital[c]	73	14	3.15	1.61	6.19	<0.001
Uterus			4.65	2.19	9.89	<0.001
Cervix			0.71	0.09	5.50	0.74
Digestive[d]	38	9	2.16	0.91	5.12	0.08
Colorectum/Anus			2.74	1.09	6.87	0.03
Other			-	-	-	1.00[g]
Brain & Nervous System[e]	13	7	9.94	2.94	28.80	<0.001
Pituitary gland			12.36	0.52	294.5	0.12
Brain			4.78	0.79	29.05	0.09
Nervous system			171.4	3.86	7,605.4	0.008
Salivary glands[f]	<5	<5	-	-	-	<0.001[g]
Other/Unknown	56	9	2.02	0.95	4.31	0.07

[a] *Baseline hazards were stratified on the matched sets and models were adjusted for average number of primary care visits per year*

[b] *Skin tumors included nevi, dermatofibromas, papillomas, lipomas, pilomatricomas, moles, and other benign neoplasm of the skin.*

[c] *Female genital tumors included uterine fibroids and polyps, and cervical polyps*

[d] *Digestive tumors included colorectal/anal polyps, and other benign neoplasms of the digestive organs*

[e] *Brain & Nervous system tumors included meningiomas, neuromas, neurofibromas, pituitary tumors and other benign neoplasms of the brain & Nervous system*

[f] *Salivary gland tumors were pleomorphic adenomas*

[g] *p-value obtained from Fisher's exact test*

Table 7: Sensitivity analyses of benign tumor risk estimates comparing DM1-affected with DM1-free individuals selected for this study

Sensitivity analysis	HR	95% CI		p-value
1	1.91	1.38	2.63	<0.001
2	1.57	1.10	2.24	0.01
3	1.77	1.30	2.41	<0.001
4	1.78	1.22	2.6	0.003

1. Restricted to DM1 patients diagnosed after their clinic's "up to standard" date and their matched cohort
2. Restricted to DM1 patients with DM1 records in at least 2 data sources and their matched cohort
3. Restricted to DM1 patients diagnosed in 1995 or later and their matched cohort
4. Ending follow-up at a maximum of 3 years for both cohorts

Chapter 5: Cataracts, endocrine abnormalities, and tumor risk in patients with myotonic dystrophy type I[1]

ABSTRACT

Background. Patients with myotonic dystrophy type I (DM1) were reported to have increased risk of benign and malignant tumors; however, the factors that contribute to tumor development are not well understood. Identifying such factors can inform clinical care and provide insight into the etiology of DM1-related tumorigenesis.

Methods. We used Cox proportional hazards regression models to assess the association between patient sex, cataracts, thyroid disease, and type 2 diabetes with tumor risk (benign and malignant, separately) in a large cohort of 960 DM1 patients. Age was the time scale used in all analyses. In analyses of clinical phenotypes, they were treated as time-varying variables and models were adjusted for sex.

Results. Twenty-five percent of DM1 patients had cataracts, 8% had type II diabetes, and 7% had thyroid disease. Thyroid disease was significantly more likely to occur in females (11%) compared with males (3%). Cataracts, type II diabetes, and thyroid disease were most prevalent in patients with late-onset DM1 (36%, 14%, and 14%, respectively), and to a lesser extent in patients with classic disease (23%, 5%, and 5%), and least in those with congenital/childhood DM1 (12%, 2%, and 2%). Developing cancer was not associated with having any of the clinical conditions studied. Female patients (HR=1.75,

[1] Rotana Alsaggaf, Diane Marie M. St. George, Min Zhan, Ruth M. Pfeiffer, Youjin Wang, Kathryn Wagner, Mark H. Greene, Sania Amr, Shahinaz M. Gadalla.

95% CI=1.22-2.5, p= 0.002) and those with cataracts (HR =1.95, 95% CI=1.31-2.92, p=0.001) were more likely to develop benign tumors.

Conclusions. Our results suggest that cancers in DM1 may have a distinct underlying biologic mechanism from the phenotypes under study. Continued efforts to understand tumorigenesis in DM1 and identify patients at risk of developing benign and malignant tumors are needed.

Introduction

Myotonic Dystrophy type I (*dystrophia myotonica* I; DM1; Steinert's disease) is a dominantly inherited neuromuscular disorder, caused by an aberrant CTG repeat expansion in the myotonic dystrophy protein kinase (*DMPK*) gene on chromosome 19.[1, 2, 18] It is one of the most common forms of adult-onset muscular dystrophies with progressive muscular weakness, myotonia, and multi-systemic manifestations.[2] Non-muscular phenotypes include early-onset cataracts, endocrine abnormalities such as thyroid dysfunction and diabetes mellitus, cognitive impairment, as well as cardiac conduction defects and respiratory insufficiency, which are the leading causes of death in DM1.[2, 18, 65, 68] In recent years, studies reported increased risk of both malignant[3, 5-9, 117] and benign[125] neoplasms in DM1 patients suggesting that neoplasia may be part of the DM1 phenotype. Although the pathophysiological mechanisms underlying DM1-related tumorigenesis are not yet understood, tumor tissue in DM1 patients were found to have longer *DMPK* CTG repeat expansion compared with surrounding tissue, suggesting that the genetic instability underlying the disease may play a role in tumor susceptibility.[4, 43-47] Cross-sectional studies of DM patient registries aiming to identify correlates of tumor development in DM1 have found that older patient age, female sex, and younger age at DM1 diagnosis were associated with a higher prevalence of benign and malignant tumors.[89, 90, 94] One study found an association between tumors and thyroid disease, only in women, but no association with type 2 diabetes.[90] Identifying DM1 patients with the highest risk of developing tumors can inform clinical care and provide insight into the etiology of DM1 tumorigenesis. We used a longitudinal primary care physician database to assess the association between patient sex and selected DM1-related chronic conditions (cataracts, thyroid disease, and type II diabetes) and tumor risk in a large cohort of DM1 patients.

Methods

Data source and variables under study

Data sources and the study population were described previously.[9, 117] Briefly, we utilized the United Kingdom (UK) Clinical Practice Research Datalink (CPRD), a large electronic primary care records database with linkage to additional patient-level data sources including hospitalization records (Hospital episodes statistics; HES), and mortality data (Office of national statistics; ONS) for approximately 57% of CPRD practices. We identified all DM1 patients (n=1,061) within the October 2016 data release using Read Codes (F392011: Steinert's disease, and F392000: Dystrophia myotonica [Steinert's disease]), the clinical classification system used by the UK National Health Services (NHS). Patients with prevalent cancers at baseline or less than 6 months of follow-up were excluded from this analysis (n=104), resulting in a cohort of 960 DM1 patients. Clinical variables were identified from CPRD using Read codes (available upon request); incident cancer cases were identified from CPRD, HES, and NOS as described earlier.[117] Age at the patient's first DM1 record in CPRD was used as a proxy for age at DM1 diagnosis. DM1 patients were categorized into congenital/childhood (0-10 years), classic (11-40 years), and late-onset (>40 years) disease based on previous literature.[2]

Statistical Analysis

We used Cox proportional hazards regression models to estimate the risk of developing benign or malignant tumors associated with sex or clinical conditions in DM1 patients (described above). Age was the time scale used for all analyses. Follow-up started at the latest of either age at DM1-diagnosis/DM1-free selection, practice registration, or study start date (January 1st, 1988; after the start of CPRD). Patients were followed to the earliest of either age-at-outcome, death, transfer-out of the CPRD practice, last data collection in CPRD, or end of study (February 29, 2016). For cancer-related analyses only, those who are linked to HES were followed until the earliest of either age-at-first-cancer-record, death, or end of HES coverage/study. The proportional hazards assumption was assessed using the Kolmogorov-type supremum test (based on a sample of 1,000 simulated residual patterns), and no significant violations were observed.

Clinical phenotypes (cataracts, thyroid disease, and type II diabetes) were treated as time-dependent exposure variables, where patients were considered unexposed until they were diagnosed with the clinical condition, if at all. If a patient developed the condition, he/she was considered exposed starting at age-at-first-record and for the remainder of follow-up, for each respective analysis. Patients who developed the relevant conditions prior to the start of follow-up were considered exposed at baseline.

Sex, age at DM1 diagnosis (continuous), year at clinic registration (categorized into: <1988; 1988-2000; >2000), region (England *vs.* others), index of multiple deprivation quintiles (as a proxy for socioeconomic status; available for all CPRD practices), and average number of primary care visits per year (calculated as the total number of clinical visits beginning after the start of follow-up and ending one year prior to outcome or censoring date, divided by the number of follow-up years) were assessed for confounding. Potential effect measure modification was assessed by running separate cox models in strata defined by sex and age at DM1 diagnosis categories, separately. Heterogeneity of estimates across strata was tested using a Wald test. Final models assessing the association of tumors with clinical conditions were adjusted for sex. To adjust for cancer ascertainment from multiple databases for linked patients, cancer models were additionally adjusted for linkage status as a time-varying covariate. Late entry into the cohort was accounted for in the PROC PHREG procedure in SAS 9.4.[113] For analyses comparing females to males, we assessed the risk of overall benign or malignant tumors both including and excluding tumors of reproductive organs. Similarly, in analyses of type two diabetes, we conducted a sensitivity analysis excluding patients with type I diabetes from the analysis.

This study is based on data from the CPRD GOLD database October 2016 release, obtained from the UK Medicines and Healthcare Products Regulatory Agency, HES database (Copyright © (2016)), and ONS database (Copyright © (2016)) reused with the permission of The Health & Social Care Information Centre. All rights reserved. The interpretation and conclusions contained in this study are those of the authors alone. This study was approved by the CPRD Independent Scientific Advisory Committee (ISAC; protocol # 16_005RA2). The use of CPRD database was exempt from full Institutional Review Board (IRB) review by the National Institutes of Health (NIH) Office of Human Subject Research and the University of Maryland's IRB because of the anonymized nature of the data.

Results

The characteristics of DM1 patients involved in this study were described earlier.[95, 117, 125] Briefly, 511 (53%) had classic DM1, 314 (33%) had late-onset DM1, and 132 (14%) had congenital/childhood disease, with an overall average age at DM1 diagnosis of 31.7 years (standard deviation [SD]= 18), and an approximately equal sex distribution (51% and 49% for females and males, respectively).

Overall, 71 patients (7%) had thyroid disease, 244 had cataracts (25%), 72 had type II diabetes (8%), and only 8 patients had type I diabetes (<1%). Approximately 4% had both cataracts and type II diabetes, 3% had cataracts and thyroid disease, and less than 1% had thyroid disease and diabetes or all three conditions. Thyroid disease was more common in females (11%) than males (3%). Table 8 summarizes the prevalence of clinical phenotypes under study by sex. Of note, cataracts, type II diabetes, and thyroid disease were most commonly diagnosed in patients with late-onset DM1 (36%, 14%, and 14%, respectively), and to a lesser extent in patients with classic disease (23%, 5%, and 5%, respectively) and in those with congenital/childhood disease (12%, 2%, and 2%, respectively).

Female patients (HR=1.75, 95% CI=1.22-2.5, p= 0.002) and those with cataracts (HR =1.95, 95% CI=1.31-2.92, p=0.001) were more likely to develop benign tumors. No associations were noted with thyroid disease (HR=0.96, 95%CI=0.4-2.1, p=0.91), while a suggested increase in benign tumors was suggested for patients with type II diabetes (HR=1.77, 95%CI=0.9-3.7, p=0.13) (Table 9).

No statistically significant associations were observed between cancer risk and any of the variables under study (Table 9). However, the data suggested an increased risk of cancer in DM1 patients with type II diabetes (HR=1.69, 95% CI=0.65-4.40, p=0.28). When stratifying by DM1 severity, we found that thyroid disease was associated with a significant increase in cancer risk among patients with classic disease (HR=3.69, 95% CI=1.07-12.71, p=0.04); however, this association became statistically not significant after adjustment for sex and linkage status (HR=3.14, 95% CI=0.86-11.54, p=0.08). We found no other statistically significant differences across strata defined by sex or DM1 severity.

Discussion

We found cataracts, type II diabetes, and thyroid disease to be prevalent in DM1 patients. Thyroid abnormalities were significantly more common in females than in males, accounting for 80% of all DM1 patients with thyroid disease. We also found female DM1 patients and patients with cataracts to be at risk for developing benign tumors. An increase in both benign and malignant tumor risk was observed in patients with type II diabetes, albeit not statistically significant; and an increased cancer risk was noted in patients with classic DM1 and thyroid disease, although not statistically significant.

Endocrine abnormalities have been frequently reported in DM1 patients[2, 18, 65], however, their prevalence remains unclear. In a study of 97 DM1 patients, 5% had diabetes and 7% had thyroid disorder.[78] Another study of 106 French DM1 patients reported that 17% of

patients had diabetes.[75] Similarly, Cataracts are thought to occur in the majority of DM1 patients,[2, 14, 18, 34, 73, 74] with reported prevalence ranging from 13% to 91% in small single center studies.[73, 78] Of the 556 DM1 patients in the UK DM registry, 26% reported having had cataract surgery.[77] More recently, a large French study by Dogan *et al.* reported the frequency of thyroid disease (females=26.9%; males=10.6%), diabetes (females=8%; males=9.4%), and cataracts (females=67.4%; males=58.9%) in adult DM1 patients.[79] These inconsistencies are likely due to variable distributions of age, gender, or disease severity within the study populations. In our study, we used primary care medical records of DM1 patients and found that 7% had thyroid disease, 8% had type II diabetes, and 25% had cataracts. Consistent with Dogan et al, we found thyroid diseases to be more prevalent in women than men, however, we observed a lower proportion of affected patients (females=11%, males=3%).[79] Our diabetes and cataracts findings were similar to those reported in Dogan *et al.* and the UK DM registry, respectively.
We found diabetes and cataract to be diagnosed more in patients with late-onset of DM1 than in the other categories; these results were consistent with those of De Antonio *et al.,* who reported an increasing proportion of cataracts and diabetes with increasing age at DM1 onset.[126] Of note, after adjusting for age, patients with congenital/childhood disease were more likely to have cataracts, followed by patients with classic DM1 when compared with those with late-onset disease.

In comparing DM1-affected females with males, we found a significantly elevated risk of developing benign tumors among females, but no significant difference in cancer risk. These findings are consistent with the results from the UK myotonic dystrophy patient registry study.[89] Two cross-sectional studies in Italian[90] and US[94] DM1 patients found that females were more likely than males to develop tumors (benign and malignant combined). These differences may be driven by a high frequency of benign tumors.

The comparable cancer risk between male and female DM1 patients we observed conflicts with the higher cancer risk seen in men within the general population. It is likely that prostate, lung, and hematological malignancies, most commonly reported in English males,[127, 128] account for the observed difference. In our previous study using the same cohort, we observed no prostate cancer in DM1 patients and a deficit in lung and hematological cancers when compared with age- and sex- matched DM1-free individuals.[117] A recent study of Spanish DM1 patients reported that the microRNA-200/141 tumor-suppressor family was downregulated in females and upregulated in males, compared with healthy controls. Such underlying DM1-related molecular alterations could explain some of the discrepancy between DM1 patients and the general population with respect to sex-specific cancer risks.[6]

Contrary to Bianchi *et al*,[90] who reported an association between thyroid disease and tumors in women and no association with diabetes in DM1 patients, we found no significant associations between thyroid disease and tumors, except for a possible association with cancer in patients with classic DM1, and a possible association between type II diabetes and both benign and malignant tumors. In our study, we estimated the incidence of developing tumors after thyroid disease; whereas Bianchi et al's study was cross-sectional and therefore the temporal relationship was not considered. In the general population, diabetes mellitus is associated with several cancers including breast, colorectum, endometrium, liver, and pancreas, some of which are also common in DM1;[129-135] on the other hand, metformin use in patients with diabetes mellitus has been shown to reduce the risk of several cancers.[136, 137] It is possible that our observed association between diabetes and tumors in DM1 was attenuated by the use of metformin, which was shown to be effective in treating insulin resistance in DM1.[87, 138] Interestingly, patients with cataracts in our study were more likely to develop benign tumors compared to those without; an association that needs validation.

Our study faced several limitations. Although our cohort was one of the largest DM1 cohorts spanning the full clinical spectrum of the disease, the frequency of cancers (5%) remained low, which may have reduced our power to detect statistically significant differences between groups. Additionally, we were unable to adjust for lifestyle factors such as smoking, alcohol, and body mass index in the regression models because of the large proportion of missing data for these variables; however, previous studies suggested no associations between these factors and tumor development in DM1.[89, 90, 94] Further, genetic testing and direct measures for disease severity such as repeat expansion size were unavailable. To address this issue, we only included patients with Read codes specific to DM1 (described above) and used age at DM1 diagnosis as a proxy for disease severity instead. Although misclassification of our study variables is possible, studies of CPRD have shown high validity in the reporting of chronic conditions including neoplasms (of 26 studies, the median proportion of cases confirmed = 95.25%), diabetes (positive predictive value [PPV]=98.6%), cataracts (PPV=96.9%), and endocrine disorders (of 17 studies, the median proportion of cases confirmed = 87.7%); hence the potential for misclassification was reduced.[104-106]

Our findings of no associations between endocrine abnormalities or cataract and cancer risk need further investigation. If validated, this may suggest that cancers in DM1 have a distinct underlying biologic mechanism. Continued efforts to understand tumorigenesis in DM1 and identify patients at risk of developing benign and malignant tumors are warranted.

Table 8: Clinical characteristics DM1 patients stratified by sex.

Characteristic	Males (n=468)		Females (n=492)	
Age at DM1 diagnosis, *n (%)*				
Congenital/Childhood (0-10 years)	58	(12%)	76	(15%)
Classic (11-40 years)	238	(51%)	274	(56%)
Late-onset (>40 years)	172	(37%)	142	(29%)
Mean age at DM1 diagnosis, *mean (SD)*	32.8	(17.9)	30.5	(18.1)
Cataracts				
Yes, *n(%)*	119	(25%)	125	(25%)
Mean age at diagnosis, *mean (SD)*	44.4	(13.2)	42.7	(12.9)
Thyroid disease				
Overall	15	(3%)	56	(11%)
Hypothyroidism	6	(1%)	18	(4%)
Hyperthyroidism	a	a	8	(2%)
Goiter/nodule/cyst	a	a	18	(4%)
Unknown/uncertain	a	a	12	(2%)
Mean age at diagnosis, *mean (SD)*	51.4	(13.4)	43.9	(13.6)
Type II diabetes				
Yes, *n(%)*	36	(8%)	36	(7%)
Mean age at diagnosis, *mean (SD)*	49.1	(7.5)	50.3	(10.1)
Cancer				
Yes, *n(%)*	19	(4%)	25	(5%)
Mean age at diagnosis, *mean (SD)*	56.2	(12.6)	56.4	(14.7)
Benign tumor				
Yes, *n(%)*	48	(10%)	82	(17%)
Mean age at diagnosis, *mean (SD)*	44.7	(15.3)	42.9	(14.2)
Death during follow-up				
Yes, *n(%)*	146	(31%)	103	(21%)
Mean age at death, *mean (SD)*	55.2	(11.4)	56.6	(15.0)
Follow up time in years, *median (range)*[b]				
Cancer outcome	8.5	(0.5-28)	8.6	(0.5-28)
Benign outcome	5.9	(0-28)	5.2	(0-28)
Total person time, *(person-years)*[c]				
Cancer outcome	4,671.81		4,911.45	
Benign outcome	3,706.49		3,532.69	

[a] *Frequency was <5 patients*
[b] *This variable was defined based on the outcome of interest, hence the difference by outcome*
[c] *Due to the ascertainment of cancer from HES, additional follow-up time from this secondary data source was added for the cancer outcome in linked patients*

Table 9: Adjusted hazard ratios and 95% confidence intervals of tumor risk (malignant or benign) in DM1 patients comparing those with to those without selected clinical phenotypes and by sex.

	Malignant Tumors			Benign Tumors		
Variable	**Frequency** (%)	**HR**	**95% CI**	**Frequency** (%)	**HR**	**95% CI**
Sex						
Males	19 (4%)	Reference		48 (10%)	Reference	
Females	25 (5%)	1.20	(0.66, 2.20)	82 (17%)	1.75	(1.22, 2.51)
Cataracts						
No	30 (4%)	Reference		83 (12%)	Reference	
Yes	14 (6%)	0.80	(0.40, 1.61)	47 (19%)	1.95	(1.31, 2.92)
Thyroid disease						
No	41 (5%)	Reference		115 (13%)	Reference	
Yes	3 (4%)	0.81	(0.24, 2.68)	15 (21%)	0.96	(0.44, 2.08)
Type II diabetes						
No	37 (4%)	Reference		118 (13%)	Reference	
Yes	7 (10%)	1.69	(0.65, 4.40)	12 (17%)	1.77	(0.85, 3.71)

Models for cataracts, thyroid disease, and type II diabetes were adjusted for sex; cancer models were additionally adjusted for linkage status

Chapter 6: Discussion, Conclusion, and Future Directions

We conducted a large retrospective cohort study of DM1 patients and matched DM1-free individuals. We found that excess cancer risk in DM1 was restricted to those with the classic form (age at DM1 diagnosis=11-40 years), driven by previously-reported DM1 site-specific cancers, namely, cancers of the uterus, thyroid, and cutaneous melanoma. We also found that DM1 patients were at elevated risks of developing benign tumors, with no significant heterogeneity by DM1 severity; these benign tumors included pilomatricoma and other skin tumors, uterine fibroids and polyps, colorectal polyps, pituitary adenomas, salivary gland adenomas, and tumors of the brain and nervous system, similar to anatomic sites targeted by invasive cancers. Among DM1 patients, we found that females and those with cataracts were more likely to develop benign tumors, however, no associations were observed between cancer risk and sex, endocrinal abnormalities, or cataracts. Further, classic DM1 patients with benign tumors were more likely to develop subsequent cancer compared with those who were tumor-free.

6.1 Cancer risk is modified by disease severity

In this study, we found that excess cancer risk was restricted to patients with classic DM1, suggesting an association between cancer in DM1 and disease severity. To our knowledge, this study was the first to examine the effects of disease severity on relative cancer risk in DM1. The excess cancer risk in classic DM1 patients, driven by previously-reported affected cancer sites, points to the female genital organs, endocrine system, and possibly the skin as target tissues for carcinogenesis in DM1. The absence of cancer cases in patients with congenital/childhood DM1 may be a consequence of a small sample size or a high competing mortality in that subset of patients who may not live long enough to develop cancer. Our results and those of a previous study[114] showed that cancer is an adult phenotype in DM1 patients (median age-at-first-cancer in this study= 54 years, range=34-96 years). Surprisingly, we observed a lower than expected cancer risk in patients with late-onset DM1 compared with their matched DM1-free cohort (HR=0.5, p=0.01); however, these results should be interpreted with caution because of our observed attenuation of the effect size in the analysis restricted to patients with a record of DM1 in more than one data source (HR=0.8, p=0.61), in which we aimed to reduce potential misclassification of DM1 diagnosis. In addition, the risks for most cancer sites in late-onset DM1 were greater than those in matched DM1-free individuals, except for hematological, female breast, lung, and prostate cancers, all of which likely drove the inverse association. The differences in relative cancer risk between classic and late-onset DM1 patients reveals for the first time that disease severity modifies DM1-related cancer susceptibility.

6.2 Risk of benign tumors, and their association with subsequent cancer

Our study is the first to systematically quantify the risk of benign tumors in DM1, and support previous hypotheses of an excess risk of benign tumors in DM1 patients.[4] Unlike our findings in cancer, we observed no risk differences by disease severity categories (based on age at DM1 diagnosis) in overall benign tumor risk. Cancer risk was associated with having these benign neoplasms in patients with classic DM1; an association that was not observed in their matched DM1-free cohort. In late-onset DM1 patients, the relationship between benign tumors and subsequent cancer was not significantly different than that observed in the matched DM1-free cohort. These findings suggest that classic DM1 patients who present with benign tumors may need close monitoring because of their elevated risk of developing subsequent cancer.

The similarities between DM1 benign and malignant tumor profiles suggest that DM1 pathogenesis could include proliferative advantage that targets specific organs, including the skin, uterus, endocrine, brain and lower digestive systems. Previous research in trinucleotide repeat disorders showed that somatic instability is tissue-selective.[118] In DM1 patients, skeletal muscles, skin fibroblasts, and parts of the brain have longer repeat expansions than in the peripheral blood of the same patients.[119-122] Repeat size elongation has been reported in tumor tissue samples from DM1 patients when compared with adjacent normal,[43-47] but the association between blood repeat size and cancer was null in previous studies.[90, 94] Our findings shed light on the target tissues to investigate in future studies aiming to elucidate tumorigenesis in DM1.

6.3 Risk factors of tumor development in DM1

Among DM1 patients, we found females to be at significant risk of developing benign tumors compared with males, but no significant sex difference in cancer risk. The observed similarity in cancer risk comparing DM1 males and females is contrary to the higher risk seen in men compared with women in the general population. It is likely that prostate, lung, and hematological malignancies, most commonly reported in English males,[127, 128] account for the observed discrepancy. In this study, we observed no prostate cancer in DM1 patients and a deficit in lung and hematological cancers when compared with age- and sex- matched DM1-free individuals.[117]

Contrary to Bianchi *et al*,[90] who reported an association between thyroid disease and tumors in women, and no association with diabetes in DM1 patients, we found no significant associations between thyroid disease and tumors, except for a possible association with cancer in patients with classic DM1, and a possible association between type II diabetes and both benign and malignant tumors. In our study, we estimated the incidence of developing tumors after thyroid disease; whereas the study by Bianchi and colleagues was cross-sectional and therefore the temporal relationship was not considered. In the general population, diabetes mellitus is associated with several cancers including breast, colorectum, endometrium, liver, and pancreas, some of which are also common in DM1;[129-135] on the other hand, metformin use in patients with diabetes mellitus has been shown to reduce the risk of several cancers.[136, 137] It is possible that our observed association between diabetes and tumors in DM1 was attenuated by the use of metformin, which was shown to be effective in treating insulin resistance in DM1.[87, 138] Interestingly, patients with cataracts in our study were more likely to develop benign tumors compared to those without; an association that needs validation.

6.4 Strengths

Our study is the first to describe tumor risk in the full spectrum of DM1 patients and systematically evaluate the risk of benign tumors compared with matched DM1-free individuals.

A major strength of this study is that it used one of the largest electronic databases in the world, comprising longitudinal primary care medical records. Using CPRD data enabled us to study a large of DM1 patients (individuals with a very rare disease), and to readily construct a matched comparison cohort. The use of longitudinal data allowed us to evaluate incidence and investigate long-term outcomes such as cancer. Studies of CPRD have shown high validity in the reporting of the study variables including neoplasms (of 26 studies, the median proportion of cases confirmed = 95.25%), diabetes (PPV=98.6%), cataracts (PPV=96.9%), and endocrine disorders (of 17 studies, the median proportion of cases confirmed = 87.7%), which reduced the potential for misclassification of these variables. [104-106]

The use of primary care data allowed us to capture patients within the full spectrum of DM1, improving the generalizability of the findings and minimizing selection bias associated with identifying cases from tertiary care facilities or hospital records. Additionally, primary care records captured data on benign tumors, which are not routinely collected by cancer registries. Linking primary care records to other data sources such as Hospital Episode Statistics and ONS provided a comprehensive clinical picture for all participants. Lastly, CPRD patients were found to be representative of the general UK population with respect to age, sex, and ethnicity, therefore increasing generalizability. [103]

6.5 Limitations

While the use of electronic medical records reduces the possibility of recall bias compared with data collected through self-report, as a retrospective cohort study, misclassification of study variables remains a possibility. To address potential misclassification of DM1 status, we only included patients with diagnostic codes specific to DM1 (described earlier). In addition, we conducted multiple sensitivity analysis using more stringent definitions of DM1; our conclusions remained unchanged. Unfortunately, data on genetic testing or direct measures for disease severity such as repeat expansion size were not available for CPRD patients. Per NHS guidelines, repeat expansion sizes for DM1 patients are not recorded; in general, patients are designated as either having expanded or not expanded repeats. Instead we used age at first DM1 record as a proxy measure of disease severity. Previous studies have shown distinct clinical profiles based on age at disease onset, while associations between severity and repeat lengths were not very robust because of the wide variability of repeat size in classical adult-onset DM1.[2, 35, 126] In a large study of French DM1 patients, CTG expansion sizes overlapped between disease subtypes, and were found to be widely distributed in each clinical form.[126] Nonetheless, future studies in genetically well-characterized DM1 patients are warranted.

While validity estimates for CPRD diagnoses were high overall, unfortunately, most validation studies considered only positive predictive values without much consideration to negative predictive values.[105] This is of importance because, in our study, the absence of a Read code was considered as absence of the corresponding condition. However, because all variables of interest were chronic conditions, and CPRD primary care records also include information from secondary care, it is unlikely that any of these clinical conditions were missed. Finally, records from linkable databases such as HES and ONS were used to corroborate DM1 and cancer diagnoses and capture any missed cases.

Our study may have also been subject to detection bias. It is likely that tumors would be more frequently detected in DM1 patients than in DM1-free individuals because their condition requires more frequent clinic visits. To address this limitation, we adjusted for the average number of primary care visits per year in CPRD. Additionally, we do not suspect that healthcare providers had actively examined for cancers because cancer predisposition in DM1 is a fairly novel finding. Further, even with tumors that have been long known to be linked to DM1, such as pilomatricoma, we observed events that were reported in several DM1 patients before their first DM1 record. Although these events did not contribute to the risk analysis, they provided reassurance that our results were not likely driven by detection bias. Future studies evaluating stage at cancer diagnosis comparing DM1with DM1-free patients can help shed light on differences related to cancer detection; unfortunately, this information was not available for CPRD patients.

While follow-up time was similar in the DM1 and DM1-free cohorts in most cases, we provided sensitivity analyses where we ended follow-up at the same maximum time for both cohorts and our conclusions remained unchanged. Although our cohort was one of the largest DM1 cohorts spanning the full clinical spectrum of the disease, the frequency of cancers, other than non-melanoma skin, was low. This may have reduced our power to detect statistically significant differences between groups, and conclusions about some cancer sites could not be made. Previous studies have shown cancer frequencies in DM1 patient between 5% and 15%.[3, 5-8] Additionally, we were unable to adjust for lifestyle factors such as smoking, alcohol, and body mass index in the regression models, because of the large proportion of missing data for these variables. Yet, previous studies suggested no associations between these factors and tumor development in DM1.[89, 90, 94] Additionally, we conducted extreme case analyses in which we set all missing data to one category or the other to evaluate the importance of these variables, and did not observe significant changes in the main estimate, suggesting that these variables may not be important confounders.

6.6 Conclusions & future directions

Our study provides further evidence for the increased cancer susceptibility in patients with DM1 and reveals for the first time that disease severity modifies this association. We also showed that DM1 patients are at increased risk of developing benign tumors in the same organ systems affected by invasive cancers; these similarities point to the skin, uterus, endocrine and lower digestive systems as possible targets for tumorigenesis in DM1. Our findings suggest that classic DM1 patients who present with benign tumors may need close monitoring because of their elevated risk of subsequently developing cancer. Our findings of no associations between cancer risk and endocrine abnormalities or cataract suggest that cancers in DM1 may have a distinct underlying biologic mechanism. Validation of these results in other DM1 cohorts, and continued efforts to identify patients at risk of developing benign and malignant tumors are warranted. If confirmed, these findings may guide future studies aiming at understanding mechanisms of DM1-related tumorigenesis as well as clinical management of DM1 patients.

Appendix A: Neoplasm Codes

Comprehensive Read code list used to identify all neoplasm events

Med code	Read code	Read term	Probable tumor type
5062	B30..11	Chondroma	Benign
29735	B30..12	Osteoma	Benign
9194	B7...00	Benign neoplasms	Benign
14954	B70..00	Benign neoplasm of lip, oral cavity and pharynx	Benign
39586	B70..11	Benign neoplasm of oral cavity	Benign
41240	B70..12	Benign neoplasm of pharynx	Benign
31851	B700.00	Benign neoplasm of lip	Benign
62794	B700100	Benign neoplasm of external upper lip	Benign
98852	B700200	Benign neoplasm of internal upper lip	Benign
67647	B700300	Benign neoplasm of frenulum of upper lip	Benign
36636	B700400	Benign neoplasm of external lower lip	Benign
54629	B700500	Benign neoplasm of internal lower lip	Benign
67986	B700z00	Benign neoplasm of lip NOS	Benign
9842	B701.00	Benign neoplasm of tongue	Benign
70494	B701000	Benign neoplasm of base of tongue	Benign
24773	B701100	Benign neoplasm of dorsal surface of tongue	Benign
28139	B701200	Benign neoplasm of ventral surface of tongue	Benign
44689	B701300	Benign neoplasm of lingual tonsil	Benign
35997	B701z00	Benign neoplasm of tongue NOS	Benign
20154	B702.00	Benign neoplasm of major salivary glands	Benign
2597	B702000	Benign neoplasm of parotid gland	Benign
17012	B702011	Adenoma of parotid gland	Benign
34234	B702100	Benign neoplasm of submandibular gland	Benign
56335	B702200	Benign neoplasm of sublingual gland	Benign
11178	B702300	Warthin's tumour	Benign
66419	B702z00	Benign neoplasm of major salivary gland NOS	Benign
23705	B703.00	Benign neoplasm of floor of mouth	Benign
34697	B704.00	Benign neoplasm of oral cavity NOS	Benign
17139	B704000	Benign neoplasm of upper gum	Benign
29431	B704100	Benign neoplasm of lower gum	Benign
24209	B704200	Benign neoplasm of cheek mucosa	Benign
48848	B704300	Benign neoplasm of vestibule of mouth	Benign
21530	B704400	Benign neoplasm of hard palate	Benign
24302	B704500	Benign neoplasm of soft palate	Benign
25818	B704600	Benign neoplasm of uvula	Benign
44940	B704z00	Benign neoplasm of oral cavity NOS	Benign
10456	B705.00	Benign neoplasm of tonsil	Benign
95366	B706.00	Benign neoplasm of other parts of oropharynx	Benign
35965	B706000	Benign neoplasm of tonsillar fossa	Benign

49574	B706100	Benign neoplasm of anterior tonsillar pillar	Benign
28670	B706200	Benign neoplasm of posterior tonsillar pillar	Benign
70465	B706300	Benign neoplasm of vallecula	Benign
32904	B706400	Benign neoplasm of anterior epiglottis	Benign
33507	B706500	Benign neoplasm of oropharyngeal wall	Benign
44853	B706z00	Benign neoplasm of oropharynx NOS	Benign
59638	B707.00	Benign neoplasm of nasopharynx	Benign
99134	B707000	Benign neoplasm of nasopharyngeal roof	Benign
69400	B707100	Benign neoplasm of pharyngeal tonsil	Benign
104372	B707200	Benign neoplasm of pharyngeal recess	Benign
62793	B707z00	Benign neoplasm of nasopharynx NOS	Benign
69790	B708.00	Benign neoplasm of hypopharynx	Benign
99228	B708000	Benign neoplasm of postcricoid region	Benign
61402	B708100	Benign neoplasm of pyriform fossa	Benign
56238	B708200	Benign neoplasm of arytenoid fold	Benign
94421	B708z00	Benign neoplasm of hypopharynx NOS	Benign
51772	B70X.00	Benign neoplasm of pharynx, unspecified	Benign
60529	B70z.00	Benign neoplasm of lip, oral cavity and pharynx NOS	Benign
15459	B71..00	Benign neoplasm of other parts of digestive system	Benign
16077	B710.00	Benign neoplasm of oesophagus	Benign
3623	B710.11	Benign oesophageal polyp	Benign
59937	B710100	Benign neoplasm of upper 1/3 of oesophagus	Benign
56870	B710300	Benign neoplasm of lower 1/3 of oesophagus	Benign
72603	B710z00	Benign neoplasm of oesophagus NOS	Benign
2151	B711.00	Benign neoplasm of stomach	Benign
9930	B711.11	Gastric polyp	Benign
70651	B711000	Benign neoplasm of stomach cardia	Benign
62625	B711100	Benign neoplasm of pylorus of stomach	Benign
52425	B711200	Benign neoplasm of fundus of stomach	Benign
62798	B711300	Benign neoplasm of body of stomach	Benign
57870	B711400	Benign neoplasm of pyloric antrum	Benign
54667	B711z00	Benign neoplasm of stomach NOS	Benign
15203	B712.00	Benign neoplasm of small intestine and duodenum	Benign
48001	B712000	Benign neoplasm of duodenum	Benign
14949	B712011	Duodenal polyp	Benign
70965	B712100	Benign neoplasm of jejunum	Benign
43341	B712111	Jejunal polyp	Benign
70275	B712200	Benign neoplasm of ileum	Benign
95911	B712z00	Benign neoplasm of small intestine or duodenum NOS	Benign
15072	B713.00	Benign neoplasm of colon	Benign
2922	B713.11	Colon polyp	Benign
2719	B713.13	Polyposis coli	Benign
29916	B713000	Benign neoplasm of hepatic flexure of colon	Benign

55538	B713100	Benign neoplasm of transverse colon	Benign
47964	B713200	Benign neoplasm of descending colon	Benign
27577	B713300	Benign neoplasm of sigmoid colon	Benign
27402	B713400	Benign neoplasm of caecum	Benign
41880	B713500	Benign neoplasm of appendix	Benign
41898	B713600	Benign neoplasm of ascending colon	Benign
42868	B713700	Benign neoplasm of splenic flexure of colon	Benign
62226	B713800	Benign neoplasm of colostomy site	Benign
54880	B713811	Polyp of colostomy site	Benign
69106	B713900	Benign neoplasm of ileocaecal valve	Benign
25999	B713z00	Benign neoplasm of colon NOS	Benign
25862	B714.00	Benign neoplasm of rectum and anal canal	Benign
27925	B714000	Benign neoplasm of rectosigmoid junction	Benign
33345	B714100	Benign neoplasm of rectum	Benign
40656	B714111	Benign papilloma rectum	Benign
15062	B714200	Benign neoplasm of anal canal	Benign
41672	B714300	Benign neoplasm of anus NOS	Benign
61560	B714z00	Benign neoplasm of rectum or anal canal NOS	Benign
65678	B715.00	Benign neoplasm of liver and biliary ducts	Benign
103011	B715.11	Benign neoplasm of biliary system	Benign
17578	B715000	Benign neoplasm of liver	Benign
63714	B715100	Benign neoplasm of intrahepatic bile ducts	Benign
45725	B715200	Benign neoplasm of gallbladder	Benign
56235	B715300	Benign neoplasm of cystic duct	Benign
62214	B715400	Benign neoplasm of hepatic duct	Benign
70669	B715500	Benign neoplasm of bile duct	Benign
100285	B715600	Benign neoplasm of sphincter of Oddi	Benign
27559	B715700	Benign neoplasm of ampulla of Vater	Benign
106387	B715800	Focal nodular hyperplasia of liver	Benign
15467	B716.00	Benign neoplasm of pancreas, excluding islets of Langerhans	Benign
44681	B716000	Benign neoplasm of head of pancreas	Benign
43666	B716100	Benign neoplasm of body of pancreas	Benign
100445	B716200	Benign neoplasm of tail of pancreas	Benign
108522	B716300	Benign neoplasm of pancreatic duct	Benign
94439	B716z00	Benign neoplasm of pancreas, excluding islets NOS	Benign
4402	B717.00	Benign neoplasm of islets of Langerhans	Benign
55675	B717011	Endocrine tumour of pancreas	Benign
36081	B718.00	Benign neoplasm of retroperitoneum and peritoneum	Benign
67562	B718000	Benign neoplasm of periadrenal tissue	Benign
57781	B718100	Benign neoplasm of perinephric tissue	Benign
97951	B718200	Benign neoplasm of retrocaecal tissue	Benign
49536	B718500	Benign neoplasm of omentum	Benign
108663	B718600	Benign neoplasm of parietal peritoneum	Benign
102108	B718700	Benign neoplasm of pelvic peritoneum	Benign
32777	B718800	Benign neoplasm of mesothelial tissue of peritoneum	Benign

100280	B718A00	Benign neoplasm of connective and soft tissue of peritoneum	Benign
68227	B718z00	Benign neoplasm of retroperitoneum or peritoneum NOS	Benign
46711	B71z.00	Benign neoplasm of other parts of digestive system NOS	Benign
71558	B72..00	Benign neoplasm of respiratory and intrathoracic organs	Benign
70562	B72..12	Benign neoplasm of respiratory system	Benign
99920	B720.00	Benign neoplasm of nose, middle ear and accessory sinuses	Benign
56555	B720.11	Benign neoplasm of nasal sinus	Benign
43686	B720000	Benign neoplasm of nasal cavity	Benign
62434	B720011	Benign neoplasm of nose	Benign
64733	B720100	Benign neoplasm of middle ear	Benign
69791	B720200	Benign neoplasm of Eustachian tube	Benign
46249	B720300	Benign neoplasm of maxillary sinus	Benign
52149	B720400	Benign neoplasm of ethmoidal sinus	Benign
39380	B720500	Benign neoplasm of frontal sinus	Benign
61276	B720600	Benign neoplasm of sphenoidal sinus	Benign
56884	B720z00	Benign neoplasm of nose, ear or accessory sinuses NOS	Benign
45153	B721.00	Benign neoplasm of larynx	Benign
50952	B721000	Benign neoplasm of thyroid cartilage	Benign
93053	B721100	Benign neoplasm of cricoid cartilage	Benign
52507	B721200	Benign neoplasm of epiglottis	Benign
67118	B721300	Benign neoplasm of arytenoid cartilage	Benign
31702	B721600	Benign neoplasm of aryepiglottic fold	Benign
70996	B721700	Benign neoplasm of vestibular fold	Benign
67847	B721800	Benign neoplasm of vocal fold - glottis	Benign
51004	B721811	Benign neoplasm of glottis	Benign
26874	B721812	Benign neoplasm of vocal fold	Benign
42492	B721z00	Benign neoplasm of glottis NOS	Benign
17748	B721z11	Benign papilloma of larynx	Benign
59418	B722.00	Benign neoplasm of trachea	Benign
36329	B723.00	Benign neoplasm of bronchus and lung	Benign
11871	B723.11	Benign neoplasm of lung	Benign
94424	B723100	Benign neoplasm of main bronchus	Benign
67935	B723200	Benign neoplasm of upper lobe bronchus and lung	Benign
72401	B723300	Benign neoplasm of middle lobe bronchus and lung	Benign
64991	B723400	Benign neoplasm of lower lobe bronchus and lung	Benign
72802	B723z00	Benign neoplasm of bronchus or lung NOS	Benign
43750	B724.00	Benign neoplasm of pleura	Benign
71597	B724000	Benign neoplasm of parietal pleura	Benign
52311	B724100	Benign neoplasm of visceral pleura	Benign
53692	B724200	Benign neoplasm of mesothelial tissue of pleura	Benign
73746	B724z00	Benign neoplasm of pleura NOS	Benign
50459	B725.00	Benign neoplasm of mediastinum	Benign

96386	B725z00	Benign neoplasm of mediastinum NOS	Benign
42545	B726.00	Benign neoplasm of thymus	Benign
29562	B727.00	Benign neoplasm of heart	Benign
96229	B728.00	Atrial myxoma	Benign
38338	B72z.00	Benign neoplasm of respiratory or intrathoracic organs NOS	Benign
9190	B73..00	Benign neoplasm of bone and articular cartilage	Benign
14675	B73..11	Benign neoplasm of articular cartilage	Benign
4794	B73..12	Osteoma	Benign
43129	B730.00	Benign neoplasm of skull and facial bones	Benign
92796	B730.11	Benign neoplasm of face bone	Benign
52495	B730100	Benign neoplasm of frontal bone	Benign
48308	B730200	Benign neoplasm of parietal bone	Benign
64968	B730300	Benign neoplasm of sphenoid bone	Benign
68092	B730400	Benign neoplasm of temporal bone	Benign
97862	B730500	Benign neoplasm of ethmoid bone	Benign
52928	B730600	Benign neoplasm of occipital bone	Benign
48482	B730700	Benign neoplasm of maxilla	Benign
23694	B730800	Benign neoplasm of zygomatic bone	Benign
68689	B730900	Benign neoplasm of nasal bone	Benign
44485	B730A00	Benign neoplasm of bony palate	Benign
70560	B730B00	Benign neoplasm of palatine bone	Benign
56842	B730E00	Benign neoplasm of inferior concha	Benign
51542	B730z00	Benign neoplasm of skull or facial bone NOS	Benign
61773	B731.00	Benign neoplasm of lower jaw bone	Benign
2497	B731000	Benign neoplasm of mandible	Benign
73747	B731z00	Benign neoplasm of lower jaw bone NOS	Benign
73468	B732.00	Benign neoplasm vertebral column, excluding sacrum/coccyx	Benign
61275	B732.11	Benign neoplasm of spine	Benign
94587	B732.12	Benign neoplasm of vertebra	Benign
46783	B732000	Benign neoplasm of cervical vertebra	Benign
69276	B732100	Benign neoplasm of thoracic vertebra	Benign
61053	B732200	Benign neoplasm of lumbar vertebra	Benign
97942	B732z00	Benign neoplasm of vertebral column NOS	Benign
98670	B733.00	Benign neoplasm of ribs, sternum and clavicle	Benign
25807	B733.11	Benign neoplasm of sternum	Benign
52264	B733000	Benign neoplasm of rib	Benign
65534	B733100	Benign neoplasm of manubrium sterni	Benign
107729	B733200	Benign neoplasm of body of sternum	Benign
31842	B733300	Benign neoplasm of xiphoid process	Benign
50839	B733400	Benign neoplasm of costal cartilage	Benign
25823	B733500	Benign neoplasm of clavicle	Benign
64552	B733z00	Benign neoplasm of rib, sternum or clavicle NOS	Benign
70125	B734.00	Benign neoplasm of scapula and long bones of upper limb	Benign
56518	B734000	Benign neoplasm of scapula	Benign

33782	B734100	Benign neoplasm of humerus	Benign
64421	B734200	Benign neoplasm of radius	Benign
102034	B734300	Benign neoplasm of ulna	Benign
73798	B734z00	Benign neoplasm of scapula or long bones of upper limb NOS	Benign
24111	B735.00	Benign neoplasm of hand bones	Benign
30077	B735000	Benign neoplasm of scaphoid	Benign
69451	B735100	Benign neoplasm of lunate	Benign
65929	B735200	Benign neoplasm of triquetrum	Benign
104701	B735300	Benign neoplasm of pisiform	Benign
37838	B735400	Benign neoplasm of trapezium	Benign
104704	B735600	Benign neoplasm of capitate	Benign
61516	B735800	Benign neoplasm of metacarpal	Benign
63250	B735900	Benign neoplasm of phalanx of hand	Benign
92198	B735z00	Benign neoplasm of hand bone NOS	Benign
108790	B736.00	Benign neoplasm of pelvic bones, sacrum and coccyx	Benign
64458	B736000	Benign neoplasm of ilium	Benign
73763	B736200	Benign neoplasm of pubis	Benign
70472	B736300	Benign neoplasm of sacrum	Benign
71942	B736400	Benign neoplasm of coccyx	Benign
54985	B736500	Benign sacral teratoma	Benign
104810	B736z00	Benign neoplasm of pelvic bone, sacrum or coccyx NOS	Benign
100079	B737.00	Benign neoplasm of long bones of lower limb	Benign
43662	B737000	Benign neoplasm of femur	Benign
36383	B737100	Benign neoplasm of tibia	Benign
67886	B737200	Benign neoplasm of fibula	Benign
96393	B737z00	Benign neoplasm of long bone of lower limb NOS	Benign
71156	B738.00	Benign neoplasm of short bones of lower limb	Benign
61771	B738.11	Benign neoplasm of bone of foot	Benign
46780	B738000	Benign neoplasm of patella	Benign
71167	B738100	Benign neoplasm of talus	Benign
15695	B738200	Benign neoplasm of calcaneum	Benign
96608	B738300	Benign neoplasm of medial cuneiform	Benign
64780	B738600	Benign neoplasm of cuboid	Benign
51402	B738700	Benign neoplasm of navicular	Benign
27879	B738800	Benign neoplasm of metatarsal bone	Benign
66701	B738900	Benign neoplasm of phalanx of foot	Benign
93358	B738z00	Benign neoplasm of short bone of lower limb NOS	Benign
43230	B73z.00	Benign neoplasm of bone or articular cartilage NOS	Benign
8249	B73z.11	Chondroma	Benign
566	B74..00	Lipoma	Benign
42954	B740.00	Lipoma of skin and subcutaneous tissue of face	Benign
8755	B740000	Lipoma of forehead	Benign

60287	B740100	Lipoma of eyebrow	Benign
17031	B740200	Lipoma of eyelid	Benign
55738	B740300	Lipoma of external nose	Benign
16666	B740400	Lipoma of cheek	Benign
60387	B740500	Lipoma of temple	Benign
38007	B740600	Lipoma of ear	Benign
37997	B740700	Lipoma of external auditory meatus	Benign
64544	B740z00	Lipoma of skin and subcutaneous tissue of face NOS	Benign
15286	B741.00	Lipoma of skin and subcutaneous tissue (excluding face)	Benign
17759	B741000	Lipoma of scalp	Benign
2104	B741100	Lipoma of neck	Benign
28486	B741200	Lipoma of anterior chest wall	Benign
4007	B741300	Lipoma of posterior chest wall	Benign
8336	B741400	Lipoma of axilla	Benign
7316	B741500	Lipoma of shoulder	Benign
35951	B741600	Lipoma of upper arm	Benign
21547	B741700	Lipoma of forearm	Benign
17170	B741800	Lipoma of hand	Benign
8089	B741900	Lipoma of abdominal wall	Benign
21949	B741A00	Lipoma of buttock	Benign
19656	B741B00	Lipoma of perineum	Benign
43183	B741C00	Lipoma of groin	Benign
50752	B741D00	Lipoma of hip	Benign
28098	B741E00	Lipoma of thigh	Benign
21439	B741F00	Lipoma of knee and popliteal area	Benign
31646	B741G00	Lipoma of lower leg	Benign
47424	B741H00	Lipoma of foot	Benign
36363	B741J00	Lipoma of back	Benign
31683	B741K00	Lipoma of lower back	Benign
33627	B741L00	Lipoma of lateral chest wall	Benign
37437	B741z00	Lipoma of skin and subcutaneous tissue (excluding face) NOS	Benign
53026	B742.00	Lipoma of intrathoracic organs	Benign
16378	B743.00	Lipoma of intra-abdominal organs	Benign
30137	B744.00	Lipoma of spermatic cord	Benign
42706	B74y.00	Lipoma of other specified sites	Benign
54143	B74y000	Lipoma of spinal column	Benign
70427	B74y100	Lipoma of spinal canal - extradural	Benign
64310	B74y200	Lipoma of spinal canal - intradural	Benign
70599	B74y300	Lipoma of spinal cord	Benign
11165	B74z.00	Lipoma NOS	Benign
31973	B75..00	Other benign neoplasms of connective and soft tissue	Benign
68506	B750.00	Benign neoplasm connective and soft tissue head and neck NEC	Benign
15473	B750000	Benign neoplasm of connective and soft tissue of face NEC	Benign
94356	B750100	Benign neoplasm of connective and soft tissue of head NEC	Benign

64456	B750200	Benign neoplasm of connective and soft tissue of neck NEC	Benign
73513	B750z00	Benign neoplasm connective and soft tissue head or neck NOS	Benign
48097	B751.00	Benign neoplasm of connective and soft tissue of arm NEC	Benign
48115	B751000	Benign neoplasm of connective and soft tissue shoulder NEC	Benign
63200	B751100	Benign neoplasm of connective and soft tissue upper arm NEC	Benign
58860	B751200	Benign neoplasm of connective and soft tissue of forearm NEC	Benign
61772	B751300	Benign neoplasm of connective and soft tissue of hand NEC	Benign
100277	B751z00	Benign neoplasm of connective and soft tissue of arm NOS	Benign
31770	B752.00	Benign neoplasm of connective and soft tissue of leg NEC	Benign
62667	B752000	Benign neoplasm of connective and soft tissue of hip NEC	Benign
43117	B752100	Benign neoplasm of connective and soft tissue of thigh NEC	Benign
38350	B752200	Benign neoplasm of connective and soft tissue of knee NEC	Benign
69653	B752300	Benign neoplasm of connective and soft tissue lower leg NEC	Benign
60840	B752400	Benign neoplasm of connective and soft tissue of foot NEC	Benign
70986	B752z00	Benign neoplasm of connective and soft tissue of leg NOS	Benign
60383	B753.00	Benign neoplasm of connective and soft tissue of thorax NEC	Benign
73756	B753000	Benign neoplasm soft tissue of thoracic spine	Benign
67784	B754.00	Benign neoplasm of connective and soft tissue of abdomen NEC	Benign
99289	B755.00	Benign neoplasm of connective and soft tissue of pelvis NEC	Benign
65134	B755000	Benign neoplasm of connective and soft tissue of buttock NEC	Benign
63977	B755100	Benign neoplasm of connective and soft tissue of groin NEC	Benign
65111	B755200	Benign neoplasm of connective and soft tissue perineum NEC	Benign
71224	B755z00	Benign neoplasm of connective and soft tissue of pelvis NOS	Benign
48108	B756.00	Benign neoplasm of connective and soft tissue of trunk NEC	Benign
62472	B75y.00	Benign neop connective and soft tissue other specified site	Benign
48150	B75z.00	Benign neoplasm of connective and soft tissue NOS	Benign
5329	B76..00	Benign neoplasm of skin	Benign
1689	B76..11	Benign naevus of skin	Benign
9680	B76..12	Blue naevus	Benign

1051	B76..13	Dermatofibroma	Benign
581	B76..14	Mole of skin	Benign
1099	B76..15	Papilloma of skin	Benign
473	B76..16	Pigmented naevus	Benign
53835	B76..17	Skin tag NOS	Benign
39387	B76..18	Syringoadenoma	Benign
5186	B76..19	Syringoma	Benign
33787	B760.00	Benign neoplasm of skin of lip	Benign
19255	B761.00	Benign neoplasm of eyelid including canthus	Benign
44718	B761000	Benign neoplasm of canthus	Benign
37741	B762.00	Benign neoplasm of skin of ear and external auditory meatus	Benign
38484	B762.11	Benign neoplasm of ear	Benign
37148	B762000	Benign neoplasm of skin of auricle	Benign
4066	B762100	Benign neoplasm of skin of external auditory meatus	Benign
70459	B762z00	Benign neoplasm skin of ear or external auditory meatus NOS	Benign
28089	B763.00	Benign neoplasm of skin of face NEC	Benign
12758	B763000	Benign neoplasm of skin of forehead	Benign
30623	B763100	Benign neoplasm of skin of nose	Benign
21074	B763200	Benign neoplasm of skin of cheek	Benign
59422	B763300	Benign neoplasm of skin of eyebrow	Benign
38348	B763400	Benign neoplasm of skin of temple	Benign
43692	B763500	Benign neoplasm of skin of chin	Benign
54863	B763z00	Benign neoplasm of skin of face NOS	Benign
41106	B764.00	Benign neoplasm of scalp and skin of neck	Benign
16798	B764000	Benign neoplasm of scalp	Benign
23901	B764100	Benign neoplasm of skin of neck	Benign
63209	B764z00	Benign neoplasm of scalp or skin of neck NOS	Benign
42081	B765.00	Benign neoplasm of skin of trunk, excluding scrotum	Benign
27531	B765000	Benign neoplasm of skin of axilla	Benign
28143	B765100	Benign neoplasm of skin of breast	Benign
24474	B765200	Benign neoplasm of skin of chest	Benign
17688	B765300	Benign neoplasm of skin of abdomen	Benign
20213	B765400	Benign neoplasm of skin of umbilicus	Benign
16637	B765500	Benign neoplasm of skin of groin	Benign
38374	B765600	Benign neoplasm of skin of perineum	Benign
42483	B765700	Benign neoplasm of skin of buttock	Benign
20262	B765800	Benign neoplasm of perianal skin	Benign
11514	B765900	Benign neoplasm of skin of back	Benign
64399	B765z00	Benign neoplasm of skin of trunk, excluding scrotum, NOS	Benign
45135	B766.00	Benign neoplasm of skin of upper limb and shoulder	Benign
63295	B766.11	Benign neoplasm of skin of arm	Benign
19160	B766000	Benign neoplasm of skin of shoulder	Benign
53313	B766100	Benign neoplasm of skin of upper arm	Benign

41862	B766200	Benign neoplasm of skin of fore-arm	Benign
53360	B766300	Benign neoplasm of skin of hand	Benign
69856	B766z00	Benign neoplasm of skin of upper limb or shoulder NOS	Benign
45884	B767.00	Benign neoplasm of skin of hip and lower limb	Benign
69450	B767.11	Benign neoplasm of skin of leg	Benign
62872	B767000	Benign neoplasm of skin of hip	Benign
30304	B767100	Benign neoplasm of skin of thigh	Benign
57302	B767200	Benign neoplasm of skin of knee	Benign
41802	B767300	Benign neoplasm of skin of lower leg	Benign
27288	B767400	Benign neoplasm of skin of foot	Benign
68998	B767z00	Benign neoplasm of skin of hip or lower limb NOS	Benign
1199	B768.00	Melanocytic naevi of skin	Benign
28582	B768000	Melanocytic naevi of lip	Benign
24179	B768100	Melanocytic naevi of eyelid, including canthus	Benign
37159	B768200	Melanocytic naevi of ear and external auricular canal	Benign
38470	B768300	Melanocytic naevi of other and unspecified parts of face	Benign
28357	B768400	Melanocytic naevi of scalp and neck	Benign
23788	B768500	Melanocytic naevi of trunk	Benign
38680	B768600	Melanocytic naevi of upper limb, including shoulder	Benign
49656	B768700	Melanocytic naevi of lower limb, including hip	Benign
38449	B768800	Benign naevus of sole of foot	Benign
103748	B768900	Atypical mole syndrome	Benign
9820	B768X00	Melanocytic naevi, unspecified	Benign
38388	B769.00	Reticulohistiocytoma	Benign
29326	B76A.00	Naevoxanthoendothelioma	Benign
5042	B76B.00	Xanthogranuloma	Benign
86748	B76C.00	Birt Hogg Dube syndrome	Benign
104684	B76D.00	Multiple self-healing epithelioma of Ferguson-Smith	Benign
30931	B76y.00	Benign neoplasm of other specified skin sites	Benign
27618	B76z.00	Benign neoplasm of skin NOS	Benign
5411	B77..00	Benign neoplasm of breast	Benign
1098	B77..11	Fibroadenoma of breast	Benign
19138	B770.00	Benign neoplasm of female breast	Benign
51631	B771.00	Benign neoplasm of male breast	Benign
28870	B77z.00	Benign neoplasm of breast NOS	Benign
759	B78..00	Uterine leiomyoma - fibroids	Benign
432	B78..11	Fibroids	Benign
32719	B780.00	Submucous uterine leiomyoma	Benign
12512	B781.00	Intramural uterine leiomyoma	Benign
55349	B781.11	Mural fibroids	Benign
41134	B782.00	Subserous uterine leiomyoma	Benign
3402	B78z.00	Uterine leiomyoma NOS	Benign

14960	B79..00	Other benign neoplasm of uterus	Benign
36293	B790.00	Benign neoplasm of cervix uteri NEC	Benign
1340	B790.11	Adenomatous polyp - cervix uteri	Benign
62383	B791.00	Benign neoplasm corpus uteri NEC	Benign
22609	B791000	Benign neoplasm of endometrium NEC	Benign
45735	B791100	Benign neoplasm of myometrium NEC	Benign
70785	B791200	Benign neoplasm of uterine fundus NEC	Benign
66816	B791z00	Benign neoplasm of corpus uteri NOS	Benign
66436	B79y.00	Benign neoplasm of other specified sites of uterus	Benign
56515	B79z.00	Benign neoplasm of uterus NOS	Benign
18639	B7A..00	Benign neoplasm of ovary	Benign
11728	B7A..11	Dermoid cyst of ovary	Benign
20663	B7A1.00	Dermoid cyst	Benign
11937	B7A2.00	Benign teratoma of ovary	Benign
18215	B7B..00	Benign neoplasm of other female genital organs	Benign
15118	B7B..11	Teratoma, benign	Benign
73740	B7B0.00	Benign neoplasm of fallopian tubes and uterine ligaments	Benign
29583	B7B0000	Benign neoplasm of fallopian tube	Benign
94258	B7B0100	Benign neoplasm of broad ligament	Benign
46838	B7B0200	Benign neoplasm of round ligament	Benign
22830	B7B0300	Benign neoplasm of ovarian ligament	Benign
97728	B7B0z00	Benign neoplasm of fallopian tube or uterine ligament NOS	Benign
21202	B7B1.00	Benign neoplasm of vagina	Benign
20905	B7B1000	Skin tag in vagina	Benign
62915	B7B1z00	Benign neoplasm vagina NOS	Benign
28087	B7B2.00	Benign neoplasm of vulva	Benign
40642	B7B2000	Benign neoplasm of labia majora	Benign
12616	B7B2100	Benign neoplasm of labia minora	Benign
46871	B7B2200	Benign neoplasm of clitoris	Benign
18965	B7B2300	Benign neoplasm of Bartholin's gland	Benign
70090	B7B2z00	Benign neoplasm of vulva NOS	Benign
20268	B7By.00	Benign neoplasm of other specified site female genital organ	Benign
16303	B7Bz.00	Benign neoplasm of other female genital organ NOS	Benign
46061	B7C..00	Benign neoplasm of male genital organs	Benign
24885	B7C0.00	Benign neoplasm of testis	Benign
43675	B7C1.00	Benign neoplasm of penis	Benign
30978	B7C1000	Benign neoplasm of prepuce of penis	Benign
19648	B7C1100	Benign neoplasm of glans penis	Benign
48836	B7C1200	Benign neoplasm of corpus spongiosum	Benign
46499	B7C1300	Benign neoplasm of corpus cavernosum	Benign
38359	B7C1z00	Benign neoplasm of penis NOS	Benign
30073	B7C2.00	Benign neoplasm of prostate	Benign
104567	B7C2000	Adenoma of prostate	Benign
105394	B7C2100	Fibroma of prostate	Benign
29725	B7C3.00	Benign neoplasm of epididymis	Benign

