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Cancer Training Affecting the Lives of Young Scientists and Teachers (CATALYST) Program¹

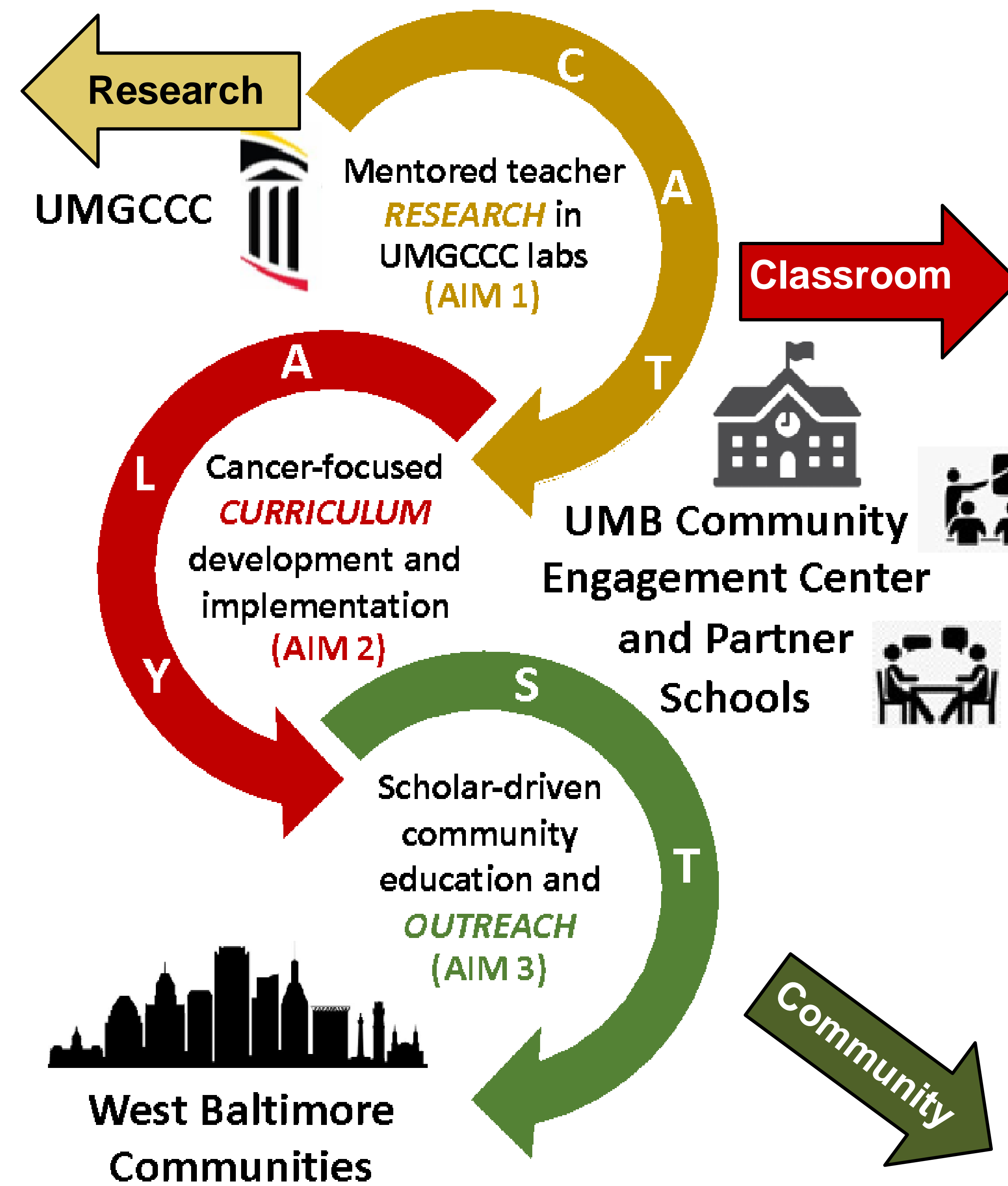
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CANCER Training Affecting the Lives of Young Scientists and Teachers (CATALYST)

Rationale: Hands on cancer research by teachers will provide the content, experiences and perspectives to develop effective middle/high school curriculum and community education material.