2959	B7C4.00	Benign neoplasm of scrotal skin	Benign
31867	B7Cy.00	Benign neoplasm of other male genital organ	Benign
65896	B7Cy000	Benign neoplasm of seminal vesicle	Benign
24313	B7Cy100	Benign neoplasm of spermatic cord	Benign
20041	B7Cyz00	Benign neoplasm of other male genital organ NOS	Benign
47958	B7Cz.00	Benign neoplasm of male genital organ NOS	Benign
50498	B7D..00	Benign neoplasm of kidney and other urinary organs	Benign
36562	B7D..11	Renal benign neoplasms	Benign
20050	B7D0.00	Benign neoplasm of renal parenchyma	Benign
30518	B7D0.11	Benign neoplasm of kidney	Benign
68313	B7D1.00	Benign neoplasm of renal pelvis	Benign
63193	B7D2.00	Benign neoplasm of ureter	Benign
25217	B7D3.00	Benign neoplasm of bladder	Benign
22886	B7D3000	Benign papilloma of bladder	Benign
106533	B7Dy.00	Benign neoplasm of other specified urinary organ	Benign
65354	B7Dy000	Benign neoplasm of urethra	Benign
39364	B7Dy100	Benign neoplasm of paraurethral glands	Benign
65465	B7Dy200	Benign neoplasm of urachus	Benign
48234	B7Dz.00	Benign neoplasm of kidney or urinary organ NOS	Benign
40562	B7E..00	Benign neoplasms of eye	Benign
27716	B7E0.00	Benign neoplasm of eye NEC	Benign
98525	B7E0000	Benign neoplasm of ciliary body	Benign
6911	B7E0100	Benign neoplasm of iris	Benign
51651	B7E0200	Benign neoplasm of sclera	Benign
64466	B7E0z00	Benign neoplasm of eye NEC NOS	Benign
39318	B7E1.00	Benign neoplasm of orbit	Benign
55348	B7E2.00	Benign neoplasm of lacrimal gland	Benign
26428	B7E3.00	Benign neoplasm of conjunctiva	Benign
63566	B7E4.00	Benign neoplasm of cornea	Benign
18807	B7E5.00	Benign neoplasm of retina	Benign
47567	B7E6.00	Benign neoplasm of choroid	Benign
34059	B7E7.00	Benign neoplasm of lacrimal duct	Benign
94747	B7E7100	Benign neoplasm nasolacrimal duct	Benign
69626	B7E7z00	Benign neoplasm lacrimal duct NOS	Benign
94340	B7E8.00	Naevus of choroid	Benign
64225	B7Ey.00	Benign neoplasm of other specified parts of eye	Benign
67031	B7Ez.00	Benign neoplasm of eye NOS	Benign
27289	B7F..00	Benign neoplasm of brain and other parts of nervous system	Benign
11678	B7F0.00	Benign neoplasm of brain	Benign
31189	B7F0.11	Cerebral tumour - benign	Benign
55419	B7F0000	Benign neoplasm of brain, supratentorial	Benign
44776	B7F1.00	Benign neoplasm of cranial nerves	Benign
6174	B7F1000	Acoustic neuroma	Benign

18200	B7F2.00	Benign neoplasm of cerebral meninges	Benign
8672	B7F2000	Cerebral meningioma	Benign
65069	B7F2z00	Benign neoplasm of cerebral meninges NOS	Benign
31391	B7F3.00	Benign neoplasm of spinal cord	Benign
35095	B7F4.00	Benign neoplasm of spinal meninges	Benign
9544	B7F4000	Spinal meningioma	Benign
94426	B7F4z00	Benign neoplasm of spinal meninges NOS	Benign
37637	B7FX.00	Benign neoplasm of meninges, unspecified	Benign
15101	B7Fy.00	Benign neoplasm of other part of nervous system	Benign
36565	B7Fy000	Benign neoplasm of periph nerves & autonomic nervous system	Benign
3743	B7Fy100	Morton neuroma	Benign
60341	B7Fz.00	Benign neoplasm of brain or other nervous system NOS	Benign
37758	B7G..00	Benign neoplasm of thyroid gland	Benign
2610	B7G..11	Adenoma of thyroid gland	Benign
52727	B7H..00	Benign neoplasm other endocrine gland and related structures	Benign
35362	B7H0.00	Benign neoplasm of adrenal gland	Benign
40538	B7H0000	Benign phaeochromocytoma	Benign
15751	B7H1.00	Benign neoplasm of parathyroid gland	Benign
5706	B7H2.00	Benign neoplasm of pituitary gland and craniopharyngeal duct	Benign
2321	B7H2.11	Pituitary adenoma	Benign
20267	B7H2000	Benign neoplasm of pituitary gland	Benign
46829	B7H2100	Benign neoplasm of Rathke's pouch	Benign
15635	B7H2200	Benign neoplasm of sella turcica	Benign
55379	B7H2300	Benign neoplasm of craniopharyngeal duct	Benign
71886	B7H2z00	Benign neoplasm of pituitary and craniopharyngeal duct NOS	Benign
50466	B7H3.00	Benign neoplasm of pineal gland	Benign
39432	B7H4.00	Benign neoplasm of carotid body	Benign
64587	B7H5.00	Benign neoplasm of aortic body and other paraganglia	Benign
58575	B7H5000	Benign neoplasm of glomus jugulare	Benign
37162	B7H5100	Benign neoplasm of aortic body	Benign
53562	B7H5200	Benign neoplasm of coccygeal body	Benign
73669	B7H5z00	Benign neoplasm of aortic body and other paraganglia NOS	Benign
20306	B7Hy.00	Benign neoplasm of other specified endocrine site	Benign
106431	B7Hz.00	Benign neoplasm of endocrine gland or related structures NOS	Benign
57570	B7J..00	Haemangiomas and lymphangiomas of any site	Benign
8521	B7J..11	Angioma - benign	Benign
16337	B7J..12	Cavernous naevus	Benign
679	B7J0.00	Haemangioma	Benign
15169	B7J0.11	Glomus tumour	Benign
15185	B7J0000	Haemangioma of unspecified site	Benign

1165	B7J0100	Haemangioma of skin and subcutaneous tissue	Benign
12281	B7J0111	Skin haemangioma	Benign
48140	B7J0112	Subcutaneous haemangioma	Benign
5100	B7J0200	Haemangioma of intracranial structures	Benign
43674	B7J0300	Haemangioma of retina	Benign
33366	B7J0400	Haemangioma of intra-abdominal structures	Benign
28527	B7J0z00	Haemangioma NOS	Benign
3692	B7J1.00	Lymphangioma	Benign
34693	B7J1.11	Congenital lymphangioma	Benign
49537	B7J1.12	Naevus - lymphatic	Benign
101374	B7J1000	Cystic hygroma of neck	Benign
33641	B7Jz.00	Haemangioma or lymphangioma NOS	Benign
35706	B7z..00	Benign neoplasm of other and unspecified site	Benign
16418	B7z0.00	Benign neoplasm of lymph nodes	Benign
43835	B7zy.00	Benign neoplasm of other specified sites	Benign
62476	B7zy100	Benign neoplasm of nose	Benign
62601	B7zyX00	Benign neoplasm of mesothelial tissue, unspecified	Benign
15125	B7zz.00	Benign neoplasm NOS	Benign
12629	BB00.00	[M]Neoplasm, benign	Benign
6895	BB05.00	[M]Tumour cells, benign	Benign
10805	BB10.00	[M]Epithelial tumour, benign	Benign
6457	BB15.00	[M]Epithelioma, benign	Benign
6280	BB3B.00	[M]Pilomatrixoma	Benign
28812	BB3B.11	[M]Malherbe's calcified epithelioma	Benign
1799	BB5..12	[M]Adenomas	Benign
30125	BB59.00	[M]Monomorphic adenoma	Benign
34291	BB5A.00	[M]Basal cell adenoma	Benign
29792	BB5D400	[M]Liver cell adenoma	Benign
37483	BB5D412	[M]Hepatoma, benign	Benign
28563	BB65.00	[M]Hidrocystoma	Benign
12254	BB66.00	[M]Papillary hydradenoma	Benign
28178	BBa0.00	[M]Craniopharyngioma	Benign
3710	BBB1.00	[M]Adenolymphoma	Benign
31343	BBB6000	[M]Thymoma, benign	Benign
107253	BBC6000	[M]Androblastoma, benign	Benign
48560	BBC6011	[M]Arrhenoblastoma, benign	Benign
62944	BBCC000	[M]Leydig cell tumour, benign	Benign
49286	BBCC011	[M]Interstitial cell tumour, benign	Benign
11754	BBCG.00	[M]Sclerosing stromal tumour	Benign
2843	BBd..00	[M]Meningiomas	Benign
24924	BBD..00	[M]Paragangliomas and glomus tumours	Benign
36209	BBD6.00	[M]Carotid body tumour	Benign
3023	BBe..11	[M]Neurofibromas	Benign
3659	BBE0.00	[M]Pigmented naevus NOS	Benign
832	BBE0.12	[M]Naevus NOS	Benign
22843	BBe5.00	[M]Neurilemmoma NOS	Benign

4776	BBE5.00	[M]Halo naevus	Benign
8527	BBe5.13	[M]Schwannoma NOS	Benign
2296	BBe8.00	[M]Neuroma NOS	Benign
931	BBEJ.00	[M]Intradermal naevus	Benign
9568	BBEJ.11	[M]Dermal naevus	Benign
1732	BBEK.00	[M]Compound naevus	Benign
1261	BBEN.00	[M]Epithelioid and spindle cell naevus	Benign
4871	BBEN.11	[M]Juvenila melanoma	Benign
4716	BBEU.00	[M]Blue naevus NOS	Benign
7264	BBEW.00	[M]Cellular blue naevus	Benign
3376	BBEY.00	[M]Dysplastic naevus	Benign
29359	BBF0.00	[M]Soft tissue tumour, benign	Benign
49131	BBg0.00	[M]Lymphomatous tumour, benign	Benign
2507	BBG0.00	[M]Fibroma NOS	Benign
10465	BBG0.11	[M]Fibroma durum	Benign
22655	BBGK.13	[M]Sclerosing haemangioma	Benign
27905	BBGK.14	[M]Subepidermal nodular fibrosis	Benign
8985	BBH0.00	[M]Myxoma NOS	Benign
6720	BBJ2.12	[M]Soft fibroma	Benign
27596	BBJB200	[M]Angiolipoma NOS	Benign
28324	BBK0000	[M]Leiomyoma NOS	Benign
8655	BBK0011	[M]Fibroid uterus	Benign
47874	BBL..00	[M]Complex mixed and stromal neoplasms	Benign
7802	BBL3.00	[M]Pleomorphic adenoma	Benign
71746	BBLC000	[M]Mesenchymoma, benign	Benign
5694	BBM..00	[M]Fibroepithelial neoplasms	Benign
1722	BBM1.00	[M]Fibroadenoma NOS	Benign
17446	BBM4.11	[M]Cystadenofibroma NOS	Benign
36242	BBM7.11	[M]Cystosarcoma phyllodes, benign	Benign
34332	BBN0.00	[M]Synovioma, benign	Benign
44207	BBn1.00	[M]Plasma cell tumour, benign	Benign
58075	BBn1.11	[M]Plasmacytoma, benign	Benign
70951	BBP0.00	[M]Mesothelioma, benign	Benign
96515	BBP2.00	[M]Fibrous mesothelioma, benign	Benign
100375	BBP4.00	[M]Epithelioid mesothelioma, benign	Benign
21882	BBP8.00	[M]Adenomatoid tumour NOS	Benign
40449	BBQ6.00	[M]Gonadoblastoma	Benign
17435	BBQ7.00	[M]Teratomas	Benign
50432	BBQ7000	[M]Teratoma, benign	Benign
847	BBQ8.00	[M]Dermoid cyst	Benign
11051	BBQ8.11	[M]Dermoid NOS	Benign
4873	BBR5.00	[M]Partial hydatidiform mole	Benign
45686	BBT0.00	[M]Haemangioma NOS	Benign
5989	BBT0.11	[M]Angioma NOS	Benign
4392	BBT2.00	[M]Cavernous haemangioma	Benign
94042	BBT7000	[M]Haemangioendothelioma, benign	Benign
7363	BBT8.00	[M]Capillary haemangioma	Benign
99715	BBTD000	[M]Haemangiopericytoma, benign	Benign
1325	BBU4.11	[M]Cystic hygroma	Benign

44191	BBU4.12	[M]Hygroma	Benign
3166	BBW0.00	[M]Osteochondroma	Benign
5773	BBW0.13	[M]Osteocartilaginous exostosis	Benign
4781	BBW2.11	[M]Enchondroma	Benign
49568	BBWA.00	[M]Chondromyxoid fibroma	Benign
22330	BBX..00	[M]Giant cell tumours	Benign
69172	BBy0.00	[M]No microscopic confirmation of tumour, clinically benign	Benign
95603	BBZ0.00	[M]Odontogenic tumour, benign	Benign
65086	BBZ5.00	[M]Cementoblastoma, benign	Benign
55929	ByuG.00	[X]Benign neoplasms	Benign
97575	ByuG000	[X]Benign neoplasm of other and unspecified parts of mouth	Benign
50810	ByuG100	[X]Benign neoplasm of other parts of oropharynx	Benign
97876	ByuG600	[X]Ben lipomatous neoplsm/skin+subcut tissu/oth+unspcf sites	Benign
95147	ByuG700	[X]Benign lipomatous neoplasm of other sites	Benign
73950	ByuG900	[X]Melanocytic naevi of other and unspecified parts of face	Benign
98193	ByuGA00	[X]Benign neoplasm/skin of other+unspecified parts of face	Benign
33859	ByuGB00	[X]Benign neoplasm of other parts of uterus	Benign
71428	ByuGC00	[X]Benign neoplasm of other specified female genital organs	Benign
59038	ByuGD00	[X]Benign neoplasm of other male genital organs	Benign
56872	ByuGH00	[X]Benign neoplasm of other specified sites	Benign
17589	ByuGH11	[X]Benign dermoid cyst of hand	Benign
98684	ByuGJ00	[X]Benign neoplasm of pharynx, unspecified	Benign
53816	ByuGN00	[X]Melanocytic naevi, unspecified	Benign
17064	142..00	H/O: malignant neoplasm (*)	History of Cancer
7628	142..11	H/O: cancer	History of Cancer
7900	142..12	H/O: carcinoma	History of Cancer
18866	142..13	H/O: malignancy	History of Cancer
31282	142..14	H/O: mitotic lesion	History of Cancer
12492	142..15	H/O: neoplasm	History of Cancer
7761	1425000	H/O Malignant melanoma	History of Cancer
20570	14CB.00	H/O Upper GIT Neoplasm	History of Cancer
39660	14CC.00	H/O Lower GIT Neoplasm	History of Cancer
12106	ZV10.00	[V]Personal history of malignant neoplasm	History of Cancer
62814	ZV10000	[V]Personal history of malig neop of gastrointestinal tract	History of Cancer
68018	ZV10011	[V]Personal history of malignant neoplasm of anus	History of Cancer
64568	ZV10012	[V]Personal history of malig neop of gastrointestinal tract	History of Cancer
57727	ZV10014	[V]Personal history of malignant neoplasm of large intestine	History of Cancer

58177	ZV10015	[V]Personal history of malignant neoplasm of liver	History of Cancer
51001	ZV10016	[V]Personal history of malignant neoplasm of oesophagus	History of Cancer
62785	ZV10017	[V]Personal history of malignant neoplasm of rectum	History of Cancer
49447	ZV10018	[V]Personal history of malignant neoplasm of stomach	History of Cancer
99931	ZV10019	[V]Personal history of malignant neoplasm of tongue	History of Cancer
49289	ZV10100	[V]Personal history of malig neop of trachea/bronchus/lung	History of Cancer
32246	ZV10111	[V]Personal history of malignant neoplasm of bronchus	History of Cancer
29284	ZV10112	[V]Personal history of malignant neoplasm of lung	History of Cancer
72262	ZV10200	[V]Personal history of malig neop other intrathoracic organ	History of Cancer
61655	ZV10211	[V]Personal history of malignant neoplasm - accessory sinus	History of Cancer
43311	ZV10212	[V]Personal history of malignant neoplasm of larynx	History of Cancer
39863	ZV10214	[V]Personal history of malignant neoplasm of nose	History of Cancer
16639	ZV10300	[V]Personal history of malignant neoplasm of breast	History of Cancer
9444	ZV10400	[V]Personal history of malignant neoplasm of genital organ	History of Cancer
23936	ZV10411	[V]Personal history of malignant neoplasm of cervix uteri	History of Cancer
109429	ZV10412	[V]Personal history of malignant neoplasm of genital organ	History of Cancer
52141	ZV10414	[V]Personal history of malignant neoplasm of ovary	History of Cancer
37306	ZV10415	[V]Personal history of malignant neoplasm of prostate	History of Cancer
48808	ZV10416	[V]Personal history of malignant neoplasm of testis	History of Cancer
46779	ZV10417	[V]Personal history of malignant neoplasm of uterine body	History of Cancer
30322	ZV10500	[V]Personal history of malignant neoplasm of urinary organ	History of Cancer
35816	ZV10511	[V]Personal history of malignant neoplasm of bladder	History of Cancer
47683	ZV10512	[V]Personal history of malignant neoplasm of kidney	History of Cancer
28881	ZV10513	[V]Personal history of malignant neoplasm of kidney	History of Cancer
36693	ZV10600	[V]Personal history of leukaemia	History of Cancer
94597	ZV10611	[V]Personal history of lymphoid leukaemia	History of Cancer
110058	ZV10613	[V]Personal history of myeloid leukaemia	History of Cancer
72204	ZV10700	[V]Personal history other lymphatic/haematopoietic neoplasm	History of Cancer
40561	ZV10711	[V]Personal history of Hodgkin's disease	History of Cancer

66457	ZV10y00	[V]Personal history of other specified malignant neoplasm	History of Cancer
46282	ZV10y11	[V]Personal history of malignant neoplasm of bone	History of Cancer
48085	ZV10y12	[V]Personal history of malignant neoplasm of brain	History of Cancer
103100	ZV10y13	[V]Personal history of malignant neoplasm of eye	History of Cancer
47669	ZV10y14	[V]Personal history of malignant neoplasm of skin	History of Cancer
35771	ZV10y15	[V]Personal history of malignant neoplasm of thyroid	History of Cancer
45803	ZV10y16	[V]Personal history of malignant neoplasm of tongue	History of Cancer
68612	ZV10z00	[V]Personal history of unspecified malignant neoplasm	History of Cancer
6090	1424	H/O: * breast	History of Cancer
6230	1425	H/O: * skin	History of Cancer
6674	1428.11	H/O: * bladder	History of Cancer
8503	142B.00	H/O: * ears, nose, throat	History of Cancer
8751	1428.12	H/O: * kidney	History of Cancer
11768	1423.11	H/O: * lung	History of Cancer
17177	1429	H/O: * leukaemia	History of Cancer
18208	1428	H/O: * urinary system	History of Cancer
18479	1426	H/O: * female genital tract	History of Cancer
18674	1427	H/O: * male genital tract	History of Cancer
29747	1422	H/O: * bronchus	History of Cancer
29992	1421	H/O: * gastrointestinal tract	History of Cancer
36821	1423.12	H/O: * trachea	History of Cancer
51182	142A.00	H/O: * other lymph/haematopoi.	History of Cancer
54786	1423	H/O: * trachea/lung	History of Cancer
59886	142Z.00	H/O: * NOS	History of Cancer
102314	1427000	H/O: prostate cancer	History of Cancer
7473	B8...00	Carcinoma in situ	In Situ
2467	B8...11	Bowen's disease	In Situ
34088	B8...12	Erythroplasia	In Situ
51899	B8...13	Queyrats's erythroplasia	In Situ
60511	B80..00	Carcinoma in situ of digestive organs	In Situ
33250	B80..11	Ca-in-situ of G.I. tract	In Situ
95390	B800.00	Carcinoma in situ of lip, oral cavity and pharynx	In Situ
37505	B800.11	Carcinoma in situ of oral cavity	In Situ
42129	B800.12	Carcinoma in situ of pharynx	In Situ
47737	B800000	Carcinoma in situ of lip	In Situ
27944	B800100	Carcinoma in situ of tongue	In Situ
50288	B800200	Carcinoma in situ of salivary glands	In Situ
57866	B800300	Carcinoma in situ of gums	In Situ
24801	B800400	Carcinoma in situ of floor of mouth	In Situ
34823	B800500	Carcinoma in situ of cheek	In Situ
30966	B800600	Carcinoma in situ of palate	In Situ
36104	B800700	Carcinoma in situ of nasopharynx	In Situ

50419	B800800	Carcinoma in situ of oropharynx	In Situ
44663	B800900	Carcinoma in situ of hypopharynx	In Situ
37187	B800z00	Carcinoma in situ of lip, oral cavity and pharynx NOS	In Situ
8244	B801.00	Carcinoma in situ of oesophagus	In Situ
99155	B801000	Carcinoma in situ of upper 1/3 oesophagus	In Situ
64274	B801100	Carcinoma in situ of middle 1/3 oesophagus	In Situ
56077	B801200	Carcinoma in situ of lower 1/3 oesophagus	In Situ
44228	B801z00	Carcinoma in situ of oesophagus NOS	In Situ
17093	B802.00	Carcinoma in situ of stomach	In Situ
17258	B802000	Carcinoma in situ of cardia of stomach	In Situ
72947	B802100	Carcinoma in situ of fundus of stomach	In Situ
63087	B802200	Carcinoma in situ of body of stomach	In Situ
51748	B802300	Carcinoma in situ of pyloric antrum	In Situ
58883	B802400	Carcinoma in situ of pyloric canal	In Situ
37774	B802z00	Carcinoma in situ of stomach NOS	In Situ
6903	B803.00	Carcinoma in situ of colon	In Situ
39080	B803000	Carcinoma in situ of hepatic flexure of colon	In Situ
37125	B803100	Carcinoma in situ of transverse colon	In Situ
47667	B803200	Carcinoma in situ of descending colon	In Situ
17144	B803300	Carcinoma in situ of sigmoid colon	In Situ
16916	B803400	Carcinoma in situ of caecum	In Situ
47656	B803500	Carcinoma in situ of appendix	In Situ
31893	B803600	Carcinoma in situ of ascending colon	In Situ
22699	B803700	Carcinoma in situ of splenic flexure of colon	In Situ
105228	B803800	High grade dysplasia of colon	In Situ
33561	B803z00	Carcinoma in situ of colon NOS	In Situ
60477	B804.00	Carcinoma in situ of rectum and rectosigmoid junction	In Situ
27811	B804000	Carcinoma in situ of rectosigmoid junction	In Situ
29975	B804100	Carcinoma in situ of rectum	In Situ
38883	B804z00	Carcinoma in situ of rectum or rectosigmoid junction NOS	In Situ
51054	B805.00	Carcinoma in situ of anal canal	In Situ
34094	B805000	Anal intraepithelial neoplasia grade III	In Situ
12273	B806.00	Carcinoma in situ of anus NOS	In Situ
22392	B807.00	Carcinoma in situ of other and unspecified small intestine	In Situ
45070	B807000	Carcinoma in situ of duodenum	In Situ
63804	B807100	Carcinoma in situ of jejunum	In Situ
45217	B807200	Carcinoma in situ of ileum	In Situ
100183	B807300	Carcinoma in situ of Meckel's diverticulum	In Situ
70728	B807z00	Carcinoma in situ other and unspecified small intestine NOS	In Situ
66673	B808.00	Carcinoma in situ of liver and biliary system	In Situ
51934	B808.11	Carcinoma in situ of biliary system	In Situ
25310	B808000	Carcinoma in situ of liver	In Situ

99580	B808100	Carcinoma in situ of intrahepatic bile ducts	In Situ
37501	B808200	Carcinoma in situ of hepatic duct	In Situ
46594	B808300	Carcinoma in situ of gall bladder	In Situ
73164	B808400	Carcinoma in situ of cystic duct	In Situ
64089	B808500	Carcinoma in situ of common bile duct	In Situ
21792	B808600	Carcinoma in situ of ampulla of Vater	In Situ
98540	B808z00	Carcinoma in situ of liver or biliary system NOS	In Situ
44166	B80z.00	Carcinoma in situ of other and unspecified digestive organs	In Situ
16931	B80z000	Carcinoma in situ of pancreas	In Situ
64700	B80z100	Carcinoma in situ of spleen	In Situ
64050	B81..00	Carcinoma in situ of respiratory system	In Situ
11403	B810.00	Carcinoma in situ of larynx	In Situ
35772	B810000	Carcinoma in situ of thyroid cartilage	In Situ
36948	B810100	Carcinoma in situ of cricoid cartilage	In Situ
53460	B810200	Carcinoma in situ of epiglottis	In Situ
65953	B810300	Carcinoma in situ of arytenoid cartilage	In Situ
31860	B810600	Carcinoma in situ of aryepiglottic fold	In Situ
73076	B810700	Carcinoma in situ of vestibular fold	In Situ
7697	B810800	Carcinoma in situ of vocal fold - glottis	In Situ
10375	B810811	Carcinoma in situ of glottis	In Situ
53882	B810z00	Carcinoma in situ of larynx NOS	In Situ
51714	B811.00	Carcinoma in situ of trachea	In Situ
9267	B812.00	Carcinoma in situ of bronchus and lung	In Situ
49159	B812000	Carcinoma in situ of carina of bronchus	In Situ
35058	B812100	Carcinoma in situ of main bronchus	In Situ
37579	B812200	Carcinoma in situ of upper lobe bronchus and lung	In Situ
47897	B812300	Carcinoma in situ of middle lobe bronchus and lung	In Situ
52373	B812400	Carcinoma in situ of lower lobe bronchus and lung	In Situ
25372	B812z00	Carcinoma in situ of bronchus or lung NOS	In Situ
97954	B81y.00	Carcinoma in situ of other specified part respiratory system	In Situ
59426	B81y.11	Carcinoma in situ of nasal sinuses	In Situ
46497	B81y000	Carcinoma in situ of pleura	In Situ
39717	B81y100	Carcinoma in situ of nasal cavity	In Situ
97200	B81y400	Carcinoma in situ of Eustachian tube	In Situ
68135	B81y500	Carcinoma in situ of mastoid air cells	In Situ
43380	B81y600	Carcinoma in situ of maxillary sinus	In Situ
26846	B81y700	Carcinoma in situ of ethmoidal sinus	In Situ
39064	B81y900	Carcinoma in situ of sphenoidal sinus	In Situ
95559	B81yz00	Carcinoma in situ of specified parts respiratory system NOS	In Situ
62610	B81z.00	Carcinoma in situ of respiratory organ NOS	In Situ
12084	B82..00	Carcinoma in situ of skin	In Situ
63957	B820.00	Carcinoma in situ of skin of lip	In Situ
57550	B821.00	Carcinoma in situ of skin of eyelid including canthus	In Situ

50189	B822.00	Carcinoma in situ skin of ear and external auricular canal	In Situ
32249	B822.11	Carcinoma in situ of ear	In Situ
59614	B822000	Carcinoma in situ of skin of auricle	In Situ
70295	B822z00	Carcinoma in situ skin of ear/external auricular canal NOS	In Situ
49254	B823.00	Carcinoma in situ of skin of other parts of face	In Situ
47789	B823000	Carcinoma in situ of skin of forehead skin	In Situ
69720	B823100	Carcinoma in situ of skin of eyebrow	In Situ
61103	B823300	Carcinoma in situ of skin of cheek	In Situ
3135	B823400	Carcinoma in situ of skin of nose	In Situ
31511	B823500	Carcinoma in situ of skin of temple	In Situ
65222	B823600	Carcinoma in situ of skin of jaw	In Situ
110614	B823z00	Carcinoma in situ of skin of other parts of face NOS	In Situ
69345	B824.00	Carcinoma in situ of scalp and skin of neck	In Situ
19665	B824000	Carcinoma in situ of scalp	In Situ
54140	B824100	Carcinoma in situ of skin of neck	In Situ
52328	B825.00	Carcinoma in situ of skin of trunk, excluding scrotum	In Situ
8647	B825000	Carcinoma in situ of skin of breast	In Situ
62939	B825100	Carcinoma in situ of skin of chest wall NOS	In Situ
39390	B825200	Carcinoma in situ of skin of axilla	In Situ
38032	B825300	Carcinoma in situ of skin of back	In Situ
42212	B825400	Carcinoma in situ of skin of abdominal wall	In Situ
57358	B825500	Carcinoma in situ of skin of groin	In Situ
38777	B825600	Carcinoma in situ of skin of perineum	In Situ
61321	B825700	Carcinoma in situ of skin of buttock	In Situ
56374	B825800	Carcinoma in situ of perianal skin	In Situ
60563	B825z00	Carcinoma in situ of skin of trunk NOS	In Situ
46568	B826.00	Carcinoma in situ of skin of upper limb and shoulder	In Situ
56554	B826000	Carcinoma in situ of skin of shoulder	In Situ
57284	B826100	Carcinoma in situ of skin of upper arm	In Situ
54790	B826200	Carcinoma in situ of skin of lower arm	In Situ
49358	B826300	Carcinoma in situ of skin of hand	In Situ
90339	B826z00	Carcinoma in situ of skin of upper limb or shoulder NOS	In Situ
14815	B827.00	Carcinoma in situ of skin of lower limb and hip	In Situ
708	B827.11	Carcinoma in situ of skin of leg	In Situ
71655	B827000	Carcinoma in situ of skin of hip	In Situ
46469	B827100	Carcinoma in situ of skin of thigh	In Situ
69601	B827200	Carcinoma in situ of skin of knee	In Situ
27542	B827300	Carcinoma in situ of skin of lower leg	In Situ
67755	B827400	Carcinoma in situ of skin of foot	In Situ
64630	B827z00	Carcinoma in situ of skin of lower limb or hip NOS	In Situ
19686	B828.00	Melanoma in situ of skin	In Situ

46536	B828000	Melanoma in situ of lip	In Situ
37108	B828100	Melanoma in situ of eyelid, including canthus	In Situ
72032	B828200	Melanoma in situ of ear and external auricular canal	In Situ
97858	B828300	Melanoma in situ of scalp and neck	In Situ
59768	B828400	Melanoma in situ of trunk	In Situ
56694	B828500	Melanoma in situ of upper limb, including shoulder	In Situ
47850	B828600	Melanoma in situ of lower limb, including hip	In Situ
49572	B828700	Melanoma in situ of scalp	In Situ
52332	B828800	Melanoma in situ of back of hand	In Situ
71044	B828900	Melanoma in situ of back	In Situ
54246	B828W00	Melanoma in situ, unspecified	In Situ
61989	B828X00	Melanoma in situ of other and unspecified parts of face	In Situ
108227	B829.00	Bowenoid papulosis	In Situ
57450	B82y.00	Carcinoma in situ of other specified sites of skin	In Situ
63142	B82z.00	Carcinoma in situ of skin NOS	In Situ
45681	B83..00	Carcinoma in situ of breast and genitourinary system	In Situ
7833	B830.00	Carcinoma in situ of breast	In Situ
10387	B830000	Lobular carcinoma in situ of breast	In Situ
18694	B830100	Intraductal carcinoma in situ of breast	In Situ
3279	B831.00	Carcinoma in situ of cervix uteri	In Situ
4087	B831.11	CIN III - carcinoma in situ of cervix	In Situ
5295	B831.12	Cervical intraepithelial neoplasia	In Situ
21886	B831.13	Cervical intraepithelial neoplasia grade III	In Situ
24228	B831000	Carcinoma in situ of endocervix	In Situ
50126	B831100	Carcinoma in situ of exocervix	In Situ
29898	B832.00	Carcinoma in situ of other and unspecified parts of uterus	In Situ
61803	B832.11	Carcinoma in situ of body of uterus	In Situ
7904	B832000	Carcinoma in situ of endometrium	In Situ
44915	B833.00	Carcinoma in situ other and unspecified female genital organ	In Situ
17137	B833000	Carcinoma in situ of ovary	In Situ
59499	B833100	Carcinoma in situ of fallopian tube	In Situ
34946	B833200	Carcinoma in situ of vagina	In Situ
12119	B833300	Carcinoma in situ of vulva	In Situ
3281	B833311	Vulval intraepithelial neoplasia	In Situ
97096	B833400	Vulval intraepithelial neoplasia grade 1	In Situ
96999	B833500	Vulval intraepithelial neoplasia grade 2	In Situ
97107	B833600	Vulval intraepithelial neoplasia grade 3	In Situ
102476	B833700	Vaginal intraepithelial neoplasia grade 1	In Situ
101708	B833800	Vaginal intraepithelial neoplasia grade 2	In Situ
102599	B833900	Vaginal intraepithelial neoplasia grade 3	In Situ
69208	B833z00	Carcinoma in situ of female genital organs NOS	In Situ
6328	B834.00	Carcinoma in situ of prostate	In Situ

54599	B834000	High grade prostatic intraepithelial neoplasia	In Situ
105236	B834100	Prostatic intraepithelial neoplasia	In Situ
27311	B835.00	Carcinoma in situ of penis	In Situ
107958	B836.00	Carcinoma in situ other and unspecified male genital organs	In Situ
8177	B836000	Carcinoma in situ of testis	In Situ
58879	B836300	Carcinoma in situ of scrotum	In Situ
109831	B836z00	Carcinoma in situ of male genital organs NOS	In Situ
7187	B837.00	Carcinoma in situ of bladder	In Situ
68358	B83z.00	Carcinoma in situ of urinary organs NOS	In Situ
38611	B8y..00	Carcinoma in situ of other and unspecified sites	In Situ
58124	B8y0.00	Carcinoma in situ of eye	In Situ
53349	B8yy.00	Carcinoma in situ of other specified site	In Situ
8958	B8yy000	Carcinoma in situ of thyroid gland	In Situ
46478	B8yy100	Carcinoma in situ of adrenal gland	In Situ
58016	B8yy200	Carcinoma in situ of parathyroid gland	In Situ
45909	B8yy300	Carcinoma in situ of pituitary gland	In Situ
56640	B8yyz00	Carcinoma in situ of other specified site NOS	In Situ
35136	B8z..00	Carcinoma in situ NOS	In Situ
20564	BB11.00	[M]Carcinoma in situ NOS	In Situ
21914	BB11.11	[M]Intraepithelial carcinoma NOS	In Situ
38651	BB21.00	[M]Papillary carcinoma in situ	In Situ
10134	BB29.00	[M]Squamous cell carcinoma in situ NOS	In Situ
48182	BB29.11	[M]Epidermoid carcinoma in situ	In Situ
19041	BB29.12	[M]Intraepidermal carcinoma NOS	In Situ
19678	BB29.13	[M]Intraepithelial squamous cell carcinoma	In Situ
61928	BB2H.00	[M]Squamous cell ca-in-situ, questionable stromal invasion	In Situ
8917	BB2L.00	[M]Bowen's disease	In Situ
44534	BB2N.00	[M]Intraepit neop,grade III,of cervix, vulva and vagina	In Situ
21652	BB42.00	[M]Transitional cell carcinoma in situ	In Situ
27827	BB51.00	[M]Adenocarcinoma in situ	In Situ
29170	BB51000	[M]Adenocarcinoma in situ in villous adenoma	In Situ
37137	BB51100	[M]Adenocarcinoma in situ in tubulovillous adenoma	In Situ
55741	BB5L200	[M]Adenocarcinoma in situ in adenomatous polyp	In Situ
21861	BB9E.00	[M]Lobular carcinoma in situ	In Situ
9956	BB9E000	[M]Intraductal carcinoma and lobular carcinoma in situ	In Situ
3564	BBEB.00	[M]Junctional naevus	In Situ
20709	BBEF.00	[M]Hutchinson's melanotic freckle	In Situ
2705	BBEF.11	[M]Lentigo maligna	In Situ
39059	BBEX.00	[M]Melanoma in situ	In Situ
10395	BBm7.00	[M] Monoclonal gammopathy	In Situ
101772	ByuF.00	[X]In situ neoplasms	In Situ

102708	ByuF100	[X]Carcinoma in situ of other specified digestive organs	In Situ
100781	ByuF300	[X]Carcinoma in situ of other parts of respiratory system	In Situ
97628	ByuF600	[X]Melanoma in situ of other sites	In Situ
101561	ByuF900	[X]Carcinoma in situ of skin, unspecified	In Situ
72695	ByuFA00	[X]Carcinoma in situ of other parts of cervix	In Situ
106003	ByuFC00	[X]Carcinoma in situ of oth+unspecified male genital organs	In Situ
73261	ByuFF00	[X]Melanoma in situ, unspecified	In Situ
53803	ByuFG00	[X]Other carcinoma in situ of breast	In Situ
110775	B151100	Malignant neoplasm of interlobular biliary canals	Malignant - other
110192	B315300	Malig neopl of connective and soft tissue - sacrum or coccyx	Malignant - other
109827	B329.00	Malignant melanoma stage IB	Malignant - other
110139	B32A.00	Malignant melanoma stage IIA	Malignant - other
110180	B32B.00	Malignant melanoma stage IIB	Malignant - other
110961	B32F.00	Malignant melanoma stage IIIC	Malignant - other
109745	B32G.00	Malignant melanoma stage IV M1a	Malignant - other
110483	B32H.00	Malignant melanoma stage IV M1b	Malignant - other
108363	B509.00	Malignant melanoma of eye	Malignant - other
110766	B521000	Malignant neoplasm of cerebral dura mater	Malignant - other
110563	B616500	Hodgkin's lymphocytic depletion lymph nodes inguinal and leg	Malignant - other
110903	B623800	Malignant histiocytosis of lymph nodes of multiple sites	Malignant - other
34926	B625.00	Letterer-Siwe disease	Malignant - other
102715	B625000	Letterer-Siwe disease of unspecified sites	Malignant - other
102158	B625200	Letterer-Siwe disease of intrathoracic lymph nodes	Malignant - other
54083	B625800	Letterer-Siwe disease of lymph nodes of multiple sites	Malignant - other
47204	B625z00	Letterer-Siwe disease NOS	Malignant - other
110191	B62B.00	Multifocal and unisystemic Langerhans-cell histiocytosis	Malignant - other
37468	B671.00	Chronic erythraemia	Malignant - other
63653	B671.11	Heilmeyer - Schoner disease	Malignant - other
110838	B676.00	Acute erythroid leukaemia	Malignant - other
104273	B677.00	Myelodysplastic and myeloproliferative disease	Malignant - other
100590	BB03.12	[M]Tumour embolus	Malignant - other
100112	BB03.13	[M]Tumour embolism	Malignant - other
22267	BB04.00	[M]Neoplasm, malig, uncertain whether primary or metastatic	Malignant - other
29945	BBR4.00	[M]Malignant teratoma, trophoblastic	Malignant - other
98322	BBT7100	[M]Haemangioendothelioma, malignant	Malignant - other
10335	1O0..00	Cancer confirmed	Malignant - other
40113	677H.00	Cancer information offered	Malignant - other
47018	677K.00	Cancer home care pack given	Malignant - other
37775	67D2.00	Cancer information offered to patient	Malignant - other

25349	67G2.00	Cancer information offered to significant other	Malignant - other
64997	7L1d.00	Delivery of chemotherapy for neoplasm	Malignant - other
96310	7L1dy00	Other specified delivery of chemotherapy for neoplasm	Malignant - other
95424	7L1dz00	Delivery of chemotherapy for neoplasm NOS	Malignant - other
90743	7L1e.00	Delivery of oral chemotherapy for neoplasm	Malignant - other
94431	7L1ez00	Delivery of oral chemotherapy for neoplasm NOS	Malignant - other
26197	8B3p.00	Administration of cancer treatment	Malignant - other
783	8BAD.00	Chemotherapy	Malignant - other
5019	8BAD000	Cancer chemotherapy	Malignant - other
10652	8BAV.00	Cancer care review	Malignant - other
19310	8BC3.00	Cancer care plan given	Malignant - other
32411	8BC6.00	Cancer treatment started	Malignant - other
54336	8BCF.00	Cancer hospital treatment completed	Malignant - other
10292	8CL0.00	Cancer diagnosis discussed	Malignant - other
9965	8CM0.00	Cancer care plan	Malignant - other
10334	8CP0.00	Cancer care plan discussed with patient	Malignant - other
52401	8CP1.00	Cancer care plan discussed with significant other	Malignant - other
26259	8CR8.00	Cancer shared care medication card	Malignant - other
10333	8HH8.00	Referred to cancer primary healthcare multidisciplinary team	Malignant - other
106601	8HgQ.00	Discharge from cancer primary healthcare MDT	Malignant - other
54313	8O83.00	Cancer emotional and psychosocial support and advice	Malignant - other
102339	9EV3.00	Cancer multidisciplinary team report	Malignant - other
10332	9NX0.00	Cancer primary healthcare multidisciplinary team	Malignant - other
70300	9NX1.00	Cancer supportive care worker	Malignant - other
19326	9Ok..00	Cancer monitoring administration	Malignant - other
58086	9Ok0.00	Cancer monitoring first letter	Malignant - other
69610	9Ok1.00	Cancer monitoring second letter	Malignant - other
69618	9Ok2.00	Cancer monitoring third letter	Malignant - other
42228	9OkA.00	Cancer monitoring verbal invitation	Malignant - other
90515	9OkB.00	Cancer monitoring telephone invitation	Malignant - other
7593	H51y700	Malignant pleural effusion	Malignant - other
31489	ZV58800	[V]Chemotherapy session for neoplasm	Malignant - other
31561	ZV67600	[V]Follow-up examination aft surgery for malignant neoplasm	Malignant - other
30547	ZV67700	[V]Follow-up exam after radiotherapy for malignant neoplasm	Malignant - other
25479	ZV67800	[V]Follow-up examin after chemotherapy for malign neoplasm	Malignant - other
42509	ZV67900	[V]Follow-up exam aft combined treatment for malig neoplasm	Malignant - other
44421	ZV67A00	[V]Folow-up exam aft other treatment for malignant neoplasm	Malignant - other

36321	ZV67B00	[V]Folow-up exam aft unspec treatment for malignant neoplasm	Malignant - other
44389	ZV71100	[V]Observation for suspected malignant neoplasm	Malignant - other
108905	68W2400	Bowel scope (flexible sigmoidoscopy) screen: cancer detected	Malignant - other
2755	B....11	Cancers	Malignant - Primary
19415	B0...00	Malignant neoplasm of lip, oral cavity and pharynx	Malignant - Primary
24374	B0...11	Carcinoma of lip, oral cavity and pharynx	Malignant - Primary
14712	B00..00	Malignant neoplasm of lip	Malignant - Primary
9984	B00..11	Carcinoma of lip	Malignant - Primary
73962	B000.00	Malignant neoplasm of upper lip, vermilion border	Malignant - Primary
66270	B000000	Malignant neoplasm of upper lip, external	Malignant - Primary
50296	B000100	Malignant neoplasm of upper lip, lipstick area	Malignant - Primary
98740	B000z00	Malignant neoplasm of upper lip, vermilion border NOS	Malignant - Primary
67446	B001.00	Malignant neoplasm of lower lip, vermilion border	Malignant - Primary
66384	B001000	Malignant neoplasm of lower lip, external	Malignant - Primary
95480	B001100	Malignant neoplasm of lower lip, lipstick area	Malignant - Primary
101707	B001z00	Malignant neoplasm of lower lip, vermilion border NOS	Malignant - Primary
99493	B002.00	Malignant neoplasm of upper lip, inner aspect	Malignant - Primary
99001	B002100	Malignant neoplasm of upper lip, frenulum	Malignant - Primary
98500	B002200	Malignant neoplasm of upper lip, mucosa	Malignant - Primary
90610	B002300	Malignant neoplasm of upper lip, oral aspect	Malignant - Primary
100721	B002z00	Malignant neoplasm of upper lip, inner aspect NOS	Malignant - Primary
71147	B003.00	Malignant neoplasm of lower lip, inner aspect	Malignant - Primary
67504	B003000	Malignant neoplasm of lower lip, buccal aspect	Malignant - Primary
91843	B003100	Malignant neoplasm of lower lip, frenulum	Malignant - Primary
89909	B003200	Malignant neoplasm of lower lip, mucosa	Malignant - Primary
94441	B003300	Malignant neoplasm of lower lip, oral aspect	Malignant - Primary
96782	B003z00	Malignant neoplasm of lower lip, inner aspect NOS	Malignant - Primary
61692	B004.00	Malignant neoplasm of lip unspecified, inner aspect	Malignant - Primary
73614	B004000	Malignant neoplasm of lip unspecified, buccal aspect	Malignant - Primary
68399	B004200	Malignant neoplasm of lip unspecified, mucosa	Malignant - Primary
100144	B004300	Malignant neoplasm of lip, oral aspect	Malignant - Primary
96783	B005.00	Malignant neoplasm of commissure of lip	Malignant - Primary
18882	B006.00	Malignant neoplasm of overlapping lesion of lip	Malignant - Primary

37553	B007.00	Malignant neoplasm of lip, unspecified	Malignant - Primary
100906	B00z000	Malignant neoplasm of lip, unspecified, external	Malignant - Primary
94251	B00z100	Malignant neoplasm of lip, unspecified, lipstick area	Malignant - Primary
69761	B00zz00	Malignant neoplasm of lip, vermilion border NOS	Malignant - Primary
10283	B01..00	Malignant neoplasm of tongue	Malignant - Primary
43431	B010.00	Malignant neoplasm of base of tongue	Malignant - Primary
69671	B010.11	Malignant neoplasm of posterior third of tongue	Malignant - Primary
34409	B010000	Malignant neoplasm of base of tongue dorsal surface	Malignant - Primary
91035	B010z00	Malignant neoplasm of fixed part of tongue NOS	Malignant - Primary
43642	B011.00	Malignant neoplasm of dorsal surface of tongue	Malignant - Primary
107258	B011100	Malignant neoplasm of midline of tongue	Malignant - Primary
43781	B011z00	Malignant neoplasm of dorsum of tongue NOS	Malignant - Primary
36161	B012.00	Malignant neoplasm of tongue, tip and lateral border	Malignant - Primary
62840	B013.00	Malignant neoplasm of ventral surface of tongue	Malignant - Primary
102142	B013000	Malignant neoplasm of anterior 2/3 of tongue ventral surface	Malignant - Primary
63979	B013100	Malignant neoplasm of frenulum linguae	Malignant - Primary
38488	B013z00	Malignant neoplasm of ventral tongue surface NOS	Malignant - Primary
58121	B014.00	Malignant neoplasm of anterior 2/3 of tongue unspecified	Malignant - Primary
37096	B015.00	Malignant neoplasm of tongue, junctional zone	Malignant - Primary
24852	B016.00	Malignant neoplasm of lingual tonsil	Malignant - Primary
47205	B017.00	Malignant overlapping lesion of tongue	Malignant - Primary
41530	B01y.00	Malignant neoplasm of other sites of tongue	Malignant - Primary
40557	B01z.00	Malignant neoplasm of tongue NOS	Malignant - Primary
20292	B02..00	Malignant neoplasm of major salivary glands	Malignant - Primary
4388	B020.00	Malignant neoplasm of parotid gland	Malignant - Primary
51786	B021.00	Malignant neoplasm of submandibular gland	Malignant - Primary
70928	B022.00	Malignant neoplasm of sublingual gland	Malignant - Primary
70696	B02y.00	Malignant neoplasm of other major salivary glands	Malignant - Primary
50475	B02z.00	Malignant neoplasm of major salivary gland NOS	Malignant - Primary
43400	B03..00	Malignant neoplasm of gum	Malignant - Primary
32024	B030.00	Malignant neoplasm of upper gum	Malignant - Primary
49360	B031.00	Malignant neoplasm of lower gum	Malignant - Primary
101753	B03y.00	Malignant neoplasm of other sites of gum	Malignant - Primary
93218	B03z.00	Malignant neoplasm of gum NOS	Malignant - Primary
20092	B04..00	Malignant neoplasm of floor of mouth	Malignant - Primary

45408	B040.00	Malignant neoplasm of anterior portion of floor of mouth	Malignant - Primary
45986	B041.00	Malignant neoplasm of lateral portion of floor of mouth	Malignant - Primary
17912	B042.00	Malignant neoplasm, overlapping lesion of floor of mouth	Malignant - Primary
56709	B04y.00	Malignant neoplasm of other sites of floor of mouth	Malignant - Primary
36716	B04z.00	Malignant neoplasm of floor of mouth NOS	Malignant - Primary
14792	B05..00	Malignant neoplasm of other and unspecified parts of mouth	Malignant - Primary
31364	B050.00	Malignant neoplasm of cheek mucosa	Malignant - Primary
30402	B050.11	Malignant neoplasm of buccal mucosa	Malignant - Primary
103796	B051.00	Malignant neoplasm of vestibule of mouth	Malignant - Primary
95772	B051000	Malignant neoplasm of upper buccal sulcus	Malignant - Primary
97530	B051100	Malignant neoplasm of lower buccal sulcus	Malignant - Primary
37590	B052.00	Malignant neoplasm of hard palate	Malignant - Primary
40292	B053.00	Malignant neoplasm of soft palate	Malignant - Primary
37516	B054.00	Malignant neoplasm of uvula	Malignant - Primary
70819	B055.00	Malignant neoplasm of palate unspecified	Malignant - Primary
96003	B055000	Malignant neoplasm of junction of hard and soft palate	Malignant - Primary
69951	B055100	Malignant neoplasm of roof of mouth	Malignant - Primary
28559	B055z00	Malignant neoplasm of palate NOS	Malignant - Primary
37724	B056.00	Malignant neoplasm of retromolar area	Malignant - Primary
37916	B05y.00	Malignant neoplasm of other specified mouth parts	Malignant - Primary
55015	B05z.00	Malignant neoplasm of mouth NOS	Malignant - Primary
37549	B05z000	Kaposi's sarcoma of palate	Malignant - Primary
22893	B06..00	Malignant neoplasm of oropharynx	Malignant - Primary
16241	B060.00	Malignant neoplasm of tonsil	Malignant - Primary
26448	B060000	Malignant neoplasm of faucial tonsil	Malignant - Primary
101988	B060100	Malignant neoplasm of palatine tonsil	Malignant - Primary
102151	B060200	Malignant neoplasm of overlapping lesion of tonsil	Malignant - Primary
53884	B060z00	Malignant neoplasm tonsil NOS	Malignant - Primary
24397	B061.00	Malignant neoplasm of tonsillar fossa	Malignant - Primary
55066	B062.00	Malignant neoplasm of tonsillar pillar	Malignant - Primary
51926	B062000	Malignant neoplasm of faucial pillar	Malignant - Primary
99185	B062100	Malignant neoplasm of glossopalatine fold	Malignant - Primary
61510	B062200	Malignant neoplasm of palatoglossal arch	Malignant - Primary
93842	B062300	Malignant neoplasm of palatopharyngeal arch	Malignant - Primary
100002	B062z00	Malignant neoplasm of tonsillar fossa NOS	Malignant - Primary
39554	B063.00	Malignant neoplasm of vallecula	Malignant - Primary
46728	B064.00	Malignant neoplasm of anterior epiglottis	Malignant - Primary
26134	B064000	Malignant neoplasm of epiglottis, free border	Malignant - Primary
91895	B064100	Malignant neoplasm of glossoepiglottic fold	Malignant - Primary

73439	B064z00	Malignant neoplasm of anterior epiglottis NOS	Malignant - Primary
48519	B065.00	Malignant neoplasm of junctional region of epiglottis	Malignant - Primary
56355	B066.00	Malignant neoplasm of lateral wall of oropharynx	Malignant - Primary
90124	B067.00	Malignant neoplasm of posterior wall of oropharynx	Malignant - Primary
67323	B06y.00	Malignant neoplasm of oropharynx, other specified sites	Malignant - Primary
91037	B06yz00	Malignant neoplasm of other specified site of oropharynx NOS	Malignant - Primary
43200	B06z.00	Malignant neoplasm of oropharynx NOS	Malignant - Primary
24675	B07..00	Malignant neoplasm of nasopharynx	Malignant - Primary
94390	B070.00	Malignant neoplasm of roof of nasopharynx	Malignant - Primary
95429	B071.00	Malignant neoplasm of posterior wall of nasopharynx	Malignant - Primary
33388	B071000	Malignant neoplasm of adenoid	Malignant - Primary
46548	B071100	Malignant neoplasm of pharyngeal tonsil	Malignant - Primary
96869	B071z00	Malignant neoplasm of posterior wall of nasopharynx NOS	Malignant - Primary
59004	B072.00	Malignant neoplasm of lateral wall of nasopharynx	Malignant - Primary
37940	B072000	Malignant neoplasm of pharyngeal recess	Malignant - Primary
102205	B072z00	Malignant neoplasm of lateral wall of nasopharynx NOS	Malignant - Primary
44139	B073.00	Malignant neoplasm of anterior wall of nasopharynx	Malignant - Primary
106915	B073100	Malignant neoplasm of nasopharyngeal soft palate surface	Malignant - Primary
99386	B073200	Malignant neoplasm posterior margin nasal septum and choanae	Malignant - Primary
100918	B073z00	Malignant neoplasm of anterior wall of nasopharynx NOS	Malignant - Primary
66422	B074.00	Malignant neoplasm, overlapping lesion of nasopharynx	Malignant - Primary
55630	B07y.00	Malignant neoplasm of other specified site of nasopharynx	Malignant - Primary
28665	B07z.00	Malignant neoplasm of nasopharynx NOS	Malignant - Primary
34012	B08..00	Malignant neoplasm of hypopharynx	Malignant - Primary
43548	B080.00	Malignant neoplasm of postcricoid region	Malignant - Primary
39897	B081.00	Malignant neoplasm of pyriform sinus	Malignant - Primary
57248	B082.00	Malignant neoplasm aryepiglottic fold, hypopharyngeal aspect	Malignant - Primary
64462	B083.00	Malignant neoplasm of posterior pharynx	Malignant - Primary
88362	B08y.00	Malignant neoplasm of other specified hypopharyngeal site	Malignant - Primary
28451	B08z.00	Malignant neoplasm of hypopharynx NOS	Malignant - Primary
46114	B0z..00	Malig neop other/ill-defined sites lip, oral cavity, pharynx	Malignant - Primary
16297	B0z0.00	Malignant neoplasm of pharynx unspecified	Malignant - Primary
95016	B0z1.00	Malignant neoplasm of Waldeyer's ring	Malignant - Primary

39084	B0z2.00	Malignant neoplasm of laryngopharynx	Malignant - Primary
49758	B0zy.00	Malignant neoplasm of other sites lip, oral cavity, pharynx	Malignant - Primary
39430	B0zz.00	Malignant neoplasm of lip, oral cavity and pharynx NOS	Malignant - Primary
15709	B1...00	Malignant neoplasm of digestive organs and peritoneum	Malignant - Primary
3357	B1...11	Carcinoma of digestive organs and peritoneum	Malignant - Primary
1062	B10..00	Malignant neoplasm of oesophagus	Malignant - Primary
61695	B100.00	Malignant neoplasm of cervical oesophagus	Malignant - Primary
41362	B101.00	Malignant neoplasm of thoracic oesophagus	Malignant - Primary
63470	B102.00	Malignant neoplasm of abdominal oesophagus	Malignant - Primary
50789	B103.00	Malignant neoplasm of upper third of oesophagus	Malignant - Primary
54171	B104.00	Malignant neoplasm of middle third of oesophagus	Malignant - Primary
42416	B105.00	Malignant neoplasm of lower third of oesophagus	Malignant - Primary
67497	B106.00	Malignant neoplasm, overlapping lesion of oesophagus	Malignant - Primary
98142	B107.00	Siewert type I adenocarcinoma	Malignant - Primary
53591	B10y.00	Malignant neoplasm of other specified part of oesophagus	Malignant - Primary
30700	B10z.00	Malignant neoplasm of oesophagus NOS	Malignant - Primary
4865	B10z.11	Oesophageal cancer	Malignant - Primary
8386	B11..00	Malignant neoplasm of stomach	Malignant - Primary
32022	B110.00	Malignant neoplasm of cardia of stomach	Malignant - Primary
100584	B110000	Malignant neoplasm of cardiac orifice of stomach	Malignant - Primary
22894	B110100	Malignant neoplasm of cardio-oesophageal junction of stomach	Malignant - Primary
94278	B110111	Malignant neoplasm of gastro-oesophageal junction	Malignant - Primary
37859	B110z00	Malignant neoplasm of cardia of stomach NOS	Malignant - Primary
21620	B111.00	Malignant neoplasm of pylorus of stomach	Malignant - Primary
48237	B111000	Malignant neoplasm of prepylorus of stomach	Malignant - Primary
41215	B111100	Malignant neoplasm of pyloric canal of stomach	Malignant - Primary
59092	B111z00	Malignant neoplasm of pylorus of stomach NOS	Malignant - Primary
19318	B112.00	Malignant neoplasm of pyloric antrum of stomach	Malignant - Primary
32362	B113.00	Malignant neoplasm of fundus of stomach	Malignant - Primary
43572	B114.00	Malignant neoplasm of body of stomach	Malignant - Primary
42193	B115.00	Malignant neoplasm of lesser curve of stomach unspecified	Malignant - Primary
55434	B116.00	Malignant neoplasm of greater curve of stomach unspecified	Malignant - Primary

51690	B117.00	Malignant neoplasm, overlapping lesion of stomach	Malignant - Primary
97499	B118.00	Siewert type II adenocarcinoma	Malignant - Primary
96094	B119.00	Siewert type III adenocarcinoma	Malignant - Primary
55019	B11y.00	Malignant neoplasm of other specified site of stomach	Malignant - Primary
65312	B11y000	Malignant neoplasm of anterior wall of stomach NEC	Malignant - Primary
96802	B11y100	Malignant neoplasm of posterior wall of stomach NEC	Malignant - Primary
65372	B11yz00	Malignant neoplasm of other specified site of stomach NOS	Malignant - Primary
14800	B11z.00	Malignant neoplasm of stomach NOS	Malignant - Primary
6806	B12..00	Malignant neoplasm of small intestine and duodenum	Malignant - Primary
18613	B120.00	Malignant neoplasm of duodenum	Malignant - Primary
43479	B121.00	Malignant neoplasm of jejunum	Malignant - Primary
33871	B122.00	Malignant neoplasm of ileum	Malignant - Primary
63995	B123.00	Malignant neoplasm of Meckel's diverticulum	Malignant - Primary
66166	B124.00	Malignant neoplasm, overlapping lesion of small intestine	Malignant - Primary
99896	B12y.00	Malignant neoplasm of other specified site small intestine	Malignant - Primary
43390	B12z.00	Malignant neoplasm of small intestine NOS	Malignant - Primary
1220	B13..00	Malignant neoplasm of colon	Malignant - Primary
9088	B130.00	Malignant neoplasm of hepatic flexure of colon	Malignant - Primary
6935	B131.00	Malignant neoplasm of transverse colon	Malignant - Primary
10864	B132.00	Malignant neoplasm of descending colon	Malignant - Primary
2815	B133.00	Malignant neoplasm of sigmoid colon	Malignant - Primary
3811	B134.00	Malignant neoplasm of caecum	Malignant - Primary
22163	B134.11	Carcinoma of caecum	Malignant - Primary
18632	B135.00	Malignant neoplasm of appendix	Malignant - Primary
10946	B136.00	Malignant neoplasm of ascending colon	Malignant - Primary
18619	B137.00	Malignant neoplasm of splenic flexure of colon	Malignant - Primary
93478	B138.00	Malignant neoplasm, overlapping lesion of colon	Malignant - Primary
101700	B139.00	Hereditary nonpolyposis colon cancer	Malignant - Primary
48231	B13y.00	Malignant neoplasm of other specified sites of colon	Malignant - Primary
28163	B13z.00	Malignant neoplasm of colon NOS	Malignant - Primary
9118	B13z.11	Colonic cancer	Malignant - Primary
35357	B14..00	Malignant neoplasm of rectum, rectosigmoid junction and anus	Malignant - Primary
27855	B140.00	Malignant neoplasm of rectosigmoid junction	Malignant - Primary
1800	B141.00	Malignant neoplasm of rectum	Malignant - Primary
7219	B141.11	Carcinoma of rectum	Malignant - Primary
5901	B141.12	Rectal carcinoma	Malignant - Primary
24370	B142.00	Malignant neoplasm of anal canal	Malignant - Primary
9491	B142.11	Anal carcinoma	Malignant - Primary

46159	B142000	Malignant neoplasm of cloacogenic zone	Malignant - Primary
27897	B143.00	Malignant neoplasm of anus unspecified	Malignant - Primary
55659	B14y.00	Malig neop other site rectum, rectosigmoid junction and anus	Malignant - Primary
50974	B14z.00	Malignant neoplasm rectum,rectosigmoid junction and anus NOS	Malignant - Primary
8918	B15..00	Malignant neoplasm of liver and intrahepatic bile ducts	Malignant - Primary
25535	B150.00	Primary malignant neoplasm of liver	Malignant - Primary
16126	B150000	Primary carcinoma of liver	Malignant - Primary
31210	B150100	Hepatoblastoma of liver	Malignant - Primary
68410	B150200	Primary angiosarcoma of liver	Malignant - Primary
22187	B150300	Hepatocellular carcinoma	Malignant - Primary
44399	B150z00	Primary malignant neoplasm of liver NOS	Malignant - Primary
16915	B151.00	Malignant neoplasm of intrahepatic bile ducts	Malignant - Primary
65124	B151000	Malignant neoplasm of interlobular bile ducts	Malignant - Primary
89593	B151200	Malignant neoplasm of intrahepatic biliary passages	Malignant - Primary
58088	B151400	Malignant neoplasm of intrahepatic gall duct	Malignant - Primary
61643	B151z00	Malignant neoplasm of intrahepatic bile ducts NOS	Malignant - Primary
26393	B152.00	Malignant neoplasm of liver unspecified	Malignant - Primary
38978	B15z.00	Malignant neoplasm of liver and intrahepatic bile ducts NOS	Malignant - Primary
54103	B16..00	Malignant neoplasm gallbladder and extrahepatic bile ducts	Malignant - Primary
16105	B160.00	Malignant neoplasm of gallbladder	Malignant - Primary
31393	B160.11	Carcinoma gallbladder	Malignant - Primary
23433	B161.00	Malignant neoplasm of extrahepatic bile ducts	Malignant - Primary
72445	B161000	Malignant neoplasm of cystic duct	Malignant - Primary
52537	B161100	Malignant neoplasm of hepatic duct	Malignant - Primary
7982	B161200	Malignant neoplasm of common bile duct	Malignant - Primary
36495	B161211	Carcinoma common bile duct	Malignant - Primary
105613	B161300	Malignant neoplasm of sphincter of Oddi	Malignant - Primary
74896	B161z00	Malignant neoplasm of extrahepatic bile ducts NOS	Malignant - Primary
10949	B162.00	Malignant neoplasm of ampulla of Vater	Malignant - Primary
35039	B163.00	Malignant neoplasm, overlapping lesion of biliary tract	Malignant - Primary
60312	B16y.00	Malignant neoplasm other gallbladder/extrahepatic bile duct	Malignant - Primary
15907	B16z.00	Malignant neoplasm gallbladder/extrahepatic bile ducts NOS	Malignant - Primary
8166	B17..00	Malignant neoplasm of pancreas	Malignant - Primary
8771	B170.00	Malignant neoplasm of head of pancreas	Malignant - Primary
40810	B171.00	Malignant neoplasm of body of pancreas	Malignant - Primary
39870	B172.00	Malignant neoplasm of tail of pancreas	Malignant - Primary
35535	B173.00	Malignant neoplasm of pancreatic duct	Malignant - Primary