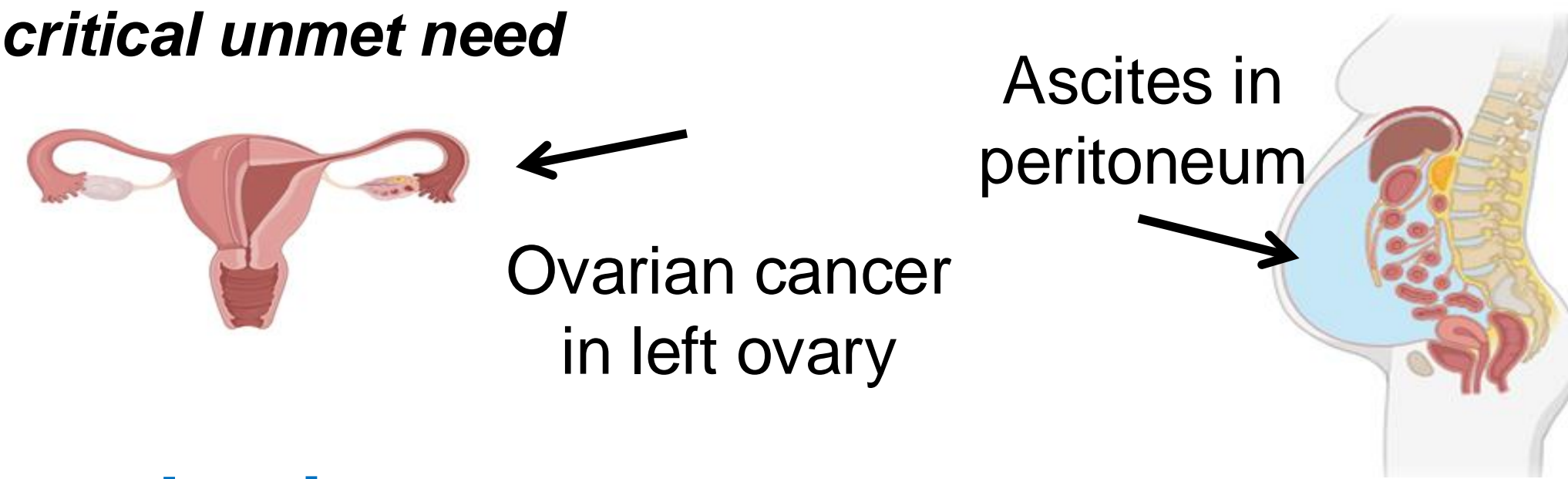
We hypothesize that implementing these resources will inspire the next generation of cancer researchers and caregivers and inform community healthcare practices.



Background

Ovarian cancer is a significant health concern

- OvCA is a cancer of the reproductive system that can go undetected until late stages of the disease.
- It is estimated that 19,680 new cases will be diagnosed and OvCA will result in 12,740 deaths this year.
- When detected early 5-year survival rates are ~90%; but decrease to >50% when diagnosed at later stages.
- OvCA associated ascites contain high levels ganglioside GD3, which suppress anti-tumor immune responses.
- **Identifying prognostic biomarkers to detect early-stage disease is essential to increase survival and represents a critical unmet need**



Hypothesis

GD3 is overexpressed and shed by OvCA. We hypothesize that GD3 can be used as a biomarker for the early detection of OvCA.

Methodology

- GD3 levels in OvCA-associated ascites will be measured by ELISA and Dot blot.
- Symmetric dimethylarginine (SDMA) levels are used to assess kidney function. SDMA levels will be measured as a control.

Results

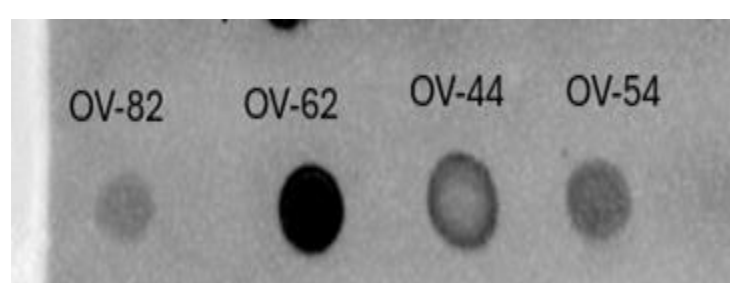


Figure 1. There was an overexpression of GD3 in patient OV-62 shown in the G3 dot plot.

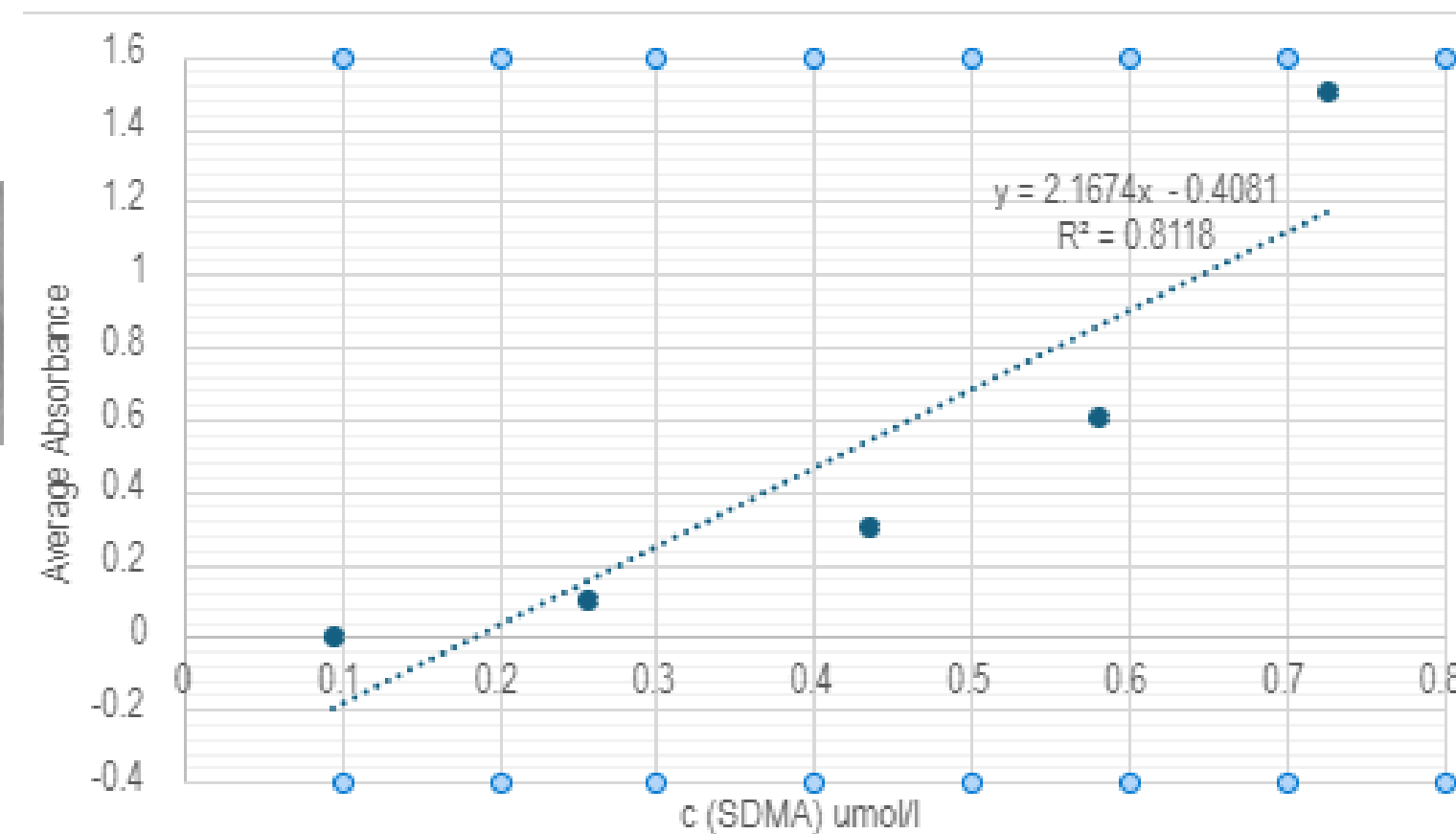


Figure 2. Quantitative determination of SDMA in OvCa patients

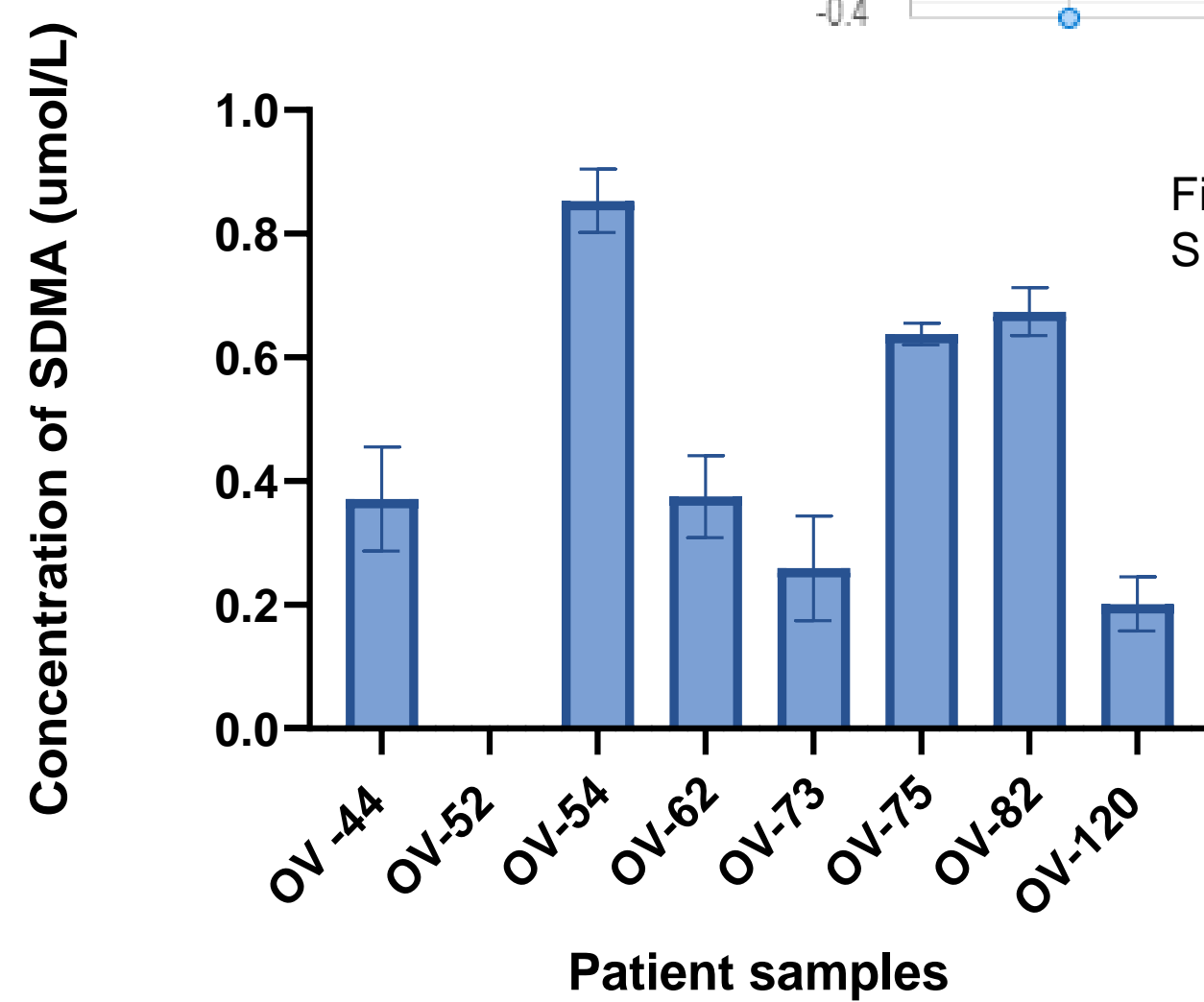