35795	B174.00	Malignant neoplasm of Islets of Langerhans	Malignant - Primary
97875	B175.00	Malignant neoplasm, overlapping lesion of pancreas	Malignant - Primary
109782	B176.00	Somatostatinoma of pancreas	Malignant - Primary
48537	B17y.00	Malignant neoplasm of other specified sites of pancreas	Malignant - Primary
96635	B17y000	Malignant neoplasm of ectopic pancreatic tissue	Malignant - Primary
95783	B17yz00	Malignant neoplasm of specified site of pancreas NOS	Malignant - Primary
34388	B17z.00	Malignant neoplasm of pancreas NOS	Malignant - Primary
44108	B18..00	Malignant neoplasm of retroperitoneum and peritoneum	Malignant - Primary
21330	B180.00	Malignant neoplasm of retroperitoneum	Malignant - Primary
65159	B180100	Malignant neoplasm of perinephric tissue	Malignant - Primary
24048	B180200	Malignant neoplasm of retrocaecal tissue	Malignant - Primary
61555	B180z00	Malignant neoplasm of retroperitoneum NOS	Malignant - Primary
17874	B181.00	Mesothelioma of peritoneum	Malignant - Primary
101907	B182.00	Overlapping malign lesion of retroperitoneum and peritoneum	Malignant - Primary
46613	B18y.00	Malignant neoplasm of specified parts of peritoneum	Malignant - Primary
59388	B18y100	Malignant neoplasm of mesocaecum	Malignant - Primary
30165	B18y200	Malignant neoplasm of mesorectum	Malignant - Primary
50898	B18y300	Malignant neoplasm of omentum	Malignant - Primary
64516	B18y400	Malignant neoplasm of parietal peritoneum	Malignant - Primary
39413	B18y500	Malignant neoplasm of pelvic peritoneum	Malignant - Primary
69821	B18y600	Malignant neoplasm of the pouch of Douglas	Malignant - Primary
90290	B18y700	Malignant neoplasm of mesentery	Malignant - Primary
64106	B18yz00	Malignant neoplasm of specified parts of peritoneum NOS	Malignant - Primary
16298	B18z.00	Malignant neoplasm of retroperitoneum and peritoneum NOS	Malignant - Primary
11009	B1z..00	Malig neop oth/ill-defined sites digestive tract/peritoneum	Malignant - Primary
17559	B1z0.00	Malignant neoplasm of intestinal tract, part unspecified	Malignant - Primary
11628	B1z0.11	Cancer of bowel	Malignant - Primary
65460	B1z1.00	Malignant neoplasm of spleen NEC	Malignant - Primary
108667	B1z1000	Angiosarcoma of spleen	Malignant - Primary
72224	B1z1100	Fibrosarcoma of spleen	Malignant - Primary
93778	B1z1z00	Malignant neoplasm of spleen NOS	Malignant - Primary
94776	B1z2.00	Malignant neoplasm, overlapping lesion of digestive system	Malignant - Primary
56918	B1zy.00	Malignant neoplasm other spec digestive tract and peritoneum	Malignant - Primary
51255	B1zz.00	Malignant neoplasm of digestive tract and peritoneum NOS	Malignant - Primary
34075	B2...00	Malig neop of respiratory tract and intrathoracic organs	Malignant - Primary

45307	B2...11	Carcinoma of respiratory tract and intrathoracic organs	Malignant - Primary
26652	B20..00	Malig neop nasal cavities, middle ear and accessory sinuses	Malignant - Primary
23389	B200.00	Malignant neoplasm of nasal cavities	Malignant - Primary
71204	B200000	Malignant neoplasm of cartilage of nose	Malignant - Primary
98911	B200100	Malignant neoplasm of nasal conchae	Malignant - Primary
62761	B200200	Malignant neoplasm of septum of nose	Malignant - Primary
62182	B200300	Malignant neoplasm of vestibule of nose	Malignant - Primary
42856	B200z00	Malignant neoplasm of nasal cavities NOS	Malignant - Primary
24456	B201.00	Malig neop auditory tube, middle ear and mastoid air cells	Malignant - Primary
107916	B201000	Malignant neoplasm of auditory (Eustachian) tube	Malignant - Primary
98537	B201100	Malignant neoplasm of tympanic cavity	Malignant - Primary
54613	B201200	Malignant neoplasm of tympanic antrum	Malignant - Primary
71946	B201300	Malignant neoplasm of mastoid air cells	Malignant - Primary
73537	B201z00	Malig neop auditory tube, middle ear, mastoid air cells NOS	Malignant - Primary
32174	B202.00	Malignant neoplasm of maxillary sinus	Malignant - Primary
54636	B203.00	Malignant neoplasm of ethmoid sinus	Malignant - Primary
15684	B204.00	Malignant neoplasm of frontal sinus	Malignant - Primary
65215	B205.00	Malignant neoplasm of sphenoidal sinus	Malignant - Primary
39590	B206.00	Malignant neoplasm, overlapping lesion of accessory sinuses	Malignant - Primary
96971	B20y.00	Malig neop other site nasal cavity, middle ear and sinuses	Malignant - Primary
55246	B20z.00	Malignant neoplasm of accessory sinus NOS	Malignant - Primary
319	B21..00	Malignant neoplasm of larynx	Malignant - Primary
318	B210.00	Malignant neoplasm of glottis	Malignant - Primary
26165	B211.00	Malignant neoplasm of supraglottis	Malignant - Primary
22441	B212.00	Malignant neoplasm of subglottis	Malignant - Primary
43111	B213.00	Malignant neoplasm of laryngeal cartilage	Malignant - Primary
63460	B213000	Malignant neoplasm of arytenoid cartilage	Malignant - Primary
37805	B213100	Malignant neoplasm of cricoid cartilage	Malignant - Primary
107878	B213200	Malignant neoplasm of cuneiform cartilage	Malignant - Primary
47862	B213300	Malignant neoplasm of thyroid cartilage	Malignant - Primary
97332	B213z00	Malignant neoplasm of laryngeal cartilage NOS	Malignant - Primary
50579	B214.00	Malignant neoplasm, overlapping lesion of larynx	Malignant - Primary
55374	B215.00	Malignant neoplasm of epiglottis NOS	Malignant - Primary
26813	B21y.00	Malignant neoplasm of larynx, other specified site	Malignant - Primary
9237	B21z.00	Malignant neoplasm of larynx NOS	Malignant - Primary
13243	B22..00	Malignant neoplasm of trachea, bronchus and lung	Malignant - Primary
15221	B220.00	Malignant neoplasm of trachea	Malignant - Primary
103946	B220100	Malignant neoplasm of mucosa of trachea	Malignant - Primary
37810	B220z00	Malignant neoplasm of trachea NOS	Malignant - Primary
12870	B221.00	Malignant neoplasm of main bronchus	Malignant - Primary

17391	B221000	Malignant neoplasm of carina of bronchus	Malignant - Primary
33444	B221100	Malignant neoplasm of hilus of lung	Malignant - Primary
21698	B221z00	Malignant neoplasm of main bronchus NOS	Malignant - Primary
10358	B222.00	Malignant neoplasm of upper lobe, bronchus or lung	Malignant - Primary
20170	B222.11	Pancoast's syndrome	Malignant - Primary
31700	B222000	Malignant neoplasm of upper lobe bronchus	Malignant - Primary
25886	B222100	Malignant neoplasm of upper lobe of lung	Malignant - Primary
44169	B222z00	Malignant neoplasm of upper lobe, bronchus or lung NOS	Malignant - Primary
31268	B223.00	Malignant neoplasm of middle lobe, bronchus or lung	Malignant - Primary
41523	B223000	Malignant neoplasm of middle lobe bronchus	Malignant - Primary
39923	B223100	Malignant neoplasm of middle lobe of lung	Malignant - Primary
54134	B223z00	Malignant neoplasm of middle lobe, bronchus or lung NOS	Malignant - Primary
31188	B224.00	Malignant neoplasm of lower lobe, bronchus or lung	Malignant - Primary
18678	B224000	Malignant neoplasm of lower lobe bronchus	Malignant - Primary
12582	B224100	Malignant neoplasm of lower lobe of lung	Malignant - Primary
42566	B224z00	Malignant neoplasm of lower lobe, bronchus or lung NOS	Malignant - Primary
36371	B225.00	Malignant neoplasm of overlapping lesion of bronchus & lung	Malignant - Primary
7484	B226.00	Mesothelioma	Malignant - Primary
38961	B22y.00	Malignant neoplasm of other sites of bronchus or lung	Malignant - Primary
3903	B22z.00	Malignant neoplasm of bronchus or lung NOS	Malignant - Primary
2587	B22z.11	Lung cancer	Malignant - Primary
31573	B23..00	Malignant neoplasm of pleura	Malignant - Primary
67107	B230.00	Malignant neoplasm of parietal pleura	Malignant - Primary
106194	B231.00	Malignant neoplasm of visceral pleura	Malignant - Primary
9600	B232.00	Mesothelioma of pleura	Malignant - Primary
98104	B23y.00	Malignant neoplasm of other specified pleura	Malignant - Primary
34742	B23z.00	Malignant neoplasm of pleura NOS	Malignant - Primary
62556	B24..00	Malignant neoplasm of thymus, heart and mediastinum	Malignant - Primary
27483	B240.00	Malignant neoplasm of thymus	Malignant - Primary
95644	B241.00	Malignant neoplasm of heart	Malignant - Primary
63430	B241000	Malignant neoplasm of endocardium	Malignant - Primary
65605	B241200	Malignant neoplasm of myocardium	Malignant - Primary
94975	B241300	Malignant neoplasm of pericardium	Malignant - Primary
101885	B241400	Mesothelioma of pericardium	Malignant - Primary
50289	B241z00	Malignant neoplasm of heart NOS	Malignant - Primary
27715	B242.00	Malignant neoplasm of anterior mediastinum	Malignant - Primary

92720	B243.00	Malignant neoplasm of posterior mediastinum	Malignant - Primary
61064	B24X.00	Malignant neoplasm of mediastinum, part unspecified	Malignant - Primary
100232	B24y.00	Malig neop of other site of heart, thymus and mediastinum	Malignant - Primary
66750	B24z.00	Malignant neoplasm of heart, thymus and mediastinum NOS	Malignant - Primary
39531	B25..00	Malig neo, overlapping lesion of heart, mediastinum & pleura	Malignant - Primary
66646	B26..00	Malignant neoplasm, overlap lesion of resp & intrathor orgs	Malignant - Primary
44356	B2z..00	Malig neop other/ill-defined sites resp/intrathoracic organs	Malignant - Primary
65793	B2z0.00	Malig neop of upper respiratory tract, part unspecified	Malignant - Primary
29283	B2zy.00	Malignant neoplasm of other site of respiratory tract	Malignant - Primary
42569	B2zz.00	Malignant neoplasm of respiratory tract NOS	Malignant - Primary
18608	B3...00	Malig neop of bone, connective tissue, skin and breast	Malignant - Primary
9902	B3...11	Carcinoma of bone, connective tissue, skin and breast	Malignant - Primary
12539	B3...12	Sarcoma of bone and connective tissue	Malignant - Primary
18314	B30..00	Malignant neoplasm of bone and articular cartilage	Malignant - Primary
59036	B300.00	Malignant neoplasm of bones of skull and face	Malignant - Primary
53594	B300000	Malignant neoplasm of ethmoid bone	Malignant - Primary
53599	B300100	Malignant neoplasm of frontal bone	Malignant - Primary
59520	B300200	Malignant neoplasm of malar bone	Malignant - Primary
95458	B300300	Malignant neoplasm of nasal bone	Malignant - Primary
55953	B300400	Malignant neoplasm of occipital bone	Malignant - Primary
50298	B300500	Malignant neoplasm of orbital bone	Malignant - Primary
54747	B300600	Malignant neoplasm of parietal bone	Malignant - Primary
55595	B300700	Malignant neoplasm of sphenoid bone	Malignant - Primary
62104	B300800	Malignant neoplasm of temporal bone	Malignant - Primary
50299	B300900	Malignant neoplasm of zygomatic bone	Malignant - Primary
17475	B300A00	Malignant neoplasm of maxilla	Malignant - Primary
96445	B300B00	Malignant neoplasm of turbinate	Malignant - Primary
44452	B300C00	Malignant neoplasm of vomer	Malignant - Primary
69146	B300z00	Malignant neoplasm of bones of skull and face NOS	Malignant - Primary
33833	B301.00	Malignant neoplasm of mandible	Malignant - Primary
16704	B302.00	Malignant neoplasm of vertebral column	Malignant - Primary
46939	B302000	Malignant neoplasm of cervical vertebra	Malignant - Primary
32372	B302100	Malignant neoplasm of thoracic vertebra	Malignant - Primary
54691	B302200	Malignant neoplasm of lumbar vertebra	Malignant - Primary
49701	B302z00	Malignant neoplasm of vertebral column NOS	Malignant - Primary
27528	B303.00	Malignant neoplasm of ribs, sternum and clavicle	Malignant - Primary

37842	B303000	Malignant neoplasm of rib	Malignant - Primary
49491	B303100	Malignant neoplasm of sternum	Malignant - Primary
66639	B303200	Malignant neoplasm of clavicle	Malignant - Primary
60403	B303300	Malignant neoplasm of costal cartilage	Malignant - Primary
67763	B303400	Malignant neoplasm of costo-vertebral joint	Malignant - Primary
54493	B303500	Malignant neoplasm of xiphoid process	Malignant - Primary
51237	B303z00	Malignant neoplasm of rib, sternum and clavicle NOS	Malignant - Primary
71810	B304.00	Malignant neoplasm of scapula and long bones of upper arm	Malignant - Primary
49054	B304000	Malignant neoplasm of scapula	Malignant - Primary
105797	B304100	Malignant neoplasm of acromion	Malignant - Primary
61741	B304200	Malignant neoplasm of humerus	Malignant - Primary
92371	B304300	Malignant neoplasm of radius	Malignant - Primary
64848	B304400	Malignant neoplasm of ulna	Malignant - Primary
65880	B304z00	Malig neop of scapula and long bones of upper arm NOS	Malignant - Primary
73530	B305.00	Malignant neoplasm of hand bones	Malignant - Primary
106069	B305.11	Malignant neoplasm of carpal bones	Malignant - Primary
72464	B305.12	Malignant neoplasm of metacarpal bones	Malignant - Primary
57988	B305000	Malignant neoplasm of carpal bone - scaphoid	Malignant - Primary
69104	B305100	Malignant neoplasm of carpal bone - lunate	Malignant - Primary
108638	B305A00	Malignant neoplasm of third metacarpal bone	Malignant - Primary
94427	B305C00	Malignant neoplasm of fifth metacarpal bone	Malignant - Primary
86812	B305D00	Malignant neoplasm of phalanges of hand	Malignant - Primary
73556	B305z00	Malignant neoplasm of hand bones NOS	Malignant - Primary
54631	B306.00	Malignant neoplasm of pelvic bones, sacrum and coccyx	Malignant - Primary
44609	B306000	Malignant neoplasm of ilium	Malignant - Primary
59223	B306100	Malignant neoplasm of ischium	Malignant - Primary
51921	B306200	Malignant neoplasm of pubis	Malignant - Primary
40966	B306300	Malignant neoplasm of sacral vertebra	Malignant - Primary
66908	B306400	Malignant neoplasm of coccygeal vertebra	Malignant - Primary
50152	B306500	Malignant sacral teratoma	Malignant - Primary
38938	B306z00	Malignant neoplasm of pelvis, sacrum or coccyx NOS	Malignant - Primary
68055	B307.00	Malignant neoplasm of long bones of leg	Malignant - Primary
56513	B307000	Malignant neoplasm of femur	Malignant - Primary
50402	B307100	Malignant neoplasm of fibula	Malignant - Primary
40814	B307200	Malignant neoplasm of tibia	Malignant - Primary
62630	B307z00	Malignant neoplasm of long bones of leg NOS	Malignant - Primary
105475	B308.00	Malignant neoplasm of short bones of leg	Malignant - Primary
95182	B308100	Malignant neoplasm of talus	Malignant - Primary
72212	B308200	Malignant neoplasm of calcaneum	Malignant - Primary
34878	B308300	Malignant neoplasm of medial cuneiform	Malignant - Primary
69927	B308800	Malignant neoplasm of first metatarsal bone	Malignant - Primary

92382	B308B00	Malignant neoplasm of fourth metatarsal bone	Malignant - Primary
58949	B308D00	Malignant neoplasm of phalanges of foot	Malignant - Primary
103354	B308z00	Malignant neoplasm of short bones of leg NOS	Malignant - Primary
67451	B30W.00	Malignant neoplasm/overlap lesion/bone+articulr cartilage	Malignant - Primary
43614	B30X.00	Malignant neoplasm/bones+articular cartilage/limb,unspfd	Malignant - Primary
16075	B30z.00	Malignant neoplasm of bone and articular cartilage NOS	Malignant - Primary
19437	B30z000	Osteosarcoma	Malignant - Primary
34451	B31..00	Malignant neoplasm of connective and other soft tissue	Malignant - Primary
43475	B310.00	Malig neop of connective and soft tissue head, face and neck	Malignant - Primary
59382	B310000	Malignant neoplasm of soft tissue of head	Malignant - Primary
40014	B310100	Malignant neoplasm of soft tissue of face	Malignant - Primary
48517	B310200	Malignant neoplasm of soft tissue of neck	Malignant - Primary
60035	B310300	Malignant neoplasm of cartilage of ear	Malignant - Primary
49463	B310400	Malignant neoplasm of tarsus of eyelid	Malignant - Primary
108389	B310500	Malignant neoplasm soft tissues of cervical spine	Malignant - Primary
73718	B310z00	Malig neop connective and soft tissue head, face, neck NOS	Malignant - Primary
53989	B311.00	Malig neop connective and soft tissue upper limb/shoulder	Malignant - Primary
50222	B311000	Malignant neoplasm of connective and soft tissue of shoulder	Malignant - Primary
64345	B311100	Malignant neoplasm of connective and soft tissue, upper arm	Malignant - Primary
57482	B311200	Malignant neoplasm of connective and soft tissue of fore-arm	Malignant - Primary
19321	B311300	Malignant neoplasm of connective and soft tissue of hand	Malignant - Primary
91586	B311400	Malignant neoplasm of connective and soft tissue of finger	Malignant - Primary
63988	B311500	Malignant neoplasm of connective and soft tissue of thumb	Malignant - Primary
104913	B311z00	Malig neop connective soft tissue upper limb/shoulder NOS	Malignant - Primary
66088	B312.00	Malig neop of connective and soft tissue of hip and leg	Malignant - Primary
102949	B312000	Malignant neoplasm of connective and soft tissue of hip	Malignant - Primary
44805	B312100	Malig neop of connective and soft tissue thigh and upper leg	Malignant - Primary
54965	B312200	Malig neop connective and soft tissue of popliteal space	Malignant - Primary
30542	B312300	Malig neop of connective and soft tissue of lower leg	Malignant - Primary
54222	B312400	Malignant neoplasm of connective and soft tissue of foot	Malignant - Primary
99572	B312500	Malignant neoplasm of connective and soft tissue of toe	Malignant - Primary

90546	B312z00	Malig neop connective and soft tissue hip and leg NOS	Malignant - Primary
22290	B313.00	Malignant neoplasm of connective and soft tissue of thorax	Malignant - Primary
29160	B313000	Malignant neoplasm of connective and soft tissue of axilla	Malignant - Primary
54186	B313100	Malignant neoplasm of diaphragm	Malignant - Primary
72522	B313200	Malignant neoplasm of great vessels	Malignant - Primary
104139	B313300	Malig neoplasm of connective and soft tissues of thor spine	Malignant - Primary
98408	B313z00	Malig neop of connective and soft tissue of thorax NOS	Malignant - Primary
45071	B314.00	Malignant neoplasm of connective and soft tissue of abdomen	Malignant - Primary
66488	B314000	Malig neop of connective and soft tissue of abdominal wall	Malignant - Primary
94272	B314100	Malig neoplasm of connective and soft tissues of lumb spine	Malignant - Primary
60247	B314z00	Malig neop of connective and soft tissue of abdomen NOS	Malignant - Primary
51965	B315.00	Malignant neoplasm of connective and soft tissue of pelvis	Malignant - Primary
70463	B315000	Malignant neoplasm of connective and soft tissue of buttock	Malignant - Primary
67324	B315100	Malig neop of connective and soft tissue of inguinal region	Malignant - Primary
59152	B315200	Malignant neoplasm of connective and soft tissue of perineum	Malignant - Primary
58836	B315z00	Malig neop of connective and soft tissue of pelvis NOS	Malignant - Primary
57471	B316.00	Malig neop of connective and soft tissue trunk unspecified	Malignant - Primary
65233	B31y.00	Malig neop connective and soft tissue other specified site	Malignant - Primary
15182	B31z.00	Malignant neoplasm of connective and soft tissue, site NOS	Malignant - Primary
104128	B31z000	Kaposi's sarcoma of soft tissue	Malignant - Primary
865	B32..00	Malignant melanoma of skin	Malignant - Primary
70637	B320.00	Malignant melanoma of lip	Malignant - Primary
54632	B321.00	Malignant melanoma of eyelid including canthus	Malignant - Primary
57260	B322.00	Malignant melanoma of ear and external auricular canal	Malignant - Primary
59061	B322000	Malignant melanoma of auricle (ear)	Malignant - Primary
102145	B322100	Malignant melanoma of external auditory meatus	Malignant - Primary
73744	B322z00	Malignant melanoma of ear and external auricular canal NOS	Malignant - Primary
47252	B323.00	Malignant melanoma of other and unspecified parts of face	Malignant - Primary
41278	B323000	Malignant melanoma of external surface of cheek	Malignant - Primary
71136	B323100	Malignant melanoma of chin	Malignant - Primary
47094	B323200	Malignant melanoma of eyebrow	Malignant - Primary
68133	B323300	Malignant melanoma of forehead	Malignant - Primary

45139	B323400	Malignant melanoma of external surface of nose	Malignant - Primary
58958	B323500	Malignant melanoma of temple	Malignant - Primary
67806	B323z00	Malignant melanoma of face NOS	Malignant - Primary
65625	B324.00	Malignant melanoma of scalp and neck	Malignant - Primary
55881	B324000	Malignant melanoma of scalp	Malignant - Primary
45306	B324100	Malignant melanoma of neck	Malignant - Primary
99257	B324z00	Malignant melanoma of scalp and neck NOS	Malignant - Primary
38689	B325.00	Malignant melanoma of trunk (excluding scrotum)	Malignant - Primary
49814	B325000	Malignant melanoma of axilla	Malignant - Primary
32768	B325100	Malignant melanoma of breast	Malignant - Primary
53629	B325200	Malignant melanoma of buttock	Malignant - Primary
34259	B325300	Malignant melanoma of groin	Malignant - Primary
109002	B325400	Malignant melanoma of perianal skin	Malignant - Primary
95629	B325500	Malignant melanoma of perineum	Malignant - Primary
43715	B325600	Malignant melanoma of umbilicus	Malignant - Primary
43463	B325700	Malignant melanoma of back	Malignant - Primary
51209	B325800	Malignant melanoma of chest wall	Malignant - Primary
45760	B325z00	Malignant melanoma of trunk, excluding scrotum, NOS	Malignant - Primary
65164	B326.00	Malignant melanoma of upper limb and shoulder	Malignant - Primary
50505	B326000	Malignant melanoma of shoulder	Malignant - Primary
54685	B326100	Malignant melanoma of upper arm	Malignant - Primary
45755	B326200	Malignant melanoma of fore-arm	Malignant - Primary
62475	B326300	Malignant melanoma of hand	Malignant - Primary
25602	B326400	Malignant melanoma of finger	Malignant - Primary
63997	B326500	Malignant melanoma of thumb	Malignant - Primary
55292	B326z00	Malignant melanoma of upper limb or shoulder NOS	Malignant - Primary
46255	B327.00	Malignant melanoma of lower limb and hip	Malignant - Primary
73536	B327000	Malignant melanoma of hip	Malignant - Primary
51873	B327100	Malignant melanoma of thigh	Malignant - Primary
54305	B327200	Malignant melanoma of knee	Malignant - Primary
39878	B327300	Malignant melanoma of popliteal fossa area	Malignant - Primary
37872	B327400	Malignant melanoma of lower leg	Malignant - Primary
42714	B327500	Malignant melanoma of ankle	Malignant - Primary
61246	B327600	Malignant melanoma of heel	Malignant - Primary
41490	B327700	Malignant melanoma of foot	Malignant - Primary
36899	B327800	Malignant melanoma of toe	Malignant - Primary
53369	B327900	Malignant melanoma of great toe	Malignant - Primary
64327	B327z00	Malignant melanoma of lower limb or hip NOS	Malignant - Primary
42153	B32y.00	Malignant melanoma of other specified skin site	Malignant - Primary
96585	B32y000	Overlapping malignant melanoma of skin	Malignant - Primary
28556	B32z.00	Malignant melanoma of skin NOS	Malignant - Primary
4632	B33..00	Other malignant neoplasm of skin	Malignant - Primary
876	B33..11	Basal cell carcinoma	Malignant - Primary

1940	B33..13	Rodent ulcer	Malignant - Primary
37016	B33..14	Malignant neoplasm of sebaceous gland	Malignant - Primary
40443	B33..15	Malignant neoplasm of sweat gland	Malignant - Primary
18245	B330.00	Malignant neoplasm of skin of lip	Malignant - Primary
43087	B331.00	Malignant neoplasm of eyelid including canthus	Malignant - Primary
36731	B331000	Malignant neoplasm of canthus	Malignant - Primary
55550	B331100	Malignant neoplasm of upper eyelid	Malignant - Primary
41958	B331200	Malignant neoplasm of lower eyelid	Malignant - Primary
53515	B332.00	Malignant neoplasm skin of ear and external auricular canal	Malignant - Primary
33997	B332000	Malignant neoplasm of skin of auricle (ear)	Malignant - Primary
62080	B332100	Malignant neoplasm of skin of external auditory meatus	Malignant - Primary
33271	B332200	Malignant neoplasm of pinna NEC	Malignant - Primary
62399	B332z00	Malig neop skin of ear and external auricular canal NOS	Malignant - Primary
27370	B333.00	Malignant neoplasm skin of other and unspecified parts face	Malignant - Primary
30645	B333000	Malignant neoplasm of skin of cheek, external	Malignant - Primary
49403	B333100	Malignant neoplasm of skin of chin	Malignant - Primary
55670	B333200	Malignant neoplasm of skin of eyebrow	Malignant - Primary
30576	B333300	Malignant neoplasm of skin of forehead	Malignant - Primary
16202	B333400	Malignant neoplasm of skin of nose (external)	Malignant - Primary
21327	B333500	Malignant neoplasm of skin of temple	Malignant - Primary
46008	B333z00	Malignant neoplasm skin other and unspec part of face NOS	Malignant - Primary
54234	B334.00	Malignant neoplasm of scalp and skin of neck	Malignant - Primary
37165	B334000	Malignant neoplasm of scalp	Malignant - Primary
43619	B334100	Malignant neoplasm of skin of neck	Malignant - Primary
73760	B334z00	Malignant neoplasm of scalp or skin of neck NOS	Malignant - Primary
57446	B335.00	Malignant neoplasm of skin of trunk, excluding scrotum	Malignant - Primary
70380	B335000	Malignant neoplasm of skin of axillary fold	Malignant - Primary
37969	B335100	Malignant neoplasm of skin of chest, excluding breast	Malignant - Primary
30543	B335200	Malignant neoplasm of skin of breast	Malignant - Primary
18618	B335300	Malignant neoplasm of skin of abdominal wall	Malignant - Primary
67748	B335400	Malignant neoplasm of skin of umbilicus	Malignant - Primary
66319	B335500	Malignant neoplasm of skin of groin	Malignant - Primary
46458	B335600	Malignant neoplasm of skin of perineum	Malignant - Primary
45077	B335700	Malignant neoplasm of skin of back	Malignant - Primary
62305	B335800	Malignant neoplasm of skin of buttock	Malignant - Primary
23480	B335900	Malignant neoplasm of perianal skin	Malignant - Primary
66447	B335A00	Malignant neoplasm of skin of scapular region	Malignant - Primary
15868	B335z00	Malignant neoplasm of skin of trunk, excluding scrotum, NOS	Malignant - Primary

30747	B336.00	Malignant neoplasm of skin of upper limb and shoulder	Malignant - Primary
43122	B336000	Malignant neoplasm of skin of shoulder	Malignant - Primary
42707	B336100	Malignant neoplasm of skin of upper arm	Malignant - Primary
30577	B336200	Malignant neoplasm of skin of fore-arm	Malignant - Primary
54352	B336300	Malignant neoplasm of skin of hand	Malignant - Primary
25245	B336400	Malignant neoplasm of skin of finger	Malignant - Primary
64406	B336500	Malignant neoplasm of skin of thumb	Malignant - Primary
60526	B336z00	Malignant neoplasm of skin of upper limb or shoulder NOS	Malignant - Primary
57442	B337.00	Malignant neoplasm of skin of lower limb and hip	Malignant - Primary
70988	B337000	Malignant neoplasm of skin of hip	Malignant - Primary
58601	B337100	Malignant neoplasm of skin of thigh	Malignant - Primary
56954	B337200	Malignant neoplasm of skin of knee	Malignant - Primary
68197	B337300	Malignant neoplasm of skin of popliteal fossa area	Malignant - Primary
33682	B337400	Malignant neoplasm of skin of lower leg	Malignant - Primary
64270	B337500	Malignant neoplasm of skin of ankle	Malignant - Primary
104025	B337600	Malignant neoplasm of skin of heel	Malignant - Primary
70587	B337700	Malignant neoplasm of skin of foot	Malignant - Primary
65782	B337800	Malignant neoplasm of skin of toe	Malignant - Primary
67914	B337900	Malignant neoplasm of skin of great toe	Malignant - Primary
61194	B337z00	Malignant neoplasm of skin of lower limb or hip NOS	Malignant - Primary
93352	B338.00	Squamous cell carcinoma of skin	Malignant - Primary
24375	B339.00	Dermatofibrosarcoma protuberans	Malignant - Primary
42429	B33X.00	Malignant neoplasm overlapping lesion of skin	Malignant - Primary
18354	B33y.00	Malignant neoplasm of other specified skin sites	Malignant - Primary
2492	B33z.00	Malignant neoplasm of skin NOS	Malignant - Primary
93490	B33z.11	Squamous cell carcinoma of skin NOS	Malignant - Primary
27931	B33z000	Kaposi's sarcoma of skin	Malignant - Primary
54182	B33z100	Naevoid basal cell carcinoma syndrome	Malignant - Primary
3968	B34..00	Malignant neoplasm of female breast	Malignant - Primary
348	B34..11	Ca female breast	Malignant - Primary
26853	B340.00	Malignant neoplasm of nipple and areola of female breast	Malignant - Primary
23380	B340000	Malignant neoplasm of nipple of female breast	Malignant - Primary
64686	B340100	Malignant neoplasm of areola of female breast	Malignant - Primary
59831	B340z00	Malignant neoplasm of nipple or areola of female breast NOS	Malignant - Primary
31546	B341.00	Malignant neoplasm of central part of female breast	Malignant - Primary
29826	B342.00	Malignant neoplasm of upper-inner quadrant of female breast	Malignant - Primary
45222	B343.00	Malignant neoplasm of lower-inner quadrant of female breast	Malignant - Primary
23399	B344.00	Malignant neoplasm of upper-outer quadrant of female breast	Malignant - Primary

42070	B345.00	Malignant neoplasm of lower-outer quadrant of female breast	Malignant - Primary
20685	B346.00	Malignant neoplasm of axillary tail of female breast	Malignant - Primary
49148	B347.00	Malignant neoplasm, overlapping lesion of breast	Malignant - Primary
56715	B34y.00	Malignant neoplasm of other site of female breast	Malignant - Primary
95057	B34y000	Malignant neoplasm of ectopic site of female breast	Malignant - Primary
38475	B34yz00	Malignant neoplasm of other site of female breast NOS	Malignant - Primary
9470	B34z.00	Malignant neoplasm of female breast NOS	Malignant - Primary
19423	B35..00	Malignant neoplasm of male breast	Malignant - Primary
54494	B350.00	Malignant neoplasm of nipple and areola of male breast	Malignant - Primary
68480	B350000	Malignant neoplasm of nipple of male breast	Malignant - Primary
67884	B350100	Malignant neoplasm of areola of male breast	Malignant - Primary
54202	B35z.00	Malignant neoplasm of other site of male breast	Malignant - Primary
95323	B35z000	Malignant neoplasm of ectopic site of male breast	Malignant - Primary
48809	B35zz00	Malignant neoplasm of male breast NOS	Malignant - Primary
19389	B3y..00	Malig neop of bone, connective tissue, skin and breast OS	Malignant - Primary
41011	B3z..00	Malig neop of bone, connective tissue, skin and breast NOS	Malignant - Primary
13252	B4...00	Malignant neoplasm of genitourinary organ	Malignant - Primary
16874	B4...11	Carcinoma of genitourinary organ	Malignant - Primary
2744	B40..00	Malignant neoplasm of uterus, part unspecified	Malignant - Primary
2747	B41..00	Malignant neoplasm of cervix uteri	Malignant - Primary
3230	B41..11	Cervical carcinoma (uterus)	Malignant - Primary
48820	B410.00	Malignant neoplasm of endocervix	Malignant - Primary
57235	B410000	Malignant neoplasm of endocervical canal	Malignant - Primary
53103	B410100	Malignant neoplasm of endocervical gland	Malignant - Primary
50285	B410z00	Malignant neoplasm of endocervix NOS	Malignant - Primary
50297	B411.00	Malignant neoplasm of exocervix	Malignant - Primary
58094	B412.00	Malignant neoplasm, overlapping lesion of cervix uteri	Malignant - Primary
32955	B41y.00	Malignant neoplasm of other site of cervix	Malignant - Primary
95505	B41y000	Malignant neoplasm of cervical stump	Malignant - Primary
57719	B41y100	Malignant neoplasm of squamocolumnar junction of cervix	Malignant - Primary
43435	B41yz00	Malignant neoplasm of other site of cervix NOS	Malignant - Primary
28311	B41z.00	Malignant neoplasm of cervix uteri NOS	Malignant - Primary
93762	B42..00	Malignant neoplasm of placenta	Malignant - Primary
28003	B420.00	Choriocarcinoma	Malignant - Primary
7046	B43..00	Malignant neoplasm of body of uterus	Malignant - Primary
3213	B430.00	Malignant neoplasm of corpus uteri, excluding isthmus	Malignant - Primary

72723	B430000	Malignant neoplasm of cornu of corpus uteri	Malignant - Primary
68155	B430100	Malignant neoplasm of fundus of corpus uteri	Malignant - Primary
2890	B430200	Malignant neoplasm of endometrium of corpus uteri	Malignant - Primary
49400	B430211	Malignant neoplasm of endometrium	Malignant - Primary
45793	B430300	Malignant neoplasm of myometrium of corpus uteri	Malignant - Primary
45490	B430z00	Malignant neoplasm of corpus uteri NOS	Malignant - Primary
43940	B431.00	Malignant neoplasm of isthmus of uterine body	Malignant - Primary
59097	B431000	Malignant neoplasm of lower uterine segment	Malignant - Primary
70729	B431z00	Malignant neoplasm of isthmus of uterine body NOS	Malignant - Primary
16967	B432.00	Malignant neoplasm of overlapping lesion of corpus uteri	Malignant - Primary
31608	B43y.00	Malignant neoplasm of other site of uterine body	Malignant - Primary
33617	B43z.00	Malignant neoplasm of body of uterus NOS	Malignant - Primary
19141	B44..00	Malignant neoplasm of ovary and other uterine adnexa	Malignant - Primary
7805	B440.00	Malignant neoplasm of ovary	Malignant - Primary
1986	B440.11	Cancer of ovary	Malignant - Primary
49828	B441.00	Malignant neoplasm of fallopian tube	Malignant - Primary
101778	B442.00	Malignant neoplasm of broad ligament	Malignant - Primary
46153	B443.00	Malignant neoplasm of parametrium	Malignant - Primary
97996	B44y.00	Malignant neoplasm of other site of uterine adnexa	Malignant - Primary
65106	B44z.00	Malignant neoplasm of uterine adnexa NOS	Malignant - Primary
4555	B45..00	Malig neop of other and unspecified female genital organs	Malignant - Primary
37328	B450.00	Malignant neoplasm of vagina	Malignant - Primary
10698	B450100	Malignant neoplasm of vaginal vault	Malignant - Primary
60772	B450z00	Malignant neoplasm of vagina NOS	Malignant - Primary
43761	B451.00	Malignant neoplasm of labia majora	Malignant - Primary
47899	B451000	Malignant neoplasm of greater vestibular (Bartholin's) gland	Malignant - Primary
59362	B451z00	Malignant neoplasm of labia majora NOS	Malignant - Primary
58061	B452.00	Malignant neoplasm of labia minora	Malignant - Primary
53910	B453.00	Malignant neoplasm of clitoris	Malignant - Primary
4554	B454.00	Malignant neoplasm of vulva unspecified	Malignant - Primary
11991	B454.11	Primary vulval cancer	Malignant - Primary
26454	B45X.00	Malignant neoplasm/overlapping lesion/feml genital organs	Malignant - Primary
95421	B45y.00	Malignant neoplasm of other specified female genital organ	Malignant - Primary
27617	B45y000	Malignant neoplasm of overlapping lesion of vulva	Malignant - Primary
20166	B45z.00	Malignant neoplasm of female genital organ NOS	Malignant - Primary
780	B46..00	Malignant neoplasm of prostate	Malignant - Primary

15148	B47..00	Malignant neoplasm of testis	Malignant - Primary
64602	B470.00	Malignant neoplasm of undescended testis	Malignant - Primary
7740	B470200	Seminoma of undescended testis	Malignant - Primary
36325	B470300	Teratoma of undescended testis	Malignant - Primary
96429	B470z00	Malignant neoplasm of undescended testis NOS	Malignant - Primary
19475	B471.00	Malignant neoplasm of descended testis	Malignant - Primary
21786	B471000	Seminoma of descended testis	Malignant - Primary
9476	B471100	Teratoma of descended testis	Malignant - Primary
91509	B471z00	Malignant neoplasm of descended testis NOS	Malignant - Primary
38510	B47z.00	Malignant neoplasm of testis NOS	Malignant - Primary
2961	B47z.11	Seminoma of testis	Malignant - Primary
15989	B47z.12	Teratoma of testis	Malignant - Primary
3541	B48..00	Malignant neoplasm of penis and other male genital organs	Malignant - Primary
50681	B480.00	Malignant neoplasm of prepuce (foreskin)	Malignant - Primary
17841	B481.00	Malignant neoplasm of glans penis	Malignant - Primary
48743	B482.00	Malignant neoplasm of body of penis	Malignant - Primary
43392	B483.00	Malignant neoplasm of penis, part unspecified	Malignant - Primary
72127	B484.00	Malignant neoplasm of epididymis	Malignant - Primary
63331	B485.00	Malignant neoplasm of spermatic cord	Malignant - Primary
47767	B486.00	Malignant neoplasm of scrotum	Malignant - Primary
52570	B487.00	Malignant neoplasm, overlapping lesion of penis	Malignant - Primary
67949	B48y.00	Malignant neoplasm of other male genital organ	Malignant - Primary
68161	B48y000	Malignant neoplasm of seminal vesicle	Malignant - Primary
47668	B48y100	Malignant neoplasm of tunica vaginalis	Malignant - Primary
68824	B48y200	Malignant neoplasm, overlapping lesion male genital orgs	Malignant - Primary
92329	B48yz00	Malignant neoplasm of other male genital organ NOS	Malignant - Primary
63224	B48z.00	Malignant neoplasm of penis and other male genital organ NOS	Malignant - Primary
779	B49..00	Malignant neoplasm of urinary bladder	Malignant - Primary
38862	B490.00	Malignant neoplasm of trigone of urinary bladder	Malignant - Primary
44996	B491.00	Malignant neoplasm of dome of urinary bladder	Malignant - Primary
35963	B492.00	Malignant neoplasm of lateral wall of urinary bladder	Malignant - Primary
19162	B493.00	Malignant neoplasm of anterior wall of urinary bladder	Malignant - Primary
42012	B494.00	Malignant neoplasm of posterior wall of urinary bladder	Malignant - Primary
41571	B495.00	Malignant neoplasm of bladder neck	Malignant - Primary
28241	B496.00	Malignant neoplasm of ureteric orifice	Malignant - Primary
42023	B497.00	Malignant neoplasm of urachus	Malignant - Primary
36949	B49y.00	Malignant neoplasm of other site of urinary bladder	Malignant - Primary

47801	B49y000	Malignant neoplasm, overlapping lesion of bladder	Malignant - Primary
31102	B49z.00	Malignant neoplasm of urinary bladder NOS	Malignant - Primary
13559	B4A..00	Malig neop of kidney and other unspecified urinary organs	Malignant - Primary
18712	B4A..11	Renal malignant neoplasm	Malignant - Primary
1599	B4A0.00	Malignant neoplasm of kidney parenchyma	Malignant - Primary
7978	B4A0000	Hypernephroma	Malignant - Primary
12389	B4A1.00	Malignant neoplasm of renal pelvis	Malignant - Primary
27540	B4A1000	Malignant neoplasm of renal calyces	Malignant - Primary
101608	B4A1100	Malignant neoplasm of ureteropelvic junction	Malignant - Primary
54184	B4A1z00	Malignant neoplasm of renal pelvis NOS	Malignant - Primary
15223	B4A2.00	Malignant neoplasm of ureter	Malignant - Primary
15644	B4A3.00	Malignant neoplasm of urethra	Malignant - Primary
72174	B4A4.00	Malignant neoplasm of paraurethral glands	Malignant - Primary
44884	B4Ay.00	Malignant neoplasm of other urinary organs	Malignant - Primary
59286	B4Ay000	Malignant neoplasm of overlapping lesion of urinary organs	Malignant - Primary
29462	B4Az.00	Malignant neoplasm of kidney or urinary organs NOS	Malignant - Primary
38931	B4y..00	Malignant neoplasm of genitourinary organ OS	Malignant - Primary
52594	B4z..00	Malignant neoplasm of genitourinary organ NOS	Malignant - Primary
10995	B5...00	Malignant neoplasm of other and unspecified sites	Malignant - Primary
8693	B5...11	Carcinoma of other and unspecified sites	Malignant - Primary
20160	B50..00	Malignant neoplasm of eye	Malignant - Primary
98813	B500.00	Malig neop eyeball excl conjunctiva, cornea, retina, choroid	Malignant - Primary
59041	B500000	Malignant neoplasm of ciliary body	Malignant - Primary
59381	B500100	Malignant neoplasm of iris	Malignant - Primary
106569	B500200	Malignant neoplasm of crystalline lens	Malignant - Primary
56718	B500z00	Malignant neoplasm of eyeball NOS	Malignant - Primary
45667	B501.00	Malignant neoplasm of orbit	Malignant - Primary
86996	B501000	Malignant neoplasm of connective tissue of orbit	Malignant - Primary
63104	B501z00	Malignant neoplasm of orbit NOS	Malignant - Primary
64817	B502.00	Malignant neoplasm of lacrimal gland	Malignant - Primary
63657	B503.00	Malignant neoplasm of conjunctiva	Malignant - Primary
73992	B504.00	Malignant neoplasm of cornea	Malignant - Primary
28069	B505.00	Malignant neoplasm of retina	Malignant - Primary
15991	B506.00	Malignant neoplasm of choroid	Malignant - Primary
71584	B507.00	Malignant neoplasm of lacrimal duct	Malignant - Primary
101805	B507000	Malignant neoplasm of lacrimal sac	Malignant - Primary
65357	B507100	Malignant neoplasm of nasolacrimal duct	Malignant - Primary
45922	B508.00	Malignant neoplasm, overlapping lesion of eye and adnexa	Malignant - Primary
40437	B50y.00	Malignant neoplasm of other specified site of eye	Malignant - Primary

54956	B50z.00	Malignant neoplasm of eye NOS	Malignant - Primary
18617	B51..00	Malignant neoplasm of brain	Malignant - Primary
10851	B51..11	Cerebral tumour - malignant	Malignant - Primary
15711	B510.00	Malignant neoplasm cerebrum (excluding lobes and ventricles)	Malignant - Primary
48073	B510000	Malignant neoplasm of basal ganglia	Malignant - Primary
61399	B510100	Malignant neoplasm of cerebral cortex	Malignant - Primary
99913	B510300	Malignant neoplasm of globus pallidus	Malignant - Primary
70942	B510400	Malignant neoplasm of hypothalamus	Malignant - Primary
62126	B510500	Malignant neoplasm of thalamus	Malignant - Primary
54133	B510z00	Malignant neoplasm of cerebrum NOS	Malignant - Primary
42426	B511.00	Malignant neoplasm of frontal lobe	Malignant - Primary
46792	B512.00	Malignant neoplasm of temporal lobe	Malignant - Primary
67236	B512000	Malignant neoplasm of hippocampus	Malignant - Primary
47556	B512z00	Malignant neoplasm of temporal lobe NOS	Malignant - Primary
19226	B513.00	Malignant neoplasm of parietal lobe	Malignant - Primary
39088	B514.00	Malignant neoplasm of occipital lobe	Malignant - Primary
52511	B515.00	Malignant neoplasm of cerebral ventricles	Malignant - Primary
46789	B515000	Malignant neoplasm of choroid plexus	Malignant - Primary
45154	B516.00	Malignant neoplasm of cerebellum	Malignant - Primary
44089	B517.00	Malignant neoplasm of brain stem	Malignant - Primary
64557	B517000	Malignant neoplasm of cerebral peduncle	Malignant - Primary
49132	B517100	Malignant neoplasm of medulla oblongata	Malignant - Primary
93537	B517200	Malignant neoplasm of midbrain	Malignant - Primary
91240	B517300	Malignant neoplasm of pons	Malignant - Primary
68641	B517z00	Malignant neoplasm of brain stem NOS	Malignant - Primary
71139	B51y.00	Malignant neoplasm of other parts of brain	Malignant - Primary
59170	B51y000	Malignant neoplasm of corpus callosum	Malignant - Primary
65241	B51y200	Malignant neoplasm, overlapping lesion of brain	Malignant - Primary
100733	B51yz00	Malignant neoplasm of other part of brain NOS	Malignant - Primary
41520	B51z.00	Malignant neoplasm of brain NOS	Malignant - Primary
65458	B52..00	Malig neop of other and unspecified parts of nervous system	Malignant - Primary
99621	B520.00	Malignant neoplasm of cranial nerves	Malignant - Primary
64971	B520000	Malignant neoplasm of olfactory bulb	Malignant - Primary
70126	B520100	Malignant neoplasm of optic nerve	Malignant - Primary
65599	B520200	Malignant neoplasm of acoustic nerve	Malignant - Primary
101086	B520z00	Malignant neoplasm of cranial nerves NOS	Malignant - Primary
28919	B521.00	Malignant neoplasm of cerebral meninges	Malignant - Primary
109473	B521200	Malignant neoplasm of cerebral pia mater	Malignant - Primary
70104	B521z00	Malignant neoplasm of cerebral meninges NOS	Malignant - Primary
51115	B522.00	Malignant neoplasm of spinal cord	Malignant - Primary
49714	B523.00	Malignant neoplasm of spinal meninges	Malignant - Primary
67211	B523z00	Malignant neoplasm of spinal meninges NOS	Malignant - Primary
24235	B524.00	Malig neopl peripheral nerves and autonomic nervous system	Malignant - Primary

63568	B524000	Malignant neoplasm of peripheral nerves of head, face & neck	Malignant - Primary
61716	B524100	Malignant neoplasm of peripheral nerve,upp limb,incl should	Malignant - Primary
89258	B524200	Malignant neoplasm of peripheral nerve of low limb, incl hip	Malignant - Primary
63695	B524300	Malignant neoplasm of peripheral nerve of thorax	Malignant - Primary
86046	B524400	Malignant neoplasm of peripheral nerve of abdomen	Malignant - Primary
73988	B524500	Malignant neoplasm of peripheral nerve of pelvis	Malignant - Primary
50777	B524600	Malignant neoplasm,overlap lesion periph nerve & auton ns	Malignant - Primary
106654	B524W00	Mal neoplasm/periph nerves+autonomic nervous system,unspc	Malignant - Primary
9622	B525.00	Malignant neoplasm of cauda equina	Malignant - Primary
53504	B52W.00	Malig neopl, overlap lesion brain & other part of CNS	Malignant - Primary
49875	B52X.00	Malignant neoplasm of meninges, unspecified	Malignant - Primary
88144	B52y.00	Malignant neoplasm of other specified part of nervous system	Malignant - Primary
56490	B52z.00	Malignant neoplasm of nervous system NOS	Malignant - Primary
5637	B53..00	Malignant neoplasm of thyroid gland	Malignant - Primary
30511	B54..00	Malig neop of other endocrine glands and related structures	Malignant - Primary
28148	B540.00	Malignant neoplasm of adrenal gland	Malignant - Primary
18231	B540.11	Phaeochromocytoma	Malignant - Primary
61390	B540000	Malignant neoplasm of adrenal cortex	Malignant - Primary
94220	B540100	Malignant neoplasm of adrenal medulla	Malignant - Primary
70824	B540z00	Malignant neoplasm of adrenal gland NOS	Malignant - Primary
4218	B541.00	Malignant neoplasm of parathyroid gland	Malignant - Primary
59823	B542.00	Malignant neoplasm pituitary gland and craniopharyngeal duct	Malignant - Primary
8550	B542000	Malignant neoplasm of pituitary gland	Malignant - Primary
39899	B542100	Malignant neoplasm of craniopharyngeal duct	Malignant - Primary
59718	B542z00	Malig neop pituitary gland or craniopharyngeal duct NOS	Malignant - Primary
42460	B543.00	Malignant neoplasm of pineal gland	Malignant - Primary
57047	B544.00	Malignant neoplasm of carotid body	Malignant - Primary
50035	B545.00	Malignant neoplasm of aortic body and other paraganglia	Malignant - Primary
51795	B545000	Malignant neoplasm of glomus jugulare	Malignant - Primary
47840	B545100	Malignant neoplasm of aortic body	Malignant - Primary
46905	B545200	Malignant neoplasm of coccygeal body	Malignant - Primary
103995	B545z00	Malignant neoplasm of aortic body or paraganglia NOS	Malignant - Primary
100083	B546.00	Neuroblastoma	Malignant - Primary
87113	B54X.00	Malignant neoplasm-pluriglandular involvement,unspecified	Malignant - Primary

90659	B54y.00	Malignant neoplasm of other specified endocrine gland	Malignant - Primary
64195	B54z.00	Malig neop of endocrine gland or related structure NOS	Malignant - Primary
9030	B55..00	Malignant neoplasm of other and ill-defined sites	Malignant - Primary
68236	B550.00	Malignant neoplasm of head, neck and face	Malignant - Primary
55098	B550000	Malignant neoplasm of head NOS	Malignant - Primary
41931	B550100	Malignant neoplasm of cheek NOS	Malignant - Primary
12490	B550200	Malignant neoplasm of nose NOS	Malignant - Primary
51818	B550300	Malignant neoplasm of jaw NOS	Malignant - Primary
16280	B550400	Malignant neoplasm of neck NOS	Malignant - Primary
73510	B550500	Malignant neoplasm of supraclavicular fossa NOS	Malignant - Primary
58903	B550z00	Malignant neoplasm of head, neck and face NOS	Malignant - Primary
47286	B551.00	Malignant neoplasm of thorax	Malignant - Primary
37618	B551000	Malignant neoplasm of axilla NOS	Malignant - Primary
23861	B551100	Malignant neoplasm of chest wall NOS	Malignant - Primary
97547	B551200	Malignant neoplasm of intrathoracic site NOS	Malignant - Primary
64810	B551z00	Malignant neoplasm of thorax NOS	Malignant - Primary
15976	B552.00	Malignant neoplasm of abdomen	Malignant - Primary
52316	B553.00	Malignant neoplasm of pelvis	Malignant - Primary
57854	B553000	Malignant neoplasm of inguinal region NOS	Malignant - Primary
89916	B553100	Malignant neoplasm of presacral region	Malignant - Primary
107126	B553200	Malignant neoplasm of sacrococcygeal region	Malignant - Primary
55101	B553z00	Malignant neoplasm of pelvis NOS	Malignant - Primary
27449	B554.00	Malignant neoplasm of upper limb NOS	Malignant - Primary
31399	B555.00	Malignant neoplasm of lower limb NOS	Malignant - Primary
42218	B55y.00	Malignant neoplasm of other specified sites	Malignant - Primary
68787	B55y000	Malignant neoplasm of back NOS	Malignant - Primary
67217	B55y100	Malignant neoplasm of trunk NOS	Malignant - Primary
94355	B55y200	Malignant neoplasm of flank NOS	Malignant - Primary
60052	B55yz00	Malignant neoplasm of specified site NOS	Malignant - Primary
45267	B55z.00	Malignant neoplasm of other and ill defined site NOS	Malignant - Primary
26034	B591.00	Other malignant neoplasm NOS	Malignant - Primary
51352	B592.00	Malignant neoplasms of independent (primary) multiple sites	Malignant - Primary
65466	B592X00	Kaposi's sarcoma of multiple organs	Malignant - Primary
11035	B593.00	Primary malignant neoplasm of unknown site	Malignant - Primary
104324	B595.00	Malignant tumour of unknown origin	Malignant - Primary
54267	B59z.00	Malignant neoplasm of unspecified site NOS	Malignant - Primary
49525	B59zX00	Kaposi's sarcoma, unspecified	Malignant - Primary
38736	B5y..00	Malignant neoplasm of other and unspecified site OS	Malignant - Primary
1056	B5z..00	Malignant neoplasm of other and unspecified site NOS	Malignant - Primary

12323	B6...00	Malignant neoplasm of lymphatic and haemopoietic tissue	Malignant - Primary
37112	B6...11	Malignant neoplasm of histiocytic tissue	Malignant - Primary
41369	B60..00	Lymphosarcoma and reticulosarcoma	Malignant - Primary
1481	B600.00	Reticulosarcoma	Malignant - Primary
60242	B600000	Reticulosarcoma of unspecified site	Malignant - Primary
71031	B600100	Reticulosarcoma of lymph nodes of head, face and neck	Malignant - Primary
70374	B600300	Reticulosarcoma of intra-abdominal lymph nodes	Malignant - Primary
95058	B600700	Reticulosarcoma of spleen	Malignant - Primary
99240	B600z00	Reticulosarcoma NOS	Malignant - Primary
27416	B601.00	Lymphosarcoma	Malignant - Primary
71625	B601000	Lymphosarcoma of unspecified site	Malignant - Primary
71238	B601100	Lymphosarcoma of lymph nodes of head, face and neck	Malignant - Primary
62380	B601200	Lymphosarcoma of intrathoracic lymph nodes	Malignant - Primary
64670	B601300	Lymphosarcoma of intra-abdominal lymph nodes	Malignant - Primary
100352	B601500	Lymphosarcoma of lymph nodes of inguinal region and leg	Malignant - Primary
103245	B601700	Lymphosarcoma of spleen	Malignant - Primary
104790	B601800	Lymphosarcoma of lymph nodes of multiple sites	Malignant - Primary
63723	B601z00	Lymphosarcoma NOS	Malignant - Primary
21402	B602.00	Burkitt's lymphoma	Malignant - Primary
59115	B602100	Burkitt's lymphoma of lymph nodes of head, face and neck	Malignant - Primary
100006	B602200	Burkitt's lymphoma of intrathoracic lymph nodes	Malignant - Primary
97577	B602300	Burkitt's lymphoma of intra-abdominal lymph nodes	Malignant - Primary
92380	B602500	Burkitt's lymphoma of lymph nodes of inguinal region and leg	Malignant - Primary
71304	B602z00	Burkitt's lymphoma NOS	Malignant - Primary
99887	B60y.00	Other specified reticulosarcoma or lymphosarcoma	Malignant - Primary
99951	B60z.00	Reticulosarcoma or lymphosarcoma NOS	Malignant - Primary
2462	B61..00	Hodgkin's disease	Malignant - Primary
104291	B61..11	Hodgkin lymphoma	Malignant - Primary
65489	B610.00	Hodgkin's paragranuloma	Malignant - Primary
100423	B610100	Hodgkin's paragranuloma of lymph nodes of head, face, neck	Malignant - Primary
98840	B610300	Hodgkin's paragranuloma of intra-abdominal lymph nodes	Malignant - Primary
44196	B611.00	Hodgkin's granuloma	Malignant - Primary
98909	B611100	Hodgkin's granuloma of lymph nodes of head, face and neck	Malignant - Primary
64036	B612.00	Hodgkin's sarcoma	Malignant - Primary
68039	B612400	Hodgkin's sarcoma of lymph nodes of axilla and upper limb	Malignant - Primary
38939	B613.00	Hodgkin's disease, lymphocytic-histiocytic predominance	Malignant - Primary

71142	B613000	Hodgkin's, lymphocytic-histiocytic predominance unspec site	Malignant - Primary
68330	B613100	Hodgkin's, lymphocytic-histiocytic pred of head, face, neck	Malignant - Primary
92245	B613200	Hodgkin's, lymphocytic-histiocytic pred intrathoracic nodes	Malignant - Primary
73532	B613300	Hodgkin's, lymphocytic-histiocytic pred intra-abdominal node	Malignant - Primary
93951	B613500	Hodgkin's, lymphocytic-histiocytic pred inguinal and leg	Malignant - Primary
95338	B613600	Hodgkin's, lymphocytic-histiocytic pred intrapelvic nodes	Malignant - Primary
106911	B613700	Hodgkin's, lymphocytic-histiocytic predominance of spleen	Malignant - Primary
104743	B613800	Hodgkin's, lymphocytic-histiocytic pred of multiple sites	Malignant - Primary
29876	B613z00	Hodgkin's, lymphocytic-histiocytic predominance NOS	Malignant - Primary
29178	B614.00	Hodgkin's disease, nodular sclerosis	Malignant - Primary
57225	B614000	Hodgkin's disease, nodular sclerosis of unspecified site	Malignant - Primary
55303	B614100	Hodgkin's nodular sclerosis of head, face and neck	Malignant - Primary
67506	B614200	Hodgkin's nodular sclerosis of intrathoracic lymph nodes	Malignant - Primary
61149	B614300	Hodgkin's nodular sclerosis of intra-abdominal lymph nodes	Malignant - Primary
65483	B614400	Hodgkin's nodular sclerosis of lymph nodes of axilla and arm	Malignant - Primary
105472	B614700	Hodgkin's disease, nodular sclerosis of spleen	Malignant - Primary
19140	B614800	Hodgkin's nodular sclerosis of lymph nodes of multiple sites	Malignant - Primary
63054	B614z00	Hodgkin's disease, nodular sclerosis NOS	Malignant - Primary
49605	B615.00	Hodgkin's disease, mixed cellularity	Malignant - Primary
97863	B615000	Hodgkin's disease, mixed cellularity of unspecified site	Malignant - Primary
94407	B615100	Hodgkin's mixed cellularity of lymph nodes head, face, neck	Malignant - Primary
58684	B615200	Hodgkin's mixed cellularity of intrathoracic lymph nodes	Malignant - Primary
108886	B615500	Hodgkin's mixed cellularity of lymph nodes inguinal and leg	Malignant - Primary
94005	B615z00	Hodgkin's disease, mixed cellularity NOS	Malignant - Primary
67703	B616.00	Hodgkin's disease, lymphocytic depletion	Malignant - Primary
95049	B616000	Hodgkin's lymphocytic depletion of unspecified site	Malignant - Primary
63625	B616400	Hodgkin's lymphocytic depletion lymph nodes axilla and arm	Malignant - Primary
101715	B616700	Hodgkin's disease, lymphocytic depletion of spleen	Malignant - Primary
107032	B616800	Hodgkin's lymphocytic depletion lymph nodes multiple sites	Malignant - Primary
101530	B616z00	Hodgkin's disease, lymphocytic depletion NOS	Malignant - Primary

104895	B617.00	Nodular lymphocyte predominant Hodgkin lymphoma	Malignant - Primary
105841	B618.00	Nodular sclerosis classical Hodgkin lymphoma	Malignant - Primary
108775	B619.00	Mixed cellularity classical Hodgkin lymphoma	Malignant - Primary
106597	B61B.00	Lymphocyte-rich classical Hodgkin lymphoma	Malignant - Primary
104484	B61C.00	Other classical Hodgkin lymphoma	Malignant - Primary
53397	B61z.00	Hodgkin's disease NOS	Malignant - Primary
106349	B61z.11	Hodgkin lymphoma NOS	Malignant - Primary
61662	B61z000	Hodgkin's disease NOS, unspecified site	Malignant - Primary
59778	B61z100	Hodgkin's disease NOS of lymph nodes of head, face and neck	Malignant - Primary
59755	B61z200	Hodgkin's disease NOS of intrathoracic lymph nodes	Malignant - Primary
107804	B61z300	Hodgkin's disease NOS of intra-abdominal lymph nodes	Malignant - Primary
91900	B61z400	Hodgkin's disease NOS of lymph nodes of axilla and arm	Malignant - Primary
99012	B61z500	Hodgkin's disease NOS of lymph nodes inguinal region and leg	Malignant - Primary
94279	B61z700	Hodgkin's disease NOS of spleen	Malignant - Primary
97746	B61z800	Hodgkin's disease NOS of lymph nodes of multiple sites	Malignant - Primary
42461	B61zz00	Hodgkin's disease NOS	Malignant - Primary
33333	B62..00	Other malignant neoplasm of lymphoid and histiocytic tissue	Malignant - Primary
5179	B620.00	Nodular lymphoma (Brill - Symmers disease)	Malignant - Primary
66327	B620000	Nodular lymphoma of unspecified site	Malignant - Primary
45264	B620100	Nodular lymphoma of lymph nodes of head, face and neck	Malignant - Primary
105203	B620200	Nodular lymphoma of intrathoracic lymph nodes	Malignant - Primary
92068	B620300	Nodular lymphoma of intra-abdominal lymph nodes	Malignant - Primary
94995	B620500	Nodular lymphoma of lymph nodes of inguinal region and leg	Malignant - Primary
58082	B620800	Nodular lymphoma of lymph nodes of multiple sites	Malignant - Primary
65701	B620z00	Nodular lymphoma NOS	Malignant - Primary
12006	B621.00	Mycosis fungoides	Malignant - Primary
95949	B621000	Mycosis fungoides of unspecified site	Malignant - Primary
91674	B621300	Mycosis fungoides of intra-abdominal lymph nodes	Malignant - Primary
96379	B621400	Mycosis fungoides of lymph nodes of axilla and upper limb	Malignant - Primary
72714	B621500	Mycosis fungoides of lymph nodes of inguinal region and leg	Malignant - Primary
95012	B621800	Mycosis fungoides of lymph nodes of multiple sites	Malignant - Primary
38005	B621z00	Mycosis fungoides NOS	Malignant - Primary
35014	B622.00	Sezary's disease	Malignant - Primary

100532	B622z00	Sezary's disease NOS	Malignant - Primary
44267	B623.00	Malignant histiocytosis	Malignant - Primary
69497	B623000	Malignant histiocytosis of unspecified site	Malignant - Primary
94415	B623100	Malignant histiocytosis of lymph nodes head, face and neck	Malignant - Primary
65642	B623300	Malignant histiocytosis of intra-abdominal lymph nodes	Malignant - Primary
58871	B623z00	Malignant histiocytosis NOS	Malignant - Primary
27330	B624.00	Leukaemic reticuloendotheliosis	Malignant - Primary
5137	B624.11	Leukaemic reticuloendotheliosis	Malignant - Primary
87335	B624.12	Hairy cell leukaemia	Malignant - Primary
65122	B624000	Leukaemic reticuloendotheliosis of unspecified sites	Malignant - Primary
65123	B624300	Leukaemic reticuloend of intra-abdominal lymph nodes	Malignant - Primary
73777	B624z00	Leukaemic reticuloendotheliosis NOS	Malignant - Primary
4870	B625.11	Histiocytosis X (acute, progressive)	Malignant - Primary
15036	B626.00	Malignant mast cell tumours	Malignant - Primary
103900	B626000	Mast cell malignancy of unspecified site	Malignant - Primary
100615	B626500	Mast cell malignancy of lymph nodes inguinal region and leg	Malignant - Primary
31324	B626800	Mast cell malignancy of lymph nodes of multiple sites	Malignant - Primary
89657	B626z00	Malignant mast cell tumour NOS	Malignant - Primary
3604	B627.00	Non - Hodgkin's lymphoma	Malignant - Primary
104391	B627.11	Non-Hodgkin lymphoma	Malignant - Primary
28639	B627000	Follicular non-Hodgkin's small cleaved cell lymphoma	Malignant - Primary
70842	B627100	Follicular non-Hodg mixed sml cleavd & lge cell lymphoma	Malignant - Primary
49262	B627200	Follicular non-Hodgkin's large cell lymphoma	Malignant - Primary
50668	B627300	Diffuse non-Hodgkin's small cell (diffuse) lymphoma	Malignant - Primary
108182	B627400	Diffuse non-Hodgkin's small cleaved cell (diffuse) lymphoma	Malignant - Primary
50695	B627500	Diffuse non-Hodgkin mixed sml & lge cell (diffuse) lymphoma	Malignant - Primary
53551	B627600	Diffuse non-Hodgkin's immunoblastic (diffuse) lymphoma	Malignant - Primary
17460	B627700	Diffuse non-Hodgkin's lymphoblastic (diffuse) lymphoma	Malignant - Primary
65180	B627800	Diffuse non-Hodgkin's lymphoma undifferentiated (diffuse)	Malignant - Primary
95715	B627900	Mucosa-associated lymphoma	Malignant - Primary
95545	B627911	Maltoma	Malignant - Primary
101114	B627A00	Diffuse non-Hodgkin's large cell lymphoma	Malignant - Primary
31576	B627B00	Other types of follicular non-Hodgkin's lymphoma	Malignant - Primary
21549	B627C00	Follicular non-Hodgkin's lymphoma	Malignant - Primary
17182	B627C11	Follicular lymphoma NOS	Malignant - Primary
70509	B627D00	Diffuse non-Hodgkin's centroblastic lymphoma	Malignant - Primary

102594	B627E00	Diffuse large B-cell lymphoma	Malignant - Primary
105966	B627F00	Extranod marg zone B-cell lymphom mucosa-assoc lymphoid tiss	Malignant - Primary
105038	B627G00	Mediastinal (thymic) large B-cell lymphoma	Malignant - Primary
31794	B627W00	Unspecified B-cell non-Hodgkin's lymphoma	Malignant - Primary
39798	B627X00	Diffuse non-Hodgkin's lymphoma, unspecified	Malignant - Primary
104152	B628.00	Follicular lymphoma	Malignant - Primary
105889	B628000	Follicular lymphoma grade 1	Malignant - Primary
105095	B628100	Follicular lymphoma grade 2	Malignant - Primary
107166	B628200	Follicular lymphoma grade 3	Malignant - Primary
105020	B628300	Follicular lymphoma grade 3a	Malignant - Primary
107973	B628400	Follicular lymphoma grade 3b	Malignant - Primary
106969	B628500	Diffuse follicle centre lymphoma	Malignant - Primary
108719	B628600	Cutaneous follicle centre lymphoma	Malignant - Primary
106063	B628700	Other types of follicular lymphoma	Malignant - Primary
105792	B629.00	Multifocal multisystemic dissem Langerhans-cell histiocytosi	Malignant - Primary
105335	B62A.00	Sarcoma of dendritic cells	Malignant - Primary
105762	B62C.00	Unifocal Langerhans-cell histiocytosis	Malignant - Primary
105083	B62D.00	Histiocytic sarcoma	Malignant - Primary
105085	B62E.00	T/NK-cell lymphoma	Malignant - Primary
105559	B62E100	Anaplastic large cell lymphoma, ALK-positive	Malignant - Primary
105955	B62E200	Anaplastic large cell lymphoma, ALK-negative	Malignant - Primary
104862	B62E300	Cutaneous T-cell lymphoma	Malignant - Primary
109780	B62E400	Extranodal NK/T-cell lymphoma, nasal type	Malignant - Primary
107949	B62E500	Hepatosplenic T-cell lymphoma	Malignant - Primary
105709	B62E600	Enteropathy-associated T-cell lymphoma	Malignant - Primary
105925	B62E700	Subcutaneous panniculitic T-cell lymphoma	Malignant - Primary
105375	B62E800	Blastic NK-cell lymphoma	Malignant - Primary
105636	B62E900	Angioimmunoblastic T-cell lymphoma	Malignant - Primary
105286	B62EA00	Primary cutaneous CD30-positive T-cell proliferations	Malignant - Primary
104934	B62Ew00	Other mature T/NK-cell lymphoma	Malignant - Primary
106884	B62F.00	Nonfollicular lymphoma	Malignant - Primary
106867	B62F.11	Non-follicular lymphoma	Malignant - Primary
104386	B62F000	Small cell B-cell lymphoma	Malignant - Primary
104620	B62F100	Mantle cell lymphoma	Malignant - Primary
104412	B62F200	Lymphoblastic (diffuse) lymphoma	Malignant - Primary
17887	B62x.00	Malignant lymphoma otherwise specified	Malignant - Primary
90201	B62x000	T-zone lymphoma	Malignant - Primary
57737	B62x100	Lymphoepithelioid lymphoma	Malignant - Primary
12464	B62x200	Peripheral T-cell lymphoma	Malignant - Primary
62437	B62x400	Malignant reticulosis	Malignant - Primary
58962	B62x500	Malignant immunoproliferative small intestinal disease	Malignant - Primary

95630	B62x600	True histiocytic lymphoma	Malignant - Primary
44318	B62xX00	Oth and unspecif peripheral & cutaneous T-cell lymphomas	Malignant - Primary
12335	B62y.00	Malignant lymphoma NOS	Malignant - Primary
57427	B62y000	Malignant lymphoma NOS of unspecified site	Malignant - Primary
50696	B62y100	Malignant lymphoma NOS of lymph nodes of head, face and neck	Malignant - Primary
72725	B62y200	Malignant lymphoma NOS of intrathoracic lymph nodes	Malignant - Primary
42579	B62y300	Malignant lymphoma NOS of intra-abdominal lymph nodes	Malignant - Primary
34089	B62y400	Malignant lymphoma NOS of lymph nodes of axilla and arm	Malignant - Primary
63105	B62y500	Malignant lymphoma NOS of lymph node inguinal region and leg	Malignant - Primary
71262	B62y600	Malignant lymphoma NOS of intrapelvic lymph nodes	Malignant - Primary
60092	B62y700	Malignant lymphoma NOS of spleen	Malignant - Primary
15504	B62y800	Malignant lymphoma NOS of lymph nodes of multiple sites	Malignant - Primary
15027	B62yz00	Malignant lymphoma NOS	Malignant - Primary
65434	B62z.00	Malignant neoplasms of lymphoid and histiocytic tissue NOS	Malignant - Primary
108037	B62z000	Unspec malig neop lymphoid/histiocytic of unspecified site	Malignant - Primary
64427	B62z100	Unspec malig neop lymphoid/histiocytic lymph node head/neck	Malignant - Primary
93384	B62z200	Unspec malig neop lymphoid/histiocytic of intrathoracic node	Malignant - Primary
103353	B62z300	Unspec malig neop lymphoid/histiocytic intra-abdominal nodes	Malignant - Primary
107638	B62z400	Unspec malig neop lymphoid/histiocytic lymph node axilla/arm	Malignant - Primary
71609	B62z500	Unspec malig neop lymphoid/histiocytic nodes inguinal/leg	Malignant - Primary
109342	B62z600	Unspec malig neop lymphoid/histiocytic of intrapelvic nodes	Malignant - Primary
101465	B62z800	Unspec malig neop lymphoid/histiocytic of multiple sites	Malignant - Primary
95792	B62zz00	Lymphoid and histiocytic malignancy NOS	Malignant - Primary
70716	B62zz11	Immunoproliferative neoplasm	Malignant - Primary
37182	B63..00	Multiple myeloma and immunoproliferative neoplasms	Malignant - Primary
4944	B630.00	Multiple myeloma	Malignant - Primary
43552	B630.11	Kahler's disease	Malignant - Primary
15211	B630.12	Myelomatosis	Malignant - Primary
22158	B630000	Malignant plasma cell neoplasm, extramedullary plasmacytoma	Malignant - Primary
19028	B630100	Solitary myeloma	Malignant - Primary
21329	B630200	Plasmacytoma NOS	Malignant - Primary
46042	B630300	Lambda light chain myeloma	Malignant - Primary
104418	B630400	Solitary plasmacytoma	Malignant - Primary
39187	B631.00	Plasma cell leukaemia	Malignant - Primary

64567	B63y.00	Other immunoproliferative neoplasms	Malignant - Primary
43450	B63z.00	Immunoproliferative neoplasm or myeloma NOS	Malignant - Primary
19372	B64..00	Lymphoid leukaemia	Malignant - Primary
4222	B64..11	Lymphatic leukaemia	Malignant - Primary
4251	B640.00	Acute lymphoid leukaemia	Malignant - Primary
104325	B640000	B-cell acute lymphoblastic leukaemia	Malignant - Primary
8625	B641.00	Chronic lymphoid leukaemia	Malignant - Primary
27790	B641.11	Chronic lymphatic leukaemia	Malignant - Primary
104328	B641000	B-cell chronic lymphocytic leukaemia	Malignant - Primary
107017	B641011	Chronic lymphocytic leukaemia of B-cell type	Malignant - Primary
107052	B641100	Clinical stage A chronic lymphocytic leukaemia	Malignant - Primary
106924	B641200	Clinical stage B chronic lymphocytic leukaemia	Malignant - Primary
107163	B641300	Clinical stage C chronic lymphocytic leukaemia	Malignant - Primary
72774	B642.00	Subacute lymphoid leukaemia	Malignant - Primary
49725	B64y.00	Other lymphoid leukaemia	Malignant - Primary
31586	B64y100	Prolymphocytic leukaemia	Malignant - Primary
37461	B64y200	Adult T-cell leukaemia	Malignant - Primary
108656	B64y300	B-cell prolymphocytic leukaemia	Malignant - Primary
107643	B64y400	T-cell prolymphocytic leukaemia	Malignant - Primary
104939	B64y500	Adult T-cell lymphoma/leukaemia (HTLV-1-associated)	Malignant - Primary
38331	B64yz00	Other lymphoid leukaemia NOS	Malignant - Primary
38914	B64z.00	Lymphoid leukaemia NOS	Malignant - Primary
7176	B65..00	Myeloid leukaemia	Malignant - Primary
4413	B650.00	Acute myeloid leukaemia	Malignant - Primary
10726	B651.00	Chronic myeloid leukaemia	Malignant - Primary
31701	B651.11	Chronic granulocytic leukaemia	Malignant - Primary
100786	B651000	Chronic eosinophilic leukaemia	Malignant - Primary
105957	B651100	Chronic myeloid leukaemia, BCR/ABL positive	Malignant - Primary
102783	B651200	Chronic neutrophilic leukaemia	Malignant - Primary
107236	B651300	Atypical chronic myeloid leukaemia, BCR/ABL negative	Malignant - Primary
27520	B651z00	Chronic myeloid leukaemia NOS	Malignant - Primary
63475	B652.00	Subacute myeloid leukaemia	Malignant - Primary
70724	B653.00	Myeloid sarcoma	Malignant - Primary
52327	B653000	Chloroma	Malignant - Primary
39629	B653100	Granulocytic sarcoma	Malignant - Primary
104788	B654.00	Acute myeloblastic leukaemia	Malignant - Primary
27664	B65y100	Acute promyelocytic leukaemia	Malignant - Primary
66089	B65yz00	Other myeloid leukaemia NOS	Malignant - Primary
33344	B65z.00	Myeloid leukaemia NOS	Malignant - Primary
35875	B66..00	Monocytic leukaemia	Malignant - Primary
108715	B66..11	Histiocytic leukaemia	Malignant - Primary
67700	B66..12	Monoblastic leukaemia	Malignant - Primary
19974	B660.00	Acute monocytic leukaemia	Malignant - Primary

27458	B661.00	Chronic monocytic leukaemia	Malignant - Primary
101606	B662.00	Subacute monocytic leukaemia	Malignant - Primary
108424	B663.00	Acute monoblastic leukaemia	Malignant - Primary
99015	B66y.00	Other monocytic leukaemia	Malignant - Primary
103645	B66yz00	Other monocytic leukaemia NOS	Malignant - Primary
93342	B66z.00	Monocytic leukaemia NOS	Malignant - Primary
37272	B67..00	Other specified leukaemia	Malignant - Primary
42539	B670.00	Acute erythraemia and erythroleukaemia	Malignant - Primary
27340	B670.11	Di Guglielmo's disease	Malignant - Primary
57671	B672.00	Megakaryocytic leukaemia	Malignant - Primary
65777	B672.11	Thrombocytic leukaemia	Malignant - Primary
65721	B673.00	Mast cell leukaemia	Malignant - Primary
50858	B674.00	Acute panmyelosis	Malignant - Primary
28276	B675.00	Acute myelofibrosis	Malignant - Primary
94174	B67y.00	Other and unspecified leukaemia	Malignant - Primary
72197	B67y000	Lymphosarcoma cell leukaemia	Malignant - Primary
99413	B67yz00	Other and unspecified leukaemia NOS	Malignant - Primary
30632	B67z.00	Other specified leukaemia NOS	Malignant - Primary
25191	B68..00	Leukaemia of unspecified cell type	Malignant - Primary
4072	B680.00	Acute leukaemia NOS	Malignant - Primary
16416	B681.00	Chronic leukaemia NOS	Malignant - Primary
54793	B682.00	Subacute leukaemia NOS	Malignant - Primary
34692	B68y.00	Other leukaemia of unspecified cell type	Malignant - Primary
4250	B68z.00	Leukaemia NOS	Malignant - Primary
20440	B69..00	Myelomonocytic leukaemia	Malignant - Primary
61500	B690.00	Acute myelomonocytic leukaemia	Malignant - Primary
22050	B691.00	Chronic myelomonocytic leukaemia	Malignant - Primary
104475	B692.00	Subacute myelomonocytic leukaemia	Malignant - Primary
105069	B693.00	Juvenile myelomonocytic leukaemia	Malignant - Primary
30646	B6y..00	Malignant neoplasm lymphatic or haematopoietic tissue OS	Malignant - Primary
6115	B6y0.00	Myeloproliferative disorder	Malignant - Primary
17056	B6y0.11	Myeloproliferative disease	Malignant - Primary
39336	B6y1.00	Myelosclerosis with myeloid metaplasia	Malignant - Primary
110065	B6y1.12	Osteomyelofibrosis	Malignant - Primary
49301	B6z..00	Malignant neoplasm lymphatic or haematopoietic tissue NOS	Malignant - Primary
50290	B6z0.00	Kaposi's sarcoma of lymph nodes	Malignant - Primary
21868	BB02.00	[M]Neoplasm, malignant	Malignant - Primary
8627	BB07.00	[M]Tumour cells, malignant	Malignant - Primary
22156	BB08.00	[M]Malignant tumour, small cell type	Malignant - Primary
24511	BB09.00	[M]Malignant tumour, giant cell type	Malignant - Primary
32213	BB0A.00	[M]Malignant tumour, fusiform cell type	Malignant - Primary
8695	BB12.00	[M]Carcinoma NOS	Malignant - Primary
57336	BB16.00	[M]Epithelioma, malignant	Malignant - Primary
25961	BB17.00	[M]Large cell carcinoma NOS	Malignant - Primary
21609	BB18.00	[M]Carcinoma, undifferentiated type, NOS	Malignant - Primary
12609	BB19.00	[M]Carcinoma, anaplastic type, NOS	Malignant - Primary
26413	BB1A.00	[M]Pleomorphic carcinoma	Malignant - Primary
48048	BB1B.00	[M]Giant cell and spindle cell carcinoma	Malignant - Primary

35474	BB1C.00	[M]Giant cell carcinoma	Malignant - Primary
6966	BB1D.00	[M]Spindle cell carcinoma	Malignant - Primary
54276	BB1E.00	[M]Pseudosarcomatous carcinoma	Malignant - Primary
69300	BB1F.00	[M]Polygonal cell carcinoma	Malignant - Primary
61984	BB1G.00	[M]Spheroidal cell carcinoma	Malignant - Primary
9291	BB1J.00	[M]Small cell carcinoma NOS	Malignant - Primary
66541	BB1J.12	[M]Round cell carcinoma	Malignant - Primary
9156	BB1K.00	[M]Oat cell carcinoma	Malignant - Primary
67970	BB1L.00	[M]Small cell carcinoma, fusiform cell type	Malignant - Primary
30988	BB1M.00	[M]Small cell carcinoma, intermediate cell	Malignant - Primary
21217	BB1N.00	[M]Small cell-large cell carcinoma	Malignant - Primary
106519	BB1P.00	[M]Non-small cell carcinoma	Malignant - Primary
10541	BB22.00	[M]Papillary carcinoma NOS	Malignant - Primary
34395	BB24.00	[M]Verrucous carcinoma NOS	Malignant - Primary
43717	BB24.11	[M]Verrucous epidermoid carcinoma	Malignant - Primary
4852	BB24.12	[M]Verrucous squamous cell carcinoma	Malignant - Primary
20807	BB26.00	[M]Papillary squamous cell carcinoma	Malignant - Primary
67912	BB26.11	[M]Papillary epidermoid carcinoma	Malignant - Primary
1624	BB2A.00	[M]Squamous cell carcinoma NOS	Malignant - Primary
56600	BB2A.11	[M]Epidermoid carcinoma NOS	Malignant - Primary
57680	BB2A.12	[M]Spinous cell carcinoma	Malignant - Primary
94873	BB2A.13	[M]Squamous cell carcinoma of skin NOS	Malignant - Primary
29787	BB2C.00	[M]Squamous cell carcinoma, keratinising type NOS	Malignant - Primary
57513	BB2C.11	[M]Epidermoid carcinoma, keratinising type	Malignant - Primary
59143	BB2D.00	[M]Squamous cell carcinoma, large cell, non-keratinising	Malignant - Primary
41816	BB2E.00	[M]Squamous cell carcinoma, small cell, non-keratinising	Malignant - Primary
45458	BB2F.00	[M]Squamous cell carcinoma, spindle cell type	Malignant - Primary
31004	BB2G.00	[M]Adenoid squamous cell carcinoma	Malignant - Primary
33497	BB2J.00	[M]Squamous cell carcinoma, microinvasive	Malignant - Primary
45510	BB2M.00	[M]Lymphoepithelial carcinoma	Malignant - Primary
3028	BB31.00	[M]Basal cell carcinoma NOS	Malignant - Primary
59919	BB32.00	[M]Multicentric basal cell carcinoma	Malignant - Primary
9885	BB33.00	[M]Basal cell carcinoma, morphoea type	Malignant - Primary
29524	BB34.00	[M]Basal cell carcinoma, fibroepithelial type	Malignant - Primary
35457	BB35.00	[M]Basosquamous carcinoma	Malignant - Primary
13574	BB36.00	[M]Metatypical carcinoma	Malignant - Primary
49835	BB37.00	[M]Intraepidermal epithelioma of Jadassohn	Malignant - Primary
20869	BB38.00	[M]Trichoepithelioma	Malignant - Primary
102417	BB3C.00	[M]Superficial basal cell carcinoma	Malignant - Primary
102547	BB3D.00	[M]Basal cell carcinoma, nodular	Malignant - Primary
103440	BB3E.00	[M]Basal cell carcinoma, micronodular	Malignant - Primary
103178	BB3F.00	[M]Basal cell carcinoma, infiltrative	Malignant - Primary

103066	BB3G.00	[M]Pigmented basal cell carcinoma	Malignant - Primary
6436	BB43.00	[M]Transitional cell carcinoma NOS	Malignant - Primary
12388	BB43.11	[M]Urothelial carcinoma	Malignant - Primary
100111	BB46.00	[M]Schneiderian carcinoma	Malignant - Primary
58798	BB47.00	[M]Transitional cell carcinoma, spindle cell type	Malignant - Primary
38454	BB48.00	[M]Basaloid carcinoma	Malignant - Primary
65216	BB49.00	[M]Cloacogenic carcinoma	Malignant - Primary
9712	BB4A.00	[M]Papillary transitional cell carcinoma	Malignant - Primary
101095	BB4B.00	[M]Grade 1 (Stage pTa) papillary urothelial/transit cell ca	Malignant - Primary
102244	BB4C.00	[M]Grade 2 (Stage pTa) papillary urothelial/transit cell ca	Malignant - Primary
101978	BB4D.00	[M]Grade 3 (Stage pTa) papillary urothelial/transit cell ca	Malignant - Primary
19091	BB5..00	[M]Adenomas and adenocarcinomas	Malignant - Primary
2272	BB5..11	[M]Adenocarcinomas	Malignant - Primary
8930	BB52.00	[M]Adenocarcinoma NOS	Malignant - Primary
44778	BB52000	[M]Adenocarcinoma in tubulovillous adenoma	Malignant - Primary
48223	BB54.00	[M]Scirrhous adenocarcinoma	Malignant - Primary
27440	BB55.00	[M]Linitis plastica	Malignant - Primary
71895	BB56.00	[M]Superficial spreading adenocarcinoma	Malignant - Primary
28272	BB57.00	[M]Adenocarcinoma, intestinal type	Malignant - Primary
59240	BB58.00	[M]Carcinoma, diffuse type	Malignant - Primary
8101	BB5a.00	[M]Renal adenoma and carcinoma	Malignant - Primary
10668	BB5a000	[M]Renal cell carcinoma	Malignant - Primary
52266	BB5a011	[M]Grawitz tumour	Malignant - Primary
15419	BB5a012	[M]Hypernephroma	Malignant - Primary
8032	BB5B.00	[M]Pancreatic adenomas and carcinomas	Malignant - Primary
34096	BB5b.00	[M]Granular cell carcinoma	Malignant - Primary
11469	BB5B011	[M]Nesidioblastoma	Malignant - Primary
63102	BB5B100	[M]Islet cell carcinoma	Malignant - Primary
95609	BB5B300	[M]Insulinoma, malignant	Malignant - Primary
32294	BB5B500	[M]Glucagonoma, malignant	Malignant - Primary
98825	BB5B600	[M]Mixed islet cell and exocrine adenocarcinoma	Malignant - Primary
21659	BB5Bz00	[M]Pancreatic adenoma or carcinoma NOS	Malignant - Primary
4217	BB5c.00	[M]Parathyroid adenomas and adenocarcinomas	Malignant - Primary
26858	BB5C.00	[M]Gastrinoma and carcinomas	Malignant - Primary
49629	BB5C100	[M]Gastrinoma, malignant	Malignant - Primary
36031	BB5D.00	[M]Hepatobiliary tract adenomas and carcinomas	Malignant - Primary
70516	BB5D.11	[M]Biliary tract adenomas and adenocarcinomas	Malignant - Primary
8711	BB5D100	[M]Cholangiocarcinoma	Malignant - Primary
40438	BB5D111	[M]Bile duct carcinoma	Malignant - Primary
41313	BB5D300	[M]Bile duct cystadenocarcinoma	Malignant - Primary
40240	BB5D500	[M]Hepatocellular carcinoma NOS	Malignant - Primary
26814	BB5D512	[M]Hepatoma, malignant	Malignant - Primary

25641	BB5D513	[M]Liver cell carcinoma	Malignant - Primary
107299	BB5D700	[M]Combined hepatocellular carcinoma and cholangiocarcinoma	Malignant - Primary
110147	BB5D711	[M]Hepatocholangiocarcinoma	Malignant - Primary
46771	BB5D800	[M]Hepatocellular carcinoma, fibrolamellar	Malignant - Primary
19263	BB5f.00	[M]Thyroid adenoma and adenocarcinoma	Malignant - Primary
98781	BB5F.00	[M]Trabecular adenocarcinoma	Malignant - Primary
21741	BB5f100	[M]Follicular adenocarcinoma NOS	Malignant - Primary
21847	BB5f111	[M]Follicular carcinoma	Malignant - Primary
59918	BB5f200	[M]Follicular adenocarcinoma, well differentiated type	Malignant - Primary
61467	BB5f300	[M]Follicular adenocarcinoma, trabecular type	Malignant - Primary
46761	BB5f600	[M]Papillary and follicular adenocarcinoma	Malignant - Primary
68757	BB5f700	[M]Nonencapsulated sclerosing carcinoma	Malignant - Primary
60775	BB5h100	[M]Adrenal cortical carcinoma	Malignant - Primary
8606	BB5j.00	[M]Endometrioid adenomas and carcinomas	Malignant - Primary
33775	BB5J.00	[M]Adenoid cystic carcinoma	Malignant - Primary
34879	BB5J.11	[M]Cylindroid adenocarcinoma	Malignant - Primary
9447	BB5j200	[M]Endometrioid carcinoma	Malignant - Primary
103034	BB5j500	[M]Endometrioid adenofibroma, malignant	Malignant - Primary
50140	BB5K.00	[M]Cribriform carcinoma	Malignant - Primary
18255	BB5L.00	[M]Adenomatous and adenocarcinomatous polyps	Malignant - Primary
52326	BB5L100	[M]Adenocarcinoma in adenomatous polyp	Malignant - Primary
73434	BB5L300	[M]Adenocarcinoma in multiple adenomatous polyps	Malignant - Primary
6746	BB5M.00	[M]Tubular adenomas and adenocarcinomas	Malignant - Primary
60045	BB5M100	[M]Tubular adenocarcinoma	Malignant - Primary
41702	BB5N.00	[M]Adenomatous and adenocarcinomatous polyps of colon	Malignant - Primary
73275	BB5N100	[M]Adenocarcinoma in adenomatous polposis coli	Malignant - Primary
94083	BB5P.00	[M]Solid carcinoma NOS	Malignant - Primary
34110	BB5R100	[M]Carcinoid tumour, malignant	Malignant - Primary
100625	BB5R500	[M]Carcinoid tumour, nonargentaffin, malignant	Malignant - Primary
55468	BB5R600	[M]Mucocarcinoid tumour, malignant	Malignant - Primary
26253	BB5R900	[M]Neuroendocrine carcinoma	Malignant - Primary
32641	BB5RA00	[M]Merkel cell carcinoma	Malignant - Primary
26848	BB5S.00	[M]Respiratory tract adenomas and adenocarcinomas	Malignant - Primary
34015	BB5S200	[M]Bronchiolo-alveolar adenocarcinoma	Malignant - Primary
36530	BB5S211	[M]Alveolar cell carcinoma	Malignant - Primary
16723	BB5S212	[M]Bronchiolar carcinoma	Malignant - Primary
57802	BB5S400	[M]Alveolar adenocarcinoma	Malignant - Primary
42273	BB5T.00	[M]Papillary adenomas and adenocarcinomas	Malignant - Primary
35348	BB5T100	[M]Papillary adenocarcinoma NOS	Malignant - Primary

6920	BB5U.00	[M]Villous adenomas and adenocarcinomas	Malignant - Primary
67342	BB5U100	[M]Adenocarcinoma in villous adenoma	Malignant - Primary
27849	BB5U200	[M]Villous adenocarcinoma	Malignant - Primary
26120	BB5V.00	[M]Pituitary adenomas and carcinomas	Malignant - Primary
68456	BB5V100	[M]Chromophobe carcinoma	Malignant - Primary
72277	BB5V700	[M]Basophil carcinoma	Malignant - Primary
40622	BB5V711	[M]Mucoid cell carcinoma	Malignant - Primary
62199	BB5W.00	[M]Oxyphilic adenomas and adenocarcinomas	Malignant - Primary
71497	BB5W100	[M]Oxyphilic adenocarcinoma	Malignant - Primary
29008	BB5W111	[M]Hurthle cell adenocarcinoma	Malignant - Primary
53129	BB5W112	[M]Oncytic adenocarcinoma	Malignant - Primary
36882	BB5X.00	[M]Clear cell adenomas and adenocarcinomas	Malignant - Primary
37354	BB5X100	[M]Clear cell adenocarcinoma NOS	Malignant - Primary
29362	BB5y.00	[M]Adenoma and adenocarcinoms OS	Malignant - Primary
16902	BB5y000	[M]Basal cell adenocarcinoma	Malignant - Primary
49900	BB5y200	[M]Klatskin's tumour	Malignant - Primary
95046	BB60.00	[M]Skin appendage adenoma and carcinoma	Malignant - Primary
68783	BB60100	[M]Skin appendage carcinoma	Malignant - Primary
24312	BB62.00	[M]Apocrine adenoma and adenocarcinomas	Malignant - Primary
38575	BB62100	[M]Apocrine adenocarcinoma	Malignant - Primary
28291	BB69.00	[M]Sebaceous adenoma and adenocarcinoma	Malignant - Primary
34269	BB69100	[M]Sebaceous adenocarcinoma	Malignant - Primary
67913	BB6A.00	[M]Ceruminous adenoma and adenocarcinoma	Malignant - Primary
28625	BB71.00	[M]Mucoepidermoid carcinoma	Malignant - Primary
34984	BB80.00	[M]Cystadenoma and carcinoma	Malignant - Primary
34000	BB80100	[M]Cystadenocarcinoma NOS	Malignant - Primary
38442	BB81200	[M]Serous cystadenocarcinoma, NOS	Malignant - Primary
65051	BB81500	[M]Papillary cystadenocarcinoma, NOS	Malignant - Primary
44930	BB81800	[M]Papillary serous cystadenocarcinoma	Malignant - Primary
95150	BB81B00	[M]Serous surface papillary carcinoma	Malignant - Primary
51656	BB81E00	[M]Mucinous cystadenocarcinoma NOS	Malignant - Primary
66876	BB81E11	[M]Pseudomucinous adenocarcinoma	Malignant - Primary
54749	BB81H00	[M]Papillary mucinous cystadenocarcinoma	Malignant - Primary
40632	BB82.00	[M]Mucinous adenoma and adenocarcinoma	Malignant - Primary
12497	BB82100	[M]Mucinous adenocarcinoma	Malignant - Primary
30416	BB82111	[M]Colloid adenocarcinoma	Malignant - Primary
95008	BB82112	[M]Gelatinous adenocarcinoma	Malignant - Primary
55429	BB82113	[M]Mucoid adenocarcionoma	Malignant - Primary
59284	BB82114	[M]Mucous adenocarcinoma	Malignant - Primary
17098	BB83.00	[M]Pseudomyxoma peritonei	Malignant - Primary
44074	BB84.00	[M]Mucin-producing adenocarcinoma	Malignant - Primary
39038	BB85.00	[M]Signet ring carcinoma	Malignant - Primary

61588	BB85000	[M]Signet ring cell carcinoma	Malignant - Primary
94438	BB85z00	[M]Signet ring carcinoma NOS	Malignant - Primary
8351	BB91.00	[M]Infiltrating duct carcinoma	Malignant - Primary
21833	BB91.11	[M]Duct carcinoma NOS	Malignant - Primary
30189	BB91000	[M]Intraductal papillary adenocarcinoma with invasion	Malignant - Primary
39760	BB91100	[M]Infiltrating duct and lobular carcinoma	Malignant - Primary
58131	BB93.00	[M]Comedocarcinoma NOS	Malignant - Primary
40359	BB94.00	[M]Juvenile breast carcinoma	Malignant - Primary
67701	BB94.11	[M]Secretory breast carcinoma	Malignant - Primary
16677	BB9B.00	[M]Medullary carcinoma NOS	Malignant - Primary
47920	BB9B.11	[M]C cell carcinoma	Malignant - Primary
50946	BB9C.00	[M]Medullary carcinoma with amyloid stroma	Malignant - Primary
98883	BB9D.00	[M]Medullary carcinoma with lymphoid stroma	Malignant - Primary
12427	BB9F.00	[M]Lobular carcinoma NOS	Malignant - Primary
7319	BB9G.00	[M]Infiltrating ductular carcinoma	Malignant - Primary
32472	BB9H.00	[M]Inflammatory carcinoma	Malignant - Primary
12300	BB9J.00	[M]Paget's disease, mammary	Malignant - Primary
60803	BB9J.11	[M]Paget's disease, breast	Malignant - Primary
42542	BB9K.00	[M]Paget's disease and infiltrating breast duct carcinoma	Malignant - Primary
12480	BB9K000	[M]Paget's disease and intraductal carcinoma of breast	Malignant - Primary
3969	BB9M.00	[M]Intracystic carcinoma NOS	Malignant - Primary
37688	BBA2.00	[M]Acinar cell carcinoma	Malignant - Primary
50151	BBa3.00	[M]Pineoblastoma	Malignant - Primary
21758	BBa5.00	[M]Chordoma	Malignant - Primary
12309	BBb..00	[M]Gliomas	Malignant - Primary
31574	BBb0.00	[M]Glioma, malignant	Malignant - Primary
12580	BBB0.00	[M]Adenosquamous carcinoma	Malignant - Primary
8523	BBb0.11	[M]Glioma NOS	Malignant - Primary
34252	BBb0.12	[M]Gliosarcoma	Malignant - Primary
38551	BBb1.00	[M]Gliomatosis cerebri	Malignant - Primary
68808	BBb2.00	[M]Mixed glioma	Malignant - Primary
16146	BBB2.00	[M]Adenocarcinoma with squamous metaplasia	Malignant - Primary
8524	BBB2.11	[M]Adenoacanthoma	Malignant - Primary
39386	BBb2.11	[M]Mixed glioma	Malignant - Primary
42553	BBB3.00	[M]Adenocarcinoma with cartilaginous and osseous metaplasia	Malignant - Primary
94810	BBB4.00	[M]Adenocarcinoma with spindle cell metaplasia	Malignant - Primary
66000	BBB5.00	[M]Adenocarcinoma with apocrine metaplasia	Malignant - Primary
59415	BBB6100	[M]Thymoma, malignant	Malignant - Primary
20084	BBb7.00	[M]Ependymoma NOS	Malignant - Primary
38770	BBB7.00	[M]Epithelial-myoepithelial carcinoma	Malignant - Primary
52751	BBb8.00	[M]Ependymoma, anaplastic type	Malignant - Primary
46769	BBb8.11	[M]Ependymoblastoma	Malignant - Primary

70151	BBb9.00	[M]Papillary ependymoma	Malignant - Primary
43114	BBbA.00	[M]Myxopapillary ependymoma	Malignant - Primary
41695	BBba.00	[M]Primitive neuroectodermal tumour	Malignant - Primary
107884	BBba000	[M]Peripheral neuroectodermal tumour	Malignant - Primary
8547	BBbB.00	[M]Astrocytoma NOS	Malignant - Primary
27748	BBbB.11	[M]Astrocytic glioma	Malignant - Primary
8328	BBbC.00	[M]Astrocytoma, anaplastic type	Malignant - Primary
45531	BBbE.00	[M]Gemistocytic astrocytoma	Malignant - Primary
27846	BBbF.00	[M]Fibrillary astrocytoma	Malignant - Primary
30273	BBbG.00	[M]Pilocytic astrocytoma	Malignant - Primary
61783	BBbG.11	[M]Juvenile astrocytoma	Malignant - Primary
98800	BBbG.12	[M]Piloid astrocytoma	Malignant - Primary
103047	BBbH.00	[M]Spongioblastoma NOS	Malignant - Primary
50235	BBbK.00	[M]Astroblastoma	Malignant - Primary
23083	BBbL.00	[M]Glioblastoma NOS	Malignant - Primary
9575	BBbL.11	[M]Glioblastoma multiforme	Malignant - Primary
66064	BBbM.00	[M]Giant cell glioblastoma	Malignant - Primary
27744	BBbQ.00	[M]Oligodendroglioma NOS	Malignant - Primary
49186	BBbR.00	[M]Oligodendroglioma, anaplastic type	Malignant - Primary
46404	BBbS.00	[M]Oligodendroblastoma	Malignant - Primary
34763	BBbT.00	[M]Medulloblastoma NOS	Malignant - Primary
65952	BBbU.00	[M]Desmoplastic medulloblastoma	Malignant - Primary
31767	BBbV.00	[M]Medullomyoblastoma	Malignant - Primary
37473	BBbW.00	[M]Cerebellar sarcoma NOS	Malignant - Primary
67587	BBbZ.00	[M]Pleomorphic xanthoastrocytoma	Malignant - Primary
27653	BBbz.00	[M]Glioma NOS	Malignant - Primary
39121	BBc0100	[M]Ganglioneuroblastoma	Malignant - Primary
2123	BBc1.00	[M]Neuroblastoma NOS	Malignant - Primary
67288	BBc2.00	[M]Medulloepithelioma NOS	Malignant - Primary
107681	BBc3.00	[M]Teratoid medulloepithelioma	Malignant - Primary
6751	BBC3.00	[M]Granulosa cell tumour NOS	Malignant - Primary
97961	BBc4.00	[M]Neuroepithelioma NOS	Malignant - Primary
31609	BBC4.00	[M]Granulosa cell tumour, malignant	Malignant - Primary
68479	BBc7.11	[M]Neuroastrocytoma	Malignant - Primary
28836	BBc9.00	[M]Retinoblastomas	Malignant - Primary
103883	BBc9100	[M]Retinoblastoma, undifferentiated type	Malignant - Primary
48952	BBc9z00	[M]Retinoblastoma NOS	Malignant - Primary
29580	BBCA.00	[M]Sertoli cell carcinoma	Malignant - Primary
51878	BBcC.00	[M]Aesthesioneuroblastoma	Malignant - Primary
39388	BBcC.11	[M]Olfactory neuroblastoma	Malignant - Primary
95373	BBCC100	[M]Leydig cell tumour, malignant	Malignant - Primary
106131	BBcD.11	[M]Olfactory neuroepithelioma	Malignant - Primary
95818	BBD1.00	[M]Paraganglioma, malignant	Malignant - Primary
27363	BBd2.00	[M]Meningioma, malignant	Malignant - Primary
60347	BBd2.11	[M]Leptomeningeal sarcoma	Malignant - Primary
96798	BBd2.12	[M]Meningothelial sarcoma	Malignant - Primary
65047	BBDA.00	[M]Phaeochromocytoma, malignant	Malignant - Primary
70176	BBdA.00	[M]Papillary meningioma	Malignant - Primary
50605	BBDB.00	[M]Glomangiosarcoma	Malignant - Primary

105166	BBDB.11	[M]Glomoid sarcoma	Malignant - Primary
7693	BBE..00	[M]Naevi and melanomas	Malignant - Primary
579	BBE1.00	[M]Malignant melanoma NOS	Malignant - Primary
24551	BBE1.11	[M]Melanocarcinoma	Malignant - Primary
7483	BBE1.12	[M]Melanoma NOS	Malignant - Primary
44157	BBE1.13	[M]Melanosarcoma NOS	Malignant - Primary
67966	BBE1.14	[M]Naevocarcinoma	Malignant - Primary
51353	BBE1000	[M]Malignant melanoma, regressing	Malignant - Primary
58835	BBE1100	[M]Desmoplastic melanoma, malignant	Malignant - Primary
62941	BBe2.00	[M]Neurofibrosarcoma	Malignant - Primary
20982	BBE2.00	[M]Nodular melanoma	Malignant - Primary
68889	BBE4.00	[M]Balloon cell melanoma	Malignant - Primary
69981	BBe7.00	[M]Neurilemmoma, malignant	Malignant - Primary
37477	BBe7.11	[M]Schwannoma, malignant	Malignant - Primary
40492	BBe9.00	[M]Triton tumour, malignant	Malignant - Primary
17232	BBEA.00	[M]Amelanotic melanoma	Malignant - Primary
63574	BBEC.00	[M]Malignant melanoma in junctional naevus	Malignant - Primary
62088	BBEG.00	[M]Malignant melanoma in Hutchinson's melanotic freckle	Malignant - Primary
11922	BBEG.11	[M]Lentigo maligna melanoma	Malignant - Primary
22692	BBEG000	[M]Acral lentiginous melanoma, malignant	Malignant - Primary
24208	BBEH.00	[M]Superficial spreading melanoma	Malignant - Primary
73251	BBEM.00	[M]Malignant melanoma in giant pigmented naevus	Malignant - Primary
23085	BBEP.00	[M]Epithelioid cell melanoma	Malignant - Primary
44061	BBEQ.00	[M]Spindle cell melanoma NOS	Malignant - Primary
92293	BBES.00	[M]Spindle cell melanoma, type B	Malignant - Primary
40303	BBET.00	[M]Mixed epithelioid and spindle melanoma	Malignant - Primary
68447	BBEV.00	[M]Blue naevus, malignant	Malignant - Primary
17366	BBF..00	[M]Soft tissue tumours and sarcomas NOS	Malignant - Primary
41803	BBf..00	[M]Granular cell tumours and alveolar soft part sarcoma	Malignant - Primary
8085	BBF1.00	[M]Sarcoma NOS	Malignant - Primary
71869	BBf2.00	[M]Alveolar soft part sarcoma	Malignant - Primary
31026	BBF3.00	[M]Spindle cell sarcoma	Malignant - Primary
97463	BBF4.00	[M]Giant cell sarcoma (except of bone)	Malignant - Primary
46581	BBF4.11	[M]Pleomorphic cell sarcoma	Malignant - Primary
58837	BBF5.00	[M]Small cell sarcoma	Malignant - Primary
69844	BBF5.11	[M]Round cell sarcoma	Malignant - Primary
62396	BBF6.00	[M]Epithelioid cell sarcoma	Malignant - Primary
55116	BBFz.00	[M]Soft tissue tumour or sarcoma NOS	Malignant - Primary
17178	BBg..00	[M]Lymphomas, NOS or diffuse	Malignant - Primary
36114	BBg1.00	[M]Malignant lymphoma NOS	Malignant - Primary
31323	BBG1.00	[M]Fibrosarcoma NOS	Malignant - Primary
1483	BBg1.11	[M]Lymphoma NOS	Malignant - Primary
23711	BBg1000	[M]Malignant lymphoma, diffuse NOS	Malignant - Primary
16460	BBg2.00	[M]Malignant lymphoma, non Hodgkin's type	Malignant - Primary
3371	BBg2.11	[M]Non Hodgkins lymphoma	Malignant - Primary

71117	BBg3.00	[M]Malignant lymphoma, undifferentiated cell type NOS	Malignant - Primary
8088	BBG3.00	[M]Fibromyxosarcoma	Malignant - Primary
46931	BBg4.00	[M]Malignant lymphoma, stem cell type	Malignant - Primary
69301	BBg5.00	[M]Malignant lymphoma, convoluted cell type NOS	Malignant - Primary
99655	BBg6.00	[M]Lymphosarcoma NOS	Malignant - Primary
41754	BBg7.00	[M]Malignant lymphoma, lymphoplasmacytoid type	Malignant - Primary
48253	BBg8.00	[M]Malignant lymphoma, immunoblastic type	Malignant - Primary
95024	BBG8.00	[M]Infantile fibrosarcoma	Malignant - Primary
94286	BBG8.11	[M]Congenital fibrosarcoma	Malignant - Primary
68964	BBgA.00	[M]Malignant lymphoma, centroblastic-centrocytic, diffuse	Malignant - Primary
41841	BBgB.00	[M]Malignant lymphoma, follicular centre cell NOS	Malignant - Primary
69980	BBgC.00	[M]Malignant lymphoma, lymphocytic, well differentiated NOS	Malignant - Primary
21463	BBgC.11	[M]Lymphocytic lymphoma NOS	Malignant - Primary
60504	BBgC.12	[M]Lymphocytic lymphosarcoma NOS	Malignant - Primary
51852	BBgD.00	[M]Malig lymphoma, lymphocytic, intermediate different NOS	Malignant - Primary
39906	BBgE.00	[M]Malignant lymphoma, centrocytic	Malignant - Primary
37680	BBGF.00	[M]Fibrous histiocytoma, malignant	Malignant - Primary
72196	BBgG.00	[M]Malignant lymphoma, lymphocytic, poorly different NOS	Malignant - Primary
67203	BBgG.11	[M]Lymphoblastic lymphosarcoma NOS	Malignant - Primary
34352	BBgG.12	[M]Lymphoblastic lymphoma NOS	Malignant - Primary
52591	BBgG.13	[M]Lymphoblastoma NOS	Malignant - Primary
72241	BBgH.00	[M]Prolymphocytic lymphosarcoma	Malignant - Primary
60275	BBgJ.00	[M]Malignant lymphoma, centroblastic type NOS	Malignant - Primary
96231	BBGJ.00	[M]Fibroxanthoma, malignant	Malignant - Primary
108682	BBgJ.11	[M]Germinoblastic sarcoma NOS	Malignant - Primary
35034	BBGJ.11	[M]Fibroxanthosarcoma	Malignant - Primary
66603	BBgK.00	[M]Malig lymphoma, follicular centre cell, non-cleaved NOS	Malignant - Primary
46877	BBgL.00	[M]Malignant lymphoma, small lymphocytic NOS	Malignant - Primary
26881	BBGL.00	[M]Dermatofibroma protuberans	Malignant - Primary
31726	BBgM.00	[M]Malignant lymphoma, small cleaved cell, diffuse	Malignant - Primary
31772	BBGM.00	[M]Dermatofibrosarcoma NOS	Malignant - Primary
61251	BBgN.00	[M]Malign lymphoma,lymphocytic,intermediate differn, diffuse	Malignant - Primary
71652	BBgP.00	[M]Malignant lymphoma, mixed small and large cell, diffuse	Malignant - Primary
31090	BBGP.00	[M]Pigmented dermatofibrosarcoma protuberans	Malignant - Primary
58015	BBgQ.00	[M]Malignant lymphomatous polyposis	Malignant - Primary

33869	BBgR.00	[M]Malignant lymphoma, large cell, diffuse NOS	Malignant - Primary
63994	BBgS.00	[M]Malignant lymphoma, large cell, cleaved, diffuse	Malignant - Primary
71619	BBgT.00	[M]Malignant lymphoma, large cell, noncleaved, diffuse	Malignant - Primary
51680	BBgV.00	[M]Malignant lymphoma, small cell, noncleaved, diffuse	Malignant - Primary
51895	BBgz.00	[M]Lymphoma, diffuse or NOS	Malignant - Primary
106137	BBh..00	[M]Reticulosarcomas	Malignant - Primary
72433	BBh0.00	[M]Reticulosarcoma NOS	Malignant - Primary
49825	BBh0.11	[M]Reticulum cell sarcoma NOS	Malignant - Primary
21732	BBH1.00	[M]Myxosarcoma	Malignant - Primary
100544	BBh2.00	[M]Reticulosarcoma, nodular	Malignant - Primary
20710	BBj..00	[M]Hodgkin's disease	Malignant - Primary
61997	BBj0.00	[M]Hodgkin's disease NOS	Malignant - Primary
101429	BBj0.11	[M]Lymphogranuloma, malignant	Malignant - Primary
56041	BBj1.00	[M]Hodgkin's disease, lymphocytic predominance	Malignant - Primary
28599	BBJ1.00	[M]Liposarcoma NOS	Malignant - Primary
101923	BBJ1.11	[M]Fibroliposarcoma	Malignant - Primary
65584	BBj1000	[M]Hodgkin,s disease, lymphocytic predominance, diffuse	Malignant - Primary
31537	BBj1100	[M]Hodgkin,s disease, lymphocytic predominance, nodular	Malignant - Primary
51285	BBj2.00	[M]Hodgkin's disease, mixed cellularity	Malignant - Primary
28628	BBJ3.00	[M]Liposarcoma, well differentiated type	Malignant - Primary
96183	BBj4.00	[M]Hodgkin's disease,lymphocytic depletion,diffuse fibrosis	Malignant - Primary
56676	BBJ5.00	[M]Myxoid liposarcoma	Malignant - Primary
60127	BBJ5.12	[M]Myxoliposarcoma	Malignant - Primary
42198	BBj6.00	[M]Hodgkin's disease, nodular sclerosis NOS	Malignant - Primary
103708	BBJ6.00	[M]Round cell liposarcoma	Malignant - Primary
40508	BBj6000	[M]Hodgkin,s disease, nodular sclerosis, lymphocytic predom	Malignant - Primary
64343	BBj6100	[M]Hodgkin,s disease, nodular sclerosis, mixed cellularity	Malignant - Primary
31741	BBj6200	[M]Hodgkin,s disease, nodular sclerosis, lymphocytic deplet	Malignant - Primary
99200	BBj7.00	[M]Hodgkin's disease, nodular sclerosis, cellular phase	Malignant - Primary
55947	BBJ7.00	[M]Pleomorphic liposarcoma	Malignant - Primary
59651	BBJ8.00	[M]Mixed type liposarcoma	Malignant - Primary
89230	BBj9.00	[M]Hodgkin's granuloma	Malignant - Primary
7856	BBJH.00	[M]Dedifferentiated liposarcoma	Malignant - Primary
42769	BBjz.00	[M]Hodgkin's disease NOS	Malignant - Primary
20437	BBk..00	[M]Lymphomas, nodular or follicular	Malignant - Primary
63699	BBk0.00	[M]Malignant lymphoma, nodular NOS	Malignant - Primary
64947	BBk0.11	[M]Brill - Symmers' disease	Malignant - Primary
27562	BBk0.12	[M]Follicular lymphosarcoma NOS	Malignant - Primary
49253	BBk0.13	[M]Giant follicular lymphoma	Malignant - Primary

10588	BBK0200	[M]Leiomyosarcoma NOS	Malignant - Primary
73916	BBK0400	[M]Epithelioid leiomyosarcoma	Malignant - Primary
64596	BBK0700	[M]Myxoid leiomyosarcoma	Malignant - Primary
67019	BBK1100	[M]Angiomyosarcoma	Malignant - Primary
31818	BBK2.00	[M]Myoma and myosarcoma	Malignant - Primary
98961	BBk2.00	[M]Malignant lymphoma, centroblastic-centrocytic, follicular	Malignant - Primary
55268	BBK2100	[M]Myosarcoma	Malignant - Primary
106970	BBk3.00	[M]Malig lymphoma, lymphocytic, well differentiated,nodular	Malignant - Primary
31421	BBK3100	[M]Rhabdomyosarcoma NOS	Malignant - Primary
48275	BBK3600	[M]Embryonal rhabdomyosarcoma	Malignant - Primary
63247	BBK3611	[M]Sarcoma botryoides	Malignant - Primary
42082	BBK3700	[M]Alveolar rhabdomyosarcoma	Malignant - Primary
39883	BBk5.00	[M]Malig lymp, follicular centre cell, cleaved, follicular	Malignant - Primary
97852	BBk7.00	[M]Malignant lymphoma, centroblastic type, follicular	Malignant - Primary
58953	BBk8.00	[M]Malig lymp,follicular centre cell,noncleaved,follicular	Malignant - Primary
40513	BBkz.00	[M]Lymphoma, nodular or follicular NOS	Malignant - Primary
46967	BBl..00	[M]Mycosis fungoides	Malignant - Primary
34030	BBL0.00	[M]Endometrial stromal sarcoma	Malignant - Primary
95464	BBl0.00	[M]Mycosis fungoides	Malignant - Primary
72319	BBL1.00	[M]Endolymphatic stromal myosis	Malignant - Primary
97756	BBl1.00	[M]Sezary's disease	Malignant - Primary
66607	BBL4.00	[M]Mixed tumour, malignant, NOS	Malignant - Primary
21173	BBL5.00	[M]Mullerian mixed tumour	Malignant - Primary
49811	BBL6.00	[M]Mesodermal mixed tumour	Malignant - Primary
43703	BBL7.11	[M]Nephromas and nephroblastomas	Malignant - Primary
21681	BBL7100	[M]Nephroblastoma NOS	Malignant - Primary
36870	BBL7111	[M]Adenosarcoma	Malignant - Primary
17314	BBL7112	[M]Wilms' tumour	Malignant - Primary
100371	BBL7200	[M]Epithelial nephroblastoma	Malignant - Primary
105862	BBL7300	[M]Mesenchymal nephroblastoma	Malignant - Primary
57677	BBL8.00	[M]Hepatoblastoma	Malignant - Primary
106889	BBL8.11	[M]Embryonal hepatoma	Malignant - Primary
19334	BBL9.00	[M]Carcinosarcoma NOS	Malignant - Primary
67934	BBLA.00	[M]Carcinosarcoma, embryonal type	Malignant - Primary
61082	BBLA.11	[M]Pneumoblastoma	Malignant - Primary
87003	BBLC100	[M]Mesenchymoma, malignant	Malignant - Primary
98797	BBLD.00	[M]Embryonal sarcoma	Malignant - Primary
63518	BBLE.00	[M]Adenosarcoma	Malignant - Primary
37510	BBLG.00	[M]Carcinoma in pleomorphic adenoma	Malignant - Primary
17212	BBLH.00	[M]Rhabdoid sarcoma	Malignant - Primary
18771	BBLJ.00	[M]Clear cell sarcoma of kidney	Malignant - Primary
48348	BBLM.00	[M]Pulmonary blastoma	Malignant - Primary
99695	BBlz.00	[M]Mycosis fungoides NOS	Malignant - Primary
63973	BBm0.00	[M]Microglioma	Malignant - Primary
70383	BBM0100	[M]Brenner tumour, malignant	Malignant - Primary
63239	BBm1.00	[M]Malignant histiocytosis	Malignant - Primary

70740	BBm1.11	[M]Malignant reticulosis	Malignant - Primary
47330	BBm2.00	[M]Histiocytic medullary reticulosis	Malignant - Primary
57544	BBm4.00	[M]True histiocytic lymphoma	Malignant - Primary
40766	BBm5.00	[M] Peripheral T-cell lymphoma NOS	Malignant - Primary
26135	BBm6.00	[M] Alpha heavy chain disease	Malignant - Primary
54190	BBm8.00	[M] Angioimmunoblastic lymphadenopathy	Malignant - Primary
31492	BBm9.00	[M] Monocytoid B-cell lymphoma	Malignant - Primary
59251	BBM9.00	[M]Cystosarcoma phyllodes, malignant	Malignant - Primary
49530	BBmC.00	[M] T-gamma lymphoproliferative disease	Malignant - Primary
16774	BBmD.00	[M] Cutaneous lymphoma	Malignant - Primary
52593	BBmE.00	[M] Gamma heavy chain disease	Malignant - Primary
18383	BBmH.00	[M] Large cell lymphoma	Malignant - Primary
9172	BBmK.00	[M]Waldenstrom's macroglobulinaemia	Malignant - Primary
31671	BBn0.00	[M]Plasma cell myeloma	Malignant - Primary
18744	BBn0.11	[M]Multiple myeloma	Malignant - Primary
3672	BBn0.12	[M]Myeloma NOS	Malignant - Primary
53647	BBn0.13	[M]Myelomatosis	Malignant - Primary
39490	BBn0.14	[M]Plasmacytic myeloma	Malignant - Primary
50379	BBN1.00	[M]Synovial sarcoma NOS	Malignant - Primary
105073	BBN2.00	[M]Synovial sarcoma, spindle cell type	Malignant - Primary
102164	BBn2.11	[M]Monostotic myeloma	Malignant - Primary
73135	BBn2.12	[M]Solitary myeloma	Malignant - Primary
99702	BBn3.00	[M]Plasma cell tumour, malignant	Malignant - Primary
57796	BBN4.00	[M]Synovial sarcoma, biphasic type	Malignant - Primary
63286	BBN5.00	[M]Clear cell sarcoma of tendons and aponeuroses	Malignant - Primary
16474	BBP..00	[M]Mesothelial neoplasms	Malignant - Primary
27509	BBP1.00	[M]Mesothelioma, malignant	Malignant - Primary
94239	BBp1.00	[M]Mast cell sarcoma	Malignant - Primary
67339	BBp2.00	[M]Malignant mastocytosis	Malignant - Primary
104720	BBP3.11	[M]Sarcomatoid mesothelioma	Malignant - Primary
47734	BBP5.00	[M]Epithelioid mesothelioma, malignant	Malignant - Primary
86820	BBP7.00	[M]Mesothelioma, biphasic type, malignant	Malignant - Primary
32191	BBQ0.00	[M]Dysgerminoma	Malignant - Primary
7476	BBQ1.00	[M]Seminomas	Malignant - Primary
57084	BBQ1000	[M]Seminoma, anaplastic type	Malignant - Primary
35223	BBQ1100	[M]Spermatocytic seminoma	Malignant - Primary
9859	BBQ1z00	[M]Seminoma NOS	Malignant - Primary
27971	BBQ2.00	[M]Germinoma	Malignant - Primary
28941	BBQ3.00	[M]Embryonal carcinoma NOS	Malignant - Primary
37621	BBQ4.00	[M]Endodermal sinus tumour	Malignant - Primary
104147	BBQ4.11	[M]Infantile embryonal carcinoma	Malignant - Primary
55658	BBQ4.12	[M]Orchioblastoma	Malignant - Primary
20350	BBQ4.14	[M]Yolk sac tumour	Malignant - Primary
102356	BBQ5.00	[M]Polyembryoma	Malignant - Primary
33636	BBQ7200	[M]Teratoma, malignant, NOS	Malignant - Primary
57087	BBQ7211	[M]Embryonal teratoma	Malignant - Primary
43865	BBQ7212	[M]Immature teratoma	Malignant - Primary
52493	BBQ7213	[M]Teratoblastoma, malignant	Malignant - Primary

37542	BBQ7300	[M]Teratocarcinoma	Malignant - Primary
61542	BBQ7400	[M]Malignant teratoma, undifferentiated type	Malignant - Primary
21682	BBQ7500	[M]Malignant teratoma, intermediate type	Malignant - Primary
65861	BBQ9.00	[M]Dermoid cyst with malignant transformation	Malignant - Primary
71301	BBQA100	[M]Struma ovarii, malignant	Malignant - Primary
35071	BBQB.00	[M]Mixed germ cell tumour	Malignant - Primary
4637	BBr..00	[M]Leukaemias	Malignant - Primary
40420	BBr0.00	[M]Leukaemias unspecified	Malignant - Primary
41734	BBr0000	[M]Leukaemia NOS	Malignant - Primary
6316	BBr0100	[M]Acute leukaemia NOS	Malignant - Primary
22071	BBr0111	[M]Blast cell leukaemia	Malignant - Primary
64963	BBr0112	[M]Blastic leukaemia	Malignant - Primary
63570	BBr0113	[M]Stem cell leukaemia	Malignant - Primary
72179	BBr0200	[M]Subacute leukaemia NOS	Malignant - Primary
31750	BBr0300	[M]Chronic leukaemia NOS	Malignant - Primary
72310	BBr0400	[M]Aleukaemic leukaemia NOS	Malignant - Primary
59929	BBr0z00	[M]Leukaemia unspecified, NOS	Malignant - Primary
48155	BBr2.00	[M]Lymphoid leukaemias	Malignant - Primary
12146	BBr2000	[M]Lymphoid leukaemia NOS	Malignant - Primary
20635	BBr2011	[M]Lymphatic leukaemia	Malignant - Primary
37410	BBr2100	[M]Acute lymphoid leukaemia	Malignant - Primary
41500	BBr2300	[M]Chronic lymphoid leukaemia	Malignant - Primary
46048	BBr2500	[M]Prolymphocytic leukaemia	Malignant - Primary
50928	BBr2600	[M]Burkitt's cell leukaemia	Malignant - Primary
29335	BBr2700	[M]Adult T-cell leukaemia/lymphoma	Malignant - Primary
64618	BBr3.00	[M]Plasma cell leukaemias	Malignant - Primary
46444	BBr4.00	[M]Erythroleukaemias	Malignant - Primary
70935	BBr4000	[M]Erythroleukaemia	Malignant - Primary
100927	BBr4z00	[M]Erythroleukaemia NOS	Malignant - Primary
35697	BBr6.00	[M]Myeloid leukaemias	Malignant - Primary
71850	BBr6000	[M]Myeloid leukaemia NOS	Malignant - Primary
37723	BBr6011	[M]Granulocytic leukaemia NOS	Malignant - Primary
54585	BBr6100	[M]Acute myeloid leukaemia	Malignant - Primary
106483	BBr6200	[M]Subacute myeloid leukaemia	Malignant - Primary
52942	BBr6300	[M]Chronic myeloid leukaemia	Malignant - Primary
66694	BBr6311	[M]Naegeli-type monocytic leukaemia	Malignant - Primary
57316	BBr6600	[M]Acute promyelocytic leukaemia	Malignant - Primary
46263	BBr6700	[M]Acute myelomonocytic leukaemia	Malignant - Primary
48049	BBr6800	[M]Chronic myelomonocytic leukaemia	Malignant - Primary
108964	BBr6900	[M]Juvenile myelomonocytic leukaemia	Malignant - Primary
62330	BBr6z00	[M]Other myeloid leukaemia NOS	Malignant - Primary
106197	BBr7000	[M]Basophilic leukaemia	Malignant - Primary
57713	BBr8.00	[M]Eosinophilic leukaemias	Malignant - Primary
71377	BBr8000	[M]Eosinophilic leukaemia	Malignant - Primary
107773	BBr8z00	[M]Eosinophilic leukaemia NOS	Malignant - Primary
73088	BBr9000	[M]Monocytic leukaemia NOS	Malignant - Primary
73066	BBrA.00	[M]Miscellaneous leukaemias	Malignant - Primary
72222	BBrA100	[M]Megakaryocytic leukaemia	Malignant - Primary