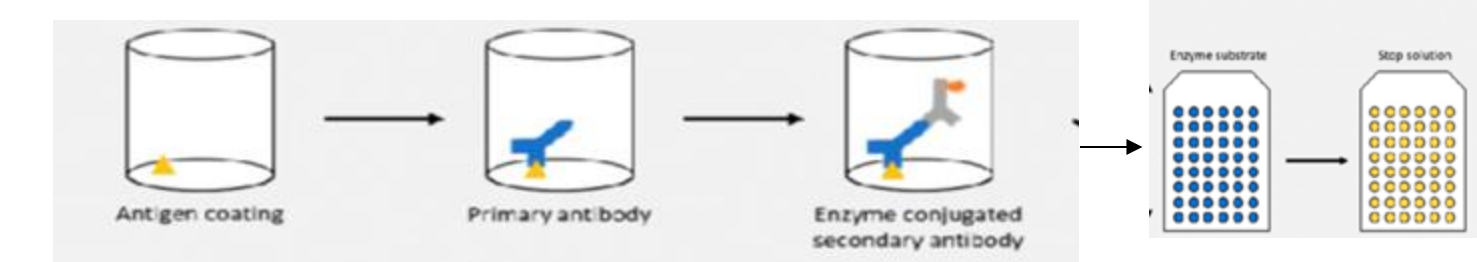
Fig. 3. Standards for SDMA in human serum is 0., .1, .3, .6, and 1.5. The OvCa patients are in the standard curve range except OV-52 patient.