69299	BBrA111	[M]Thrombocytic leukaemia	Malignant - Primary
96893	BBrA300	[M]Myeloid sarcoma	Malignant - Primary
93944	BBrA311	[M]Chloroma	Malignant - Primary
98009	BBrA312	[M]Granulocytic sarcoma	Malignant - Primary
5915	BBrA400	[M]Hairy cell leukaemia	Malignant - Primary
49327	BBrA500	[M]Acute megakaryoblastic leukaemia	Malignant - Primary
102764	BBrA600	[M]Acute panmyelosis	Malignant - Primary
37487	BBrA700	[M]Acute myelofibrosis	Malignant - Primary
108316	BBrAz00	[M]Miscellaneous leukaemia NOS	Malignant - Primary
42297	BBrz.00	[M]Leukaemia NOS	Malignant - Primary
101271	BBs1.00	[M]Acute panmyelosis	Malignant - Primary
17091	BBs2.00	[M]Chronic myeloproliferative disease	Malignant - Primary
9673	BBs5.00	[M]Chronic lymphoproliferative disease	Malignant - Primary
62348	BBT1.00	[M]Haemangiosarcoma	Malignant - Primary
22650	BBT1.11	[M]Angiosarcoma	Malignant - Primary
27439	BBTA.00	[M]Kaposi's sarcoma	Malignant - Primary
105296	BBTD200	[M]Haemangiopericytoma, malignant	Malignant - Primary
38481	BBTK.00	[M]Epithelioid haemangioendothelioma, malignant	Malignant - Primary
52178	BBTL.00	[M]Intravascular bronchial alveolar tumour	Malignant - Primary
57729	BBU1.00	[M]Lymphangiosarcoma	Malignant - Primary
7799	BBv..00	[M]Myelodysplastic syndrome	Malignant - Primary
39522	BBV..00	[M]Osteomas and osteosarcomas	Malignant - Primary
99665	BBV..11	[M]Juxtacortical osteogenic sarcoma	Malignant - Primary
63571	BBV..12	[M]Parosteal osteosarcoma	Malignant - Primary
105275	BBV..13	[M]Periosteal osteogenic sarcoma	Malignant - Primary
31749	BBv0.00	[M]Monocytoid B-cell lymphoma	Malignant - Primary
8660	BBV1.00	[M]Osteosarcoma NOS	Malignant - Primary
49862	BBV1.11	[M]Osteoblastic sarcoma	Malignant - Primary
59310	BBV1.12	[M]Osteochondrosarcoma	Malignant - Primary
5052	BBV1.13	[M]Osteogenic sarcoma NOS	Malignant - Primary
27965	BBv2.00	[M]AngiocentricT-cell lymphoma	Malignant - Primary
24539	BBV2.00	[M]Chondroblastic osteosarcoma	Malignant - Primary
21447	BBV3.00	[M]Fibroblastic osteosarcoma	Malignant - Primary
22561	BBV4.00	[M]Telangiectatic osteosarcoma	Malignant - Primary
60631	BBV5.00	[M]Osteosarcoma in Paget's disease of bone	Malignant - Primary
4118	BBV9.00	[M]Myxoid chondrosarcoma	Malignant - Primary
29337	BBVA.00	[M] Small cell osteosarcoma	Malignant - Primary
7941	BBW4.00	[M]Chondrosarcoma NOS	Malignant - Primary
68220	BBW4.11	[M]Fibrochondrosarcoma	Malignant - Primary
63659	BBW6.00	[M]Juxtacortical chondrosarcoma	Malignant - Primary
98559	BBW8.00	[M]Chondroblastoma, malignant	Malignant - Primary
52684	BBW9.00	[M]Mesenchymal chondrosarcoma	Malignant - Primary
68956	BBX1.00	[M]Giant cell tumour of bone, malignant	Malignant - Primary
50859	BBX1.11	[M]Giant cell bone sarcoma	Malignant - Primary
31673	BBX1.12	[M]Osteoclastoma, malignant	Malignant - Primary
99797	BBX3.00	[M]Malignant giant cell tumour of soft parts	Malignant - Primary
4473	BBY0.00	[M]Ewing's sarcoma	Malignant - Primary

49023	BBY0.11	[M]Endothelial bone sarcoma	Malignant - Primary
38593	BBY1.00	[M]Adamantinoma of long bones	Malignant - Primary
67430	BBY1.11	[M]Tibial adamantinoma	Malignant - Primary
72443	BBZ2.00	[M]Odontogenic tumour, malignant	Malignant - Primary
93175	BBZ2.11	[M]Intraosseous carcinoma	Malignant - Primary
46741	BBZC.00	[M]Ameloblastic odontosarcoma	Malignant - Primary
63171	BBZF.11	[M]Adamantinoma NOS	Malignant - Primary
97593	BBZG.00	[M]Ameloblastoma, malignant	Malignant - Primary
100267	BBZG.11	[M]Adamantinoma, malignant	Malignant - Primary
68730	BBZN.00	[M]Ameloblastic fibrosarcoma	Malignant - Primary
98483	BBZN.11	[M]Odontogenic fibrosarcoma	Malignant - Primary
58973	Byu0.00	[X]Malignant neoplasm of lip, oral cavity and pharynx	Malignant - Primary
35180	Byu1.00	[X]Malignant neoplasm of digestive organs	Malignant - Primary
43490	Byu1100	[X]Other specified carcinomas of liver	Malignant - Primary
45766	Byu1200	[X]Malignant neoplasm of intestinal tract, part unspecified	Malignant - Primary
49292	Byu1300	[X]Malignant neoplsm/ill-defin sites within digestive system	Malignant - Primary
35325	Byu2.00	[X]Malignant neoplasm of respiratory and intrathoracic orga	Malignant - Primary
40595	Byu2000	[X]Malignant neoplasm of bronchus or lung, unspecified	Malignant - Primary
66444	Byu2100	[X]Malignant neoplasm/overlap lesion/heart,mediastinm+pleura	Malignant - Primary
99096	Byu2300	[X]Malignant neopl/overlapping les/resp+intrathoracic organs	Malignant - Primary
86997	Byu2400	[X]Malignant neoplasm/ill-defined sites within resp system	Malignant - Primary
50292	Byu2500	[X]Malignant neoplasm of mediastinum, part unspecified	Malignant - Primary
40749	Byu3.00	[X]Malignant neoplasm of bone and articular cartilage	Malignant - Primary
73296	Byu3100	[X]Malignant neoplasm/bones+articular cartilage/limb,unspfd	Malignant - Primary
63300	Byu3200	[X]Malignant neoplasm/overlap lesion/bone+articulr cartilage	Malignant - Primary
43151	Byu3300	[X]Malignant neoplasm/bone+articular cartilage, unspecified	Malignant - Primary
19144	Byu4.00	[X]Melanoma and other malignant neoplasms of skin	Malignant - Primary
56925	Byu4000	[X]Malignant melanoma of other+unspecified parts of face	Malignant - Primary
19444	Byu4100	[X]Malignant melanoma of skin, unspecified	Malignant - Primary
57184	Byu4200	[X]Oth malignant neoplasm/skin of oth+unspecfd parts of face	Malignant - Primary
56121	Byu4300	[X]Malignant neoplasm of skin, unspecified	Malignant - Primary
40592	Byu5.00	[X]Malignant neoplasm of mesothelial and soft tissue	Malignant - Primary
67034	Byu5000	[X]Mesothelioma of other sites	Malignant - Primary
21715	Byu5011	[X]Mesothelioma of lung	Malignant - Primary
30526	Byu5100	[X]Mesothelioma, unspecified	Malignant - Primary

93665	Byu5300	[X]Kaposi's sarcoma, unspecified	Malignant - Primary
101668	Byu5400	[X]Malignant neoplasm/peripheral nerves of trunk,unspecified	Malignant - Primary
105072	Byu5500	[X]Mal neoplasm/overlap les/periph nerv+autonomic nerv systm	Malignant - Primary
95671	Byu5700	[X]Malignant neoplasm of peritoneum, unspecified	Malignant - Primary
91896	Byu5800	[X]Mal neoplasm/connective+soft tissue of trunk,unspecified	Malignant - Primary
91457	Byu5900	[X]Malignant neoplasm/connective + soft tissue,unspecified	Malignant - Primary
60162	Byu5A00	[X]Malignant neoplasm overlapping lesion of skin	Malignant - Primary
98361	Byu5B00	[X]Kaposi's sarcoma of other sites	Malignant - Primary
12499	Byu6.00	[X]Malignant neoplasm of breast	Malignant - Primary
40598	Byu7.00	[X]Malignant neoplasm of female genital organs	Malignant - Primary
64497	Byu7000	[X]Malignant neoplasm of uterine adnexa, unspecified	Malignant - Primary
57756	Byu7100	[X]Malignant neoplasm/other specified female genital organs	Malignant - Primary
55588	Byu7300	[X]Malignant neoplasm of female genital organ, unspecified	Malignant - Primary
40671	Byu8.00	[X]Malignant neoplasm of male genital organs	Malignant - Primary
57191	Byu8000	[X]Malignant neoplasm/other specified male genital organs	Malignant - Primary
45262	Byu8200	[X]Malignant neoplasm of male genital organ, unspecified	Malignant - Primary
35113	Byu9.00	[X]Malignant neoplasm of urinary tract	Malignant - Primary
45260	Byu9000	[X]Malignant neoplasm of urinary organ, unspecified	Malignant - Primary
35285	ByuA.00	[X]Malignant neoplasm of eye, brain and other parts of cent	Malignant - Primary
68027	ByuA000	[X]Malignant neoplasm/other and unspecified cranial nerves	Malignant - Primary
41515	ByuA100	[X]Malignant neoplasm/central nervous system, unspecified	Malignant - Primary
63925	ByuA200	[X]Malignant neoplasm of meninges, unspecified	Malignant - Primary
47633	ByuA300	[X]Malig neopl, overlap lesion brain & other part of CNS	Malignant - Primary
40608	ByuB.00	[X]Malignant neoplasm of thyroid and other endocrine glands	Malignant - Primary
64309	ByuB100	[X]Malignant neoplasm of endocrine gland, unspecified	Malignant - Primary
39027	ByuC000	[X]Malignant neoplasm of other specified sites	Malignant - Primary
96226	ByuC100	[X]Malignant neoplasm/overlap lesion/other+ill-defined sites	Malignant - Primary
52029	ByuC800	[X]Malignant neoplasm without specification of site	Malignant - Primary
40740	ByuD.00	[X]Malignant neoplasms of lymphoid, haematopoietic and rela	Malignant - Primary
43415	ByuD000	[X]Other Hodgkin's disease	Malignant - Primary

67518	ByuD100	[X]Other types of follicular non-Hodgkin's lymphoma	Malignant - Primary
98596	ByuD200	[X]Other types of diffuse non-Hodgkin's lymphoma	Malignant - Primary
64336	ByuD300	[X]Other specified types of non-Hodgkin's lymphoma	Malignant - Primary
102688	ByuD400	[X]Other malignant immunoproliferative diseases	Malignant - Primary
67029	ByuD500	[X]Other lymphoid leukaemia	Malignant - Primary
61693	ByuD600	[X]Other myeloid leukaemia	Malignant - Primary
89762	ByuD700	[X]Other monocytic leukaemia	Malignant - Primary
89329	ByuD800	[X]Other specified leukaemias	Malignant - Primary
65165	ByuD900	[X]Other leukaemia of unspecified cell type	Malignant - Primary
105025	ByuDA00	[X]Oth spcf mal neoplsm/lymphoid,haematopoietic+rltd tissue	Malignant - Primary
72500	ByuDB00	[X]Mal neoplasm/lymphoid,haematopoietic+related tissu,unspcf	Malignant - Primary
64515	ByuDC00	[X]Diffuse non-Hodgkin's lymphoma, unspecified	Malignant - Primary
109714	ByuDD00	[X]Oth and unspecif peripheral & cutaneous T-cell lymphomas	Malignant - Primary
63375	ByuDE00	[X]Unspecified B-cell non-Hodgkin's lymphoma	Malignant - Primary
8649	ByuDF00	[X]Non-Hodgkin's lymphoma, unspecified type	Malignant - Primary
7940	ByuDF11	[X]Non-Hodgkin's lymphoma NOS	Malignant - Primary
63598	ByuE.00	[X]Malignant neoplasms/independent (primary) multiple sites	Malignant - Primary
64897	ByuE000	[X]Malignant neoplasms/independent(primary)multiple sites	Malignant - Primary
36147	B153.00	Secondary malignant neoplasm of liver	Malignant - Secondary
105488	B36..00	Local recurrence of malignant tumour of breast	Malignant - Secondary
105388	B498.00	Local recurrence of malignant tumour of urinary bladder	Malignant - Secondary
9618	B56..00	Secondary and unspecified malignant neoplasm of lymph nodes	Malignant - Secondary
7830	B56..11	Lymph node metastases	Malignant - Secondary
49214	B560.00	Secondary and unspec malig neop lymph nodes head/face/neck	Malignant - Secondary
64918	B560000	Secondary and unspec malig neop of superficial parotid LN	Malignant - Secondary
66775	B560100	Secondary and unspec malignant neoplasm mastoid lymph nodes	Malignant - Secondary
33395	B560200	Secondary and unspec malig neop superficial cervical LN	Malignant - Secondary
65253	B560300	Secondary and unspec malignant neoplasm occipital lymph node	Malignant - Secondary
92703	B560400	Secondary and unspec malig neop deep parotid lymph nodes	Malignant - Secondary

39433	B560500	Secondary and unspec malig neop submandibular lymph nodes	Malignant - Secondary
28059	B560600	Secondary and unspec malig neop of facial lymph nodes	Malignant - Secondary
38343	B560700	Secondary and unspec malig neop submental lymph nodes	Malignant - Secondary
44627	B560800	Secondary and unspec malig neop anterior cervical LN	Malignant - Secondary
68611	B560900	Secondary and unspec malig neop deep cervical LN	Malignant - Secondary
67129	B560z00	Secondary unspec malig neop lymph nodes head/face/neck NOS	Malignant - Secondary
64116	B561.00	Secondary and unspec malig neop intrathoracic lymph nodes	Malignant - Secondary
37919	B561000	Secondary and unspec malig neop internal mammary lymph nodes	Malignant - Secondary
105953	B561100	Secondary and unspec malig neop intercostal lymph nodes	Malignant - Secondary
95378	B561200	Secondary and unspec malig neop diaphragmatic lymph nodes	Malignant - Secondary
25366	B561300	Secondary and unspec malig neop ant mediastinal lymph nodes	Malignant - Secondary
55463	B561400	Secondary and unspec malig neop post mediastinal lymph nodes	Malignant - Secondary
58692	B561500	Secondary and unspec malig neop paratracheal lymph nodes	Malignant - Secondary
67797	B561600	Secondary and unspec malig neop superfic tracheobronchial LN	Malignant - Secondary
69392	B561700	Secondary and unspec malig neop inferior tracheobronchial LN	Malignant - Secondary
62124	B561800	Secondary and unspec malig neop bronchopulmonary lymph nodes	Malignant - Secondary
52190	B561900	Secondary and unspec malig neop pulmonary lymph nodes	Malignant - Secondary
93716	B561z00	Secondary and unspec malig neop intrathoracic LN NOS	Malignant - Secondary
52736	B562.00	Secondary and unspec malig neop intra-abdominal lymph nodes	Malignant - Secondary
41691	B562000	Secondary and unspec malig neop coeliac lymph nodes	Malignant - Secondary
72713	B562100	Secondary and unspec malig neop superficial mesenteric LN	Malignant - Secondary
61677	B562200	Secondary and unspec malig neop inferior mesenteric LN	Malignant - Secondary
18658	B562300	Secondary and unspec malig neop common iliac lymph nodes	Malignant - Secondary
69132	B562400	Secondary and unspec malig neop external iliac lymph nodes	Malignant - Secondary
44931	B562z00	Secondary and unspec malig neop intra-abdominal LN NOS	Malignant - Secondary
50199	B563.00	Secondary and unspec malig neop axilla and upper limb LN	Malignant - Secondary
37540	B563000	Secondary and unspec malig neop axillary lymph nodes	Malignant - Secondary
98626	B563100	Secondary and unspec malig neop supratrochlear lymph nodes	Malignant - Secondary

50904	B563200	Secondary and unspec malig neop infraclavicular lymph nodes	Malignant - Secondary
46409	B563300	Secondary and unspec malig neop pectoral lymph nodes	Malignant - Secondary
73538	B563z00	Secondary and unspec malig neop axilla and upper limb LN NOS	Malignant - Secondary
63915	B564.00	Secondary and unspec malig neop inguinal and lower limb LN	Malignant - Secondary
54278	B564000	Secondary and unspec malig neop superficial inguinal LN	Malignant - Secondary
61289	B564100	Secondary and unspec malig neop deep inguinal lymph nodes	Malignant - Secondary
70747	B564z00	Secondary and unspec malig neop of inguinal and leg LN NOS	Malignant - Secondary
6701	B565.00	Secondary and unspec malig neop intrapelvic lymph nodes	Malignant - Secondary
84368	B565000	Secondary and unspec malig neop internal iliac lymph nodes	Malignant - Secondary
101662	B565200	Secondary and unspec malig neop circumflex iliac LN	Malignant - Secondary
47366	B565300	Secondary and unspec malig neop sacral lymph nodes	Malignant - Secondary
72803	B565z00	Secondary and unspec malig neop intrapelvic LN NOS	Malignant - Secondary
20159	B56y.00	Secondary and unspec malig neop lymph nodes multiple sites	Malignant - Secondary
15507	B56z.00	Secondary and unspec malig neop lymph nodes NOS	Malignant - Secondary
35053	B57..00	Secondary malig neop of respiratory and digestive systems	Malignant - Secondary
6471	B57..11	Metastases of respiratory and/or digestive systems	Malignant - Secondary
24301	B57..12	Secondary carcinoma of respiratory and/or digestive systems	Malignant - Secondary
4137	B570.00	Secondary malignant neoplasm of lung	Malignant - Secondary
51551	B571.00	Secondary malignant neoplasm of mediastinum	Malignant - Secondary
16213	B572.00	Secondary malignant neoplasm of pleura	Malignant - Secondary
62584	B573.00	Secondary malignant neoplasm of other respiratory organs	Malignant - Secondary
64680	B574.00	Secondary malignant neoplasm of small intestine and duodenum	Malignant - Secondary
55946	B574000	Secondary malignant neoplasm of duodenum	Malignant - Secondary
110433	B574100	Secondary malignant neoplasm of jejunum	Malignant - Secondary
99511	B574200	Secondary malignant neoplasm of ileum	Malignant - Secondary
70026	B574z00	Secondary malig neop of small intestine or duodenum NOS	Malignant - Secondary
44529	B575.00	Secondary malignant neoplasm of large intestine and rectum	Malignant - Secondary
28727	B575000	Secondary malignant neoplasm of colon	Malignant - Secondary
62909	B575100	Secondary malignant neoplasm of rectum	Malignant - Secondary
36200	B575z00	Secondary malig neop of large intestine or rectum NOS	Malignant - Secondary

67396	B576.00	Secondary malig neop of retroperitoneum and peritoneum	Malignant - Secondary
35364	B576000	Secondary malignant neoplasm of retroperitoneum	Malignant - Secondary
27391	B576100	Secondary malignant neoplasm of peritoneum	Malignant - Secondary
8154	B576200	Malignant ascites	Malignant - Secondary
97672	B576z00	Secondary malig neop of retroperitoneum or peritoneum NOS	Malignant - Secondary
15103	B577.00	Secondary malignant neoplasm of liver	Malignant - Secondary
4403	B577.11	Liver metastases	Malignant - Secondary
56345	B57y.00	Secondary malignant neoplasm of other digestive organ	Malignant - Secondary
66083	B57z.00	Secondary malig neop of respiratory or digestive system NOS	Malignant - Secondary
5842	B58..00	Secondary malignant neoplasm of other specified sites	Malignant - Secondary
27651	B58..11	Secondary carcinoma of other specified sites	Malignant - Secondary
1952	B580.00	Secondary malignant neoplasm of kidney	Malignant - Secondary
73213	B581.00	Secondary malignant neoplasm of other urinary organs	Malignant - Secondary
60134	B581000	Secondary malignant neoplasm of ureter	Malignant - Secondary
22146	B581100	Secondary malignant neoplasm of bladder	Malignant - Secondary
53528	B581200	Secondary malignant neoplasm of urethra	Malignant - Secondary
62828	B581z00	Secondary malignant neoplasm of other urinary organ NOS	Malignant - Secondary
19945	B582.00	Secondary malignant neoplasm of skin	Malignant - Secondary
43930	B582000	Secondary malignant neoplasm of skin of head	Malignant - Secondary
100296	B582100	Secondary malignant neoplasm of skin of face	Malignant - Secondary
35999	B582200	Secondary malignant neoplasm of skin of neck	Malignant - Secondary
41144	B582300	Secondary malignant neoplasm of skin of trunk	Malignant - Secondary
63896	B582400	Secondary malignant neoplasm of skin of shoulder and arm	Malignant - Secondary
48828	B582500	Secondary malignant neoplasm of skin of hip and leg	Malignant - Secondary
9505	B582600	Secondary malignant neoplasm of skin of breast	Malignant - Secondary
55096	B582z00	Secondary malignant neoplasm of skin NOS	Malignant - Secondary
33843	B583.00	Secondary malignant neoplasm of brain and spinal cord	Malignant - Secondary
5198	B583000	Secondary malignant neoplasm of brain	Malignant - Secondary
38918	B583100	Secondary malignant neoplasm of spinal cord	Malignant - Secondary
5199	B583200	Cerebral metastasis	Malignant - Secondary
59375	B583z00	Secondary malignant neoplasm of brain or spinal cord NOS	Malignant - Secondary
54120	B584.00	Secondary malignant neoplasm of other part of nervous system	Malignant - Secondary

7654	B585.00	Secondary malignant neoplasm of bone and bone marrow	Malignant - Secondary
18676	B585000	Pathological fracture due to metastatic bone disease	Malignant - Secondary
44615	B586.00	Secondary malignant neoplasm of ovary	Malignant - Secondary
36401	B587.00	Secondary malignant neoplasm of adrenal gland	Malignant - Secondary
18616	B58y.00	Secondary malignant neoplasm of other specified sites	Malignant - Secondary
16760	B58y000	Secondary malignant neoplasm of breast	Malignant - Secondary
55090	B58y100	Secondary malignant neoplasm of uterus	Malignant - Secondary
73616	B58y200	Secondary malignant neoplasm of cervix uteri	Malignant - Secondary
97832	B58y211	Secondary cancer of the cervix	Malignant - Secondary
70736	B58y300	Secondary malignant neoplasm of vagina	Malignant - Secondary
60335	B58y400	Secondary malignant neoplasm of vulva	Malignant - Secondary
65490	B58y411	Secondary cancer of the vulva	Malignant - Secondary
21590	B58y500	Secondary malignant neoplasm of prostate	Malignant - Secondary
34145	B58y600	Secondary malignant neoplasm of testis	Malignant - Secondary
49145	B58y700	Secondary malignant neoplasm of penis	Malignant - Secondary
104480	B58y800	Secondary malignant neoplasm of epididymis and vas deferens	Malignant - Secondary
45824	B58y900	Secondary malignant neoplasm of tongue	Malignant - Secondary
22524	B58yz00	Secondary malignant neoplasm of other specified site NOS	Malignant - Secondary
16500	B58z.00	Secondary malignant neoplasm of other specified site NOS	Malignant - Secondary
47810	B59..00	Malignant neoplasm of unspecified site	Malignant - Secondary
13569	B590.00	Disseminated malignancy NOS	Malignant - Secondary
6170	B590.11	Carcinomatosis	Malignant - Secondary
54679	B594.00	Secondary malignant neoplasm of unknown site	Malignant - Secondary
3197	BB03.00	[M]Neoplasm, metastatic	Malignant - Secondary
6985	BB03.11	[M]Secondary neoplasm	Malignant - Secondary
3152	BB13.00	[M]Carcinoma, metastatic, NOS	Malignant - Secondary
9366	BB13.11	[M]Secondary carcinoma	Malignant - Secondary
16692	BB14.00	[M]Carcinomatosis	Malignant - Secondary
24293	BB2B.00	[M]Squamous cell carcinoma, metastatic NOS	Malignant - Secondary
5455	BB53.00	[M]Adenocarcinoma, metastatic, NOS	Malignant - Secondary
54874	BB85100	[M]Metastatic signet ring cell carcinoma	Malignant - Secondary
104699	BBy2.00	[M]No microscopic confirmation tumour, clinically metastatic	Malignant - Secondary
35186	ByuC.00	[X]Malignant neoplasm of ill-defined, secondary and unspeci	Malignant - Secondary
66163	ByuC200	[X]2ndry+unspcf malignant neoplasm lymph nodes/multi regions	Malignant - Secondary
57481	ByuC300	[X]Secondary malignant neoplasm/oth+unspc respiratory organs	Malignant - Secondary
88022	ByuC400	[X]Secondary malignant neoplasm/oth+unspcfd digestive organs	Malignant - Secondary
97091	ByuC500	[X]2ndry malignant neoplasm/bladder+oth+unsp urinary organs	Malignant - Secondary

68332	ByuC600	[X]2ndry malignant neoplasm/oth+unspec parts/nervous system	Malignant - Secondary
54253	ByuC700	[X]Secondary malignant neoplasm of other specified sites	Malignant - Secondary
35532	BB...00	[M]Morphology of neoplasms	Neoplasm Morphology - unspecified
21207	BB...11	[M]Tumour morphology	Neoplasm Morphology - unspecified
10258	BB0..00	[M]Neoplasms NOS	Neoplasm Morphology - unspecified
5932	BB06.00	[M]Tumour cells, uncertain whether benign or malignant	Neoplasm Morphology - unspecified
33508	BB0z.00	[M]Unspecified tumour cell NOS	Neoplasm Morphology - unspecified
20653	BB1..00	[M]Epithelial neoplasms NOS	Neoplasm Morphology - unspecified
68679	BB1H.00	[M]Tumourlet	Neoplasm Morphology - unspecified
60082	BB1z.00	[M]Unspecified epithelial neoplasm	Neoplasm Morphology - unspecified
40494	BB2..00	[M]Papillary and squamous cell neoplasms	Neoplasm Morphology - unspecified
11782	BB2..11	[M]Papillary neoplasms	Neoplasm Morphology - unspecified
46432	BB23.00	[M]Verrucous papilloma	Neoplasm Morphology - unspecified
48321	BB25.11	[M]Dyskeratotic papilloma	Neoplasm Morphology - unspecified
8909	BB25.13	[M]Keratotic papilloma	Neoplasm Morphology - unspecified
29892	BB25.14	[M]Parakeratotic papilloma	Neoplasm Morphology - unspecified
9675	BB27.00	[M]Inverted papilloma	Neoplasm Morphology - unspecified
41481	BB2K.00	[M]Queyrat's erythroplasia	Neoplasm Morphology - unspecified
49399	BB2z.00	[M]Papillary or squamous cell neoplasm NOS	Neoplasm Morphology - unspecified
29282	BB30.00	[M]Basal cell tumour	Neoplasm Morphology - unspecified
49765	BB38.12	[M]Epithelioma adenoides cyst	Neoplasm Morphology - unspecified
22060	BB39.00	[M]Trichofolliculoma	Neoplasm Morphology - unspecified
24711	BB3A.00	[M]Tricholemmoma	Neoplasm Morphology - unspecified
104854	BB3H.00	[M]Trichoblastoma	Neoplasm Morphology - unspecified
30853	BB3z.00	[M]Basal cell neoplasm NOS	Neoplasm Morphology - unspecified
41726	BB40.00	[M]Transitional cell papilloma NOS	Neoplasm Morphology - unspecified
50294	BB41.00	[M]Urothelial papilloma	Neoplasm Morphology - unspecified
42001	BB44.00	[M]Schneiderian papilloma	Neoplasm Morphology - unspecified

61490	BB45.00	[M]Transitional cell papilloma, inverted type	Neoplasm Morphology - unspecified
33897	BB4z.00	[M]Transitional cell papilloma or carcinoma NOS	Neoplasm Morphology - unspecified
4903	BB50.00	[M]Adenoma NOS	Neoplasm Morphology - unspecified
47721	BB50000	[M]Microcystic adenoma	Neoplasm Morphology - unspecified
65658	BB5B000	[M]Islet cell adenoma	Neoplasm Morphology - unspecified
9224	BB5B200	[M]Insulinoma NOS	Neoplasm Morphology - unspecified
58022	BB5B400	[M]Glucagonoma NOS	Neoplasm Morphology - unspecified
35718	BB5C000	[M]Gastrinoma NOS	Neoplasm Morphology - unspecified
55380	BB5c000	[M]Chief cell adenoma	Neoplasm Morphology - unspecified
45814	BB5C011	[M]G cell tumour NOS	Neoplasm Morphology - unspecified
85969	BB5c100	[M]Water-clear cell adenoma	Neoplasm Morphology - unspecified
43594	BB5Cz00	[M]Gastrinoma or carcinoma NOS	Neoplasm Morphology - unspecified
42169	BB5cz00	[M]Parathyroid adenoma or adenocarcinoma NOS	Neoplasm Morphology - unspecified
72198	BB5D000	[M]Bile duct adenoma	Neoplasm Morphology - unspecified
17979	BB5D011	[M]Cholangioma	Neoplasm Morphology - unspecified
30596	BB5D200	[M]Bile duct cystadenoma	Neoplasm Morphology - unspecified
52492	BB5D411	[M]Hepatocellular adenoma	Neoplasm Morphology - unspecified
53987	BB5Dz00	[M]Hepatobiliary adenoma or carcinoma NOS	Neoplasm Morphology - unspecified
40371	BB5e.00	[M]Lipoadenoma	Neoplasm Morphology - unspecified
67399	BB5E.00	[M]Trabecular adenoma	Neoplasm Morphology - unspecified
21424	BB5f000	[M]Follicular adenoma	Neoplasm Morphology - unspecified
35428	BB5f400	[M]Microfollicular adenoma	Neoplasm Morphology - unspecified
26296	BB5f500	[M]Macrofollicular adenoma	Neoplasm Morphology - unspecified
31061	BB5f511	[M]Colloid adenoma	Neoplasm Morphology - unspecified
38685	BB5fz00	[M]Thyroid adenoma or adenocarcinoma NOS	Neoplasm Morphology - unspecified
40266	BB5g.00	[M]Multiple endocrine adenomas	Neoplasm Morphology - unspecified
72292	BB5G.00	[M]Embryonal adenoma	Neoplasm Morphology - unspecified
36124	BB5H.00	[M]Eccrine dermal cylindroma	Neoplasm Morphology - unspecified

50753	BB5H.11	[M]Turban tumour	Neoplasm Morphology - unspecified
53968	BB5h000	[M]Adrenal cortical adenoma NOS	Neoplasm Morphology - unspecified
97740	BB5h400	[M]Adrenal cortical adenoma, clear cell type	Neoplasm Morphology - unspecified
96181	BB5h600	[M]Adrenal cortical adenoma, mixed cell type	Neoplasm Morphology - unspecified
62256	BB5hz00	[M]Adrenal cortical tumours NOS	Neoplasm Morphology - unspecified
60756	BB5J.12	[M]Cylindroid bronchial adenoma	Neoplasm Morphology - unspecified
5265	BB5J.13	[M]Cylindroma NOS	Neoplasm Morphology - unspecified
35012	BB5j000	[M]Endometrioid adenoma NOS	Neoplasm Morphology - unspecified
37728	BB5j011	[M]Endometrioid cystadenoma NOS	Neoplasm Morphology - unspecified
35747	BB5j100	[M]Endometrioid adenoma, borderline malignancy	Neoplasm Morphology - unspecified
107097	BB5j300	[M]Endometrioid adenofibroma NOS	Neoplasm Morphology - unspecified
99570	BB5j400	[M]Endometrioid adenofibroma, borderline malignancy	Neoplasm Morphology - unspecified
36286	BB5Lz00	[M]Adenomatous or adenocarcinomatous polyp NOS	Neoplasm Morphology - unspecified
39148	BB5Mz00	[M]Tubular adenoma or adenocarcinoma NOS	Neoplasm Morphology - unspecified
19731	BB5N.11	[M]Adenoma or or adenocarcinoma in polyposis coli	Neoplasm Morphology - unspecified
33904	BB5N000	[M]Adenomatous polyposis coli	Neoplasm Morphology - unspecified
54883	BB5N011	[M]Adenomatosis NOS	Neoplasm Morphology - unspecified
12494	BB5N012	[M]Familial polyposis coli	Neoplasm Morphology - unspecified
11398	BB5N200	[M]Multiple adenomatous polyps	Neoplasm Morphology - unspecified
39875	BB5Nz00	[M]Adenomatous or adenocarcinomatous polyps of the colon NOS	Neoplasm Morphology - unspecified
23081	BB5R111	[M]Carcinoid bronchial adenoma	Neoplasm Morphology - unspecified
39130	BB5R200	[M]Carcinoid tumour, argentaffin, NOS	Neoplasm Morphology - unspecified
49797	BB5R211	[M]Argentaffinoma NOS	Neoplasm Morphology - unspecified
99296	BB5R400	[M]Carcinoid tumour, nonargentaffin, NOS	Neoplasm Morphology - unspecified
69210	BB5R611	[M]Goblet cell tumour	Neoplasm Morphology - unspecified
56794	BB5R800	[M]Adenocarcinoid tumour	Neoplasm Morphology - unspecified
45573	BB5Rz00	[M]Carcinoid tumours NOS	Neoplasm Morphology - unspecified
91889	BB5S000	[M]Pulmonary adenomatosis	Neoplasm Morphology - unspecified

72290	BB5S300	[M]Alveolar adenoma	Neoplasm Morphology - unspecified
36221	BB5Sz00	[M]Respiratory tract adenoma or adenocarcinoma NOS	Neoplasm Morphology - unspecified
67004	BB5T000	[M]Papillary adenoma NOS	Neoplasm Morphology - unspecified
96494	BB5Tz00	[M]Papillary adenoma or adenocarcinoma NOS	Neoplasm Morphology - unspecified
29449	BB5U011	[M]Villous papilloma	Neoplasm Morphology - unspecified
68367	BB5U311	[M]Papillotubular adenoma	Neoplasm Morphology - unspecified
35891	BB5U312	[M]Villoglandular adenoma	Neoplasm Morphology - unspecified
50108	BB5Uz00	[M]Villous adenoma or adenocarcinoma NOS	Neoplasm Morphology - unspecified
39727	BB5V000	[M]Chromophobe adenoma	Neoplasm Morphology - unspecified
56907	BB5V200	[M]Acidophil adenoma	Neoplasm Morphology - unspecified
68218	BB5V211	[M]Eosinophil adenoma	Neoplasm Morphology - unspecified
36876	BB5V311	[M]Eosinophil carcinoma	Neoplasm Morphology - unspecified
72185	BB5V600	[M]Basophil adenoma	Neoplasm Morphology - unspecified
40965	BB5V611	[M]Mucoid cell adenoma	Neoplasm Morphology - unspecified
71518	BB5W000	[M]Oxyphilic adenoma	Neoplasm Morphology - unspecified
44903	BB5W011	[M]Hurthle cell adenoma	Neoplasm Morphology - unspecified
41934	BB5W012	[M]Oncocytic adenoma	Neoplasm Morphology - unspecified
28806	BB5W013	[M]Oncocytoma	Neoplasm Morphology - unspecified
73662	BB5Wz00	[M]Oxyphilic adenoma or adenocarcinoma NOS	Neoplasm Morphology - unspecified
37673	BB5X000	[M]Clear cell adenoma	Neoplasm Morphology - unspecified
72192	BB5Xz00	[M]Clear cell adenoma or adenocarcinoma NOS	Neoplasm Morphology - unspecified
27697	BB5Y.00	[M]Hypernephroid tumour	Neoplasm Morphology - unspecified
61764	BB5y100	[M]Vipoma	Neoplasm Morphology - unspecified
55663	BB5y300	[M]Apudoma	Neoplasm Morphology - unspecified
5707	BB5y400	[M]Prolactinoma	Neoplasm Morphology - unspecified
35975	BB5z.00	[M]Adenoma or adenocarcinoma NOS	Neoplasm Morphology - unspecified
73568	BB5Z.00	[M]Clear cell adenofibroma	Neoplasm Morphology - unspecified
29563	BB6..00	[M]Adnexal and skin appendage neoplasms	Neoplasm Morphology - unspecified

100117	BB60000	[M]Skin appendage adenoma	Neoplasm Morphology - unspecified
52496	BB61.00	[M]Sweat gland adenoma and adenocarcinomas	Neoplasm Morphology - unspecified
38506	BB61000	[M]Sweat gland adenoma	Neoplasm Morphology - unspecified
11182	BB61011	[M]Hidradenoma NOS	Neoplasm Morphology - unspecified
33819	BB61012	[M]Nodular hidradenoma	Neoplasm Morphology - unspecified
17164	BB61013	[M]Syringadenoma NOS	Neoplasm Morphology - unspecified
67354	BB61100	[M]Sweat gland tumour NOS	Neoplasm Morphology - unspecified
71627	BB61200	[M]Sweat gland adenocarcinoma	Neoplasm Morphology - unspecified
60901	BB62000	[M]Apocrine adenoma	Neoplasm Morphology - unspecified
104973	BB62z00	[M]Apocrine adenoma or adenocarcinoma NOS	Neoplasm Morphology - unspecified
44066	BB63.00	[M]Eccrine acrospiroma	Neoplasm Morphology - unspecified
60071	BB63.11	[M]Clear cell hidradenoma	Neoplasm Morphology - unspecified
6753	BB63.12	[M]Eccrine poroma	Neoplasm Morphology - unspecified
17501	BB64.00	[M]Eccrine spiradenoma	Neoplasm Morphology - unspecified
30293	BB64.11	[M]Spiradenoma NOS	Neoplasm Morphology - unspecified
49416	BB67.00	[M]Papillary syringadenoma	Neoplasm Morphology - unspecified
17676	BB68.00	[M]Syringoma NOS	Neoplasm Morphology - unspecified
91842	BB69z00	[M]Sebaceous adenoma or adenocarcinoma NOS	Neoplasm Morphology - unspecified
105776	BB6A000	[M]Ceruminous adenoma	Neoplasm Morphology - unspecified
55430	BB6B.00	[M]Eccrine papillary adenoma	Neoplasm Morphology - unspecified
10315	BB6z.00	[M]Adnexal and skin appendage neoplasm NOS	Neoplasm Morphology - unspecified
34627	BB7..00	[M]Mucoepidermoid neoplasms	Neoplasm Morphology - unspecified
59100	BB70.00	[M]Mucoepidermoid tumour	Neoplasm Morphology - unspecified
70918	BB7z.00	[M]Mucoepidermoid neoplasm NOS	Neoplasm Morphology - unspecified
21651	BB8..00	[M]Cystic, mucinous and serous neoplasms	Neoplasm Morphology - unspecified
35377	BB80011	[M]Cystoma NOS	Neoplasm Morphology - unspecified
69978	BB80200	[M]Borderline mucinous cystadenoma of the ovary	Neoplasm Morphology - unspecified
65207	BB80z00	[M]Cystadenoma or carcinoma NOS	Neoplasm Morphology - unspecified

2979	BB81.00	[M]Ovarian cystic, mucinous and serous neoplasms	Neoplasm Morphology - unspecified
39007	BB81.13	[M]Ovarian papillary tumour	Neoplasm Morphology - unspecified
30541	BB81.14	[M]Ovarian serous tumour	Neoplasm Morphology - unspecified
28939	BB81000	[M]Serous cystadenoma NOS	Neoplasm Morphology - unspecified
52263	BB81100	[M]Serous cystadenoma, borderline malignancy	Neoplasm Morphology - unspecified
51394	BB81300	[M]Papillary cystadenoma NOS	Neoplasm Morphology - unspecified
98696	BB81400	[M]Papillary cystadenoma, borderline malignancy	Neoplasm Morphology - unspecified
60406	BB81600	[M]Papillary serous cystadenoma NOS	Neoplasm Morphology - unspecified
62246	BB81900	[M]Serous surface papilloma NOS	Neoplasm Morphology - unspecified
95774	BB81A00	[M]Serous surface papilloma, borderline malignancy	Neoplasm Morphology - unspecified
20210	BB81C00	[M]Mucinous cystadenoma NOS	Neoplasm Morphology - unspecified
38808	BB81C11	[M]Pseudomucinous cystadenoma NOS	Neoplasm Morphology - unspecified
28396	BB81D00	[M]Mucinous cystadenoma, borderline malignancy	Neoplasm Morphology - unspecified
65645	BB81F00	[M]Papillary mucinous cystadenoma NOS	Neoplasm Morphology - unspecified
21131	BB81J00	[M]Serous cystadenoma, borderline malignancy	Neoplasm Morphology - unspecified
46113	BB81K00	[M]Papillary cystadenoma, borderline malignancy	Neoplasm Morphology - unspecified
72684	BB81L00	[M]Papillary cystic tumour	Neoplasm Morphology - unspecified
6203	BB81M00	[M]Papillary serous cystadenoma, borderline malignancy	Neoplasm Morphology - unspecified
41911	BB82000	[M]Mucinous adenoma	Neoplasm Morphology - unspecified
64796	BB82z00	[M]Mucinous adenoma or adenocarcinoma NOS	Neoplasm Morphology - unspecified
53694	BB85111	[M]Krukenberg tumour	Neoplasm Morphology - unspecified
44231	BB8z.00	[M]Cystic, mucinous or serous neoplasm NOS	Neoplasm Morphology - unspecified
27728	BB90.00	[M]Intraductal carcinoma, noninfiltrating NOS	Neoplasm Morphology - unspecified
62871	BB92.00	[M]Comedocarcinoma, noninfiltrating	Neoplasm Morphology - unspecified
93987	BB95.11	[M]Duct adenoma NOS	Neoplasm Morphology - unspecified
31740	BB95.12	[M]Ductal papilloma	Neoplasm Morphology - unspecified
102593	BB96.00	[M]Noninfiltrating intraductal papillary adenocarcinoma	Neoplasm Morphology - unspecified
39394	BB97.00	[M]Intracystic papillary adenoma	Neoplasm Morphology - unspecified

67932	BB99.00	[M]Intraductal papillomatosis NOS	Neoplasm Morphology - unspecified
39145	BB9A.00	[M]Subareolar duct papillomatosis	Neoplasm Morphology - unspecified
36488	BB9A.11	[M]Adenoma of the nipple	Neoplasm Morphology - unspecified
52269	BB9A.12	[M]Erosive nipple adenomatosis	Neoplasm Morphology - unspecified
24523	BB9L.00	[M]Paget's disease, extramammary, exc Paget's disease bone	Neoplasm Morphology - unspecified
60683	BB9z.00	[M]Ductal, lobular or medullary neoplasm NOS	Neoplasm Morphology - unspecified
64314	BBa..00	[M]Miscellaneous tumours	Neoplasm Morphology - unspecified
90320	BBA..00	[M]Acinar cell neoplasms	Neoplasm Morphology - unspecified
70631	BBA0.00	[M]Acinar cell adenoma	Neoplasm Morphology - unspecified
99949	BBa0.11	[M]Rathke's pouch tumour	Neoplasm Morphology - unspecified
72440	BBA1.00	[M]Acinar cell tumour	Neoplasm Morphology - unspecified
48477	BBa1.00	[M]Pinealoma	Neoplasm Morphology - unspecified
33951	BBa2.00	[M]Pineocytoma	Neoplasm Morphology - unspecified
64874	BBa4.00	[M]Melanotic neuroectodermal tumour	Neoplasm Morphology - unspecified
57864	BBa4.11	[M]Melanoameloblastoma	Neoplasm Morphology - unspecified
67715	BBa4.12	[M]Melanotic progonoma	Neoplasm Morphology - unspecified
73023	BBa4.13	[M]Retinal angle tumour	Neoplasm Morphology - unspecified
28950	BBaz.00	[M]Miscellaneous tumour NOS	Neoplasm Morphology - unspecified
96870	BBAz.00	[M]Acinar cell neoplasm NOS	Neoplasm Morphology - unspecified
68810	BBB..00	[M]Complex epithelial neoplasms	Neoplasm Morphology - unspecified
27594	BBB1.11	[M]Warthin's tumour	Neoplasm Morphology - unspecified
94267	BBb3.00	[M]Subependymal glioma	Neoplasm Morphology - unspecified
90487	BBb3.11	[M]Subependymal astrocytoma NOS	Neoplasm Morphology - unspecified
28344	BBb3.12	[M]Subependymal astrocytoma NOS	Neoplasm Morphology - unspecified
50834	BBb3.13	[M]Subependymoma	Neoplasm Morphology - unspecified
49168	BBb4.00	[M]Subependymal giant cell astrocytoma	Neoplasm Morphology - unspecified
26157	BBb5.00	[M]Choroid plexus papilloma NOS	Neoplasm Morphology - unspecified
31793	BBB6.00	[M]Thymoma	Neoplasm Morphology - unspecified

67767	BBB6z00	[M]Thymoma NOS	Neoplasm Morphology - unspecified
102030	BBBz.00	[M]Complex epithelial neoplasm NOS	Neoplasm Morphology - unspecified
54284	BBc..00	[M]Neuroepitheliomatous neoplasms	Neoplasm Morphology - unspecified
39294	BBC..00	[M]Specialised gonadal neoplasms	Neoplasm Morphology - unspecified
54654	BBC0.00	[M]Sex cord-stromal tumour	Neoplasm Morphology - unspecified
32357	BBc0.00	[M]Ganglioneuromatous neoplasms	Neoplasm Morphology - unspecified
92275	BBC0.11	[M]Gonadal stromal tumour	Neoplasm Morphology - unspecified
21435	BBC0.12	[M]Ovarian stromal tumour	Neoplasm Morphology - unspecified
21319	BBC0.13	[M]Testicular stromal tumour	Neoplasm Morphology - unspecified
61115	BBC0000	[M]Sex cord tumour with annular tubules	Neoplasm Morphology - unspecified
34713	BBc0000	[M]Ganglioneuroma	Neoplasm Morphology - unspecified
41953	BBc0011	[M]Gangliocytoma	Neoplasm Morphology - unspecified
62567	BBc0200	[M]Ganglioneuromatosis	Neoplasm Morphology - unspecified
64491	BBC1.00	[M]Thecal cell neoplasms	Neoplasm Morphology - unspecified
60530	BBC1000	[M]Thecoma NOS	Neoplasm Morphology - unspecified
40742	BBC1200	[M]Thecoma, luteinized	Neoplasm Morphology - unspecified
107109	BBC2.00	[M]Luteoma NOS	Neoplasm Morphology - unspecified
48957	BBC5.00	[M]Granulosa cell-theca cell tumour	Neoplasm Morphology - unspecified
89457	BBC6.00	[M]Androblastoma	Neoplasm Morphology - unspecified
31629	BBc6.00	[M]Ganglioglioma	Neoplasm Morphology - unspecified
93097	BBc6.11	[M]Glioneuroma	Neoplasm Morphology - unspecified
94614	BBC6z11	[M]Arrhenoblastoma NOS	Neoplasm Morphology - unspecified
51920	BBc7.00	[M]Neurocytoma	Neoplasm Morphology - unspecified
18065	BBC7.00	[M]Sertoli-Leydig cell tumour	Neoplasm Morphology - unspecified
104977	BBc8.00	[M]Pacinian tumour	Neoplasm Morphology - unspecified
59787	BBC9.00	[M]Tubular androblastoma NOS	Neoplasm Morphology - unspecified
62056	BBC9.11	[M]Pick's tubular adenoma	Neoplasm Morphology - unspecified
87331	BBC9.12	[M]Sertoli cell adenoma	Neoplasm Morphology - unspecified

38979	BBC9.13	[M]Sertoli cell tumour	Neoplasm Morphology - unspecified
40954	BBC9.14	[M]Testicular adenoma	Neoplasm Morphology - unspecified
58902	BBcA.00	[M]Olfactory neurogenic tumour	Neoplasm Morphology - unspecified
72912	BBCB.00	[M]Tubular androblastoma with lipid storage	Neoplasm Morphology - unspecified
31170	BBCC.00	[M]Leydig cell tumour	Neoplasm Morphology - unspecified
73623	BBCCz00	[M]Leydig cell tumour NOS	Neoplasm Morphology - unspecified
99219	BBCCz11	[M]Interstitial cell tumour NOS	Neoplasm Morphology - unspecified
39734	BBCD.00	[M]Hilar cell tumour	Neoplasm Morphology - unspecified
59995	BBCE.00	[M]Lipid cell tumour of ovary	Neoplasm Morphology - unspecified
50519	BBCF.00	[M]Adrenal rest tumour	Neoplasm Morphology - unspecified
99491	BBcz.00	[M]Neuroepitheliomatous neoplasm NOS	Neoplasm Morphology - unspecified
98677	BBd1.00	[M]Meningiomatosis NOS	Neoplasm Morphology - unspecified
95108	BBd1.11	[M]Diffuse meningiomatosis	Neoplasm Morphology - unspecified
54710	BBd1.12	[M]Multiple meningiomatosis	Neoplasm Morphology - unspecified
65426	BBd3.00	[M]Meningotheliomatous meningioma	Neoplasm Morphology - unspecified
101342	BBD3.00	[M]Parasympathetic paraganglioma	Neoplasm Morphology - unspecified
96487	BBd3.11	[M]Endotheliomatous meningioma	Neoplasm Morphology - unspecified
45953	BBD4.00	[M]Glomus jugulare tumour	Neoplasm Morphology - unspecified
38295	BBd4.00	[M]Fibrous meningioma	Neoplasm Morphology - unspecified
70320	BBD4.11	[M]Jugular paraganglioma	Neoplasm Morphology - unspecified
67018	BBD5.00	[M]Aortic body tumour	Neoplasm Morphology - unspecified
38870	BBd5.00	[M]Psammomatous meningioma	Neoplasm Morphology - unspecified
46251	BBd6.00	[M]Angiomatous meningioma	Neoplasm Morphology - unspecified
93717	BBD7.00	[M]Extra-adrenal paraganglioma, NOS	Neoplasm Morphology - unspecified
21598	BBd7.00	[M]Haemangioblastic meningioma	Neoplasm Morphology - unspecified
46490	BBd7.11	[M]Angioblastic meningioma	Neoplasm Morphology - unspecified
48326	BBD7.11	[M]Chemodectoma	Neoplasm Morphology - unspecified
50822	BBd8.00	[M]Haemangiopericytic meningioma	Neoplasm Morphology - unspecified

67929	BBd9.00	[M]Transitional meningioma	Neoplasm Morphology - unspecified
44435	BBD9.00	[M]Phaeochromocytoma NOS	Neoplasm Morphology - unspecified
109110	BBD9.11	[M]Chromaffin paraganglioma	Neoplasm Morphology - unspecified
106613	BBDA.11	[M]Phaeochromoblastoma	Neoplasm Morphology - unspecified
106134	BBdB.00	[M]Meningeal sarcomatosis	Neoplasm Morphology - unspecified
45969	BBDC.00	[M]Glomus tumour	Neoplasm Morphology - unspecified
4916	BBDD.00	[M]Glomangioma	Neoplasm Morphology - unspecified
52070	BBDE.00	[M]Gangliocytic paraganglioma	Neoplasm Morphology - unspecified
34712	BBDF.00	[M]Glomangiomyoma	Neoplasm Morphology - unspecified
69421	BBDz.00	[M]Paraganglioma or glomus tumour NOS	Neoplasm Morphology - unspecified
47848	BBdz.00	[M]Meningioma NOS	Neoplasm Morphology - unspecified
18690	BBe..00	[M]Nerve sheath tumour	Neoplasm Morphology - unspecified
26309	BBe0.00	[M]Neurofibroma NOS	Neoplasm Morphology - unspecified
12574	BBE0.11	[M]Hairy naevus NOS	Neoplasm Morphology - unspecified
765	BBe1.00	[M]Neurofibromatosis NOS	Neoplasm Morphology - unspecified
36785	BBe1.11	[M]Multiple neurofibromatosis	Neoplasm Morphology - unspecified
23455	BBe1.12	[M]Von Recklinghausen's disease	Neoplasm Morphology - unspecified
99595	BBE3.00	[M]Balloon cell naevus	Neoplasm Morphology - unspecified
59749	BBe3.00	[M]Melanotic neurofibroma	Neoplasm Morphology - unspecified
12016	BBe4.00	[M]Plexiform neurofibroma	Neoplasm Morphology - unspecified
21247	BBe5.11	[M]Acoustic neuroma	Neoplasm Morphology - unspecified
46753	BBe5.12	[M]Neurinoma	Neoplasm Morphology - unspecified
9431	BBE6.00	[M]Fibrous papule of nose	Neoplasm Morphology - unspecified
60590	BBe6.00	[M]Neurinomatosis	Neoplasm Morphology - unspecified
20853	BBE6.11	[M]Involuting naevus	Neoplasm Morphology - unspecified
53522	BBE7.00	[M]Neuronaevus	Neoplasm Morphology - unspecified
11496	BBE8.00	[M]Magnocellular naevus	Neoplasm Morphology - unspecified
17292	BBE8.11	[M]Melanocytoma of eyeball	Neoplasm Morphology - unspecified

4209	BBE9.00	[M]Nonpigmented naevus	Neoplasm Morphology - unspecified
68621	BBE9.11	[M]Achromic naevus	Neoplasm Morphology - unspecified
28592	BBeA.00	[M]Neurothekeoma	Neoplasm Morphology - unspecified
34237	BBEa.00	[M]Spindle cell naevus	Neoplasm Morphology - unspecified
48152	BBEb.00	[M] Epithelioid cell naevus	Neoplasm Morphology - unspecified
55556	BBEB.11	[M]Intraepidermal naevus	Neoplasm Morphology - unspecified
43189	BBED.00	[M]Precancerous melanosis NOS	Neoplasm Morphology - unspecified
42340	BBEL.00	[M]Giant pigmented naevus	Neoplasm Morphology - unspecified
38842	BBEN.12	[M]Juvenila naevus	Neoplasm Morphology - unspecified
6937	BBEN.13	[M] Spitz naevus	Neoplasm Morphology - unspecified
21383	BBEU.11	[M]Jadassohn's blue naevus	Neoplasm Morphology - unspecified
105954	BBEW.11	[M]Giant blue naevus	Neoplasm Morphology - unspecified
35284	BBez.00	[M]Nerve sheath tumour NOS	Neoplasm Morphology - unspecified
18266	BBf0.00	[M]Granular cell tumour NOS	Neoplasm Morphology - unspecified
34891	BBF2.00	[M]Sarcomatosis NOS	Neoplasm Morphology - unspecified
38869	BBG..00	[M]Fibromatous neoplasms	Neoplasm Morphology - unspecified
61822	BBG2.00	[M]Fibromyxoma	Neoplasm Morphology - unspecified
50574	BBG2.11	[M]Myxofibroma NOS	Neoplasm Morphology - unspecified
23919	BBG4.00	[M]Periosteal fibroma	Neoplasm Morphology - unspecified
12242	BBG6.00	[M]Fascial fibroma	Neoplasm Morphology - unspecified
50423	BBG9.00	[M]Elastofibroma	Neoplasm Morphology - unspecified
55886	BBGA.00	[M]Aggressive fibromatosis	Neoplasm Morphology - unspecified
2776	BBGA.11	[M]Desmoid NOS	Neoplasm Morphology - unspecified
60177	BBGA.12	[M]Extra-abdominal desmoid	Neoplasm Morphology - unspecified
44277	BBGA.13	[M]Invasive fibroma	Neoplasm Morphology - unspecified
53333	BBGB.00	[M]Abdominal fibromatosis	Neoplasm Morphology - unspecified
18566	BBGB.11	[M]Abdominal desmoid	Neoplasm Morphology - unspecified
46243	BBGC.00	[M]Desmoplastic fibroma	Neoplasm Morphology - unspecified

27674	BBGE.00	[M]Atypical fibrous histiocytoma	Neoplasm Morphology - unspecified
24682	BBGG.11	[M]Xanthofibroma	Neoplasm Morphology - unspecified
34276	BBGH.00	[M]Atypical fibroxanthoma	Neoplasm Morphology - unspecified
43169	BBGK.11	[M]Dermatofibroma lenticulare	Neoplasm Morphology - unspecified
30314	BBGN.00	[M]Myofibromatosis	Neoplasm Morphology - unspecified
40525	BBGz.00	[M]Fibromatous neoplasm NOS	Neoplasm Morphology - unspecified
64642	BBH..00	[M]Myxomatous neoplasms	Neoplasm Morphology - unspecified
63050	BBHz.00	[M]Myxomatous neoplasm NOS	Neoplasm Morphology - unspecified
26171	BBHZ.00	[M]Angiomyxoma	Neoplasm Morphology - unspecified
12268	BBJ..00	[M]Lipomatous neoplasms	Neoplasm Morphology - unspecified
45882	BBJ0.00	[M]Lipoma NOS	Neoplasm Morphology - unspecified
10472	BBJ2.00	[M]Fibrolipoma	Neoplasm Morphology - unspecified
42422	BBJ2.11	[M]Fibroma molle	Neoplasm Morphology - unspecified
23904	BBJ4.00	[M]Fibromyxolipoma	Neoplasm Morphology - unspecified
57685	BBJ4.11	[M]Myxolipoma	Neoplasm Morphology - unspecified
39431	BBJ9.00	[M]Intramuscular lipoma	Neoplasm Morphology - unspecified
60747	BBJ9.11	[M]Infiltrating lipoma	Neoplasm Morphology - unspecified
12058	BBJA.00	[M]Spindle cell lipoma	Neoplasm Morphology - unspecified
18521	BBJB.00	[M]Angiolipomatous neoplasms	Neoplasm Morphology - unspecified
37857	BBJB000	[M]Angiomyolipoma	Neoplasm Morphology - unspecified
110827	BBJB300	[M]Angiolipoma, infiltrating	Neoplasm Morphology - unspecified
94454	BBJBz00	[M]Angiolipomatous neoplasm NOS	Neoplasm Morphology - unspecified
69326	BBJC.00	[M]Myelolipoma	Neoplasm Morphology - unspecified
42528	BBJD.00	[M]Hibernoma	Neoplasm Morphology - unspecified
57601	BBJD.11	[M]Brown fat tumour	Neoplasm Morphology - unspecified
100947	BBJE.00	[M]Lipoblastomatosis	Neoplasm Morphology - unspecified
96523	BBJF.00	[M]Pleomorphic lipoma	Neoplasm Morphology - unspecified
57628	BBJz.00	[M]Lipomatous neoplasms NOS	Neoplasm Morphology - unspecified

21064	BBK..00	[M]Myomatous neoplasms	Neoplasm Morphology - unspecified
33691	BBK0.00	[M]Leiomyomatous neoplasms	Neoplasm Morphology - unspecified
22195	BBK0012	[M]Fibromyoma	Neoplasm Morphology - unspecified
24308	BBK0013	[M]Leiomyofibroma	Neoplasm Morphology - unspecified
39743	BBK0014	[M]Myofibroma	Neoplasm Morphology - unspecified
70473	BBK0100	[M]Intravascular leiomyomatosis	Neoplasm Morphology - unspecified
61404	BBK0300	[M]Epithelioid leiomyoma	Neoplasm Morphology - unspecified
56740	BBK0311	[M]Leiomyoblastoma	Neoplasm Morphology - unspecified
61105	BBK0500	[M]Cellular leiomyoma	Neoplasm Morphology - unspecified
72251	BBK0600	[M]Bizarre leiomyoma	Neoplasm Morphology - unspecified
67322	BBK0z00	[M]Leiomyomatous neoplasm NOS	Neoplasm Morphology - unspecified
42526	BBK1.00	[M]Angiomyomatous neoplasms	Neoplasm Morphology - unspecified
47811	BBK1000	[M]Angiomyoma	Neoplasm Morphology - unspecified
17530	BBK1011	[M]Angioleiomyoma	Neoplasm Morphology - unspecified
31094	BBK1012	[M]Vascular leiomyoma	Neoplasm Morphology - unspecified
62662	BBK1z00	[M]Angiomyomatous neoplasm NOS	Neoplasm Morphology - unspecified
54486	BBK2000	[M]Myoma	Neoplasm Morphology - unspecified
68999	BBK2z00	[M]Myoma or myosarcoma NOS	Neoplasm Morphology - unspecified
28382	BBK3.00	[M]Rhabdomyomatous neoplasms	Neoplasm Morphology - unspecified
43773	BBK3000	[M]Rhabdomyoma NOS	Neoplasm Morphology - unspecified
57505	BBK3200	[M]Pleomorphic rhabdomyosarcoma	Neoplasm Morphology - unspecified
105944	BBK3300	[M]Mixed cell rhabdomyosarcoma	Neoplasm Morphology - unspecified
101225	BBK3400	[M]Fetal rhabdomyoma	Neoplasm Morphology - unspecified
108495	BBK3500	[M]Adult rhabdomyoma	Neoplasm Morphology - unspecified
70807	BBK3z00	[M]Rhabdomyomatous neoplasm NOS	Neoplasm Morphology - unspecified
97974	BBKz.00	[M]Myomatous neoplasm NOS	Neoplasm Morphology - unspecified
56751	BBL1.11	[M]Stromal endometriosis	Neoplasm Morphology - unspecified
9114	BBL2.00	[M]Adenomyoma	Neoplasm Morphology - unspecified

21419	BBL3.11	[M]Chondroid syringoma	Neoplasm Morphology - unspecified
44217	BBL3.12	[M]Mixed tumour NOS	Neoplasm Morphology - unspecified
71161	BBL7.00	[M]Mixed and stromal renal neoplasms	Neoplasm Morphology - unspecified
54594	BBL7000	[M]Mesoblastic nephroma	Neoplasm Morphology - unspecified
110404	BBL7z00	[M]Mixed or stromal renal neoplasm NOS	Neoplasm Morphology - unspecified
45668	BBLB.00	[M]Myoepithelioma	Neoplasm Morphology - unspecified
44060	BBLC.00	[M]Mesenchymomas	Neoplasm Morphology - unspecified
50344	BBLCz00	[M]Mesenchymoma NOS	Neoplasm Morphology - unspecified
43975	BBLF.00	[M]Endometrial stromal nodule	Neoplasm Morphology - unspecified
61933	BBLz.00	[M]Complex mixed or stromal neoplasm NOS	Neoplasm Morphology - unspecified
66267	BBm..00	[M]Miscellaneous reticuloendothelial neoplasms	Neoplasm Morphology - unspecified
25810	BBM0.00	[M]Brenner tumours	Neoplasm Morphology - unspecified
71490	BBM0000	[M]Brenner tumour, borderline malignancy	Neoplasm Morphology - unspecified
44793	BBM0z00	[M]Brenner tumour NOS	Neoplasm Morphology - unspecified
48254	BBM2.00	[M]Intracanalicular fibroadenoma NOS	Neoplasm Morphology - unspecified
54692	BBM3.00	[M]Pericanalicular fibroadenoma	Neoplasm Morphology - unspecified
59593	BBm3.00	[M]Letterer - Siwe disease	Neoplasm Morphology - unspecified
45768	BBm3.12	[M]Acute progressive histiocytosis X	Neoplasm Morphology - unspecified
9066	BBM4.00	[M]Adenofibroma NOS	Neoplasm Morphology - unspecified
37507	BBM5.00	[M]Serous adenofibroma	Neoplasm Morphology - unspecified
40514	BBM6.00	[M]Mucinous adenofibroma	Neoplasm Morphology - unspecified
62431	BBM7.00	[M]Cellular intracanalicular fibroadenoma	Neoplasm Morphology - unspecified
10595	BBM7.12	[M]Fibroadenoma phyllodes	Neoplasm Morphology - unspecified
36701	BBM7.13	[M]Giant fibroadenoma NOS	Neoplasm Morphology - unspecified
39312	BBM8.00	[M]Cystosarcoma phyllodes NOS	Neoplasm Morphology - unspecified
50905	BBMA.00	[M]Juvenile fibroadenoma	Neoplasm Morphology - unspecified
56756	BBmA.00	[M] Refractory anaemia with sideroblasts	Neoplasm Morphology - unspecified
49755	BBMB.00	[M]Giant fibroadenoma	Neoplasm Morphology - unspecified

60186	BBmB.00	[M]Refractory anaemia+excess of blasts with transformation	Neoplasm Morphology - unspecified
61146	BBmF.00	[M] Angiocentric immunoproliferative lesion	Neoplasm Morphology - unspecified
68353	BBmJ.00	[M] Angioendotheliomatosis	Neoplasm Morphology - unspecified
94921	BBmL.00	[M] Refractory anaemia with excess of blasts	Neoplasm Morphology - unspecified
7966	BBMz.00	[M]Fibroepithelial neoplasm NOS	Neoplasm Morphology - unspecified
43459	BBn..00	[M]Plasma cell tumours	Neoplasm Morphology - unspecified
35883	BBN..00	[M]Synovial neoplasms	Neoplasm Morphology - unspecified
17409	BBN1.11	[M]Synovioma NOS	Neoplasm Morphology - unspecified
63864	BBn2.00	[M]Plasmacytoma NOS	Neoplasm Morphology - unspecified
64068	BBnz.00	[M]Plasma cell tumour NOS	Neoplasm Morphology - unspecified
96780	BBNz.00	[M]Synovial neoplasm NOS	Neoplasm Morphology - unspecified
37128	BBp..00	[M]Mast cell tumours	Neoplasm Morphology - unspecified
94750	BBp0.00	[M]Mastocytoma NOS	Neoplasm Morphology - unspecified
38756	BBP9.00	[M]Cystic mesothelioma	Neoplasm Morphology - unspecified
21770	BBPX.00	[M]Mesothelioma, unspecified	Neoplasm Morphology - unspecified
92385	BBpz.00	[M]Mast cell tumour NOS	Neoplasm Morphology - unspecified
69755	BBPz.00	[M]Mesothelial neoplasm NOS	Neoplasm Morphology - unspecified
17468	BBQ..00	[M]Germ cell neoplasms	Neoplasm Morphology - unspecified
73155	BBQ7011	[M]Adult cystic teratoma	Neoplasm Morphology - unspecified
56251	BBQ7012	[M]Mature teratoma	Neoplasm Morphology - unspecified
19180	BBQ7100	[M]Teratoma NOS	Neoplasm Morphology - unspecified
42300	BBQ7z00	[M]Teratoma NOS	Neoplasm Morphology - unspecified
103259	BBQA.00	[M]Strumal neoplasms	Neoplasm Morphology - unspecified
52306	BBQA000	[M]Struma ovarii NOS	Neoplasm Morphology - unspecified
99800	BBQA200	[M]Strumal carcinoid	Neoplasm Morphology - unspecified
43582	BBQz.00	[M]Germ cell neoplasm NOS	Neoplasm Morphology - unspecified
5135	BBR..00	[M]Trophoblastic neoplasms	Neoplasm Morphology - unspecified
11404	BBR0.00	[M]Hydatidiform mole NOS	Neoplasm Morphology - unspecified

10875	BBR0.11	[M]Hydatid mole	Neoplasm Morphology - unspecified
59409	BBR1.00	[M]Invasive hydatidiform mole	Neoplasm Morphology - unspecified
56538	BBR1.11	[M]Chorioadenoma	Neoplasm Morphology - unspecified
68211	BBR1.12	[M]Chorioadenoma destruens	Neoplasm Morphology - unspecified
47339	BBR1.13	[M]Invasive mole NOS	Neoplasm Morphology - unspecified
67712	BBR2.00	[M]Choriocarcinoma	Neoplasm Morphology - unspecified
54627	BBR3.00	[M]Choriocarcinoma combined with teratoma	Neoplasm Morphology - unspecified
110349	BBr3z00	[M]Plasma cell leukaemia NOS	Neoplasm Morphology - unspecified
88593	BBR6.00	[M]Placental site trophoblastic tumour	Neoplasm Morphology - unspecified
24317	BBr6012	[M]Myelosis NOS	Neoplasm Morphology - unspecified
28635	BBR7.00	[M]Classical hydatidiform mole	Neoplasm Morphology - unspecified
47989	BBR8.00	[M]Complete hydatidiform mole	Neoplasm Morphology - unspecified
96078	BBRz.00	[M]Trophoblastic neoplasm NOS	Neoplasm Morphology - unspecified
69462	BBS..00	[M]Mesonephromas	Neoplasm Morphology - unspecified
30139	BBs..00	[M]Misc myeloproliferative and lymphoproliferative disorders	Neoplasm Morphology - unspecified
16922	BBs0.00	[M]Polycythaemia vera	Neoplasm Morphology - unspecified
58888	BBs0.11	[M]Polycythaemia rubra vera	Neoplasm Morphology - unspecified
52062	BBS3.00	[M]Endosalpingioma	Neoplasm Morphology - unspecified
30043	BBs4.00	[M]Idiopathic thrombocythaemia	Neoplasm Morphology - unspecified
37692	BBsz.00	[M]Misc myeloproliferative or lymphoproliferative dis NOS	Neoplasm Morphology - unspecified
58976	BBT..00	[M]Blood vessel tumours	Neoplasm Morphology - unspecified
36646	BBT..11	[M]Haemangiomatous tumours	Neoplasm Morphology - unspecified
60191	BBT0.12	[M]Chorioangioma	Neoplasm Morphology - unspecified
17738	BBT3.00	[M]Venous haemangioma	Neoplasm Morphology - unspecified
101256	BBT4.00	[M]Racemose haemangioma	Neoplasm Morphology - unspecified
11719	BBT4.11	[M]Arteriovenous haemangioma	Neoplasm Morphology - unspecified
67106	BBT7.00	[M]Haemangioendothelioma	Neoplasm Morphology - unspecified
72247	BBT7z00	[M]Haemangioendothelioma NOS	Neoplasm Morphology - unspecified

40853	BBT7z11	[M]Angioendothelioma	Neoplasm Morphology - unspecified
109447	BBT8.11	[M]Haemangioma simplex	Neoplasm Morphology - unspecified
50658	BBT8.12	[M]Infantile haemangioma	Neoplasm Morphology - unspecified
65852	BBT8.13	[M]Juvenile haemangioma	Neoplasm Morphology - unspecified
62001	BBT8.14	[M]Plexiform haemangioma	Neoplasm Morphology - unspecified
43321	BBT9.00	[M]Intramuscular haemangioma	Neoplasm Morphology - unspecified
11993	BBTB.00	[M]Angiokeratoma	Neoplasm Morphology - unspecified
37117	BBTC.00	[M]Verrucous keratotic haemangioma	Neoplasm Morphology - unspecified
34324	BBTD100	[M]Haemangiopericytoma NOS	Neoplasm Morphology - unspecified
96072	BBTDz00	[M]Haemangiopericytic neoplasm NOS	Neoplasm Morphology - unspecified
5430	BBTE.00	[M]Angiofibroma NOS	Neoplasm Morphology - unspecified
34385	BBTE.11	[M]Juvenile angiofibroma	Neoplasm Morphology - unspecified
1969	BBTF.00	[M]Haemangioblastoma	Neoplasm Morphology - unspecified
41349	BBTF.11	[M]Angioblastoma	Neoplasm Morphology - unspecified
53774	BBTG.00	[M]Epithelioid haemangioma	Neoplasm Morphology - unspecified
59746	BBTH.00	[M]Histiocytoid haemangioma	Neoplasm Morphology - unspecified
22712	BBTJ.00	[M]Epithelioid haemangioendothelioma NOS	Neoplasm Morphology - unspecified
62881	BBTz.00	[M]Blood vessel tumour NOS	Neoplasm Morphology - unspecified
71481	BBU..00	[M]Lymphatic vessel tumours	Neoplasm Morphology - unspecified
40415	BBU..11	[M]Lymphangiomatous tumours	Neoplasm Morphology - unspecified
53735	BBU0.00	[M]Lymphangioma NOS	Neoplasm Morphology - unspecified
57337	BBU2.00	[M]Capillary lymphangioma	Neoplasm Morphology - unspecified
38417	BBU3.00	[M]Cavernous lymphangioma	Neoplasm Morphology - unspecified
7834	BBU4.00	[M]Cystic lymphangioma	Neoplasm Morphology - unspecified
93852	BBU5.00	[M]Lymphangiomyoma	Neoplasm Morphology - unspecified
72439	BBU6.00	[M]Lymphangiomyomatosis	Neoplasm Morphology - unspecified
43845	BBU7.00	[M]Haemolymphangioma	Neoplasm Morphology - unspecified
96713	BBUz.00	[M]Lymphatic vessel tumour NOS	Neoplasm Morphology - unspecified

44556	BBV0.00	[M]Osteoma NOS	Neoplasm Morphology - unspecified
33993	BBV7.00	[M]Osteoid osteoma NOS	Neoplasm Morphology - unspecified
62492	BBV8.00	[M]Osteoblastoma	Neoplasm Morphology - unspecified
21224	BBV8.11	[M]Giant osteoid osteoma	Neoplasm Morphology - unspecified
48271	BBVz.00	[M]Osteoma or osteosarcoma NOS	Neoplasm Morphology - unspecified
36503	BBW..00	[M]Chondromatous neoplasms	Neoplasm Morphology - unspecified
19660	BBW0.11	[M]Cartilaginous exostosis	Neoplasm Morphology - unspecified
40469	BBW0.12	[M]Ecchondroma	Neoplasm Morphology - unspecified
16204	BBW1.00	[M]Osteochondromatosis NOS	Neoplasm Morphology - unspecified
58904	BBW1.11	[M]Ecchondrosis	Neoplasm Morphology - unspecified
50796	BBW2.00	[M]Chondroma NOS	Neoplasm Morphology - unspecified
33589	BBW3.00	[M]Chondromatosis NOS	Neoplasm Morphology - unspecified
49667	BBW5.00	[M]Juxtacortical chondroma	Neoplasm Morphology - unspecified
33504	BBW5.11	[M]Periosteal chondroma	Neoplasm Morphology - unspecified
68524	BBW7.00	[M]Chondroblastoma NOS	Neoplasm Morphology - unspecified
32442	BBW7.11	[M]Chondromatous giant cell tumour	Neoplasm Morphology - unspecified
33973	BBWz.00	[M]Chondromatous neoplasm NOS	Neoplasm Morphology - unspecified
38477	BBX0.00	[M]Giant cell tumour of bone NOS	Neoplasm Morphology - unspecified
29385	BBX0.11	[M]Osteoclastoma	Neoplasm Morphology - unspecified
45364	BBX2.00	[M]Giant cell tumour of soft parts NOS	Neoplasm Morphology - unspecified
37830	BBXz.00	[M]Giant cell tumour NOS	Neoplasm Morphology - unspecified
49872	BBy..00	[M]No microscopic confirmation of tumour	Neoplasm Morphology - unspecified
9102	BBY..00	[M]Miscellaneous bone tumours	Neoplasm Morphology - unspecified
6080	BBY2.00	[M]Ossifying fibroma	Neoplasm Morphology - unspecified
65643	BBY2.11	[M]Ossifying fibroma	Neoplasm Morphology - unspecified
53489	BBY2.12	[M]Osteofibroma	Neoplasm Morphology - unspecified
66502	BBYz.00	[M]Miscellaneous bone tumour NOS	Neoplasm Morphology - unspecified
72791	BByz.00	[M]No microscopic confirmation of tumour, clinically NOS	Neoplasm Morphology - unspecified

41274	BBZ..00	[M]Odontogenic tumours	Neoplasm Morphology - unspecified
50635	BBz..00	[M]Neoplasm morphology NOS	Neoplasm Morphology - unspecified
107281	BBz0.00	[M]Neuroendocrine neoplasm	Neoplasm Morphology - unspecified
55833	BBZ1.00	[M]Odontogenic tumour NOS	Neoplasm Morphology - unspecified
94828	BBZ3.00	[M]Dentinoma	Neoplasm Morphology - unspecified
45961	BBZ4.00	[M]Cementoma NOS	Neoplasm Morphology - unspecified
55474	BBZ6.00	[M]Cementifying fibroma	Neoplasm Morphology - unspecified
69443	BBZ7.00	[M]Gigantiform cementoma	Neoplasm Morphology - unspecified
44210	BBZ8.00	[M]Odontoma NOS	Neoplasm Morphology - unspecified
101590	BBZ9.00	[M]Compound odontoma	Neoplasm Morphology - unspecified
62007	BBZA.00	[M]Complex odontoma	Neoplasm Morphology - unspecified
22057	BBZB.00	[M]Ameloblastic fibro-odontoma	Neoplasm Morphology - unspecified
98019	BBZD.00	[M]Adenomatoid odontogenic tumour	Neoplasm Morphology - unspecified
58550	BBZD.11	[M]Adenoameloblastoma	Neoplasm Morphology - unspecified
57799	BBZE.00	[M]Calcifying odontogenic cyst	Neoplasm Morphology - unspecified
40467	BBZF.00	[M]Ameloblastoma NOS	Neoplasm Morphology - unspecified
98861	BBZH.00	[M]Odontoameloblastoma	Neoplasm Morphology - unspecified
45189	BBZJ.00	[M]Squamous odontogenic tumour	Neoplasm Morphology - unspecified
67837	BBZK.00	[M]Odontogenic myxoma	Neoplasm Morphology - unspecified
97546	BBZK.11	[M]Odontogenic myxofibroma	Neoplasm Morphology - unspecified
36576	BBZL.00	[M]Odontogenic fibroma NOS	Neoplasm Morphology - unspecified
59010	BBZM.00	[M]Ameloblastic fibroma	Neoplasm Morphology - unspecified
59274	BBZP.00	[M]Calcifying epithelial odontogenic tumour	Neoplasm Morphology - unspecified
101568	BBZz.00	[M]Odontogenic tumour NOS	Neoplasm Morphology - unspecified
5034	B33..12	Epithelioma	Non-melanoma skin
3445	B33..16	Epithelioma basal cell	Non-melanoma skin
21156	B33z111	Basal cell naevus syndrome	Non-melanoma skin
876	B33..11	Basal cell carcinoma	Non-melanoma skin
1940	B33..13	Rodent ulcer	Non-melanoma skin
54182	B33z100	Naevoid basal cell carcinoma syndrome	Non-melanoma skin
3028	BB31.00	[M]Basal cell carcinoma NOS	Non-melanoma skin

59919	BB32.00	[M]Multicentric basal cell carcinoma	Non-melanoma skin
9885	BB33.00	[M]Basal cell carcinoma, morphoea type	Non-melanoma skin
29524	BB34.00	[M]Basal cell carcinoma, fibroepithelial type	Non-melanoma skin
102417	BB3C.00	[M]Superficial basal cell carcinoma	Non-melanoma skin
102547	BB3D.00	[M]Basal cell carcinoma, nodular	Non-melanoma skin
103440	BB3E.00	[M]Basal cell carcinoma, micronodular	Non-melanoma skin
103178	BB3F.00	[M]Basal cell carcinoma, infiltrative	Non-melanoma skin
103066	BB3G.00	[M]Pigmented basal cell carcinoma	Non-melanoma skin
93352	B338.00	Squamous cell carcinoma of skin	Non-melanoma skin
93490	B33z.11	Squamous cell carcinoma of skin NOS	Non-melanoma skin
94873	BB2A.13	[M]Squamous cell carcinoma of skin NOS	Non-melanoma skin
4632	B33..00	Other malignant neoplasm of skin	Non-melanoma skin
37016	B33..14	Malignant neoplasm of sebaceous gland	Non-melanoma skin
40443	B33..15	Malignant neoplasm of sweat gland	Non-melanoma skin
18245	B330.00	Malignant neoplasm of skin of lip	Non-melanoma skin
43087	B331.00	Malignant neoplasm of eyelid including canthus	Non-melanoma skin
36731	B331000	Malignant neoplasm of canthus	Non-melanoma skin
55550	B331100	Malignant neoplasm of upper eyelid	Non-melanoma skin
41958	B331200	Malignant neoplasm of lower eyelid	Non-melanoma skin
53515	B332.00	Malignant neoplasm skin of ear and external auricular c	Non-melanoma skin
33997	B332000	Malignant neoplasm of skin of auricle (ear)	Non-melanoma skin
62080	B332100	Malignant neoplasm of skin of external auditory meatus	Non-melanoma skin
33271	B332200	Malignant neoplasm of pinna NEC	Non-melanoma skin
62399	B332z00	Malig neop skin of ear and external auricular canal NOS	Non-melanoma skin
27370	B333.00	Malignant neoplasm skin of other and unspecified parts	Non-melanoma skin
30645	B333000	Malignant neoplasm of skin of cheek, external	Non-melanoma skin
49403	B333100	Malignant neoplasm of skin of chin	Non-melanoma skin
55670	B333200	Malignant neoplasm of skin of eyebrow	Non-melanoma skin
30576	B333300	Malignant neoplasm of skin of forehead	Non-melanoma skin
16202	B333400	Malignant neoplasm of skin of nose (external)	Non-melanoma skin
21327	B333500	Malignant neoplasm of skin of temple	Non-melanoma skin
46008	B333z00	Malignant neoplasm skin other and unspec part of face N	Non-melanoma skin
54234	B334.00	Malignant neoplasm of scalp and skin of neck	Non-melanoma skin
37165	B334000	Malignant neoplasm of scalp	Non-melanoma skin
43619	B334100	Malignant neoplasm of skin of neck	Non-melanoma skin
73760	B334z00	Malignant neoplasm of scalp or skin of neck NOS	Non-melanoma skin
57446	B335.00	Malignant neoplasm of skin of trunk, excluding scrotum	Non-melanoma skin
70380	B335000	Malignant neoplasm of skin of axillary fold	Non-melanoma skin
37969	B335100	Malignant neoplasm of skin of chest, excluding breast	Non-melanoma skin

30543	B335200	Malignant neoplasm of skin of breast	Non-melanoma skin
18618	B335300	Malignant neoplasm of skin of abdominal wall	Non-melanoma skin
67748	B335400	Malignant neoplasm of skin of umbilicus	Non-melanoma skin
66319	B335500	Malignant neoplasm of skin of groin	Non-melanoma skin
46458	B335600	Malignant neoplasm of skin of perineum	Non-melanoma skin
45077	B335700	Malignant neoplasm of skin of back	Non-melanoma skin
62305	B335800	Malignant neoplasm of skin of buttock	Non-melanoma skin
23480	B335900	Malignant neoplasm of perianal skin	Non-melanoma skin
66447	B335A00	Malignant neoplasm of skin of scapular region	Non-melanoma skin
15868	B335z00	Malignant neoplasm of skin of trunk, excluding scrotum,	Non-melanoma skin
30747	B336.00	Malignant neoplasm of skin of upper limb and shoulder	Non-melanoma skin
43122	B336000	Malignant neoplasm of skin of shoulder	Non-melanoma skin
42707	B336100	Malignant neoplasm of skin of upper arm	Non-melanoma skin
30577	B336200	Malignant neoplasm of skin of fore-arm	Non-melanoma skin
54352	B336300	Malignant neoplasm of skin of hand	Non-melanoma skin
25245	B336400	Malignant neoplasm of skin of finger	Non-melanoma skin
64406	B336500	Malignant neoplasm of skin of thumb	Non-melanoma skin
60526	B336z00	Malignant neoplasm of skin of upper limb or shoulder NO	Non-melanoma skin
57442	B337.00	Malignant neoplasm of skin of lower limb and hip	Non-melanoma skin
70988	B337000	Malignant neoplasm of skin of hip	Non-melanoma skin
58601	B337100	Malignant neoplasm of skin of thigh	Non-melanoma skin
56954	B337200	Malignant neoplasm of skin of knee	Non-melanoma skin
68197	B337300	Malignant neoplasm of skin of popliteal fossa area	Non-melanoma skin
33682	B337400	Malignant neoplasm of skin of lower leg	Non-melanoma skin
64270	B337500	Malignant neoplasm of skin of ankle	Non-melanoma skin
104025	B337600	Malignant neoplasm of skin of heel	Non-melanoma skin
70587	B337700	Malignant neoplasm of skin of foot	Non-melanoma skin
65782	B337800	Malignant neoplasm of skin of toe	Non-melanoma skin
67914	B337900	Malignant neoplasm of skin of great toe	Non-melanoma skin
61194	B337z00	Malignant neoplasm of skin of lower limb or hip NOS	Non-melanoma skin
24375	B339.00	Dermatofibrosarcoma protuberans	Non-melanoma skin
42429	B33X.00	Malignant neoplasm overlapping lesion of skin	Non-melanoma skin
18354	B33y.00	Malignant neoplasm of other specified skin sites	Non-melanoma skin
2492	B33z.00	Malignant neoplasm of skin NOS	Non-melanoma skin
27931	B33z000	Kaposi's sarcoma of skin	Non-melanoma skin
8563	1J0..00	Suspected malignancy	Possible Cancer
13558	1J00.00	Suspected lung cancer	Possible Cancer
8327	1J01.00	Suspected sarcoma	Possible Cancer
19692	1J02.00	Suspected leukaemia	Possible Cancer
10923	1J03.00	Suspected brain tumour	Possible Cancer
19083	1J04.00	Suspected lymphoma	Possible Cancer
11297	1J05.00	Suspected neuroblastoma	Possible Cancer

26872	1J06.00	Suspected cervical cancer	Possible Cancer
18894	1J07.00	Suspected endometrial cancer	Possible Cancer
17404	1J08.00	Suspected prostate cancer	Possible Cancer
9303	1J09.00	Suspected bladder cancer	Possible Cancer
30715	1J0A.00	Suspected kidney cancer	Possible Cancer
44134	1J0B.00	Suspected urothelial cancer	Possible Cancer
26878	1J0C.00	Suspected testicular cancer	Possible Cancer
25215	1J0D.00	Suspected upper gastrointestinal cancer	Possible Cancer
25396	1J0E.00	Suspected lower gastrointestinal cancer	Possible Cancer
22723	1J0F.00	Suspected haematological malignancy	Possible Cancer
11541	1J0G.00	Suspected skin cancer	Possible Cancer
22565	1J0H.00	Suspected head and neck cancer	Possible Cancer
9901	1J0I.00	Suspected breast cancer	Possible Cancer
48342	1J0J.00	Suspected gynaecological cancer	Possible Cancer
57839	1J0K.00	Suspected pancreatic cancer	Possible Cancer
100035	1J0L.00	Suspected malignant mesothelioma	Possible Cancer
49341	4D56.00	Pleural fluid: malignant cells	Possible Cancer
59076	4E33.00	Sputum: malignant cells	Possible Cancer
13575	4F32.00	Ascitic fluid: malignant cells	Possible Cancer
94676	4KJ..00	Tumour hormone receptor status	Possible Cancer
95517	4KJ0.00	Oestrogen receptor positive tumour	Possible Cancer
96284	4KJ1.00	Progesterone receptor positive tumour	Possible Cancer
95665	4KJ2.00	Oestrogen receptor negative tumour	Possible Cancer
23224	4M...00	Tumour staging	Possible Cancer
10178	4M0..00	Gleason grading of prostate cancer	Possible Cancer
18503	4M00.00	Gleason prostate grade 2-4 (low)	Possible Cancer
18612	4M01.00	Gleason prostate grade 5-7 (medium)	Possible Cancer
26081	4M02.00	Gleason prostate grade 8-10 (high)	Possible Cancer
12033	4M1..00	Dukes staging system	Possible Cancer
40986	4M10.00	Dukes stage A	Possible Cancer
19092	4M11.00	Dukes stage B	Possible Cancer
35458	4M12.00	Dukes stage C1	Possible Cancer
42361	4M13.00	Dukes stage C2	Possible Cancer
64727	4M14.00	Dukes stage D	Possible Cancer
40991	4M2..00	Lymphoma staging system	Possible Cancer
60918	4M20.00	Lymphoma stage I	Possible Cancer
94935	4M21.00	Lymphoma stage II	Possible Cancer
32240	4M22.00	Lymphoma stage III	Possible Cancer
71672	4M23.00	Lymphoma stage IV	Possible Cancer
57294	4M3..00	Breslow depth staging for melanoma	Possible Cancer
37793	4M4..00	FIGO staging of gynaecological malignancy	Possible Cancer
57122	4M5..00	TNM tumour staging	Possible Cancer
97188	4M7..00	Clark staging levels	Possible Cancer
101198	4M70.00	Clark melanoma level 1	Possible Cancer
104609	4M71.00	Clark melanoma level 2	Possible Cancer
96280	4M72.00	Clark melanoma level 3	Possible Cancer
102116	4M73.00	Clark melanoma level 4	Possible Cancer
108866	4M74.00	Clark melanoma level 5	Possible Cancer
88762	5135	Radiological tumour control	Possible Cancer

29285	5149	Radiotherapy-tumour palliation	Possible Cancer
38486	7001000	Excision of lesion of frontal lobe of brain	Possible Cancer
31858	7001100	Excision of lesion of temporal lobe of brain	Possible Cancer
21873	7001200	Excision of lesion of parietal lobe of brain	Possible Cancer
22602	7001300	Excision of lesion of occipital lobe of brain	Possible Cancer
34961	7001400	Excision of lesion of cerebellum	Possible Cancer
95403	7001500	Excision of lesion of tissue of brain stem	Possible Cancer
67952	7003000	Open biopsy of lesion of frontal lobe of brain	Possible Cancer
34811	7003100	Open biopsy of lesion of temporal lobe of brain	Possible Cancer
44048	7003200	Open biopsy of lesion of parietal lobe of brain	Possible Cancer
90574	7003300	Open biopsy of lesion of occipital lobe of brain	Possible Cancer
34894	7003500	Open biopsy of lesion of brain stem	Possible Cancer
42159	7006000	Biopsy of lesion of frontal lobe of brain NEC	Possible Cancer
22832	7006100	Biopsy of lesion of temporal lobe of brain NEC	Possible Cancer
30654	7006200	Biopsy of lesion of parietal lobe of brain NEC	Possible Cancer
53516	7006300	Biopsy of lesion of occipital lobe of brain NEC	Possible Cancer
53641	7006400	Biopsy of lesion of cerebellum NEC	Possible Cancer
17142	7006500	Biopsy of lesion of brain stem NEC	Possible Cancer
50643	7015000	Diagnostic endoscopic exam & biopsy lesion ventricle brain	Possible Cancer
64155	7015y00	Diagnostic endoscopic examination of ventricle of brain OS	Possible Cancer
64681	7015z00	Diagnostic endoscopic examination of ventricle of brain NOS	Possible Cancer
18270	7G03K00	Excision malignant skin tumour	Possible Cancer
93402	7G05D00	Excision biopsy of basal cell carcinoma	Possible Cancer
92427	7K13500	Curettage of tumour of bone and graft HFQ	Possible Cancer
91514	7K13600	Curettage of tumour of bone NEC	Possible Cancer
87871	7K13700	Excision of tumour of bone NEC	Possible Cancer
97201	7K13900	Excision of tumour of bone	Possible Cancer
11590	7L1K300	Debulking of tumour of unspecified organ	Possible Cancer
28876	8HHt.00	Fast track cancer referral	Possible Cancer
83499	8Hn..00	Priority cancer referral	Possible Cancer
85844	8Hn0.00	Fast track referral for suspected skin cancer	Possible Cancer
85845	8Hn1.00	Fast track referral for suspected gynaecological cancer	Possible Cancer
85664	8Hn2.00	Fast track referral for suspected breast cancer	Possible Cancer
91273	8Hn3.00	Fast track referral for suspected childrens tumour	Possible Cancer
85237	8Hn4.00	Fast track referral for suspected colorectal cancer	Possible Cancer
84155	8Hn5.00	Fast track referral for suspected urological cancer	Possible Cancer

85846	8Hn6.00	Fast track referral for suspected haematology malignancy	Possible Cancer
85847	8Hn7.00	Fast track referral for suspected lung cancer	Possible Cancer
85848	8Hn8.00	Fast track referral for suspected sarcoma	Possible Cancer
85849	8Hn9.00	Fast track referral for suspected upper GI cancer	Possible Cancer
85850	8HnA.00	Fast track referral for suspected brain tumour	Possible Cancer
85851	8HnB.00	Fast track referral for suspected head and neck cancer	Possible Cancer
67575	A788W00	HIV disease resulting in unspecified malignant neoplasm	Possible Cancer
94688	4M6..00	Recurrence of tumour	Possible Cancer
105324	A789800	HIV disease resulting in multiple malignant neoplasms	Possible Cancer
108260	8HnC.00	Fast track referral for suspected lower GI cancer	Possible Cancer
782	B....00	Neoplasms	Uncertain behavior
10314	B057.00	Overlapping lesion of other and unspecified parts of mouth	Uncertain behavior
10368	B11..11	Gastric neoplasm	Uncertain behavior
22809	B9...00	Neoplasms of uncertain behaviour	Uncertain behavior
44144	B90..00	Neop uncertain behaviour of digestive and respiratory system	Uncertain behavior
101462	B900.00	Neoplasm of uncertain behaviour of major salivary glands	Uncertain behavior
11676	B900000	Neoplasm of uncertain behaviour of parotid gland	Uncertain behavior
5116	B900011	Mixed parotid tumour	Uncertain behavior
41226	B900100	Neoplasm of uncertain behaviour of sublingual gland	Uncertain behavior
41257	B900200	Neoplasm of uncertain behaviour of submandibular gland	Uncertain behavior
97721	B900z00	Neoplasm of uncertain behaviour of major salivary gland NOS	Uncertain behavior
70663	B901.00	Neop of uncertain behaviour of lip, oral cavity and pharynx	Uncertain behavior
54728	B901.11	Neoplasm of uncertain behaviour of oral cavity	Uncertain behavior
27837	B901.12	Neoplasm of uncertain behaviour of pharynx	Uncertain behavior
40435	B901000	Neoplasm of uncertain behaviour of lip	Uncertain behavior
27947	B901100	Neoplasm of uncertain behaviour of tongue	Uncertain behavior
41408	B901300	Neoplasm of uncertain behaviour of gums	Uncertain behavior
41212	B901400	Neoplasm of uncertain behaviour of floor of mouth	Uncertain behavior
56206	B901500	Neoplasm of uncertain behaviour of cheek	Uncertain behavior
49968	B901600	Neoplasm of uncertain behaviour of palate	Uncertain behavior
55874	B901700	Neoplasm of uncertain behaviour of nasopharynx	Uncertain behavior
61253	B901800	Neoplasm of uncertain behaviour of oropharynx	Uncertain behavior
51449	B901900	Neoplasm of uncertain behaviour of hypopharynx	Uncertain behavior

94038	B902.00	Neop of uncertain behaviour stomach, intestines and rectum	Uncertain behavior
51350	B902000	Neoplasm of uncertain behaviour of stomach	Uncertain behavior
18000	B902100	Neoplasm of uncertain behaviour of duodenum	Uncertain behavior
99402	B902200	Neoplasm of uncertain behaviour of jejunum	Uncertain behavior
96806	B902300	Neoplasm of uncertain behaviour of ileum	Uncertain behavior
22001	B902400	Neoplasm of uncertain behaviour of colon	Uncertain behavior
16036	B902500	Neoplasm of uncertain behaviour of rectum	Uncertain behavior
48773	B902600	Neoplasm of uncertain or unknown behaviour of appendix	Uncertain behavior
107374	B902z00	Neop of uncertain behaviour stomach, intestine or rectum NOS	Uncertain behavior
71427	B903.00	Neoplasm of uncertain behaviour of liver and biliary passage	Uncertain behavior
54497	B903.11	Neoplasm of uncertain behaviour of biliary system	Uncertain behavior
40520	B903000	Neoplasm of uncertain behaviour of liver	Uncertain behavior
98524	B903200	Neoplasm of uncertain behaviour of hepatic duct	Uncertain behavior
46873	B903300	Neoplasm of uncertain behaviour of gall bladder	Uncertain behavior
73587	B903500	Neoplasm of uncertain behaviour of common bile duct	Uncertain behavior
108716	B903600	Neoplasm of uncertain behaviour of ampulla of Vater	Uncertain behavior
46484	B903700	Neoplasm of uncertain behaviour of sphincter of Oddi	Uncertain behavior
39502	B904000	Neoplasm of uncertain behaviour of retroperitoneum	Uncertain behavior
59576	B904100	Neoplasm of uncertain behaviour of peritoneum	Uncertain behavior
105577	B905.00	Neop of uncertain behaviour other and unspec digestive organ	Uncertain behavior
38604	B905000	Neoplasm of uncertain behaviour of oesophagus	Uncertain behavior
16828	B905100	Neoplasm of uncertain behaviour of pancreas	Uncertain behavior
46245	B905200	Neoplasm of uncertain behaviour of anal canal and sphincter	Uncertain behavior
25493	B905300	Neoplasm of uncertain behaviour of spleen	Uncertain behavior
100210	B905400	Gastrointestinal stromal tumour	Uncertain behavior
103232	B905z00	Neop uncertain behaviour other unspec digestive organ NOS	Uncertain behavior
43348	B906.00	Neoplasm of uncertain behaviour of larynx	Uncertain behavior
72959	B906000	Neoplasm of uncertain behaviour of thyroid cartilage	Uncertain behavior
95829	B906100	Neoplasm of uncertain behaviour of cricoid cartilage	Uncertain behavior
71677	B906200	Neoplasm of uncertain behaviour of epiglottis	Uncertain behavior
97674	B906300	Neoplasm of uncertain behaviour of arytenoid cartilage	Uncertain behavior

108376	B906400	Neoplasm of uncertain behaviour of corniculate cartilage	Uncertain behavior
65284	B906600	Neoplasm of uncertain behaviour of aryepiglottic fold	Uncertain behavior
101616	B906700	Neoplasm of uncertain behaviour of vestibular fold	Uncertain behavior
17379	B906800	Neoplasm of uncertain behaviour of vocal cord	Uncertain behavior
95433	B906z00	Neoplasm of uncertain behaviour of larynx NOS	Uncertain behavior
105024	B907.00	Neoplasm of uncertain behaviour trachea, bronchus and lung	Uncertain behavior
54746	B907000	Neoplasm of uncertain behaviour of trachea	Uncertain behavior
25475	B907100	Neoplasm of uncertain behaviour of bronchus	Uncertain behavior
3915	B907200	Neoplasm of uncertain behaviour of lung	Uncertain behavior
55790	B907z00	Neop of uncertain behaviour of trachea, bronchus or lung NOS	Uncertain behavior
64443	B908000	Neoplasm of uncertain behaviour of pleura	Uncertain behavior
41223	B908100	Neoplasm of uncertain behaviour of thymus	Uncertain behavior
39374	B908200	Neoplasm of uncertain behaviour of mediastinum	Uncertain behavior
96431	B90z.00	Neoplasm of uncertain behaviour of respiratory organs OS/NOS	Uncertain behavior
56408	B90z000	Neoplasm of uncertain behaviour of nasal cavity	Uncertain behavior
101661	B90z100	Neoplasm of uncertain behaviour of tympanic cavity	Uncertain behavior
96442	B90z300	Neoplasm of uncertain behaviour of eustachian tube	Uncertain behavior
70480	B90z400	Neoplasm of uncertain behaviour of mastoid air cells	Uncertain behavior
54233	B90z500	Neoplasm of uncertain behaviour of maxillary sinus	Uncertain behavior
69406	B90z600	Neoplasm of uncertain behaviour of ethmoidal sinus	Uncertain behavior
95696	B90z700	Neoplasm of uncertain behaviour of frontal sinus	Uncertain behavior
68704	B90z800	Neoplasm of uncertain behaviour of sphenoidal sinus	Uncertain behavior
44170	B91..00	Neoplasm of uncertain behaviour of genitourinary organs	Uncertain behavior
16400	B910.00	Neoplasm of uncertain behaviour of uterus	Uncertain behavior
107196	B911.00	Neoplasm of uncertain behaviour of placenta	Uncertain behavior
19657	B911000	Malignant hydatidiform mole	Uncertain behavior
101813	B911012	Invasive mole - placenta	Uncertain behavior
5136	B911013	Choriocarcinoma	Uncertain behavior
106056	B911100	Epithelioid trophoblastic tumour	Uncertain behavior
1918	B912.00	Neoplasm of uncertain behaviour of ovary	Uncertain behavior
71671	B913.00	Neoplasm of uncertain behaviour other female genital organs	Uncertain behavior
23577	B913000	Neoplasm of uncertain behaviour of vagina	Uncertain behavior

14982	B913100	Neoplasm of uncertain behaviour of vulva	Uncertain behavior
108053	B913z00	Neoplasm of uncertain behaviour of female genital organs NOS	Uncertain behavior
29479	B914.00	Neoplasm of uncertain behaviour of testis	Uncertain behavior
25523	B915.00	Neoplasm of uncertain behaviour of prostate	Uncertain behavior
46107	B916000	Neoplasm of uncertain behaviour of penis	Uncertain behavior
31273	B916100	Neoplasm of uncertain behaviour of epididymis	Uncertain behavior
41227	B916200	Neoplasm of uncertain behaviour of scrotum	Uncertain behavior
29625	B916z00	Neoplasm of uncertain behaviour of male genital organs NOS	Uncertain behavior
28029	B917.00	Neoplasm of uncertain behaviour of bladder	Uncertain behavior
14753	B917.11	Benign papilloma bladder	Uncertain behavior
9907	B917.12	Transitional cell papilloma of bladder	Uncertain behavior
97017	B917000	Bladder polyp	Uncertain behavior
101044	B91z.00	Neoplasm of uncertain behaviour of urinary organs OS/NOS	Uncertain behavior
89439	B91z.11	Neoplasm of uncertain behaviour of urinary organ NOS	Uncertain behavior
18749	B91z100	Neoplasm of uncertain behaviour of kidney	Uncertain behavior
25940	B91z111	Renal neoplasm of uncertain behaviour	Uncertain behavior
35643	B91z200	Uncertain neoplasm ureter	Uncertain behavior
43804	B91z300	Neoplasm of uncertain or unknown behaviour of renal pelvis	Uncertain behavior
52477	B91zz00	Uncertain neoplasm of urinary organ NOS	Uncertain behavior
70506	B92..00	Neop of uncertain behaviour of endocrine and nervous system	Uncertain behavior
42685	B920.00	Neop uncertain behaviour pituitary and craniopharyngeal duct	Uncertain behavior
50334	B920000	Neoplasm of uncertain behaviour of pituitary gland	Uncertain behavior
57413	B920100	Neoplasm of uncertain behaviour of craniopharyngeal duct	Uncertain behavior
94371	B920z00	Neop uncertain behaviour pituitary and craniopharyngeal NOS	Uncertain behavior
34802	B921.00	Neoplasm of uncertain behaviour of pineal gland	Uncertain behavior
30393	B922.00	Neoplasm of uncertain behaviour of adrenal gland	Uncertain behavior
48079	B923.00	Neoplasm of uncertain behaviour of paraganglia	Uncertain behavior
60711	B923000	Neoplasm of uncertain behaviour of carotid body	Uncertain behavior
45855	B923100	Neoplasm of uncertain behaviour of glomus jugulare	Uncertain behavior
21400	B923300	Neoplasm of uncertain behaviour of coccygeal body	Uncertain behavior
63473	B923z00	Neoplasm of uncertain behaviour of paraganglia NOS	Uncertain behavior
109985	B924.00	Neoplasm of uncertain behaviour other/unsp. endocrine glands	Uncertain behavior

17415	B924000	Neoplasm of uncertain behaviour of thyroid gland	Uncertain behavior
46892	B924100	Neoplasm of uncertain behaviour of parathyroid gland	Uncertain behavior
69206	B924z00	Neoplasm of uncertain behaviour of endocrine gland NOS	Uncertain behavior
24729	B925000	Neoplasm of uncertain behaviour of brain	Uncertain behavior
44774	B925100	Neoplasm of uncertain behaviour of spinal cord	Uncertain behavior
59141	B925200	Neoplasm of uncertain or unknown behav brain, supratentorial	Uncertain behavior
72503	B925300	Neoplasm uncert / unkn behav brain, infratentorial	Uncertain behavior
103840	B925z00	Neoplasm of uncertain behaviour of brain or spinal cord NOS	Uncertain behavior
51915	B926.00	Neoplasm of uncertain behaviour of meninges	Uncertain behavior
94466	B926000	Neoplasm of uncertain behaviour of cerebral meninges	Uncertain behavior
16854	B927.00	Neurofibromatosis - Von Recklinghausen's disease	Uncertain behavior
12067	B927.11	Von Recklinghausen's disease	Uncertain behavior
100900	B927.12	Neurofibromatosis type 1	Uncertain behavior
16600	B928.00	Neopl uncert/unkn behav of periph nerves & autonom nerv sys	Uncertain behavior
101052	B929.00	Neurofibromatosis type 2	Uncertain behavior
91215	B92z.00	Neoplasm of uncertain behaviour of nervous system OS/NOS	Uncertain behavior
109134	B92z000	Neoplasm of uncertain behaviour of cranial nerves	Uncertain behavior
109052	B92zz00	Neoplasm of uncertain behaviour of nervous system NOS	Uncertain behavior
86340	B93..00	Neop uncertain behaviour other and unspec sites and tissues	Uncertain behavior
109359	B930.00	Neop of uncertain behaviour of bone and articular cartilage	Uncertain behavior
50333	B930000	Neoplasm of uncertain behaviour of bone	Uncertain behavior
62802	B930z00	Neop uncertain behaviour of bone or articular cartilage NOS	Uncertain behavior
62801	B931.00	Neop of uncertain behaviour connective and other soft tissue	Uncertain behavior
28980	B932.00	Neoplasm of uncertain behaviour of skin	Uncertain behavior
41232	B933.00	Neoplasm of uncertain behaviour of breast	Uncertain behavior
46423	B933.11	Cystosarcoma phyllodes	Uncertain behavior
2481	B934.00	Polycythaemia vera	Uncertain behavior
5542	B934.11	Polycythaemia rubra vera	Uncertain behavior
36790	B934.12	Primary polycythaemia	Uncertain behavior
45414	B935.00	Neoplasm of uncertain behaviour of histiocytic and mast cell	Uncertain behavior
29789	B935.11	Histiocytic tumour NOS	Uncertain behavior
4661	B935.12	Mastocytoma NOS	Uncertain behavior
59663	B936.00	Neoplasm of uncertain behaviour of plasma cells	Uncertain behavior
43312	B936.11	Myeloma - solitary	Uncertain behavior

38321	B936.12	Plasmacytoma NOS	Uncertain behavior
20609	B937.00	Neop uncertain behaviour other lymphatic/haematopoietic tiss	Uncertain behavior
72551	B937.11	Neoplasm of uncertain behaviour of blood	Uncertain behavior
31560	B937.12	Idiopathic thrombocythaemia	Uncertain behavior
14927	B937.14	Myelodysplasia	Uncertain behavior
22890	B937000	Refractory anaemia without sideroblasts, so stated	Uncertain behavior
10817	B937100	Refractory anaemia with sideroblasts	Uncertain behavior
23875	B937200	Refractory anaemia with excess of blasts	Uncertain behavior
44420	B937300	Refractory anaemia with excess of blasts with transformation	Uncertain behavior
11950	B937400	Essential (haemorrhagic) thrombocythaemia	Uncertain behavior
12265	B937411	Primary thrombocythaemia	Uncertain behavior
17386	B937500	Idiopathic thrombocythaemia	Uncertain behavior
105985	B937600	Refractory anaemia without ring sideroblasts	Uncertain behavior
106993	B937700	Refractory anaemia with ring sideroblasts	Uncertain behavior
104740	B937800	Refractory anaemia with multilineage dysplasia	Uncertain behavior
105915	B937900	5Q minus syndrome	Uncertain behavior
105390	B937911	Myelodysplastic syndrome isolated del(5q) chromosomal abnorm	Uncertain behavior
45285	B937W00	Myelodysplastic syndrome, unspecified	Uncertain behavior
4561	B937W11	Myelodysplasia	Uncertain behavior
19130	B937X00	Refractory anaemia, unspecified	Uncertain behavior
50569	B93X.00	Neo/uncertn+unknwn behav/lymph,h'matopetc+rel tiss,unspcf	Uncertain behavior
101664	B93y.00	Neoplasm of uncertain behaviour of other specified sites	Uncertain behavior
52553	B93y000	Neoplasm of uncertain behaviour of eye	Uncertain behavior
69212	B93y100	Neoplasm of uncertain behaviour of heart	Uncertain behavior
71075	B93yz00	Neop of uncertain behaviour of other specified sites NOS	Uncertain behavior
50280	B93z.00	Neop uncertain behaviour other unspec site and tissue NOS	Uncertain behavior
100304	B9y..00	Neoplasm of uncertain behaviour otherwise specified	Uncertain behavior
65022	B9z..00	Neoplasm of uncertain behaviour NOS	Uncertain behavior
26630	BA...00	Unspecified nature neoplasm	Uncertain behavior
14825	BA0..00	Neoplasm of unspecified nature	Uncertain behavior
43968	BA00.00	Neoplasm of unspecified nature of digestive system	Uncertain behavior
61579	BA01.00	Neoplasm of unspecified nature of respiratory system	Uncertain behavior
73086	BA02.00	Neoplasm of unspecified nature of bone, skin and soft tissue	Uncertain behavior
48282	BA02000	Neoplasm of unspecified nature of bone	Uncertain behavior
108844	BA02100	Neoplasm of unspecified nature of soft tissue	Uncertain behavior
20539	BA02200	Neoplasm of unspecified nature of skin	Uncertain behavior

85089	BA02z00	Neoplasm of unspec nature of bone, skin or soft tissue NOS	Uncertain behavior
45906	BA03.00	Neoplasm of unspecified nature of breast	Uncertain behavior
16926	BA04.00	Neoplasm of unspecified nature of bladder	Uncertain behavior
65485	BA05.00	Neoplasm of unspecified nature of other genitourinary organs	Uncertain behavior
1044	BA06.00	Neoplasm of unspecified nature of brain	Uncertain behavior
60141	BA07.00	Neop unspec nature of endocrine glands, other nervous system	Uncertain behavior
60181	BA0y.00	Neoplasm of unspecified nature of other specified sites	Uncertain behavior
41576	BA0z.00	Neoplasm of unspecified nature NOS	Uncertain behavior
34228	BAz..00	Neoplasm of unspecified nature NOS	Uncertain behavior
15543	BB01.00	[M]Neoplasm, uncertain whether benign or malignant	Uncertain behavior
7967	BB2..12	[M]Squamous cell neoplasms	Uncertain behavior
222	BB20.00	[M]Papilloma NOS (excluding papilloma of urinary bladder)	Uncertain behavior
155	BB25.00	[M]Squamous cell papilloma	Uncertain behavior
7386	BB25.12	[M]Hyperkeratotic papilloma	Uncertain behavior
8196	BB28.00	[M]Papillomatosis NOS	Uncertain behavior
3516	BB3..00	[M]Basal cell neoplasms	Uncertain behavior
1950	BB4..00	[M]Transitional cell papillomas and carcinomas	Uncertain behavior
1904	BB41.11	[M]Urinary bladder papilloma	Uncertain behavior
35467	BB5az00	[M]Renal adenoma or carcinoma NOS	Uncertain behavior
20234	BB5D511	[M]Hepatoma NOS	Uncertain behavior
40883	BB5h.00	[M]Adrenal cortical tumours	Uncertain behavior
28388	BB5jz00	[M]Endometrioid adenoma or carcinoma NOS	Uncertain behavior
18114	BB5L000	[M]Adenomatous polyp NOS	Uncertain behavior
452	BB5L011	[M]Polypoid adenoma	Uncertain behavior
10689	BB5M000	[M]Tubular adenoma NOS	Uncertain behavior
2721	BB5N211	[M]Multiple polyposis	Uncertain behavior
3923	BB5R.00	[M]Carcinoid tumours	Uncertain behavior
38444	BB5R000	[M]Carcinoid tumour NOS	Uncertain behavior
41260	BB5S100	[M]Bronchial adenoma NOS	Uncertain behavior
3935	BB5U000	[M]Villous adenoma NOS	Uncertain behavior
10624	BB5U300	[M]Tubulovillous adenoma	Uncertain behavior
57422	BB5Vz00	[M]Pituitary adenoma or carcinoma NOS	Uncertain behavior
29361	BB69000	[M]Sebaceous adenoma	Uncertain behavior
18633	BB80000	[M]Cystadenoma NOS	Uncertain behavior
17151	BB81.11	[M]Ovarian cystadenoma or carcinoma	Uncertain behavior
18638	BB81.12	[M]Ovarian mucinous tumour	Uncertain behavior
40033	BB81z00	[M]Ovarian cystic, mucinous or serous neoplasm NOS	Uncertain behavior
18029	BB9..00	[M]Ductal, lobular and medullary neoplasms	Uncertain behavior
18417	BB95.00	[M]Intraductal papilloma	Uncertain behavior
52963	BBC3000	[M]Juvenile granulosa cell tumour	Uncertain behavior
12096	BBd0.00	[M]Meningioma NOS	Uncertain behavior
10913	BBD0.00	[M]Paraganglioma NOS	Uncertain behavior

33734	BBEz.00	[M]Naevi or melanoma NOS	Uncertain behavior
15323	BBGD.00	[M]Fibrous histiocytoma NOS	Uncertain behavior
41839	BBGG.00	[M]Fibroxanthoma NOS	Uncertain behavior
18699	BBGK.00	[M]Dermatofibroma NOS	Uncertain behavior
3348	BBGK.12	[M]Histiocytoma NOS	Uncertain behavior
37081	BBK3800	[M]Smooth muscle tumour NOS	Uncertain behavior
109663	BC...00	Polyp	Uncertain behavior
45700	By...00	Neoplasms otherwise specified	Uncertain behavior
60053	Byu..00	[X]Additional neoplasm classification terms	Uncertain behavior
60270	ByuH.00	[X]Neoplasms of uncertain and unknown behaviour	Uncertain behavior
96489	ByuH000	[X]Neoplasm/uncertain+unknown behaviour/oth digestive organs	Uncertain behavior
108882	ByuH900	[X]Neoplasm/uncertain+unknown behavior/other specified sites	Uncertain behavior
45143	ByuHD00	[X]Myelodysplastic syndrome, unspecified	Uncertain behavior
35904	Bz...00	Neoplasms NOS	Uncertain behavior

Appendix B: Malignant Tumor Codes

Malignant tumor Read codes identified in the study population from CPRD, categorized by type/site

Med code	Read code	Read term	Site/Type
12539	B3...12	Sarcoma of bone and connective tissue	Bone and connective tissue
32372	B302100	Malignant neoplasm of thoracic vertebra	Bone and connective tissue
56513	B307000	Malignant neoplasm of femur	Bone and connective tissue
16075	B30z.00	Malignant neoplasm of bone and articular cartilage NOS	Bone and connective tissue
34451	B31..00	Malignant neoplasm of connective and other soft tissue	Bone and connective tissue
43475	B310.00	Malig neop of connective and soft tissue head, face and neck	Bone and connective tissue
30542	B312300	Malig neop of connective and soft tissue of lower leg	Bone and connective tissue
45071	B314.00	Malignant neoplasm of connective and soft tissue of abdomen	Bone and connective tissue
15182	B31z.00	Malignant neoplasm of connective and soft tissue, site NOS	Bone and connective tissue
21758	BBa5.00	[M]Chordoma	Bone and connective tissue
3968	B34..00	Malignant neoplasm of female breast	Breast
348	B34..11	Ca female breast	Breast
23399	B344.00	Malignant neoplasm of upper-outer quadrant of female breast	Breast
9470	B34z.00	Malignant neoplasm of female breast NOS	Breast
12499	Byu6.00	[X]Malignant neoplasm of breast	Breast
24370	B142.00	Malignant neoplasm of anal canal	Digestive
27897	B143.00	Malignant neoplasm of anus unspecified	Digestive
1220	B13..00	Malignant neoplasm of colon	Digestive
10864	B132.00	Malignant neoplasm of descending colon	Digestive
2815	B133.00	Malignant neoplasm of sigmoid colon	Digestive
3811	B134.00	Malignant neoplasm of caecum	Digestive
22163	B134.11	Carcinoma of caecum	Digestive
10946	B136.00	Malignant neoplasm of ascending colon	Digestive
28163	B13z.00	Malignant neoplasm of colon NOS	Digestive
9118	B13z.11	Colonic cancer	Digestive
1062	B10..00	Malignant neoplasm of oesophagus	Digestive
61695	B100.00	Malignant neoplasm of cervical oesophagus	Digestive
42416	B105.00	Malignant neoplasm of lower third of oesophagus	Digestive
30700	B10z.00	Malignant neoplasm of oesophagus NOS	Digestive
4865	B10z.11	Oesophageal cancer	Digestive

16105	B160.00	Malignant neoplasm of gallbladder	Digestive
7982	B161200	Malignant neoplasm of common bile duct	Digestive
36495	B161211	Carcinoma common bile duct	Digestive
74896	B161z00	Malignant neoplasm of extrahepatic bile ducts NOS	Digestive
10949	B162.00	Malignant neoplasm of ampulla of Vater	Digestive
35039	B163.00	Malignant neoplasm, overlapping lesion of biliary tract	Digestive
60312	B16y.00	Malignant neoplasm other gallbladder/extrahepatic bile duct	Digestive
15907	B16z.00	Malignant neoplasm gallbladder/extrahepatic bile ducts NOS	Digestive
40438	BB5D111	[M]Bile duct carcinoma	Digestive
22187	B150300	Hepatocellular carcinoma	Digestive
16915	B151.00	Malignant neoplasm of intrahepatic bile ducts	Digestive
8711	BB5D100	[M]Cholangiocarcinoma	Digestive
40240	BB5D500	[M]Hepatocellular carcinoma NOS	Digestive
90290	B18y700	Malignant neoplasm of mesentery	Digestive
15709	B1...00	Malignant neoplasm of digestive organs and peritoneum	Digestive
3357	B1...11	Carcinoma of digestive organs and peritoneum	Digestive
11009	B1z..00	Malig neop oth/ill-defined sites digestive tract/peritoneum	Digestive
11628	B1z0.11	Cancer of bowel	Digestive
28272	BB57.00	[M]Adenocarcinoma, intestinal type	Digestive
8166	B17..00	Malignant neoplasm of pancreas	Digestive
8771	B170.00	Malignant neoplasm of head of pancreas	Digestive
40810	B171.00	Malignant neoplasm of body of pancreas	Digestive
39870	B172.00	Malignant neoplasm of tail of pancreas	Digestive
34388	B17z.00	Malignant neoplasm of pancreas NOS	Digestive
8032	BB5B.00	[M]Pancreatic adenomas and carcinomas	Digestive
27855	B140.00	Malignant neoplasm of rectosigmoid junction	Digestive
1800	B141.00	Malignant neoplasm of rectum	Digestive
7219	B141.11	Carcinoma of rectum	Digestive
5901	B141.12	Rectal carcinoma	Digestive
35357	B14..00	Malignant neoplasm of rectum, rectosigmoid junction and anus	Digestive
18613	B120.00	Malignant neoplasm of duodenum	Digestive
8386	B11..00	Malignant neoplasm of stomach	Digestive
14800	B11z.00	Malignant neoplasm of stomach NOS	Digestive
27440	BB55.00	[M]Linitis plastica	Digestive
4218	B541.00	Malignant neoplasm of parathyroid gland	Endocrine
4217	BB5c.00	[M]Parathyroid adenomas and adenocarcinomas	Endocrine
8550	B542000	Malignant neoplasm of pituitary gland	Endocrine

5637	B53..00	Malignant neoplasm of thyroid gland	Endocrine
18617	B51..00	Malignant neoplasm of brain	Eye, brain & NS
10851	B51..11	Cerebral tumour - malignant	Eye, brain & NS
61399	B510100	Malignant neoplasm of cerebral cortex	Eye, brain & NS
42426	B511.00	Malignant neoplasm of frontal lobe	Eye, brain & NS
45154	B516.00	Malignant neoplasm of cerebellum	Eye, brain & NS
9622	B525.00	Malignant neoplasm of cauda equina	Eye, brain & NS
12309	BBb..00	[M]Gliomas	Eye, brain & NS
8523	BBb0.11	[M]Glioma NOS	Eye, brain & NS
20084	BBb7.00	[M]Ependymoma NOS	Eye, brain & NS
43114	BBbA.00	[M]Myxopapillary ependymoma	Eye, brain & NS
8547	BBbB.00	[M]Astrocytoma NOS	Eye, brain & NS
30273	BBbG.00	[M]Pilocytic astrocytoma	Eye, brain & NS
23083	BBbL.00	[M]Glioblastoma NOS	Eye, brain & NS
9575	BBbL.11	[M]Glioblastoma multiforme	Eye, brain & NS
27744	BBbQ.00	[M]Oligodendroglioma NOS	Eye, brain & NS
20160	B50..00	Malignant neoplasm of eye	Eye, brain & NS
28836	BBc9.00	[M]Retinoblastomas	Eye, brain & NS
3230	B41..11	Cervical carcinoma (uterus)	Female genital
28311	B41z.00	Malignant neoplasm of cervix uteri NOS	Female genital
4555	B45..00	Malig neop of other and unspecified female genital organs	Female genital
7805	B440.00	Malignant neoplasm of ovary	Female genital
1986	B440.11	Cancer of ovary	Female genital
2744	B40..00	Malignant neoplasm of uterus, part unspecified	Female genital
2747	B41..00	Malignant neoplasm of cervix uteri	Female genital
7046	B43..00	Malignant neoplasm of body of uterus	Female genital
2890	B430200	Malignant neoplasm of endometrium of corpus uteri	Female genital
16967	B432.00	Malignant neoplasm of overlapping lesion of corpus uteri	Female genital
33617	B43z.00	Malignant neoplasm of body of uterus NOS	Female genital
8606	BB5j.00	[M]Endometrioid adenomas and carcinomas	Female genital
60772	B450z00	Malignant neoplasm of vagina NOS	Female genital
4554	B454.00	Malignant neoplasm of vulva unspecified	Female genital
9984	B00..11	Carcinoma of lip	Lip, oral cavity and pharynx
36716	B04z.00	Malignant neoplasm of floor of mouth NOS	Lip, oral cavity and pharynx
49758	B0zy.00	Malignant neoplasm of other sites lip, oral cavity, pharynx	Lip, oral cavity and pharynx
39430	B0zz.00	Malignant neoplasm of lip, oral cavity and pharynx NOS	Lip, oral cavity and pharynx
22893	B06..00	Malignant neoplasm of oropharynx	Lip, oral cavity and pharynx

16297	B0z0.00	Malignant neoplasm of pharynx unspecified	Lip, oral cavity and pharynx
4388	B020.00	Malignant neoplasm of parotid gland	Lip, oral cavity and pharynx
51786	B021.00	Malignant neoplasm of submandibular gland	Lip, oral cavity and pharynx
10283	B01..00	Malignant neoplasm of tongue	Lip, oral cavity and pharynx
16241	B060.00	Malignant neoplasm of tonsil	Lip, oral cavity and pharynx
53884	B060z00	Malignant neoplasm tonsil NOS	Lip, oral cavity and pharynx
2462	B61..00	Hodgkin's disease	Lymphatic & hemopoietic
29178	B614.00	Hodgkin's disease, nodular sclerosis	Lymphatic & hemopoietic
20710	BBj..00	[M]Hodgkin's disease	Lymphatic & hemopoietic
19372	B64..00	Lymphoid leukaemia	Lymphatic & hemopoietic
4251	B640.00	Acute lymphoid leukaemia	Lymphatic & hemopoietic
8625	B641.00	Chronic lymphoid leukaemia	Lymphatic & hemopoietic
27790	B641.11	Chronic lymphatic leukaemia	Lymphatic & hemopoietic
7176	B65..00	Myeloid leukaemia	Lymphatic & hemopoietic
4413	B650.00	Acute myeloid leukaemia	Lymphatic & hemopoietic
10726	B651.00	Chronic myeloid leukaemia	Lymphatic & hemopoietic
70724	B653.00	Myeloid sarcoma	Lymphatic & hemopoietic
25191	B68..00	Leukaemia of unspecified cell type	Lymphatic & hemopoietic
4250	B68z.00	Leukaemia NOS	Lymphatic & hemopoietic
20440	B69..00	Myelomonocytic leukaemia	Lymphatic & hemopoietic
4637	BBr..00	[M]Leukaemias	Lymphatic & hemopoietic
6316	BBr0100	[M]Acute leukaemia NOS	Lymphatic & hemopoietic
48155	BBr2.00	[M]Lymphoid leukaemias	Lymphatic & hemopoietic
46263	BBr6700	[M]Acute myelomonocytic leukaemia	Lymphatic & hemopoietic
14927	B937.14	Myelodysplasia	Lymphatic & hemopoietic
4561	B937W11	Myelodysplasia	Lymphatic & hemopoietic
7799	BBv..00	[M]Myelodysplastic syndrome	Lymphatic & hemopoietic
6115	B6y0.00	Myeloproliferative disorder	Lymphatic & hemopoietic