Conclusion

GD3 and SDMA levels varied in the OvCA patient samples analyzed. Future work will provide data on patient demographics and cancer staging to assess potential correlations with GD3 and SDMA levels; this information, and analyses of additional patients, will reveal the diagnostic potential of these biomarkers. Are the levels of the biomarkers small enough concentrations to be passed through the kidney into the urine, we are testing ascites before moving forward to the urine.

Cancer and the Connection to the Lab, Classroom and Community

Lab Bench Aims



Does GD3 levels correlate with clinical outcome in OvCA?

Validate the diagnostic potential of GD3 as biomarkers in ovarian cancer.

Test GD3 levels in large populations in cervical malignancies, endometrial patients, ascites and Hep B.

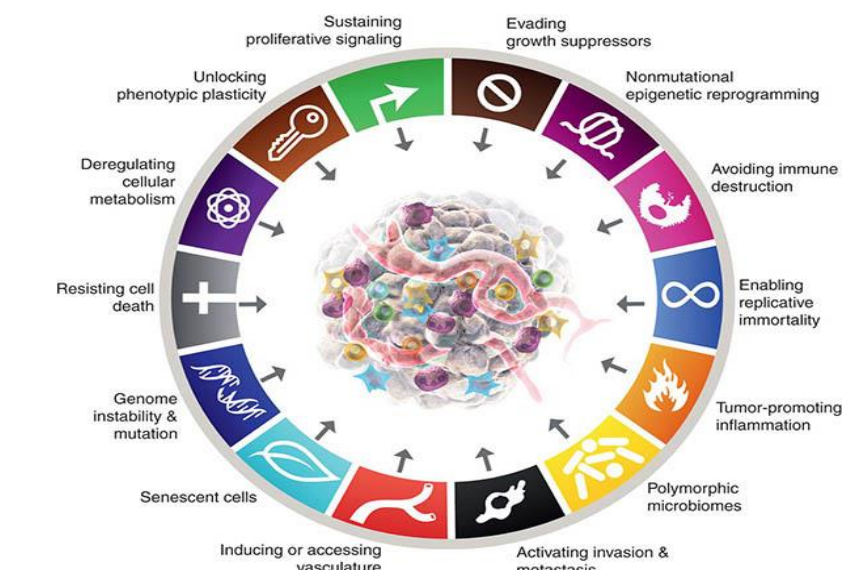
Curriculum and Instruction Focus

Biology (9th/10th/middle school cells and hallmarks of cancer)

Topic: Cells and Cancer

Anchor Phenomenon: Students will explore the importance of the cell theory and what is needed for cell regulation

Scientific Connection: Cancer and uncontrollable cell growth and metastasis

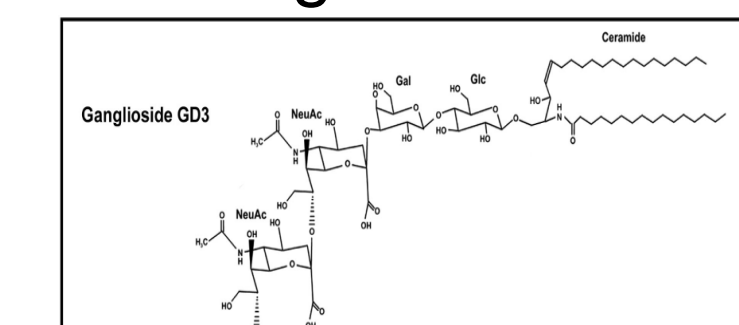


Microbiology (11th/12th Structure of GD3)

Topic: Biochemistry and molecular structure of GD3

Anchor Phenomenon: -Students will explore antibody-mediated immunity, primary and secondary antibodies

Scientific Connection: Cell mediated-autoimmune reactions and the importance of diagnostic immunology and use of ELISA



Anat. and Physiology (11th/12th Ascites and Body Systems)

Topic: Body Systems

Anchor Phenomenon: -Students will explore the effect of ascites on body systems. Diagnostic imaging to analyze peritoneal area and key organs.

Scientific Connection: Cancer and the effect on the Human Body



Community Education

Cancer-focused middle school and high school outreach through new curriculum components

Community education through PSA and Cancer Career day led by teachers and scholars

Evaluate short- and long-term consequences of health practices on the human body such as food scarcity, and diet intake

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