4944	B630.00	Multiple myeloma	Lymphatic & hemopoietic
18744	BBn0.11	[M]Multiple myeloma	Lymphatic & hemopoietic
3672	BBn0.12	[M]Myeloma NOS	Lymphatic & hemopoietic
21402	B602.00	Burkitt's lymphoma	Lymphatic & hemopoietic
97577	B602300	Burkitt's lymphoma of intra-abdominal lymph nodes	Lymphatic & hemopoietic
3604	B627.00	Non - Hodgkin's lymphoma	Lymphatic & hemopoietic
17182	B627C11	Follicular lymphoma NOS	Lymphatic & hemopoietic
104152	B628.00	Follicular lymphoma	Lymphatic & hemopoietic
104862	B62E300	Cutaneous T-cell lymphoma	Lymphatic & hemopoietic
23711	BBg1000	[M]Malignant lymphoma, diffuse NOS	Lymphatic & hemopoietic
16460	BBg2.00	[M]Malignant lymphoma, non Hodgkin's type	Lymphatic & hemopoietic
3371	BBg2.11	[M]Non Hodgkins lymphoma	Lymphatic & hemopoietic
21463	BBgC.11	[M]Lymphocytic lymphoma NOS	Lymphatic & hemopoietic
40766	BBm5.00	[M] Peripheral T-cell lymphoma NOS	Lymphatic & hemopoietic
31492	BBm9.00	[M] Monocytoid B-cell lymphoma	Lymphatic & hemopoietic
16774	BBmD.00	[M] Cutaneous lymphoma	Lymphatic & hemopoietic
9172	BBmK.00	[M]Waldenstrom's macroglobulinaemia	Lymphatic & hemopoietic
8649	ByuDF00	[X]Non-Hodgkin's lymphoma, unspecified type	Lymphatic & hemopoietic
7940	ByuDF11	[X]Non-Hodgkin's lymphoma NOS	Lymphatic & hemopoietic
12323	B6...00	Malignant neoplasm of lymphatic and haemopoietic tissue	Lymphatic & hemopoietic
105083	B62D.00	Histiocytic sarcoma	Lymphatic & hemopoietic
21329	B630200	Plasmacytoma NOS	Lymphatic & hemopoietic
9673	BBs5.00	[M]Chronic lymphoproliferative disease	Lymphatic & hemopoietic
17887	B62x.00	Malignant lymphoma otherwise specified	Lymphatic & hemopoietic
12335	B62y.00	Malignant lymphoma NOS	Lymphatic & hemopoietic
15027	B62yz00	Malignant lymphoma NOS	Lymphatic & hemopoietic
1483	BBg1.11	[M]Lymphoma NOS	Lymphatic & hemopoietic
780	B46..00	Malignant neoplasm of prostate	Male genital

15148	B47..00	Malignant neoplasm of testis	Male genital
36325	B470300	Teratoma of undescended testis	Male genital
21786	B471000	Seminoma of descended testis	Male genital
38510	B47z.00	Malignant neoplasm of testis NOS	Male genital
2961	B47z.11	Seminoma of testis	Male genital
15989	B47z.12	Teratoma of testis	Male genital
7476	BBQ1.00	[M]Seminomas	Male genital
12870	B221.00	Malignant neoplasm of main bronchus	Respiratory
17391	B221000	Malignant neoplasm of carina of bronchus	Respiratory
21698	B221z00	Malignant neoplasm of main bronchus NOS	Respiratory
25886	B222100	Malignant neoplasm of upper lobe of lung	Respiratory
39923	B223100	Malignant neoplasm of middle lobe of lung	Respiratory
18678	B224000	Malignant neoplasm of lower lobe bronchus	Respiratory
12582	B224100	Malignant neoplasm of lower lobe of lung	Respiratory
2587	B22z.11	Lung cancer	Respiratory
34015	BB5S200	[M]Bronchiolo-alveolar adenocarcinoma	Respiratory
16723	BB5S212	[M]Bronchiolar carcinoma	Respiratory
319	B21..00	Malignant neoplasm of larynx	Respiratory
9237	B21z.00	Malignant neoplasm of larynx NOS	Respiratory
7484	B226.00	Mesothelioma	Respiratory
16474	BBP..00	[M]Mesothelial neoplasms	Respiratory
21715	Byu5011	[X]Mesothelioma of lung	Respiratory
34075	B2...00	Malig neop of respiratory tract and intrathoracic organs	Respiratory
71946	B201300	Malignant neoplasm of mastoid air cells	Respiratory
13243	B22..00	Malignant neoplasm of trachea, bronchus and lung	Respiratory
10358	B222.00	Malignant neoplasm of upper lobe, bronchus or lung	Respiratory
44169	B222z00	Malignant neoplasm of upper lobe, bronchus or lung NOS	Respiratory
31188	B224.00	Malignant neoplasm of lower lobe, bronchus or lung	Respiratory
3903	B22z.00	Malignant neoplasm of bronchus or lung NOS	Respiratory
31573	B23..00	Malignant neoplasm of pleura	Respiratory
9600	B232.00	Mesothelioma of pleura	Respiratory
41816	BB2E.00	[M]Squamous cell carcinoma, small cell, non-keratinising	Respiratory
865	B32..00	Malignant melanoma of skin	Skin
38689	B325.00	Malignant melanoma of trunk (excluding scrotum)	Skin
43463	B325700	Malignant melanoma of back	Skin
54685	B326100	Malignant melanoma of upper arm	Skin
46255	B327.00	Malignant melanoma of lower limb and hip	Skin

28556	B32z.00	Malignant melanoma of skin NOS	Skin
7693	BBE..00	[M]Naevi and melanomas	Skin
579	BBE1.00	[M]Malignant melanoma NOS	Skin
7483	BBE1.12	[M]Melanoma NOS	Skin
11922	BBEG.11	[M]Lentigo maligna melanoma	Skin
19444	Byu4100	[X]Malignant melanoma of skin, unspecified	Skin
105296	BBTD200	[M]Haemangiopericytoma, malignant	Soft
8085	BBF1.00	[M]Sarcoma NOS	Soft
31026	BBF3.00	[M]Spindle cell sarcoma	Soft
56676	BBJ5.00	[M]Myxoid liposarcoma	Soft
7856	BBJH.00	[M]Dedifferentiated liposarcoma	Soft
10588	BBK0200	[M]Leiomyosarcoma NOS	Soft
55268	BBK2100	[M]Myosarcoma	Soft
22650	BBT1.11	[M]Angiosarcoma	Soft
4118	BBV9.00	[M]Myxoid chondrosarcoma	Soft
19091	BB5..00	[M]Adenomas and adenocarcinomas	Unknown
2272	BB5..11	[M]Adenocarcinomas	Unknown
8930	BB52.00	[M]Adenocarcinoma NOS	Unknown
16902	BB5y000	[M]Basal cell adenocarcinoma	Unknown
36882	BB5X.00	[M]Clear cell adenomas and adenocarcinomas	Unknown
21833	BB91.11	[M]Duct carcinoma NOS	Unknown
7319	BB9G.00	[M]Infiltrating ductular carcinoma	Unknown
4473	BBY0.00	[M]Ewing's sarcoma	Unknown
21847	BB5f111	[M]Follicular carcinoma	Unknown
29008	BB5W111	[M]Hurthle cell adenocarcinoma	Unknown
34110	BB5R100	[M]Carcinoid tumour, malignant	Unknown
5052	BBV1.13	[M]Osteogenic sarcoma NOS	Unknown
35348	BB5T100	[M]Papillary adenocarcinoma NOS	Unknown
20807	BB26.00	[M]Papillary squamous cell carcinoma	Unknown
1624	BB2A.00	[M]Squamous cell carcinoma NOS	Unknown
28291	BB69.00	[M]Sebaceous adenoma and adenocarcinoma	Unknown
22156	BB08.00	[M]Malignant tumour, small cell type	Unknown
9291	BB1J.00	[M]Small cell carcinoma NOS	Unknown
21217	BB1N.00	[M]Small cell-large cell carcinoma	Unknown
6436	BB43.00	[M]Transitional cell carcinoma NOS	Unknown
6746	BB5M.00	[M]Tubular adenomas and adenocarcinomas	Unknown
2755	B....11	Cancers	Unknown
10995	B5...00	Malignant neoplasm of other and unspecified sites	Unknown
8693	B5...11	Carcinoma of other and unspecified sites	Unknown
9030	B55..00	Malignant neoplasm of other and ill-defined sites	Unknown

42218	B55y.00	Malignant neoplasm of other specified sites	Unknown
45267	B55z.00	Malignant neoplasm of other and ill defined site NOS	Unknown
1056	B5z..00	Malignant neoplasm of other and unspecified site NOS	Unknown
21868	BB02.00	[M]Neoplasm, malignant	Unknown
8695	BB12.00	[M]Carcinoma NOS	Unknown
52029	ByuC800	[X]Malignant neoplasm without specification of site	Unknown
4852	BB24.12	[M]Verrucous squamous cell carcinoma	Unknown
18608	B3...00	Malig neop of bone, connective tissue, skin and breast	Unspecified
9902	B3...11	Carcinoma of bone, connective tissue, skin and breast	Unspecified
13252	B4...00	Malignant neoplasm of genitourinary organ	Unspecified
16874	B4...11	Carcinoma of genitourinary organ	Unspecified
68236	B550.00	Malignant neoplasm of head, neck and face	Unspecified
97547	B551200	Malignant neoplasm of intrathoracic site NOS	Unspecified
55101	B553z00	Malignant neoplasm of pelvis NOS	Unspecified
6751	BBC3.00	[M]Granulosa cell tumour NOS	Unspecified
779	B49..00	Malignant neoplasm of urinary bladder	Urinary
31102	B49z.00	Malignant neoplasm of urinary bladder NOS	Urinary
18712	B4A..11	Renal malignant neoplasm	Urinary
1599	B4A0.00	Malignant neoplasm of kidney parenchyma	Urinary
7978	B4A0000	Hypernephroma	Urinary
12389	B4A1.00	Malignant neoplasm of renal pelvis	Urinary
8101	BB5a.00	[M]Renal adenoma and carcinoma	Urinary
10668	BB5a000	[M]Renal cell carcinoma	Urinary
21681	BBL7100	[M]Nephroblastoma NOS	Urinary
17314	BBL7112	[M]Wilms' tumour	Urinary
13559	B4A..00	Malig neop of kidney and other unspecified urinary organs	Urinary
29462	B4Az.00	Malignant neoplasm of kidney or urinary organs NOS	Urinary
17064	142..00	H/O: malignant neoplasm (*)	History
7628	142..11	H/O: cancer	History
7900	142..12	H/O: carcinoma	History
18866	142..13	H/O: malignancy	History
7761	1425000	H/O Malignant melanoma	History
6090	1424	H/O: * breast	History
6674	1428.11	H/O: * bladder	History
8503	142B.00	H/O: * ears, nose, throat	History
8751	1428.12	H/O: * kidney	History
11768	1423.11	H/O: * lung	History
36821	1423.12	H/O: * trachea	History

102314	1427000	H/O: prostate cancer	History
12106	ZV10.00	[V]Personal history of malignant neoplasm	History
62785	ZV10017	[V]Personal history of malignant neoplasm of rectum	History
3197	BB03.00	[M]Neoplasm, metastatic	Secondary
3152	BB13.00	[M]Carcinoma, metastatic, NOS	Secondary
16692	BB14.00	[M]Carcinomatosis	Secondary
24293	BB2B.00	[M]Squamous cell carcinoma, metastatic NOS	Secondary
5455	BB53.00	[M]Adenocarcinoma, metastatic, NOS	Secondary
7593	H51y700	Malignant pleural effusion	Secondary
105488	B36..00	Local recurrence of malignant tumour of breast	Secondary
9618	B56..00	Secondary and unspecified malignant neoplasm of lymph nodes	Secondary
7830	B56..11	Lymph node metastases	Secondary
6471	B57..11	Metastases of respiratory and/or digestive systems	Secondary
4137	B570.00	Secondary malignant neoplasm of lung	Secondary
16213	B572.00	Secondary malignant neoplasm of pleura	Secondary
15103	B577.00	Secondary malignant neoplasm of liver	Secondary
4403	B577.11	Liver metastases	Secondary
5842	B58..00	Secondary malignant neoplasm of other specified sites	Secondary
19945	B582.00	Secondary malignant neoplasm of skin	Secondary
33843	B583.00	Secondary malignant neoplasm of brain and spinal cord	Secondary
5198	B583000	Secondary malignant neoplasm of brain	Secondary
5199	B583200	Cerebral metastasis	Secondary
7654	B585.00	Secondary malignant neoplasm of bone and bone marrow	Secondary
18676	B585000	Pathological fracture due to metastatic bone disease	Secondary
36401	B587.00	Secondary malignant neoplasm of adrenal gland	Secondary
18616	B58y.00	Secondary malignant neoplasm of other specified sites	Secondary
22524	B58yz00	Secondary malignant neoplasm of other specified site NOS	Secondary
16500	B58z.00	Secondary malignant neoplasm of other specified site NOS	Secondary
13569	B590.00	Disseminated malignancy NOS	Secondary
6170	B590.11	Carcinomatosis	Secondary
10335	1O0..00	Cancer confirmed	Unknown
26081	4M02.00	Gleason prostate grade 8-10 (high)	Unknown
40113	677H.00	Cancer information offered	Unknown
47018	677K.00	Cancer home care pack given	Unknown
783	8BAD.00	Chemotherapy	Unknown
5019	8BAD000	Cancer chemotherapy	Unknown

10652	8BAV.00	Cancer care review	Unknown
19310	8BC3.00	Cancer care plan given	Unknown
32411	8BC6.00	Cancer treatment started	Unknown
10292	8CL0.00	Cancer diagnosis discussed	Unknown
9965	8CM0.00	Cancer care plan	Unknown
10334	8CP0.00	Cancer care plan discussed with patient	Unknown
54313	8O83.00	Cancer emotional and psychosocial support and advice	Unknown
102339	9EV3.00	Cancer multidisciplinary team report	Unknown
10332	9NX0.00	Cancer primary healthcare multidisciplinary team	Unknown
19326	9Ok..00	Cancer monitoring administration	Unknown

Malignant tumor ICD-10 codes identified in the study population from HES, categorized by type/site

ICD code	ICD code description	Tumor site
C00.1	Malignant neoplasm of external lower lip	Lip, oral cavity and pharynx
C00.9	Malignant neoplasm of lip, unspecified	Lip, oral cavity and pharynx
C01	Malignant neoplasm of base of tongue	Lip, oral cavity and pharynx
C02.1	Malignant neoplasm of border of tongue	Lip, oral cavity and pharynx
C02.8	Malignant neoplasm of overlapping sites of tongue	Lip, oral cavity and pharynx
C02.9	Malignant neoplasm of tongue, unspecified	Lip, oral cavity and pharynx
C04.9	Malignant neoplasm of floor of mouth, unspecified	Lip, oral cavity and pharynx
C05.1	Malignant neoplasm of soft palate	Lip, oral cavity and pharynx
C05.8	Malignant neoplasm of overlapping sites of palate	Lip, oral cavity and pharynx
C05.9	Malignant neoplasm of palate, unspecified	Lip, oral cavity and pharynx
C07	Malignant neoplasm of parotid gland	Lip, oral cavity and pharynx
C08.0	Malignant neoplasm of submandibular gland	Lip, oral cavity and pharynx
C08.9	Malignant neoplasm of major salivary gland, unspecified	Lip, oral cavity and pharynx
C09.0	Malignant neoplasm of tonsillar fossa	Lip, oral cavity and pharynx
C09.9	Malignant neoplasm of tonsil, unspecified	Lip, oral cavity and pharynx
C10.9	Malignant neoplasm of oropharynx, unspecified	Lip, oral cavity and pharynx
C12	Malignant neoplasm of pyriform sinus	Lip, oral cavity and pharynx
C13.9	Malignant neoplasm of hypopharynx, unspecified	Lip, oral cavity and pharynx
C14.0	Malignant neoplasm of pharynx, unspecified	Lip, oral cavity and pharynx
C15.4	Malignant neoplasm of middle third of esophagus	Digestive
C15.5	Malignant neoplasm of lower third of esophagus	Digestive
C15.8	Malignant neoplasm of overlapping sites of esophagus	Digestive
C15.9	Malignant neoplasm of esophagus, unspecified	Digestive
C16.0	Malignant neoplasm of cardia	Digestive
C16.1	Malignant neoplasm of fundus of stomach	Digestive
C16.2	Malignant neoplasm of body of stomach	Digestive

C16.3	Malignant neoplasm of pyloric antrum	Digestive
C16.4	Malignant neoplasm of pylorus	Digestive
C16.5	Malignant neoplasm of lesser curvature of stomach, unsp	Digestive
C16.9	Malignant neoplasm of stomach, unspecified	Digestive
C17.0	Malignant neoplasm of duodenum	Digestive
C17.2	Malignant neoplasm of ileum	Digestive
C18.0	Malignant neoplasm of cecum	Digestive
C18.1	Malignant neoplasm of appendix	Digestive
C18.2	Malignant neoplasm of ascending colon	Digestive
C18.3	Malignant neoplasm of hepatic flexure	Digestive
C18.4	Malignant neoplasm of transverse colon	Digestive
C18.6	Malignant neoplasm of descending colon	Digestive
C18.7	Malignant neoplasm of sigmoid colon	Digestive
C18.8	Malignant neoplasm of overlapping sites of colon	Digestive
C18.9	Malignant neoplasm of colon, unspecified	Digestive
C19	Malignant neoplasm of rectosigmoid junction	Digestive
C20	Malignant neoplasm of rectum	Digestive
C21.0	Malignant neoplasm of anus, unspecified	Digestive
C21.1	Malignant neoplasm of anal canal	Digestive
C22.0	Liver cell carcinoma	Digestive
C22.1	Intrahepatic bile duct carcinoma	Digestive
C22.9	Malig neoplasm of liver, not specified as primary or sec	Digestive
C23	Malignant neoplasm of gallbladder	Digestive
C24.1	Malignant neoplasm of ampulla of Vater	Digestive
C24.9	Malignant neoplasm of biliary tract, unspecified	Digestive
C25.0	Malignant neoplasm of head of pancreas	Digestive
C25.1	Malignant neoplasm of body of pancreas	Digestive
C25.2	Malignant neoplasm of tail of pancreas	Digestive
C25.7	Malignant neoplasm of other parts of pancreas	Digestive
C25.8	Malignant neoplasm of overlapping sites of pancreas	Digestive
C25.9	Malignant neoplasm of pancreas, unspecified	Digestive
C26.0	Malignant neoplasm of intestinal tract, part unspecified	Digestive
C26.9	Malignant neoplasm of ill-defined sites within the dgstv sys	Digestive
C32.0	Malignant neoplasm of glottis	Respiratory
C32.1	Malignant neoplasm of supraglottis	Respiratory
C32.2	Malignant neoplasm of subglottis	Respiratory
C32.8	Malignant neoplasm of overlapping sites of larynx	Respiratory
C32.9	Malignant neoplasm of larynx, unspecified	Respiratory
C34.0	Malignant neoplasm of main bronchus	Respiratory
C34.1	Malignant neoplasm of upper lobe, bronchus or lung	Respiratory
C34.2	Malignant neoplasm of middle lobe, bronchus or lung	Respiratory
C34.3	Malignant neoplasm of lower lobe, bronchus or lung	Respiratory

C34.8	Malignant neoplasm of overlapping sites of bronchus and lung	Respiratory
C34.9	Malignant neoplasm of unspecified part of bronchus or lung	Respiratory
C38.3	Malignant neoplasm of mediastinum, part unspecified	Respiratory
C38.4	Malignant neoplasm of pleura	Respiratory
C40.2	Malignant neoplasm of long bones of lower limb	Bone and connective tissue
C41.2	Malignant neoplasm of vertebral column	Bone and connective tissue
C41.4	Malignant neoplasm of pelvic bones, sacrum and coccyx	Bone and connective tissue
C43.4	Malignant melanoma of scalp and neck	Skin
C43.5	Malignant melanoma of trunk	Skin
C43.6	Malignant melanoma of upper limb, including shoulder	Skin
C43.7	Malignant melanoma of lower limb, including hip	Skin
C43.9	Malignant melanoma of skin, unspecified	Skin
C45.0	Mesothelioma of pleura	Respiratory
C45.7	Mesothelioma of other sites	Soft
C45.9	Mesothelioma, unspecified	Respiratory
C46.9	Kaposi's sarcoma, unspecified	Soft
C47.4	Malignant neoplasm of peripheral nerves of abdomen	Soft
C48.1	Malignant neoplasm of specified parts of peritoneum	Digestive
C49.1	Malignant neoplasm of connective and soft tissue of upper limb, including shoulder	Soft
C49.4	Malignant neoplasm of connective and soft tissue of abdomen	Soft
C49.5	Malignant neoplasm of connective and soft tissue of pelvis	Soft
C49.6	Malignant neoplasm of conn and soft tissue of trunk, unsp	Soft
C50.0	Malignant neoplasm of nipple and areola	Breast
C50.1	Malignant neoplasm of central portion of breast	Breast
C50.2	Malignant neoplasm of upper-inner quadrant of breast	Breast
C50.3	Malignant neoplasm of lower-inner quadrant of breast	Breast
C50.4	Malignant neoplasm of upper-outer quadrant of breast	Breast
C50.5	Malignant neoplasm of lower-outer quadrant of breast	Breast
C50.6	Malignant neoplasm of axillary tail of breast	Breast
C50.8	Malignant neoplasm of overlapping sites of breast	Breast
C50.9	Malignant neoplasm of breast of unspecified site	Breast
C53.0	Malignant neoplasm of endocervix	Female genital
C53.9	Malignant neoplasm of cervix uteri, unspecified	Female genital
C54.1	Malignant neoplasm of endometrium	Female genital
C54.9	Malignant neoplasm of corpus uteri, unspecified	Female genital
C55	Malignant neoplasm of uterus, part unspecified	Female genital
C56	Malignant neoplasm of ovary	Female genital
C57.7	Malignant neoplasm of other specified female genital organs	Female genital
C57.8	Malignant neoplasm of ovrlp sites of female genital organs	Female genital
C61	Malignant neoplasm of prostate	Male genital

C62.9	Malignant neoplasm of testis, unspecified whether descended or undescended	Male genital
C63.2	Malignant neoplasm of scrotum	Male genital
C64	Malignant neoplasm of kidney, except renal pelvis	Urinary
C65	Malignant neoplasm of renal pelvis	Urinary
C66	Malignant neoplasm of ureter	Urinary
C67.0	Malignant neoplasm of trigone of bladder	Urinary
C67.1	Malignant neoplasm of dome of bladder	Urinary
C67.2	Malignant neoplasm of lateral wall of bladder	Urinary
C67.3	Malignant neoplasm of anterior wall of bladder	Urinary
C67.4	Malignant neoplasm of posterior wall of bladder	Urinary
C67.6	Malignant neoplasm of ureteric orifice	Urinary
C67.8	Malignant neoplasm of overlapping sites of bladder	Urinary
C67.9	Malignant neoplasm of bladder, unspecified	Urinary
C68.9	Malignant neoplasm of urinary organ, unspecified	Urinary
C69.3	Malignant neoplasm of choroid	Eye, brain & NS
C69.6	Malignant neoplasm of orbit	Eye, brain & NS
C71.0	Malignant neoplasm of cerebrum, except lobes and ventricles	Eye, brain & NS
C71.1	Malignant neoplasm of frontal lobe	Eye, brain & NS
C71.2	Malignant neoplasm of temporal lobe	Eye, brain & NS
C71.3	Malignant neoplasm of parietal lobe	Eye, brain & NS
C71.4	Malignant neoplasm of occipital lobe	Eye, brain & NS
C71.5	Malignant neoplasm of cerebral ventricle	Eye, brain & NS
C71.7	Malignant neoplasm of brain stem	Eye, brain & NS
C71.8	Malignant neoplasm of overlapping sites of brain	Eye, brain & NS
C71.9	Malignant neoplasm of brain, unspecified	Eye, brain & NS
C72.0	Malignant neoplasm of spinal cord	Eye, brain & NS
C73	Malignant neoplasm of thyroid gland	Endocrine
C76.0	Malignant neoplasm of head, face and neck	Unspecified
C76.1	Malignant neoplasm of thorax	Unspecified
C76.2	Malignant neoplasm of abdomen	Unspecified
C76.3	Malignant neoplasm of pelvis	Unspecified
C77.0	Sec and unsp malig neoplasm of nodes of head, face and neck	Secondary
C77.1	Secondary and unsp malignant neoplasm of intrathorac nodes	Secondary
C77.2	Secondary and unsp malignant neoplasm of intra-abd nodes	Secondary
C77.3	Sec and unsp malig neoplasm of axilla and upper limb nodes	Secondary
C77.4	Sec and unsp malig neoplasm of inguinal and lower limb nodes	Secondary
C77.5	Secondary and unsp malignant neoplasm of intrapelv nodes	Secondary
C77.9	Secondary and unsp malignant neoplasm of lymph node, unsp	Secondary

C78.0	Secondary malignant neoplasm of lung	Secondary
C78.1	Secondary malignant neoplasm of mediastinum	Secondary
C78.2	Secondary malignant neoplasm of pleura	Secondary
C78.3	Secondary malignant neoplasm of other and unspecified respiratory organs	Secondary
C78.4	Secondary malignant neoplasm of small intestine	Secondary
C78.5	Secondary malignant neoplasm of large intestine and rectum	Secondary
C78.6	Secondary malignant neoplasm of retroperiton and peritoneum	Secondary
C78.7	Secondary malig neoplasm of liver and intrahepatic bile duct	Secondary
C78.8	Secondary malignant neoplasm of other and unspecified digestive organs	Secondary
C79.0	Secondary malignant neoplasm of kidney and renal pelvis	Secondary
C79.1	Secondary malignant neoplasm of bladder and other and unspecified urinary organs	Secondary
C79.2	Secondary malignant neoplasm of skin	Secondary
C79.3	Secondary malignant neoplasm of brain and cerebral meninges	Secondary
C79.4	Secondary malignant neoplasm of other and unspecified parts of nervous system	Secondary
C79.5	Secondary malignant neoplasm of bone and bone marrow	Secondary
C79.6	Secondary malignant neoplasm of ovary	Secondary
C79.7	Secondary malignant neoplasm of adrenal gland	Secondary
C79.8	Secondary malignant neoplasm of other specified sites	Secondary
C79.9	Secondary malignant neoplasm of unspecified site	Secondary
C80	Malignant neoplasm without specification of site	Unknown
C80.0	Disseminated malignant neoplasm, unspecified	Secondary
C80.9	Malignant neoplasm, primary site unspecified	Unknown
C81.0	Nodular lymphocyte predominant Hodgkin lymphoma	Lymphatic & hemopoietic
C81.1	Nodular sclerosis Hodgkin lymphoma	Lymphatic & hemopoietic
C81.9	Hodgkin lymphoma, unspecified	Lymphatic & hemopoietic
C82.0	Follicular lymphoma grade I	Lymphatic & hemopoietic
C82.7	Other types of follicular non-Hodgkin's lymphoma	Lymphatic & hemopoietic
C82.9	Follicular lymphoma, unspecified	Lymphatic & hemopoietic
C83.0	Small cell B-cell lymphoma	Lymphatic & hemopoietic
C83.1	Mantle cell lymphoma	Lymphatic & hemopoietic
C83.3	Diffuse large B-cell lymphoma	Lymphatic & hemopoietic
C83.8	Other non-follicular lymphoma	Lymphatic & hemopoietic
C84.5	Other and unspecified T-cell lymphomas	Lymphatic & hemopoietic
C85.1	Unspecified B-cell lymphoma	Lymphatic & hemopoietic
C85.9	Non-Hodgkin lymphoma, unspecified	Lymphatic & hemopoietic
C88.0	Waldenstrom macroglobulinemia	Lymphatic & hemopoietic
C90.0	Multiple myeloma	Lymphatic & hemopoietic
C90.1	Plasma cell leukemia	Lymphatic & hemopoietic

C90.2	Extramedullary plasmacytoma	Lymphatic & hemopoietic
C90.3	Solitary plasmacytoma	Lymphatic & hemopoietic
C91.0	Acute lymphoblastic leukemia [ALL]	Lymphatic & hemopoietic
C91.1	Chronic lymphocytic leukemia of B-cell type	Lymphatic & hemopoietic
C91.5	Adult T-cell lymphoma/leukemia (HTLV-1-associated)	Lymphatic & hemopoietic
C91.9	Lymphoid leukemia, unspecified	Lymphatic & hemopoietic
C92.0	Acute myeloblastic leukemia	Lymphatic & hemopoietic
C92.1	Chronic myeloid leukemia, BCR/ABL-positive	Lymphatic & hemopoietic
C92.3	Myeloid sarcoma	Lymphatic & hemopoietic
C95.0	Acute leukemia of unspecified cell type	Lymphatic & hemopoietic
C95.1	Chronic leukemia of unspecified cell type	Lymphatic & hemopoietic
C95.9	Leukemia, unspecified	Lymphatic & hemopoietic
C97	Malignant neoplasms of independent (primary) multiple sites	Unknown

Appendix C: Benign Tumor Codes

Benign tumor Read codes identified in the study population from CPRD, categorized by type/site

Med code	Read code	Read term	Site/Type
5062	B30..11	Chondroma	Bone and connective tissue
9190	B73..00	Benign neoplasm of bone and articular cartilage	Bone and connective tissue
4794	B73..12	Osteoma	Bone and connective tissue
15695	B738200	Benign neoplasm of calcaneum	Bone and connective tissue
8249	B73z.11	Chondroma	Bone and connective tissue
3166	BBW0.00	[M]Osteochondroma	Bone and connective tissue
5773	BBW0.13	[M]Osteocartilaginous exostosis	Bone and connective tissue
4781	BBW2.11	[M]Enchondroma	Bone and connective tissue
49568	BBWA.00	[M]Chondromyxoid fibroma	Bone and connective tissue
5411	B77..00	Benign neoplasm of breast	Breast
1098	B77..11	Fibroadenoma of breast	Breast
19138	B770.00	Benign neoplasm of female breast	Breast
28870	B77z.00	Benign neoplasm of breast NOS	Breast
1722	BBM1.00	[M]Fibroadenoma NOS	Breast
15459	B71..00	Benign neoplasm of other parts of digestive system	Digestive
9930	B711.11	Gastric polyp	Digestive
70651	B711000	Benign neoplasm of stomach cardia	Digestive
14949	B712011	Duodenal polyp	Digestive
15072	B713.00	Benign neoplasm of colon	Digestive
2922	B713.11	Colon polyp	Digestive
2719	B713.13	Polyposis coli	Digestive
17578	B715000	Benign neoplasm of liver	Digestive
29792	BB5D400	[M]Liver cell adenoma	Digestive
5975	J570.00	Anal and rectal polyp	Digestive
2700	J570000	Anal polyp	Digestive
2207	J570100	Rectal polyp	Digestive
57584	J570z00	Anal and rectal polyp NOS	Digestive
11340	J578.00	Colonic polyp	Digestive
63594	J578.11	Polyp of colon	Digestive
37758	B7G..00	Benign neoplasm of thyroid gland	Endocrine
2610	B7G..11	Adenoma of thyroid gland	Endocrine
2321	B7H2.11	Pituitary adenoma	Endocrine
55379	B7H2300	Benign neoplasm of craniopharyngeal duct	Endocrine

36209	BBD6.00	[M]Carotid body tumour	Endocrine
94340	B7E8.00	Naevus of choroid	Eye, brain & NS
11678	B7F0.00	Benign neoplasm of brain	Eye, brain & NS
31189	B7F0.11	Cerebral tumour - benign	Eye, brain & NS
55419	B7F0000	Benign neoplasm of brain, supratentorial	Eye, brain & NS
6174	B7F1000	Acoustic neuroma	Eye, brain & NS
8672	B7F2000	Cerebral meningioma	Eye, brain & NS
15101	B7Fy.00	Benign neoplasm of other part of nervous system	Eye, brain & NS
3743	B7Fy100	Morton neuroma	Eye, brain & NS
2843	BBd..00	[M]Meningiomas	Eye, brain & NS
24924	BBD..00	[M]Paragangliomas and glomus tumours	Eye, brain & NS
3023	BBe..11	[M]Neurofibromas	Eye, brain & NS
22843	BBe5.00	[M]Neurilemmoma NOS	Eye, brain & NS
8527	BBe5.13	[M]Schwannoma NOS	Eye, brain & NS
2296	BBe8.00	[M]Neuroma NOS	Eye, brain & NS
759	B78..00	Uterine leiomyoma - fibroids	Female genital
432	B78..11	Fibroids	Female genital
32719	B780.00	Submucous uterine leiomyoma	Female genital
12512	B781.00	Intramural uterine leiomyoma	Female genital
3402	B78z.00	Uterine leiomyoma NOS	Female genital
1340	B790.11	Adenomatous polyp - cervix uteri	Female genital
22609	B791000	Benign neoplasm of endometrium NEC	Female genital
45735	B791100	Benign neoplasm of myometrium NEC	Female genital
11728	B7A..11	Dermoid cyst of ovary	Female genital
20663	B7A1.00	Dermoid cyst	Female genital
11937	B7A2.00	Benign teratoma of ovary	Female genital
15118	B7B..11	Teratoma, benign	Female genital
11754	BBCG.00	[M]Sclerosing stromal tumour	Female genital
28324	BBK0000	[M]Leiomyoma NOS	Female genital
8655	BBK0011	[M]Fibroid uterus	Female genital
40449	BBQ6.00	[M]Gonadoblastoma	Female genital
4873	BBR5.00	[M]Partial hydatidiform mole	Female genital
2742	K540.00	Polyp of the corpus uteri	Female genital
1269	K540.11	Endometrial polyp	Female genital
32566	K54y200	Fibrosis of uterus NOS	Female genital
18276	K557.00	Mucous polyp of cervix	Female genital
706	K557.11	Polyp of cervix NOS	Female genital
52277	K55y200	Fibrosis of cervix	Female genital
14954	B70..00	Benign neoplasm of lip, oral cavity and pharynx	Lip, oral cavity and pharynx
24209	B704200	Benign neoplasm of cheek mucosa	Lip, oral cavity and pharynx
566	B74..00	Lipoma	Lipoma
17031	B740200	Lipoma of eyelid	Lipoma
16666	B740400	Lipoma of cheek	Lipoma
15286	B741.00	Lipoma of skin and subcutaneous tissue (excluding face)	Lipoma

4007	B741300	Lipoma of posterior chest wall	Lipoma
7316	B741500	Lipoma of shoulder	Lipoma
35951	B741600	Lipoma of upper arm	Lipoma
17170	B741800	Lipoma of hand	Lipoma
31646	B741G00	Lipoma of lower leg	Lipoma
11165	B74z.00	Lipoma NOS	Lipoma
27596	BBJB200	[M]Angiolipoma NOS	Lipoma
16418	B7z0.00	Benign neoplasm of lymph nodes	Lymphatic & hemopoietic
30073	B7C2.00	Benign neoplasm of prostate	Male genital
17748	B721z11	Benign papilloma of larynx	Respiratory
20154	B702.00	Benign neoplasm of major salivary glands	Salivary
2597	B702000	Benign neoplasm of parotid gland	Salivary
11178	B702300	Warthin's tumour	Salivary
5116	B900011	Mixed parotid tumour	Salivary
30125	BB59.00	[M]Monomorphic adenoma	Salivary
3710	BBB1.00	[M]Adenolymphoma	Salivary
7802	BBL3.00	[M]Pleomorphic adenoma	Salivary
5329	B76..00	Benign neoplasm of skin	Skin
1689	B76..11	Benign naevus of skin	Skin
9680	B76..12	Blue naevus	Skin
1051	B76..13	Dermatofibroma	Skin
581	B76..14	Mole of skin	Skin
1099	B76..15	Papilloma of skin	Skin
473	B76..16	Pigmented naevus	Skin
53835	B76..17	Skin tag NOS	Skin
5186	B76..19	Syringoma	Skin
33787	B760.00	Benign neoplasm of skin of lip	Skin
23901	B764100	Benign neoplasm of skin of neck	Skin
17688	B765300	Benign neoplasm of skin of abdomen	Skin
11514	B765900	Benign neoplasm of skin of back	Skin
64399	B765z00	Benign neoplasm of skin of trunk, excluding scrotum, NOS	Skin
19160	B766000	Benign neoplasm of skin of shoulder	Skin
41862	B766200	Benign neoplasm of skin of fore-arm	Skin
27288	B767400	Benign neoplasm of skin of foot	Skin
1199	B768.00	Melanocytic naevi of skin	Skin
23788	B768500	Melanocytic naevi of trunk	Skin
49656	B768700	Melanocytic naevi of lower limb, including hip	Skin
9820	B768X00	Melanocytic naevi, unspecified	Skin
30931	B76y.00	Benign neoplasm of other specified skin sites	Skin
27618	B76z.00	Benign neoplasm of skin NOS	Skin
1165	B7J0100	Haemangioma of skin and subcutaneous tissue	Skin
20869	BB38.00	[M]Trichoepithelioma	Skin
6280	BB3B.00	[M]Pilomatrixoma	Skin
28812	BB3B.11	[M]Malherbe's calcified epithelioma	Skin
34291	BB5A.00	[M]Basal cell adenoma	Skin

28563	BB65.00	[M]Hidrocystoma	Skin
12254	BB66.00	[M]Papillary hydradenoma	Skin
28178	BBa0.00	[M]Craniopharyngioma	Skin
3659	BBE0.00	[M]Pigmented naevus NOS	Skin
832	BBE0.12	[M]Naevus NOS	Skin
4776	BBE5.00	[M]Halo naevus	Skin
3564	BBEB.00	[M]Junctional naevus	Skin
931	BBEJ.00	[M]Intradermal naevus	Skin
9568	BBEJ.11	[M]Dermal naevus	Skin
1732	BBEK.00	[M]Compound naevus	Skin
1261	BBEN.00	[M]Epithelioid and spindle cell naevus	Skin
4871	BBEN.11	[M]Juvenila melanoma	Skin
4716	BBEU.00	[M]Blue naevus NOS	Skin
7264	BBEW.00	[M]Cellular blue naevus	Skin
3376	BBEY.00	[M]Dysplastic naevus	Skin
5694	BBM..00	[M]Fibroepithelial neoplasms	Skin
96229	B728.00	Atrial myxoma	Soft
31973	B75..00	Other benign neoplasms of connective and soft tissue	Soft
9194	B7...00	Benign neoplasms	Unknown
57570	B7J..00	Haemangiomas and lymphangiomas of any site	Unknown
8521	B7J..11	Angioma - benign	Unknown
679	B7J0.00	Haemangioma	Unknown
15169	B7J0.11	Glomus tumour	Unknown
3692	B7J1.00	Lymphangioma	Unknown
6895	BB05.00	[M]Tumour cells, benign	Unknown
1799	BB5..12	[M]Adenomas	Unknown
2507	BBG0.00	[M]Fibroma NOS	Unknown
10465	BBG0.11	[M]Fibroma durum	Unknown
22655	BBGK.13	[M]Sclerosing haemangioma	Unknown
27905	BBGK.14	[M]Subepidermal nodular fibrosis	Unknown
8985	BBH0.00	[M]Myxoma NOS	Unknown
6720	BBJ2.12	[M]Soft fibroma	Unknown
47874	BBL..00	[M]Complex mixed and stromal neoplasms	Unknown
17446	BBM4.11	[M]Cystadenofibroma NOS	Unknown
21882	BBP8.00	[M]Adenomatoid tumour NOS	Unknown
17435	BBQ7.00	[M]Teratomas	Unknown
847	BBQ8.00	[M]Dermoid cyst	Unknown
11051	BBQ8.11	[M]Dermoid NOS	Unknown
45686	BBT0.00	[M]Haemangioma NOS	Unknown
5989	BBT0.11	[M]Angioma NOS	Unknown
4392	BBT2.00	[M]Cavernous haemangioma	Unknown
7363	BBT8.00	[M]Capillary haemangioma	Unknown
1325	BBU4.11	[M]Cystic hygroma	Unknown
44191	BBU4.12	[M]Hygroma	Unknown
22330	BBX..00	[M]Giant cell tumours	Unknown

Appendix D: Cataract Codes

Read codes for to identify cataract events from CPRD

Med code	Read code	Read term
1622	22E5.00	O/E - cataract present
4439	22E5.11	O/E - lens opacity
64196	2BT..00	Cataract observation
6547	2BT0.00	O/E - Right cataract present
9931	2BT1.00	O/E - Left cataract present
296	F46..00	Cataract
41668	F460.00	Infantile, juvenile and presenile cataracts
44794	F460000	Unspecified infantile cataract
63491	F460100	Unspecified juvenile cataract
57805	F460200	Unspecified presenile cataract
59125	F460300	Anterior subcapsular polar cataract
4242	F460400	Posterior subcapsular polar cataract
7257	F460500	Cortical cataract
45190	F460600	Lamellar zonular cataract
7793	F460700	Nuclear cataract
94474	F460x00	Combined nonsenile cataract
70403	F460y00	Other nonsenile cataract
58078	F460z00	Nonsenile cataract NOS
10010	F461.00	Senile cataract
47566	F461000	Unspecified senile cataract
18048	F461100	Lens capsule pseudoexfoliation
50932	F461200	Coronary cataract
26097	F461300	Punctate cataract
48148	F461400	Incipient cataract NOS
23631	F461500	Immature cataract NOS
92358	F461600	Anterior subcapsular polar senile cataract
5325	F461700	Posterior subcapsular polar senile cataract
22022	F461800	Cortical senile cataract
6876	F461900	Nuclear senile cataract
33793	F461A00	Total, mature senile cataract
51162	F461B00	Hypermature cataract
63640	F461B11	Morgagni cataract
70257	F461x00	Combined senile cataract
49085	F461y00	Other senile cataract
29770	F461z00	Senile cataract NOS
48228	F463.00	Cataract secondary to ocular disease

62188	F463000	Unspecified cataracta complicata
107168	F463100	Glaucomatous subcapsular flecks
54130	F463200	Cataract in eye inflammatory disorder
61325	F463300	Cataract with neovascularization
19371	F463400	Cataract in degenerative disorder
46169	F463z00	Cataract secondary to ocular disorder NOS
71291	F464.00	Cataract due to other disorder
10659	F464000	Diabetic cataract
45952	F464100	Tetanic cataract
60883	F464200	Myotonic cataract
58625	F464300	Cataract associated with other syndromes
58120	F464400	Drug induced cataract
66093	F464600	Radiation induced cataract
94430	F464z00	Cataract due to other disorder NOS
33482	F465.00	After cataract
24467	F465000	Unspecified secondary cataract
36813	F465100	Soemmering's ring
89585	F465200	Other after cataract with vision normal
26850	F465300	After-cataract with vision obscured
8130	F465500	Posterior capsule opacification
44487	F465z00	After cataract NOS
703	F466.00	Bilateral cataracts
4358	F46y.00	Other cataract
24481	F46y000	Calcification of lens
15589	F46yz00	Other cataract NOS
6317	F46z.00	Cataract NOS
44294	F46z000	Immature cortical cataract
5518	1483	H/O: cataract
28513	14N9.00	H/O: R cataract extraction
28515	14NA.00	H/O: L cataract extraction
11970	14NC.00	H/O: Bilateral cataract extraction
6330	7263.12	Extracapsular extraction of cataract
4260	7264.11	Intracapsular extraction of cataract
5361	7266.11	Other extraction of cataract
23883	7263011	Needling of lens for cataract
38641	7266100	Discission of cataract
11767	8H5H.00	Referral for cataract extraction
11941	8HTV.00	Referral to cataract clinic
94348	8LC0.00	Cataract operation planned

Appendix E: Diabetes Codes

Read codes for to identify diabetes events from CPRD

Med code	Read code	Read term
Type II diabetes		
7563	66A3.00	Diabetic on diet only
1684	66A4.00	Diabetic on oral treatment
4513	C109.00	Non-insulin dependent diabetes mellitus
5884	C109.11	NIDDM - Non-insulin dependent diabetes mellitus
17859	C109.12	Type 2 diabetes mellitus
18219	C109.13	Type II diabetes mellitus
52303	C109000	Non-insulin-dependent diabetes mellitus with renal comps
50225	C109011	Type II diabetes mellitus with renal complications
18209	C109012	Type 2 diabetes mellitus with renal complications
50429	C109100	Non-insulin-dependent diabetes mellitus with ophthalm comps
59725	C109111	Type II diabetes mellitus with ophthalmic complications
70316	C109112	Type 2 diabetes mellitus with ophthalmic complications
55842	C109200	Non-insulin-dependent diabetes mellitus with neuro comps
67905	C109211	Type II diabetes mellitus with neurological complications
45919	C109212	Type 2 diabetes mellitus with neurological complications
62146	C109300	Non-insulin-dependent diabetes mellitus with multiple comps
108005	C109312	Type 2 diabetes mellitus with multiple complications
34912	C109400	Non-insulin dependent diabetes mellitus with ulcer
55075	C109411	Type II diabetes mellitus with ulcer
65704	C109412	Type 2 diabetes mellitus with ulcer
40401	C109500	Non-insulin dependent diabetes mellitus with gangrene
62107	C109511	Type II diabetes mellitus with gangrene
46150	C109512	Type 2 diabetes mellitus with gangrene
17262	C109600	Non-insulin-dependent diabetes mellitus with retinopathy
58604	C109611	Type II diabetes mellitus with retinopathy
42762	C109612	Type 2 diabetes mellitus with retinopathy
8403	C109700	Non-insulin dependent diabetes mellitus - poor control
24458	C109711	Type II diabetes mellitus - poor control
45913	C109712	Type 2 diabetes mellitus - poor control
39406	C109800	Reaven's syndrome
29979	C109900	Non-insulin-dependent diabetes mellitus without complication
109103	C109911	Type II diabetes mellitus without complication
105784	C109912	Type 2 diabetes mellitus without complication
72320	C109A00	Non-insulin dependent diabetes mellitus with mononeuropathy

50813	C109A11	Type II diabetes mellitus with mononeuropathy
45467	C109B00	Non-insulin dependent diabetes mellitus with polyneuropathy
47409	C109B11	Type II diabetes mellitus with polyneuropathy
109865	C109B12	Type 2 diabetes mellitus with polyneuropathy
59365	C109C00	Non-insulin dependent diabetes mellitus with nephropathy
64571	C109C11	Type II diabetes mellitus with nephropathy
24836	C109C12	Type 2 diabetes mellitus with nephropathy
43785	C109D00	Non-insulin dependent diabetes mellitus with hypoglyca coma
56268	C109D11	Type II diabetes mellitus with hypoglycaemic coma
61071	C109D12	Type 2 diabetes mellitus with hypoglycaemic coma
69278	C109E00	Non-insulin depend diabetes mellitus with diabetic cataract
48192	C109E11	Type II diabetes mellitus with diabetic cataract
44779	C109E12	Type 2 diabetes mellitus with diabetic cataract
54212	C109F00	Non-insulin-dependent d m with peripheral angiopath
54899	C109F11	Type II diabetes mellitus with peripheral angiopathy
60699	C109F12	Type 2 diabetes mellitus with peripheral angiopathy
24693	C109G00	Non-insulin dependent diabetes mellitus with arthropathy
18143	C109G11	Type II diabetes mellitus with arthropathy
49869	C109G12	Type 2 diabetes mellitus with arthropathy
40962	C109H00	Non-insulin dependent d m with neuropathic arthropathy
47816	C109H11	Type II diabetes mellitus with neuropathic arthropathy
66965	C109H12	Type 2 diabetes mellitus with neuropathic arthropathy
18278	C109J00	Insulin treated Type 2 diabetes mellitus
37648	C109J11	Insulin treated non-insulin dependent diabetes mellitus
18264	C109J12	Insulin treated Type II diabetes mellitus
36633	C109K00	Hyperosmolar non-ketotic state in type 2 diabetes mellitus
758	C10F.00	Type 2 diabetes mellitus
22884	C10F.11	Type II diabetes mellitus
18777	C10F000	Type 2 diabetes mellitus with renal complications
57278	C10F011	Type II diabetes mellitus with renal complications
47321	C10F100	Type 2 diabetes mellitus with ophthalmic complications
100964	C10F111	Type II diabetes mellitus with ophthalmic complications
34268	C10F200	Type 2 diabetes mellitus with neurological complications
98616	C10F211	Type II diabetes mellitus with neurological complications
65267	C10F300	Type 2 diabetes mellitus with multiple complications
43227	C10F311	Type II diabetes mellitus with multiple complications
49074	C10F400	Type 2 diabetes mellitus with ulcer
91646	C10F411	Type II diabetes mellitus with ulcer
12736	C10F500	Type 2 diabetes mellitus with gangrene
104323	C10F511	Type II diabetes mellitus with gangrene

18496	C10F600	Type 2 diabetes mellitus with retinopathy
49655	C10F611	Type II diabetes mellitus with retinopathy
25627	C10F700	Type 2 diabetes mellitus - poor control
47315	C10F711	Type II diabetes mellitus - poor control
54773	C10F800	Reaven's syndrome
39481	C10F811	Metabolic syndrome X
47954	C10F900	Type 2 diabetes mellitus without complication
53392	C10F911	Type II diabetes mellitus without complication
62674	C10FA00	Type 2 diabetes mellitus with mononeuropathy
95351	C10FA11	Type II diabetes mellitus with mononeuropathy
18425	C10FB00	Type 2 diabetes mellitus with polyneuropathy
50527	C10FB11	Type II diabetes mellitus with polyneuropathy
12640	C10FC00	Type 2 diabetes mellitus with nephropathy
102201	C10FC11	Type II diabetes mellitus with nephropathy
46917	C10FD00	Type 2 diabetes mellitus with hypoglycaemic coma
98723	C10FD11	Type II diabetes mellitus with hypoglycaemic coma
44982	C10FE00	Type 2 diabetes mellitus with diabetic cataract
93727	C10FE11	Type II diabetes mellitus with diabetic cataract
37806	C10FF00	Type 2 diabetes mellitus with peripheral angiopathy
104639	C10FF11	Type II diabetes mellitus with peripheral angiopathy
59253	C10FG00	Type 2 diabetes mellitus with arthropathy
103902	C10FG11	Type II diabetes mellitus with arthropathy
35385	C10FH00	Type 2 diabetes mellitus with neuropathic arthropathy
109197	C10FH11	Type II diabetes mellitus with neuropathic arthropathy
1407	C10FJ00	Insulin treated Type 2 diabetes mellitus
64668	C10FJ11	Insulin treated Type II diabetes mellitus
34450	C10FK00	Hyperosmolar non-ketotic state in type 2 diabetes mellitus
107701	C10FK11	Hyperosmolar non-ketotic state in type II diabetes mellitus
26054	C10FL00	Type 2 diabetes mellitus with persistent proteinuria
60796	C10FL11	Type II diabetes mellitus with persistent proteinuria
18390	C10FM00	Type 2 diabetes mellitus with persistent microalbuminuria
85991	C10FM11	Type II diabetes mellitus with persistent microalbuminuria
32627	C10FN00	Type 2 diabetes mellitus with ketoacidosis
106528	C10FN11	Type II diabetes mellitus with ketoacidosis
51756	C10FP00	Type 2 diabetes mellitus with ketoacidotic coma
106061	C10FP11	Type II diabetes mellitus with ketoacidotic coma
25591	C10FQ00	Type 2 diabetes mellitus with exudative maculopathy
63690	C10FR00	Type 2 diabetes mellitus with gastroparesis
95539	C10FS00	Maternally inherited diabetes mellitus

Diabetes (unspecified)

6813	1434	H/O: diabetes mellitus
711	C10..00	Diabetes mellitus
38986	C100.00	Diabetes mellitus with no mention of complication
24490	C100000	Diabetes mellitus, juvenile type, no mention of complication
1038	C100011	Insulin dependent diabetes mellitus
14803	C100100	Diabetes mellitus, adult onset, no mention of complication
14889	C100111	Maturity onset diabetes
506	C100112	Non-insulin dependent diabetes mellitus
50972	C100z00	Diabetes mellitus NOS with no mention of complication
1682	C101.00	Diabetes mellitus with ketoacidosis
53200	C101000	Diabetes mellitus, juvenile type, with ketoacidosis
54856	C101100	Diabetes mellitus, adult onset, with ketoacidosis
38617	C101y00	Other specified diabetes mellitus with ketoacidosis
42505	C101z00	Diabetes mellitus NOS with ketoacidosis
21482	C102.00	Diabetes mellitus with hyperosmolar coma
40023	C102000	Diabetes mellitus, juvenile type, with hyperosmolar coma
43139	C102100	Diabetes mellitus, adult onset, with hyperosmolar coma
72345	C102z00	Diabetes mellitus NOS with hyperosmolar coma
15690	C103.00	Diabetes mellitus with ketoacidotic coma
42567	C103000	Diabetes mellitus, juvenile type, with ketoacidotic coma
68843	C103100	Diabetes mellitus, adult onset, with ketoacidotic coma
59288	C103y00	Other specified diabetes mellitus with coma
65062	C103z00	Diabetes mellitus NOS with ketoacidotic coma
16502	C104.00	Diabetes mellitus with renal manifestation
2475	C104.11	Diabetic nephropathy
93922	C104000	Diabetes mellitus, juvenile type, with renal manifestation
35105	C104100	Diabetes mellitus, adult onset, with renal manifestation
13279	C104y00	Other specified diabetes mellitus with renal complications
35107	C104z00	Diabetes mellitus with nephropathy NOS
33254	C105.00	Diabetes mellitus with ophthalmic manifestation
69748	C105000	Diabetes mellitus, juvenile type, + ophthalmic manifestation
41389	C105100	Diabetes mellitus, adult onset, + ophthalmic manifestation
47377	C105y00	Other specified diabetes mellitus with ophthalmic complicatn
34283	C105z00	Diabetes mellitus NOS with ophthalmic manifestation
16230	C106.00	Diabetes mellitus with neurological manifestation
59903	C106.11	Diabetic amyotrophy
7795	C106.12	Diabetes mellitus with neuropathy
16491	C106.13	Diabetes mellitus with polyneuropathy
67853	C106000	Diabetes mellitus, juvenile, + neurological manifestation

39317	C106100	Diabetes mellitus, adult onset, + neurological manifestation
61523	C106y00	Other specified diabetes mellitus with neurological comps
22573	C106z00	Diabetes mellitus NOS with neurological manifestation
35399	C107.00	Diabetes mellitus with peripheral circulatory disorder
32403	C107.11	Diabetes mellitus with gangrene
32556	C107.12	Diabetes with gangrene
70448	C107000	Diabetes mellitus, juvenile +peripheral circulatory disorder
63357	C107100	Diabetes mellitus, adult, + peripheral circulatory disorder
33807	C107200	Diabetes mellitus, adult with gangrene
69124	C107300	IDDM with peripheral circulatory disorder
56803	C107400	NIDDM with peripheral circulatory disorder
65025	C107z00	Diabetes mellitus NOS with peripheral circulatory disorder
1647	C108.00	Insulin dependent diabetes mellitus
18505	C108.11	IDDM-Insulin dependent diabetes mellitus
46963	C108000	Insulin-dependent diabetes mellitus with renal complications
49276	C108100	Insulin-dependent diabetes mellitus with ophthalmic comps
52283	C108200	Insulin-dependent diabetes mellitus with neurological comps
52104	C108300	Insulin dependent diabetes mellitus with multiple complicatn
26855	C108400	Unstable insulin dependent diabetes mellitus
44443	C108500	Insulin dependent diabetes mellitus with ulcer
60499	C108600	Insulin dependent diabetes mellitus with gangrene
6509	C108700	Insulin dependent diabetes mellitus with retinopathy
6791	C108800	Insulin dependent diabetes mellitus - poor control
31310	C108900	Insulin dependent diabetes maturity onset
56448	C108A00	Insulin-dependent diabetes without complication
24694	C108B00	Insulin dependent diabetes mellitus with mononeuropathy
41716	C108C00	Insulin dependent diabetes mellitus with polyneuropathy
57621	C108D00	Insulin dependent diabetes mellitus with nephropathy
44440	C108E00	Insulin dependent diabetes mellitus with hypoglycaemic coma
44260	C108F00	Insulin dependent diabetes mellitus with diabetic cataract
64446	C108G00	Insulin dependent diab mell with peripheral angiopathy
65616	C108H00	Insulin dependent diabetes mellitus with arthropathy
39809	C108J00	Insulin dependent diab mell with neuropathic arthropathy
46290	C108y00	Other specified diabetes mellitus with multiple comps
64449	C108z00	Unspecified diabetes mellitus with multiple complications
52236	C10A.00	Malnutrition-related diabetes mellitus
66675	C10A000	Malnutrition-related diabetes mellitus with coma
33969	C10A100	Malnutrition-related diabetes mellitus with ketoacidosis
100347	C10A500	Malnutritn-relat diabetes melitus wth periph circul complctn
11551	C10B.00	Diabetes mellitus induced by steroids

26108	C10B000	Steroid induced diabetes mellitus without complication
43453	C10C.00	Diabetes mellitus autosomal dominant
46624	C10C.11	Maturity onset diabetes in youth
36695	C10D.00	Diabetes mellitus autosomal dominant type 2
59991	C10D.11	Maturity onset diabetes in youth type 2
51261	C10E.12	Insulin dependent diabetes mellitus
102946	C10E012	Insulin-dependent diabetes mellitus with renal complications
98071	C10E112	Insulin-dependent diabetes mellitus with ophthalmic comps
101735	C10E212	Insulin-dependent diabetes mellitus with neurological comps
45276	C10E312	Insulin dependent diabetes mellitus with multiple complicat
54600	C10E412	Unstable insulin dependent diabetes mellitus
98704	C10E512	Insulin dependent diabetes mellitus with ulcer
109051	C10E612	Insulin dependent diabetes mellitus with gangrene
93875	C10E712	Insulin dependent diabetes mellitus with retinopathy
72702	C10E812	Insulin dependent diabetes mellitus - poor control
97849	C10E912	Insulin dependent diabetes maturity onset
99719	C10EA12	Insulin-dependent diabetes without complication
101311	C10EC12	Insulin dependent diabetes mellitus with polyneuropathy
102163	C10ED12	Insulin dependent diabetes mellitus with nephropathy
99716	C10EE12	Insulin dependent diabetes mellitus with hypoglycaemic coma
100770	C10EF12	Insulin dependent diabetes mellitus with diabetic cataract
95636	C10ER00	Latent autoimmune diabetes mellitus in adult
51697	C10G.00	Secondary pancreatic diabetes mellitus
96506	C10G000	Secondary pancreatic diabetes mellitus without complication
61122	C10H.00	Diabetes mellitus induced by non-steroid drugs
67212	C10H000	DM induced by non-steroid drugs without complication
68517	C10J.00	Insulin autoimmune syndrome
37957	C10K.00	Type A insulin resistance
56885	C10K000	Type A insulin resistance without complication
43857	C10M.00	Lipoatrophic diabetes mellitus
22487	C10N.00	Secondary diabetes mellitus
94383	C10N000	Secondary diabetes mellitus without complication
93380	C10N100	Cystic fibrosis related diabetes mellitus
107603	C10P.00	Diabetes mellitus in remission
107824	C10P100	Type II diabetes mellitus in remission
110611	C10P111	Type 2 diabetes mellitus in remission
33343	C10y.00	Diabetes mellitus with other specified manifestation
63371	C10y100	Diabetes mellitus, adult, + other specified manifestation
10098	C10yy00	Other specified diabetes mellitus with other spec comps
70821	C10yz00	Diabetes mellitus NOS with other specified manifestation

45491	C10z.00	Diabetes mellitus with unspecified complication
68792	C10z000	Diabetes mellitus, juvenile type, + unspecified complication
63762	C10z100	Diabetes mellitus, adult onset, + unspecified complication
64283	C10zy00	Other specified diabetes mellitus with unspecified comps
64357	C10zz00	Diabetes mellitus NOS with unspecified complication
Diabetic complications		
13071	66AI.00	Diabetic - good control
2378	66AJ.00	Diabetic - poor control
9013	66AJ.11	Unstable diabetes
2478	66AJ100	Brittle diabetes
22023	66AJz00	Diabetic - poor control NOS
43951	66AK.00	Diabetic - cooperative patient
17869	66AL.00	Diabetic-uncooperative patient
17886	66AM.00	Diabetic - follow-up default
7045	14F4.00	H/O: Admission in last year for diabetes foot problem
22967	2BBF.00	Retinal abnormality - diabetes related
47328	2BBk.00	O/E - right eye stable treated prolif diabetic retinopathy
52041	2BBl.00	O/E - left eye stable treated prolif diabetic retinopathy
9835	2BBL.00	O/E - diabetic maculopathy present both eyes
47144	2BBM.00	O/E - diabetic maculopathy absent both eyes
52630	2BBo.00	O/E - sight threatening diabetic retinopathy
11433	2BBP.00	O/E - right eye background diabetic retinopathy
11129	2BBQ.00	O/E - left eye background diabetic retinopathy
13099	2BBR.00	O/E - right eye preproliferative diabetic retinopathy
101881	2BBr.00	Impaired vision due to diabetic retinopathy
13103	2BBS.00	O/E - left eye preproliferative diabetic retinopathy
13097	2BBT.00	O/E - right eye proliferative diabetic retinopathy
13101	2BBV.00	O/E - left eye proliferative diabetic retinopathy
13102	2BBW.00	O/E - right eye diabetic maculopathy
13108	2BBX.00	O/E - left eye diabetic maculopathy
27921	2G51000	Foot abnormality - diabetes related
17095	2G5A.00	O/E - Right diabetic foot at risk
26664	2G5B.00	O/E - Left diabetic foot at risk
18056	2G5C.00	Foot abnormality - diabetes related
105740	2G5d.00	O/E - Left diabetic foot at increased risk
26666	2G5E.00	O/E - Right diabetic foot at low risk
105741	2G5e.00	O/E - Right diabetic foot at increased risk
31157	2G5F.00	O/E - Right diabetic foot at moderate risk
31171	2G5G.00	O/E - Right diabetic foot at high risk
35316	2G5H.00	O/E - Right diabetic foot - ulcerated

26667	2G5I.00	O/E - Left diabetic foot at low risk
31156	2G5J.00	O/E - Left diabetic foot at moderate risk
31172	2G5K.00	O/E - Left diabetic foot at high risk
35116	2G5L.00	O/E - Left diabetic foot - ulcerated
62384	2G5V.00	O/E - right chronic diabetic foot ulcer
49640	2G5W.00	O/E - left chronic diabetic foot ulcer
17067	F171100	Autonomic neuropathy due to diabetes
44033	F345000	Diabetic mononeuritis multiplex
17247	F35z000	Diabetic mononeuritis NOS
31790	F372.00	Polyneuropathy in diabetes
5002	F372.11	Diabetic polyneuropathy
2342	F372.12	Diabetic neuropathy
48078	F372000	Acute painful diabetic neuropathy
35785	F372100	Chronic painful diabetic neuropathy
24571	F372200	Asymptomatic diabetic neuropathy
39420	F381300	Myasthenic syndrome due to diabetic amyotrophy
2340	F381311	Diabetic amyotrophy
37315	F3y0.00	Diabetic mononeuropathy
1323	F420.00	Diabetic retinopathy
7069	F420000	Background diabetic retinopathy
3286	F420100	Proliferative diabetic retinopathy
2986	F420200	Preproliferative diabetic retinopathy
10099	F420300	Advanced diabetic maculopathy
3837	F420400	Diabetic maculopathy
47584	F420500	Advanced diabetic retinal disease
10755	F420600	Non proliferative diabetic retinopathy
30477	F420700	High risk proliferative diabetic retinopathy
65463	F420800	High risk non proliferative diabetic retinopathy
11626	F420z00	Diabetic retinopathy NOS
17313	F440700	Diabetic iritis
10659	F464000	Diabetic cataract
34152	G73y000	Diabetic peripheral angiopathy
2471	K01x100	Nephrotic syndrome in diabetes mellitus
105302	K08yA00	Proteinuric diabetic nephropathy
107881	K08yA11	Clinical diabetic nephropathy
106360	K27y700	Erectile dysfunction due to diabetes mellitus
99628	Kyu0300	[X]Glomerular disorders in diabetes mellitus
50960	L180500	Pre-existing diabetes mellitus, insulin-dependent
50609	L180600	Pre-existing diabetes mellitus, non-insulin-dependent
109133	L180700	Pre-existing malnutrition-related diabetes mellitus

7328	M037200	Cellulitis in diabetic foot
24327	M271000	Ischaemic ulcer diabetic foot
11663	M271100	Neuropathic diabetic ulcer - foot
9881	M271200	Mixed diabetic ulcer - foot
18142	N030000	Diabetic cheiroarthropathy
57333	N030011	Diabetic cheiropathy
27891	N030100	Diabetic Charcot arthropathy
53634	R054200	[D]Gangrene of toe in diabetic
31053	R054300	[D]Widespread diabetic foot gangrene

Appendix F: Thyroid Disease Codes

Read codes for to identify thyroid disease events from CPRD

Med code	Read code	Read term
6245	1431	H/O: hyperthyroidism
8038	1431.11	H/O: thyrotoxicosis
3611	1432	H/O: hypothyroidism
35608	1433	H/O: thyroid disorder NOS
27278	4422	Thyroid hormone tests high
33292	4423	Thyroid hormone tests low
26936	4424100	Serum T3 level high
20983	4426100	Serum T4 level abnormal
4937	143..11	H/O: thyroid disorder
15728	22H2.00	O/E - thyroid swelling -unilat
16057	22H3.00	O/E - thyroid swelling -bilat.
728	22H4.00	O/E - thyroid lump
3789	43G5.00	Thyroid autoantibodies
20096	43G5.12	Thyroglobulin autoantibodies
3900	442A100	Serum TSH level abnormal
59072	442D100	T3 uptake test abnormal
20970	442G.00	Thyroid hormone tests abnormal
18598	442I.00	Thyroid function tests abnormal
20311	C00..00	Simple and unspecified goitre
2518	C000.00	Simple goitre
3655	C000.11	Retrosternal thyroid goitre
60288	C000.12	Substernal thyroid goitre
2572	C000.13	Thyroid nodule
4212	C000.14	Colloid goitre
7911	C00z.00	Goitre NOS
1881	C00z.11	Thyroid enlargement
1348	C01..00	Nontoxic nodular goitre
26700	C010.00	Nontoxic uninodular goitre
11743	C011.00	Nontoxic multinodular goitre
34491	C01z.00	Nontoxic nodular goitre NOS
47120	C01z.11	Adenomatous goitre
677	C02..00	Thyrotoxicosis
1472	C02..11	Hyperthyroidism
10760	C02..12	Toxic goitre
23315	C020.00	Toxic diffuse goitre

44405	C020.11	Basedow's disease
5257	C020.12	Graves' disease
26702	C020000	Toxic diffuse goitre with no crisis
57011	C020100	Toxic diffuse goitre with crisis
100476	C020200	Thyroid-associated dermopathy
49334	C020z00	Toxic diffuse goitre NOS
53280	C021.00	Toxic uninodular goitre
26869	C021000	Toxic uninodular goitre with no crisis
61498	C021z00	Toxic uninodular goitre NOS
11426	C022.00	Toxic multinodular goitre
46985	C022000	Toxic multinodular goitre with no crisis
53981	C022z00	Toxic multinodular goitre NOS
15790	C023.00	Toxic nodular goitre unspecified
68512	C023000	Toxic nodular goitre unspecified with no crisis
100004	C023100	Toxic nodular goitre unspecified with crisis
49361	C023z00	Toxic nodular goitre NOS
49508	C024.00	Thyrotoxicosis from ectopic thyroid nodule
64656	C024000	Thyrotoxicosis from ectopic thyroid nodule with no crisis
56270	C024z00	Thyrotoxicosis from ectopic thyroid nodule NOS
106640	C025.00	Subclinical hyperthyroidism
43136	C02y.00	Thyrotoxicosis of other specified origin
58138	C02y.11	Factitia thyrotoxicosis
51273	C02y000	Thyrotoxicosis of other specified origin with no crisis
106532	C02y100	Thyrotoxicosis of other specified origin with crisis
64856	C02y200	Thyrotoxicosis factitia
19205	C02y300	Thyroid crisis
34220	C02yz00	Thyrotoxicosis of other specified origin NOS
15565	C02z.00	Thyrotoxicosis without mention of goitre or other cause
26701	C02z000	Thyrotoxicosis without mention of goitre or cause no crisis
3194	C02z100	Thyrotoxicosis without mention of goitre, cause with crisis
26699	C02zz00	Thyrotoxicosis NOS
10097	C03..00	Congenital hypothyroidism
67513	C03..11	Cretinism
11892	C030.00	Pendred's syndrome
47449	C031.00	Goitrous cretin
69290	C03y.00	Other specified congenital hypothyroidism
31612	C03y000	Congenital hypothyroidism with diffuse goitre
93159	C03y100	Congenital hypothyroidism without goitre
51481	C03z.00	Congenital hypothyroidism NOS
93323	C03z.11	Congenital thyroid insufficiency

27533	C03z.12	Cretinism
3290	C04..00	Acquired hypothyroidism
1619	C04..11	Myxoedema
14704	C04..12	Thyroid deficiency
273	C04..13	Hypothyroidism
28852	C040.00	Postsurgical hypothyroidism
47521	C040.11	Post ablative hypothyroidism
50275	C041.00	Other postablative hypothyroidism
11322	C041000	Irradiation hypothyroidism
51706	C041z00	Postablative hypothyroidism NOS
34221	C042.00	Iodine hypothyroidism
25913	C043.00	Other iatrogenic hypothyroidism
15743	C043000	Hypothyroidism resulting from para-aminosalicylic acid
97090	C043100	Hypothyroidism resulting from phenylbutazone
94915	C043200	Hypothyroidism resulting from resorcinol
38976	C043z00	Iatrogenic hypothyroidism NOS
50860	C044.00	Postinfectious hypothyroidism
46345	C045.00	Acquired atrophy of thyroid
31971	C046.00	Autoimmune myxoedema
95830	C047.00	Subclinical hypothyroidism
24748	C04y.00	Other acquired hypothyroidism
3941	C04z.00	Hypothyroidism NOS
20310	C04z.11	Pretibial myxoedema - hypothyroid
23014	C04z.12	Thyroid insufficiency
18282	C04z.13	Hypothyroid goitre, acquired
56722	C04z000	Premature puberty due to hypothyroidism
59702	C04z100	Myxoedema coma
1346	C05..00	Thyroiditis
4898	C050.00	Acute thyroiditis
67972	C050000	Acute nonsuppurative thyroiditis
70773	C050100	Acute suppurative thyroiditis
29296	C050200	Abscess of thyroid
42323	C050z00	Acute thyroiditis NOS
30799	C051.00	Subacute thyroiditis
21747	C051.11	De Quervain's thyroiditis
26833	C052.00	Chronic lymphocytic thyroiditis
3857	C052.11	Autoimmune thyroiditis
3436	C052.12	Hashimoto's disease
70244	C053.00	Chronic fibrous thyroiditis
53667	C053.11	Riedel's thyroiditis

61026	C054.00	Iatrogenic thyroiditis
65444	C05y.00	Other and unspecified chronic thyroiditis
65907	C05y400	Chronic thyroiditis with transient thyrotoxicosis
20909	C05z.00	Thyroiditis NOS
43871	C06..00	Other disorders of thyroid
45656	C060.00	Disorder of thyrocalcitonin secretion
19362	C061.00	Dyshormonogenic goitre
2338	C062.00	Thyroid cyst
39575	C063000	Thyroid haemorrhage
56655	C063100	Thyroid infarction
43245	C06y.00	Other specified thyroid disorders
41014	C06y000	Thyroid-binding globulin abnormality
69113	C06y100	Thyroid atrophy
27996	C06yz00	Other specified thyroid disorder NOS
35957	C06z.00	Thyroid disorder NOS
96787	C0A..00	Congenital iodine deficiency syndrome
72331	C0A0.00	Congenital iodine-deficiency syndrome, neurological type
39166	C0A1.00	Congenital iodine-deficiency syndrome, myxoedematous type
37518	C0A3.00	Iodine-deficiency-related diffuse (endemic) goitre
44459	C0A4.00	Iodine-deficiency-related multinodular (endemic) goitre
718	C0A5.00	Subclinical iodine-deficiency hypothyroidism
54511	C0AX.00	Iodine-deficiency-related (endemic) goitre, unspecified
11146	C134300	TSH - thyroid-stimulating hormone deficiency
1658	R145.00	[D]Thyroid function test abnormal
27639	R145000	[D]Thyroid scan abnormal
51339	R145100	[D]Thyroid uptake abnormal
48045	R145z00	[D]Thyroid function tests abnormal NOS

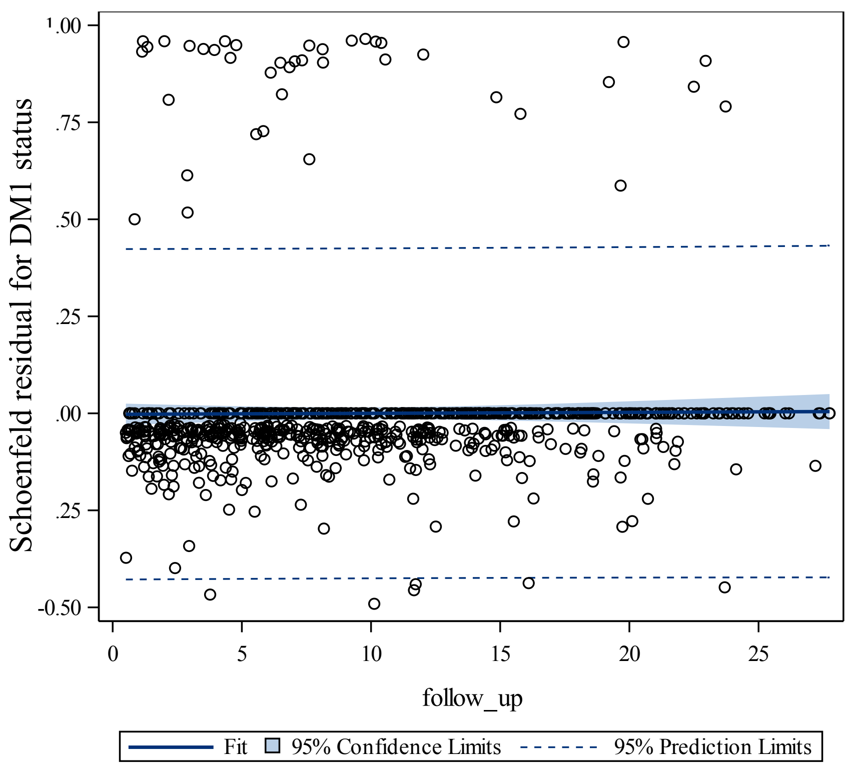
Appendix G: Evaluation of Model Assumptions

1. Proportional hazards assumption for non-time-varying covariates. This assumption was assessed by plotting the Schoenfeld residuals for each independent variable against follow-up time to evaluate the presence of a significant pattern (all aims). If a violation is observed, other methods were explored to assess the validity of the observed violation.
2. Linearity assumption for continuous covariates. This assumption was assessed by plotting the continuous variable against Martingale residuals to evaluate the presence of a significant pattern. (aims 1 & 2)

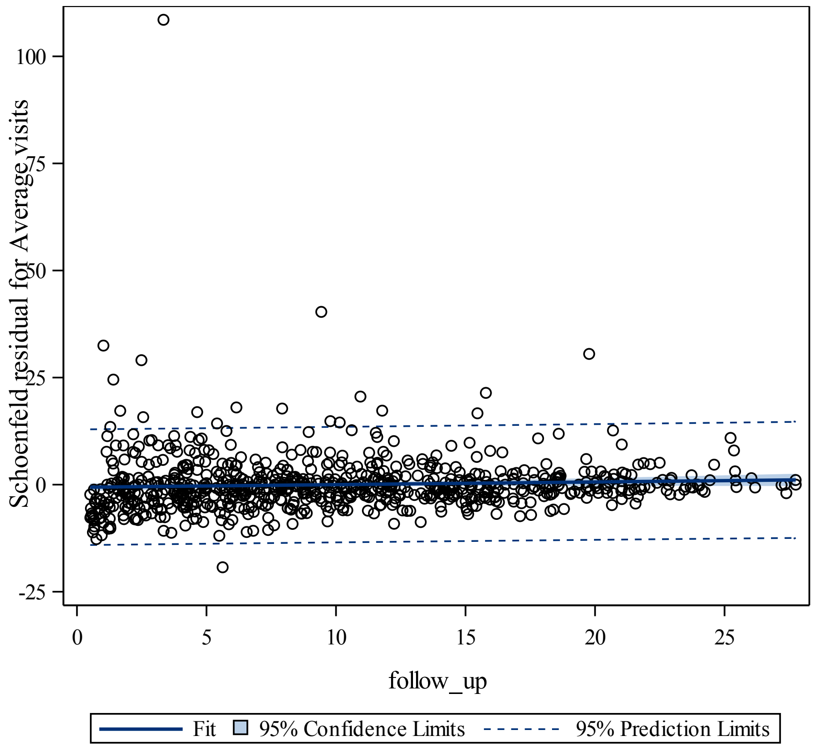
Aim 1 proportional hazards assessment:

Independent variable	p-value Schoenfeld residual
DM1 status (yes/no)	0.8339
Average Number of visits (continuous)	0.1070

Plot of Schoenfeld residual vs. follow-up time for DM1 status



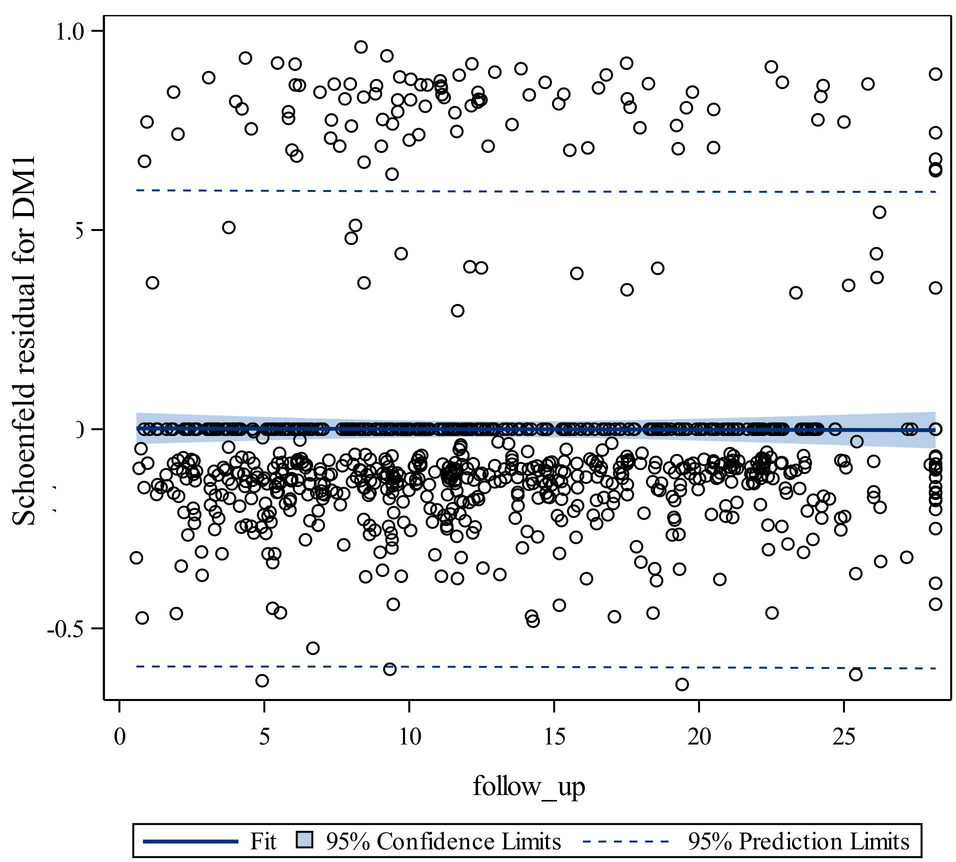
Plot of Schoenfeld residual vs. follow-up time for average visits per year



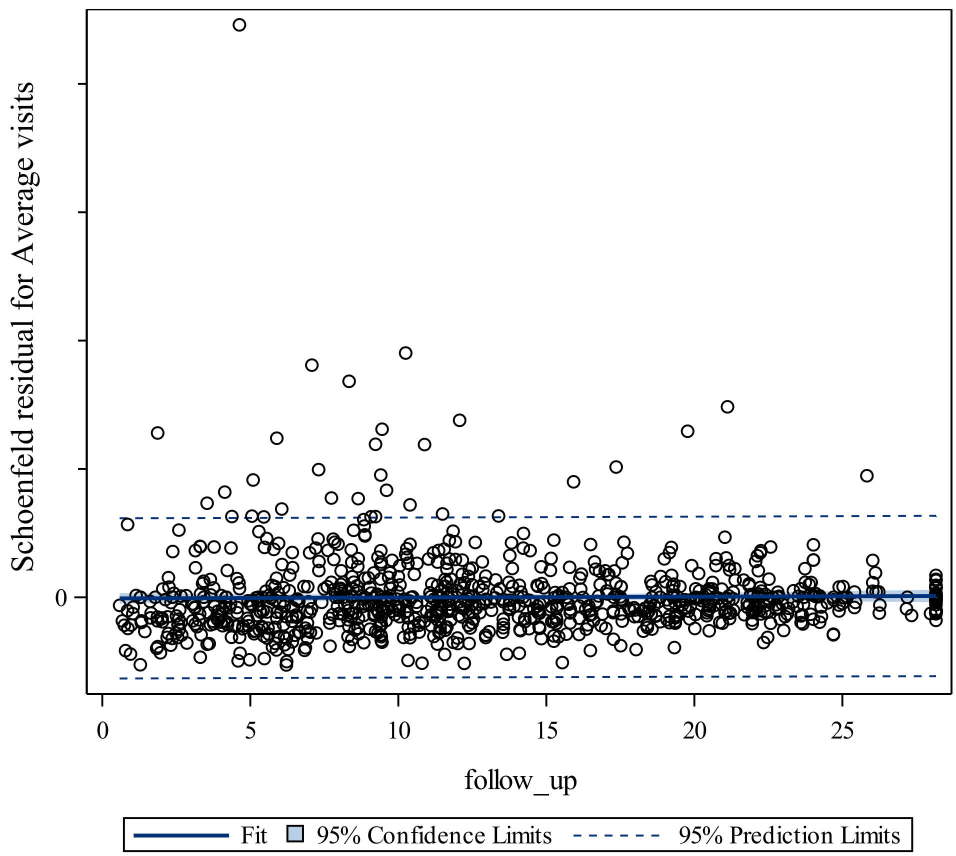
Aim 2 proportional hazards assessment:

Independent variable	p-value Schoenfeld residual
DM1 status (yes/no)	0.9091
Average Number of visits (continuous)	0.6467

Plot of Schoenfeld residual vs. follow-up time for DM1 status



Plot of Schoenfeld residual vs. follow-up time for average visits per year

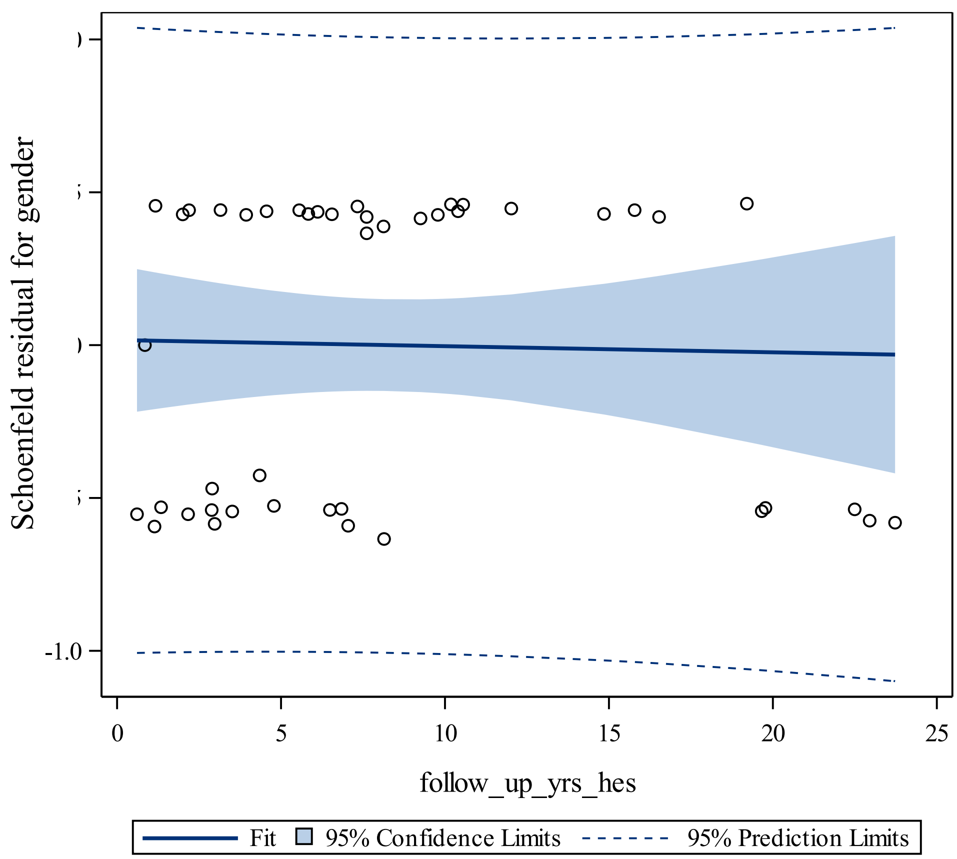


Aim 3 proportional hazards assessment

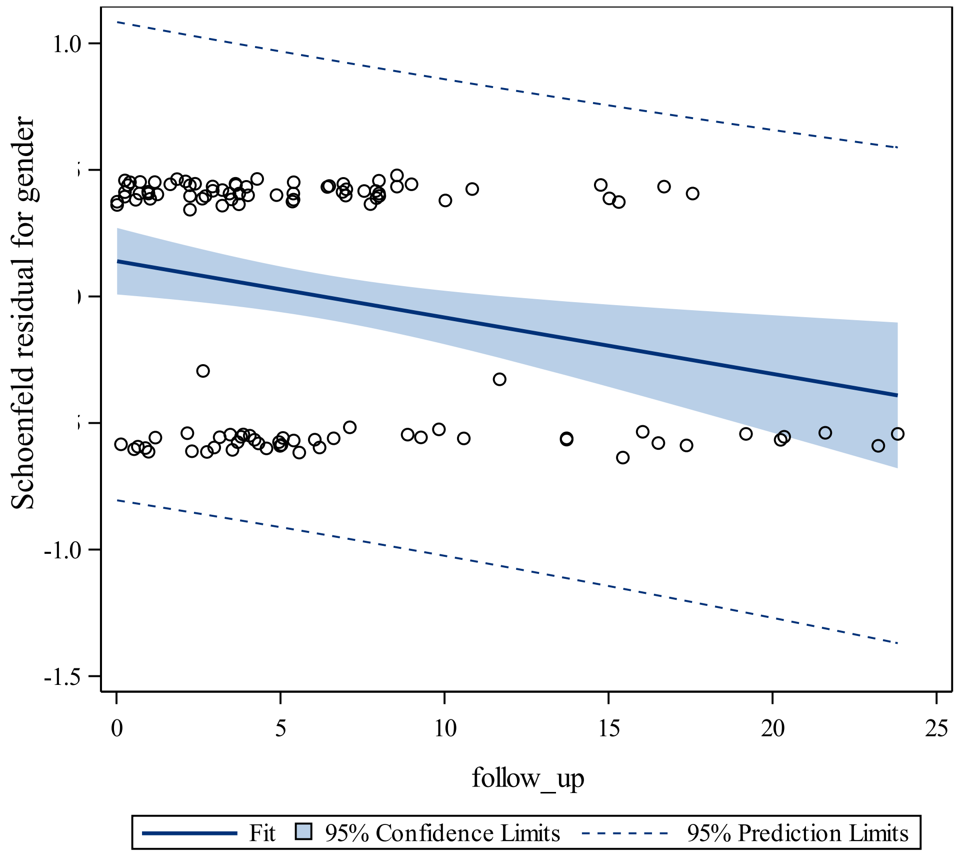
Because clinical phenotypes were modeled as time-varying, only the gender variable were checked for the proportional hazards assumption.

Analysis	p-value Schoenfeld residual	p-value ASSESS in PHREG
Cancer	0.8622	0.3800
Benign tumor	0.0091	0.1220

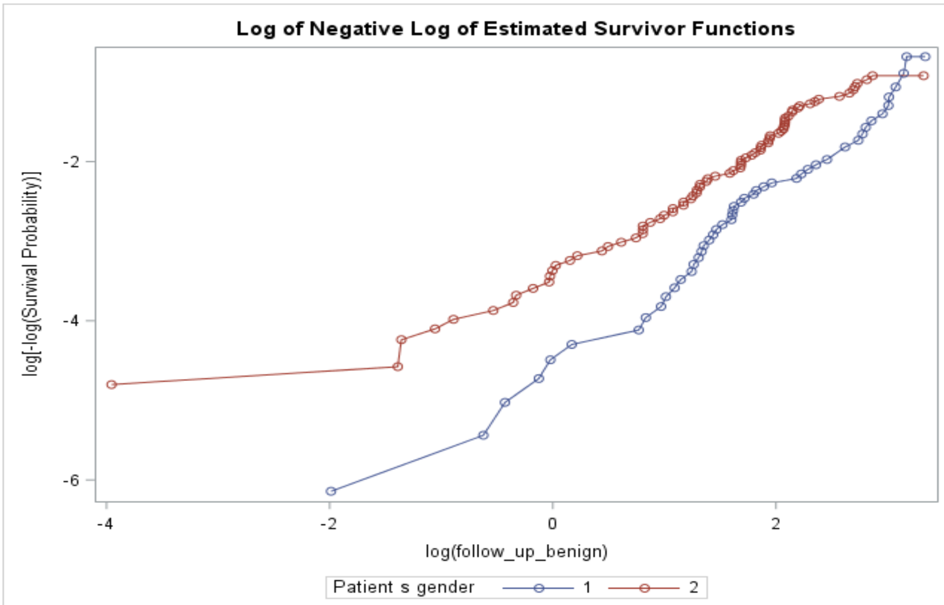
Plot of Schoenfeld residual vs. follow-up time for gender (cancer analysis)



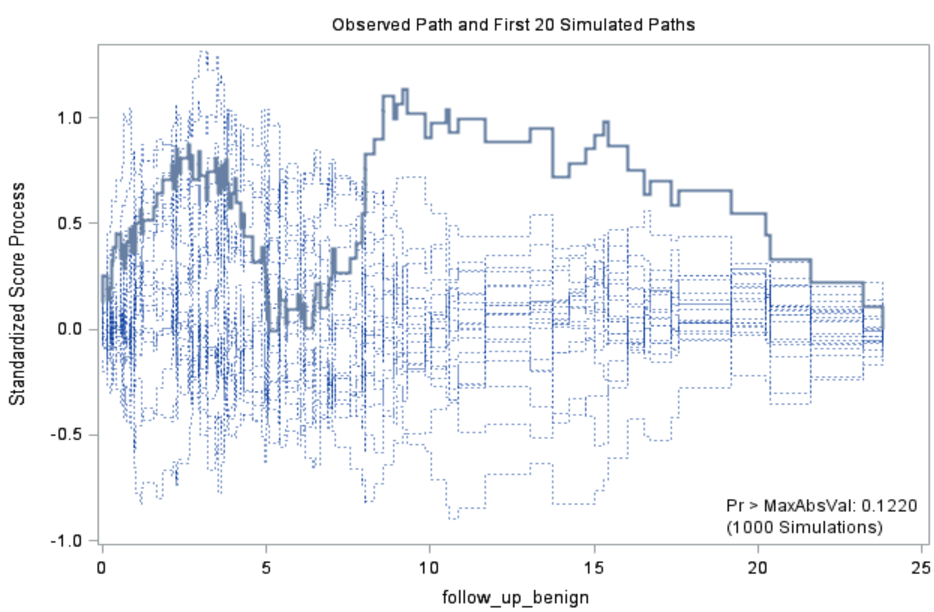
Plot of Schoenfeld residual vs. follow-up time for gender (benign tumor analysis)



Log-log plot comparing males to females to visually assess proportional hazards assumption



Checking proportional hazards assumption for (males vs. females) using the ASSESS statement in PHREG



Linearity assessment for the average number of visits variable by aim:

Analysis	Slope of Martingale residual vs. continuous variable	p-value (H_o: slope = 0)
Aim 1 (cancer)	-3.18212E-7	0.1070
Aim 2 (benign tumors)	-1.251E-8	1.0000

References

1. Johnson NE, Heatwole CR. Myotonic dystrophy: from bench to bedside. Seminars in neurology. 2012;32(3):246-54.

2. Thornton CA. Myotonic dystrophy. Neurol Clin. 2014;32(3):705-19, viii.

3. Gadalla SM, Lund M, Pfeiffer RM, Gortz S, Mueller CM, Moxley RT, 3rd, et al. Cancer risk among patients with myotonic muscular dystrophy. JAMA. 2011;306(22):2480-6.

4. Mueller CM, Hilbert JE, Martens W, Thornton CA, Moxley RT, 3rd, Greene MH. Hypothesis: neoplasms in myotonic dystrophy. Cancer causes & control : CCC. 2009;20(10):2009-20.

5. Abbott D, Johnson NE, Cannon-Albright LA. A population-based survey of risk for cancer in individuals diagnosed with myotonic dystrophy. Muscle Nerve. 2016;54(4):783-5.

6. Fernandez-Torron R, Garcia-Puga M, Emparanza JI, Maneiro M, Cobo AM, Poza JJ, et al. Cancer risk in DM1 is sex-related and linked to miRNA-200/141 downregulation. Neurology. 2016;87(12):1250-7.

7. Mohamed S, Pruna L, Kaminsky P. [Increasing risk of tumors in myotonic dystrophy type 1]. Presse Med. 2013;42(9 Pt 1):e281-4.

8. Win AK, Perattur PG, Pulido JS, Pulido CM, Lindor NM. Increased cancer risks in myotonic dystrophy. Mayo Clin Proc. 2012;87(2):130-5.

9. Wang Y, Pfeiffer RM, Alsaggaf R, Meeraus W, Gage JC, Anderson LA, et al. Risk of skin cancer among patients with myotonic dystrophy type 1 based on primary care physician data from the U.K. Clinical Practice Research Datalink. Int J Cancer. 2018;142(6):1174-81.

10. Du H, Cline MS, Osborne RJ, Tuttle DL, Clark TA, Donohue JP, et al. Aberrant alternative splicing and extracellular matrix gene expression in mouse models of myotonic dystrophy. Nat Struct Mol Biol. 2010;17(2):187-93.

11. Osborne RJ, Lin X, Welle S, Sobczak K, O'Rourke JR, Swanson MS, et al. Transcriptional and post-transcriptional impact of toxic RNA in myotonic dystrophy. Hum Mol Genet. 2009;18(8):1471-81.

12. Ranum LP, Day JW. Myotonic dystrophy: clinical and molecular parallels between myotonic dystrophy type 1 and type 2. Curr Neurol Neurosci Rep. 2002;2(5):465-70.

13. Ranum LP, Rasmussen PF, Benzow KA, Koob MD, Day JW. Genetic mapping of a second myotonic dystrophy locus. Nat Genet. 1998;19(2):196-8.

14. Udd B, Krahe R. The myotonic dystrophies: molecular, clinical, and therapeutic challenges. The Lancet Neurology. 2012;11(10):891-905.

15. Panzer S, Kuhl DP, Caskey CT. Unstable triplet repeat sequences: a source of cancer mutations? Stem Cells. 1995;13(2):146-57.

16. Emery AE. The muscular dystrophies. Lancet. 2002;359(9307):687-95.

17. Mercuri E, Muntoni F. Muscular dystrophies. Lancet. 2013;381(9869):845-60.

18. Bird TD. Myotonic Dystrophy Type 1. In: Pagon RA, Adam MP, Ardinger HH, Wallace SE, Amemiya A, Bean LJH, et al., editors. GeneReviews(R). Seattle (WA): University of Washington, Seattle
University of Washington, Seattle. All rights reserved.; 1993.

19. Brook JD, McCurrach ME, Harley HG, Buckler AJ, Church D, Aburatani H, et al. Molecular basis of myotonic dystrophy: expansion of a trinucleotide (CTG) repeat at the 3' end of a transcript encoding a protein kinase family member. Cell. 1992;68(4):799-808.

20. Fu YH, Pizzuti A, Fenwick RG, Jr., King J, Rajnarayan S, Dunne PW, et al. An unstable triplet repeat in a gene related to myotonic muscular dystrophy. Science. 1992;255(5049):1256-8.

21. Mahadevan M, Tsilfidis C, Sabourin L, Shutler G, Amemiya C, Jansen G, et al. Myotonic dystrophy mutation: an unstable CTG repeat in the 3' untranslated region of the gene. Science. 1992;255(5049):1253-5.

22. Liquori CL, Ricker K, Moseley ML, Jacobsen JF, Kress W, Naylor SL, et al. Myotonic dystrophy type 2 caused by a CCTG expansion in intron 1 of ZNF9. Science. 2001;293(5531):864-7.

23. Hsiao KM, Chen SS, Li SY, Chiang SY, Lin HM, Pan H, et al. Epidemiological and genetic studies of myotonic dystrophy type 1 in Taiwan. Neuroepidemiology. 2003;22(5):283-9.

24. Yotova V, Labuda D, Zietkiewicz E, Gehl D, Lovell A, Lefebvre JF, et al. Anatomy of a founder effect: myotonic dystrophy in Northeastern Quebec. Hum Genet. 2005;117(2-3):177-87.

25. Suominen T, Bachinski LL, Auvinen S, Hackman P, Baggerly KA, Angelini C, et al. Population frequency of myotonic dystrophy: higher than expected frequency of myotonic dystrophy type 2 (DM2) mutation in Finland. Eur J Hum Genet. 2011;19(7):776-82.

26. Mladenovic J, Pekmezovic T, Todorovic S, Rakocevic-Stojanovic V, Savic D, Romac S, et al. Epidemiology of myotonic dystrophy type 1 (Steinert disease) in Belgrade (Serbia). Clin Neurol Neurosurg. 2006;108(8):757-60.

27. Mladenovic J, Pekmezovic T, Todorovic S, Rakocevic-Stojanovic V, Romac S, Apostolski S. [Epidemiology of myotonic dystrophy type 1 in the population of central Serbia]. Vojnosanit Pregl. 2005;62(5):377-82.

28. Lefter S, Hardiman O, Ryan AM. A population-based epidemiologic study of adult neuromuscular disease in the Republic of Ireland. Neurology. 2017;88(3):304-13.

29. Magee A, Nevin NC. The epidemiology of myotonic dystrophy in Northern Ireland. Community Genet. 1999;2(4):179-83.

30. Lindberg C, Bjerkne F. Prevalence of myotonic dystrophy type 1 in adults in western Sweden. Neuromuscul Disord. 2017;27(2):159-62.

31. Lopez de Munain A, Blanco A, Emparanza JI, Poza JJ, Marti Masso JF, Cobo A, et al. Prevalence of myotonic dystrophy in Guipuzcoa (Basque Country, Spain). Neurology. 1993;43(8):1573-6.

32. Norwood FL, Harling C, Chinnery PF, Eagle M, Bushby K, Straub V. Prevalence of genetic muscle disease in Northern England: in-depth analysis of a muscle clinic population. Brain. 2009;132(Pt 11):3175-86.

33. Kurtzke JF. Neuroepidemiology. Ann Neurol. 1984;16(3):265-77.

34. Ashizawa T, Sarkar PS. Myotonic dystrophy types 1 and 2. Handb Clin Neurol. 2011;101:193-237.

35. Harley HG, Rundle SA, MacMillan JC, Myring J, Brook JD, Crow S, et al. Size of the unstable CTG repeat sequence in relation to phenotype and parental transmission in myotonic dystrophy. Am J Hum Genet. 1993;52(6):1164-74.

36. De Temmerman N, Sermon K, Seneca S, De Rycke M, Hilven P, Lissens W, et al. Intergenerational instability of the expanded CTG repeat in the DMPK gene: studies in human gametes and preimplantation embryos. Am J Hum Genet. 2004;75(2):325-9.

37. Ashizawa T, Anvret M, Baiget M, Barcelo JM, Brunner H, Cobo AM, et al. Characteristics of intergenerational contractions of the CTG repeat in myotonic dystrophy. Am J Hum Genet. 1994;54(3):414-23.

38. Ashizawa T, Dunne PW, Ward PA, Seltzer WK, Richards CS. Effects of the sex of myotonic dystrophy patients on the unstable triplet repeat in their affected offspring. Neurology. 1994;44(1):120-2.

39. Barcelo JM, Mahadevan MS, Tsilfidis C, MacKenzie AE, Korneluk RG. Intergenerational stability of the myotonic dystrophy protomutation. Hum Mol Genet. 1993;2(6):705-9.

40. Braida C, Stefanatos RK, Adam B, Mahajan N, Smeets HJ, Niel F, et al. Variant CCG and GGC repeats within the CTG expansion dramatically modify mutational dynamics and likely contribute toward unusual symptoms in some myotonic dystrophy type 1 patients. Hum Mol Genet. 2010;19(8):1399-412.

41. Ashizawa T, Dubel JR, Harati Y. Somatic instability of CTG repeat in myotonic dystrophy. Neurology. 1993;43(12):2674-8.

42. Morales F, Couto JM, Higham CF, Hogg G, Cuenca P, Braida C, et al. Somatic instability of the expanded CTG triplet repeat in myotonic dystrophy type 1 is a heritable quantitative trait and modifier of disease severity. Hum Mol Genet. 2012;21(16):3558-67.

43. Banuls J, Botella R, Palau F, Ramon R, Diaz C, Paya A, et al. Tissue and tumor mosaicism of the myotonin protein kinase gene trinucleotide repeat in a patient with multiple basal cell carcinomas associated with myotonic dystrophy. J Am Acad Dermatol. 2004;50(2 Suppl):S1-3.

44. Jinnai K, Sugio T, Mitani M, Hashimoto K, Takahashi K. Elongation of (CTG)n repeats in myotonic dystrophy protein kinase gene in tumors associated with myotonic dystrophy patients. Muscle Nerve. 1999;22(9):1271-4.

45. Kinoshita M, Igarashi A, Komori T, Tamura H, Hayashi M, Kinoshita K, et al. Differences in CTG triplet repeat expansions in an ovarian cancer and cyst from a patient with myotonic dystrophy. Muscle Nerve. 1997;20(5):622-4.

46. Ogata K, Takahashi A, Oguchi N, Ishitoya J, Fuse S, Shimpo T. [Somatic mosaicism of p(CTG)n expansion in a case of myotonic dystrophy with parotid tumor]. Rinsho Shinkeigaku. 1998;38(8):736-8.

47. Osanai R, Kinoshita M, Hirose K, Homma T, Kawabata I. CTG triplet repeat expansion in a laryngeal carcinoma from a patient with myotonic dystrophy. Muscle Nerve. 2000;23(5):804-6.

48. Lee JE, Cooper TA. Pathogenic mechanisms of myotonic dystrophy. Biochem Soc Trans. 2009;37(Pt 6):1281-6.

49. Sicot G, Gourdon G, Gomes-Pereira M. Myotonic dystrophy, when simple repeats reveal complex pathogenic entities: new findings and future challenges. Hum Mol Genet. 2011;20(R2):R116-23.

50. Amack JD, Mahadevan MS. The myotonic dystrophy expanded CUG repeat tract is necessary but not sufficient to disrupt C2C12 myoblast differentiation. Hum Mol Genet. 2001;10(18):1879-87.

51. Mankodi A, Logigian E, Callahan L, McClain C, White R, Henderson D, et al. Myotonic dystrophy in transgenic mice expressing an expanded CUG repeat. Science. 2000;289(5485):1769-73.

52. Jiang H, Mankodi A, Swanson MS, Moxley RT, Thornton CA. Myotonic dystrophy type 1 is associated with nuclear foci of mutant RNA, sequestration of muscleblind proteins and deregulated alternative splicing in neurons. Hum Mol Genet. 2004;13(24):3079-88.

53. Mankodi A, Lin X, Blaxall BC, Swanson MS, Thornton CA. Nuclear RNA foci in the heart in myotonic dystrophy. Circ Res. 2005;97(11):1152-5.

54. Mankodi A, Urbinati CR, Yuan QP, Moxley RT, Sansone V, Krym M, et al. Muscleblind localizes to nuclear foci of aberrant RNA in myotonic dystrophy types 1 and 2. Hum Mol Genet. 2001;10(19):2165-70.

55. Wang J, Pegoraro E, Menegazzo E, Gennarelli M, Hoop RC, Angelini C, et al. Myotonic dystrophy: evidence for a possible dominant-negative RNA mutation. Hum Mol Genet. 1995;4(4):599-606.

56. Wang ET, Cody NA, Jog S, Biancolella M, Wang TT, Treacy DJ, et al. Transcriptome-wide regulation of pre-mRNA splicing and mRNA localization by muscleblind proteins. Cell. 2012;150(4):710-24.

57. Ho TH, Charlet BN, Poulos MG, Singh G, Swanson MS, Cooper TA. Muscleblind proteins regulate alternative splicing. EMBO J. 2004;23(15):3103-12.

58. Miller JW, Urbinati CR, Teng-Umnuay P, Stenberg MG, Byrne BJ, Thornton CA, et al. Recruitment of human muscleblind proteins to (CUG)(n) expansions associated with myotonic dystrophy. EMBO J. 2000;19(17):4439-48.

59. Mankodi A, Takahashi MP, Jiang H, Beck CL, Bowers WJ, Moxley RT, et al. Expanded CUG repeats trigger aberrant splicing of ClC-1 chloride channel pre-mRNA and hyperexcitability of skeletal muscle in myotonic dystrophy. Mol Cell. 2002;10(1):35-44.

60. Lueck JD, Mankodi A, Swanson MS, Thornton CA, Dirksen RT. Muscle chloride channel dysfunction in two mouse models of myotonic dystrophy. J Gen Physiol. 2007;129(1):79-94.

61. Zu T, Gibbens B, Doty NS, Gomes-Pereira M, Huguet A, Stone MD, et al. Non-ATG-initiated translation directed by microsatellite expansions. Proc Natl Acad Sci U S A. 2011;108(1):260-5.

62. Davis BM, McCurrach ME, Taneja KL, Singer RH, Housman DE. Expansion of a CUG trinucleotide repeat in the 3' untranslated region of myotonic dystrophy protein kinase transcripts results in nuclear retention of transcripts. Proc Natl Acad Sci U S A. 1997;94(14):7388-93.

63. Maeda M, Taft CS, Bush EW, Holder E, Bailey WM, Neville H, et al. Identification, tissue-specific expression, and subcellular localization of the 80- and 71-kDa forms of myotonic dystrophy kinase protein. J Biol Chem. 1995;270(35):20246-9.

64. Mateos-Aierdi AJ, Goicoechea M, Aiastui A, Fernandez-Torron R, Garcia-Puga M, Matheu A, et al. Muscle wasting in myotonic dystrophies: a model of premature aging. Front Aging Neurosci. 2015;7:125.

65. Harper P. Myotonic Dystrophy. 3rd ed. London: Harcourt Publishers Ltd; 2001.

66. Shelbourne P, Winqvist R, Kunert E, Davies J, Leisti J, Thiele H, et al. Unstable DNA may be responsible for the incomplete penetrance of the myotonic dystrophy phenotype. Hum Mol Genet. 1992;1(7):467-73.

67. Reardon W, Newcombe R, Fenton I, Sibert J, Harper PS. The natural history of congenital myotonic dystrophy: mortality and long term clinical aspects. Arch Dis Child. 1993;68(2):177-81.

68. de Die-Smulders CE, Howeler CJ, Thijs C, Mirandolle JF, Anten HB, Smeets HJ, et al. Age and causes of death in adult-onset myotonic dystrophy. Brain. 1998;121 (Pt 8):1557-63.

69. Groh WJ, Groh MR, Saha C, Kincaid JC, Simmons Z, Ciafaloni E, et al. Electrocardiographic abnormalities and sudden death in myotonic dystrophy type 1. N Engl J Med. 2008;358(25):2688-97.

70. Johnson NE, Abbott D, Cannon-Albright LA. Relative risks for comorbidities associated with myotonic dystrophy: A population-based analysis. Muscle Nerve. 2015;52(4):659-61.

71. Lund M, Diaz LJ, Ranthe MF, Petri H, Duno M, Juncker I, et al. Cardiac involvement in myotonic dystrophy: a nationwide cohort study. Eur Heart J. 2014;35(32):2158-64.

72. Day JW, Ricker K, Jacobsen JF, Rasmussen LJ, Dick KA, Kress W, et al. Myotonic dystrophy type 2: molecular, diagnostic and clinical spectrum. Neurology. 2003;60(4):657-64.

73. Raitta C, Karli P. Ocular findings in myotonic dystrophy. Ann Ophthalmol. 1982;14(7):647-50.

74. Lopez de Munain A, Emparanza JI, Blanco A, Cobo A, Poza JJ, Basauri B, et al. [Clinical manifestations of myotonic dystrophy: epidemiologic survey]. Med Clin (Barc). 1993;101(5):161-4.

75. Kaminsky P, Poussel M, Pruna L, Deibener J, Chenuel B, Brembilla-Perrot B. Organ dysfunction and muscular disability in myotonic dystrophy type 1. Medicine (Baltimore). 2011;90(4):262-8.

76. Choi SH, Yang HK, Hwang JM, Park KS. Ocular Findings of Myotonic Dystrophy Type 1 in the Korean Population. Graefes Arch Clin Exp Ophthalmol. 2016;254(6):1189-93.

77. Wood L, Cordts I, Atalaia A, Marini-Bettolo C, Maddison P, Phillips M, et al. The UK Myotonic Dystrophy Patient Registry: facilitating and accelerating clinical research. J Neurol. 2017;264(5):979-88.

78. Orngreen MC, Arlien-Soborg P, Duno M, Hertz JM, Vissing J. Endocrine function in 97 patients with myotonic dystrophy type 1. J Neurol. 2012;259(5):912-20.

79. Dogan C, De Antonio M, Hamroun D, Varet H, Fabbro M, Rougier F, et al. Gender as a Modifying Factor Influencing Myotonic Dystrophy Type 1 Phenotype Severity and Mortality: A Nationwide Multiple Databases Cross-Sectional Observational Study. PLoS One. 2016;11(2):e0148264.

80. National Organization for Rare Disorders (NORD). Myotonic Dystrophy. 2017 [Available from: https://rarediseases.org/rare-diseases/dystrophy-myotonic/.

81. Gadalla SM, Pfeiffer RM, Kristinsson SY, Bjorkholm M, Hilbert JE, Moxley RT, 3rd, et al. Quantifying cancer absolute risk and cancer mortality in the presence of competing events after a myotonic dystrophy diagnosis. PLoS One. 2013;8(11):e79851.

82. Griggs RC, Pandya S, Florence JM, Brooke MH, Kingston W, Miller JP, et al. Randomized controlled trial of testosterone in myotonic dystrophy. Neurology. 1989;39(2 Pt 1):219-22.

83. Heatwole CR, Eichinger KJ, Friedman DI, Hilbert JE, Jackson CE, Logigian EL, et al. Open-label trial of recombinant human insulin-like growth factor 1/recombinant human insulin-like growth factor binding protein 3 in myotonic dystrophy type 1. Arch Neurol. 2011;68(1):37-44.

84. Thornton CA, Wang E, Carrell EM. Myotonic dystrophy: approach to therapy. Curr Opin Genet Dev. 2017;44:135-40.

85. Jauvin D, Chretien J, Pandey SK, Martineau L, Revillod L, Bassez G, et al. Targeting DMPK with Antisense Oligonucleotide Improves Muscle Strength in Myotonic Dystrophy Type 1 Mice. Mol Ther Nucleic Acids. 2017;7:465-74.

86. Bhakta D, Shen C, Kron J, Epstein AE, Pascuzzi RM, Groh WJ. Pacemaker and implantable cardioverter-defibrillator use in a US myotonic dystrophy type 1 population. J Cardiovasc Electrophysiol. 2011;22(12):1369-75.

87. Kouki T, Takasu N, Nakachi A, Tamanaha T, Komiya I, Tawata M. Low-dose metformin improves hyperglycaemia related to myotonic dystrophy. Diabet Med. 2005;22(3):346-7.

88. Dahlqvist JR, Orngreen MC, Witting N, Vissing J. Endocrine function over time in patients with myotonic dystrophy type 1. Eur J Neurol. 2015;22(1):116-22.

89. Alsaggaf R, Wang Y, Marini-Bettolo C, Wood L, Nikolenko N, Lochmuller H, et al. Benign and Malignant Tumors in the UK Myotonic Dystrophy Patient Registry. Muscle Nerve. 2017.

90. Bianchi ML, Leoncini E, Masciullo M, Modoni A, Gadalla SM, Massa R, et al. Increased risk of tumor in DM1 is not related to exposure to common lifestyle risk factors. J Neurol. 2016;263(3):492-8.

91. Zampetti A, Silvestri G, Manco S, Khamis K, Masciullo M, Bianchi ML, et al. Dysplastic nevi, cutaneous melanoma, and other skin neoplasms in patients with myotonic dystrophy type 1: a cross-sectional study. J Am Acad Dermatol. 2015;72(1):85-91.

92. Marcoval J, Olive M, Bonfill-Orti M, Martinez-Molina L, Talavera-Belmonte A. Cutaneous Neoplasms in Myotonic Dystrophy Type 1. Dermatology. 2016;232(6):700-3.

93. Alsaggaf R, Wang Y, Marini-Bettolo C, Wood L, Nikolenko N, Lochmüller H, et al. Benign and Malignant Tumors in the UK Myotonic Dystrophy Patient Registry. Muscle Nerve.

94. Das M, Moxley RT, 3rd, Hilbert JE, Martens WB, Letren L, Greene MH, et al. Correlates of tumor development in patients with myotonic dystrophy. J Neurol. 2012;259(10):2161-6.

95. Wang Y, Pfeiffer RM, Alsaggaf R, Meeraus W, Gage JC, Anderson LA, et al. Risk of skin cancer among patients with myotonic dystrophy type 1 based on Primary care physician data from the United Kingdom Clinical Practice Research Datalink. 2017.

96. Kajino Y, Yamaguchi A, Hashimoto N, Matsuura A, Sato N, Kikuchi K. beta-Catenin gene mutation in human hair follicle-related tumors. Pathol Int. 2001;51(7):543-8.

97. Chan E, Gat U, McNiff JM, Fuchs E. A common human skin tumour is caused by activating mutations in β-catenin. Nature Genetics. 1999;21:410.

98. Campione E, Botta A, Di Prete M, Rastelli E, Gibellini M, Petrucci A, et al. Cutaneous features of myotonic dystrophy types 1 and 2: Implication of premature aging and vitamin D homeostasis. Neuromuscul Disord. 2017;27(2):163-9.

99. National Institutes of Health. U.S. National Library of Medicine. Genetics Home Reference. 2018 [Available from: https://www.nlm.nih.gov/.

100. Division of Human Development and Disability, National Center on Birth Defects and Developmental Disabilities, Centers for Disease Control and Prevention. Muscular Dystrophy. 2018 [Available from: https://www.cdc.gov/ncbddd/musculardystrophy/index.html.

101. National Institute of Neurological Disorders and Stroke. National Institutes of Health. Muscular Dystrophy: Hope Through Research. 2017 [Available from: https://www.ninds.nih.gov/Disorders/Patient-Caregiver-Education/Hope-Through-Research/Muscular-Dystrophy-Hope-Through-Research.

102. Lis Y, Mann RD. The VAMP Research multi-purpose database in the U.K. J Clin Epidemiol. 1995;48(3):431-43.

103. Herrett E, Gallagher AM, Bhaskaran K, Forbes H, Mathur R, van Staa T, et al. Data Resource Profile: Clinical Practice Research Datalink (CPRD). Int J Epidemiol. 2015;44(3):827-36.

104. Dregan A, Moller H, Murray-Thomas T, Gulliford MC. Validity of cancer diagnosis in a primary care database compared with linked cancer registrations in England. Population-based cohort study. Cancer Epidemiol. 2012;36(5):425-9.

105. Herrett E, Thomas SL, Schoonen WM, Smeeth L, Hall AJ. Validation and validity of diagnoses in the General Practice Research Database: a systematic review. Br J Clin Pharmacol. 2010;69(1):4-14.

106. Khan NF, Harrison SE, Rose PW. Validity of diagnostic coding within the General Practice Research Database: a systematic review. Br J Gen Pract. 2010;60(572):e128-36.

107. Boggon R, van Staa TP, Chapman M, Gallagher AM, Hammad TA, Richards MA. Cancer recording and mortality in the General Practice Research Database and linked cancer registries. Pharmacoepidemiol Drug Saf. 2013;22(2):168-75.

108. Clinical Practice Research Datalink: Medicines and Healthcare Products Regulatory Agency (MHRA); 2017 [Available from: https://www.cprd.com/.

109. GPRD recording guidelines for vision users. London: Crown Copyright; 2004 [

110. Mulnier HE, Seaman HE, Raleigh VS, Soedamah-Muthu SS, Colhoun HM, Lawrenson RA. Mortality in people with type 2 diabetes in the UK. Diabet Med. 2006;23(5):516-21.

111. Centers for Disease Control and Prevention (CDC). Factors That Contribute to Health Disparities in Cancer. 2014 [Available from: https://www.cdc.gov/cancer/healthdisparities/basic_info/challenges.htm.

112. Wang Y, Pfeiffer RM, Alsaggaf R, Meeraus W, Gage JC, Anderson LA, et al. Risk of skin cancer among patients with myotonic dystrophy type 1 based on primary

care physician data from the U.K. Clinical Practice Research Datalink. Int J Cancer. 2017.

113. Allison PD, SAS Institute. Survival analysis using SAS : a practical guide. 2nd ed. Cary, N.C.: SAS Pub.; 2010. viii, 324 p. p.

114. Gadalla SM, Pfeiffer RM, Kristinsson SY, Bjorkholm M, Landgren O, Greene MH. Brain tumors in patients with myotonic dystrophy: a population-based study. Eur J Neurol. 2016;23(3):542-7.

115. Echenne B, Bassez G. Congenital and infantile myotonic dystrophy. Handb Clin Neurol. 2013;113:1387-93.

116. Ho G, Cardamone M, Farrar M. Congenital and childhood myotonic dystrophy: Current aspects of disease and future directions. World J Clin Pediatr. 2015;4(4):66-80.

117. Alsaggaf R, St. George DM, Zhan M, Pfeiffer RM, Wang Y, Wagner KR, et al. Cancer Risk in Myotonic Dystrophy Type I: First Evidence of a Role for Disease Severity. 2018.

118. Pearson CE, Nichol Edamura K, Cleary JD. Repeat instability: mechanisms of dynamic mutations. Nat Rev Genet. 2005;6(10):729-42.

119. Abeliovich D, Lerer I, Pashut-Lavon I, Shmueli E, Raas-Rothschild A, Frydman M. Negative expansion of the myotonic dystrophy unstable sequence. Am J Hum Genet. 1993;52(6):1175-81.

120. Peterlin B, Logar N, Zidar J. CTG repeat analysis in lymphocytes, muscles and fibroblasts in patients with myotonic dystrophy. Pflugers Arch. 1996;431(6 Suppl 2):R199-200.

121. Sergeant N, Sablonniere B, Schraen-Maschke S, Ghestem A, Maurage CA, Wattez A, et al. Dysregulation of human brain microtubule-associated tau mRNA maturation in myotonic dystrophy type 1. Hum Mol Genet. 2001;10(19):2143-55.

122. Wohrle D, Kennerknecht I, Wolf M, Enders H, Schwemmle S, Steinbach P. Heterogeneity of DM kinase repeat expansion in different fetal tissues and further expansion during cell proliferation in vitro: evidence for a casual involvement of methyl-

directed DNA mismatch repair in triplet repeat stability. Hum Mol Genet. 1995;4(7):1147-53.

123. Winawer SJ, Zauber AG, Ho MN, O'Brien MJ, Gottlieb LS, Sternberg SS, et al. Prevention of colorectal cancer by colonoscopic polypectomy. The National Polyp Study Workgroup. N Engl J Med. 1993;329(27):1977-81.

124. Zauber AG, Winawer SJ, O'Brien MJ, Lansdorp-Vogelaar I, van Ballegooijen M, Hankey BF, et al. Colonoscopic polypectomy and long-term prevention of colorectal-cancer deaths. N Engl J Med. 2012;366(8):687-96.

125. Alsaggaf R, St. George DM, Zhan M, Pfeiffer RM, Wang Y, Wagner KR, et al. Risk of benign tumors in patients with myotonic dystrophy type I and their association with subsequent cancers. 2018.

126. De Antonio M, Dogan C, Hamroun D, Mati M, Zerrouki S, Eymard B, et al. Unravelling the myotonic dystrophy type 1 clinical spectrum: A systematic registry-based study with implications for disease classification. Rev Neurol (Paris). 2016;172(10):572-80.

127. Surveillance, Epidemiology, and End Results (SEER) Program (www.seer.cancer.gov) Research Data (1973-2014). National Cancer Institute, DCCPS, Surveillance Research Program. released April 2017, based on the November 2016 submission.

128. Cancer registration statistics, England. Cancer diagnoses and age-standardised incidence rates for all types of cancer by age and sex. Office for National Statistics. 2016.

129. El-Serag HB, Hampel H, Javadi F. The association between diabetes and hepatocellular carcinoma: a systematic review of epidemiologic evidence. Clin Gastroenterol Hepatol. 2006;4(3):369-80.

130. Friberg E, Orsini N, Mantzoros CS, Wolk A. Diabetes mellitus and risk of endometrial cancer: a meta-analysis. Diabetologia. 2007;50(7):1365-74.

131. Guraya SY. Association of type 2 diabetes mellitus and the risk of colorectal cancer: A meta-analysis and systematic review. World J Gastroenterol. 2015;21(19):6026-31.

132. Huxley R, Ansary-Moghaddam A, Berrington de Gonzalez A, Barzi F, Woodward M. Type-II diabetes and pancreatic cancer: a meta-analysis of 36 studies. Br J Cancer. 2005;92(11):2076-83.

133. Larsson SC, Mantzoros CS, Wolk A. Diabetes mellitus and risk of breast cancer: a meta-analysis. Int J Cancer. 2007;121(4):856-62.

134. Larsson SC, Orsini N, Wolk A. Diabetes mellitus and risk of colorectal cancer: a meta-analysis. J Natl Cancer Inst. 2005;97(22):1679-87.

135. Wang P, Kang D, Cao W, Wang Y, Liu Z. Diabetes mellitus and risk of hepatocellular carcinoma: a systematic review and meta-analysis. Diabetes Metab Res Rev. 2012;28(2):109-22.

136. Kasznicki J, Sliwinska A, Drzewoski J. Metformin in cancer prevention and therapy. Ann Transl Med. 2014;2(6):57.

137. Zi F, Zi H, Li Y, He J, Shi Q, Cai Z. Metformin and cancer: An existing drug for cancer prevention and therapy. Oncol Lett. 2018;15(1):683-90.

138. Laustriat D, Gide J, Barrault L, Chautard E, Benoit C, Auboeuf D, et al. In Vitro and In Vivo Modulation of Alternative Splicing by the Biguanide Metformin. Mol Ther Nucleic Acids. 2015;4:e262.