

# Isolating the Recipient and Donor Risk Factors of Post-Liver Transplant Death in Patients who Underwent Pre-Liver Transplant Transjugular Intrahepatic Portosystemic Shunt Insertion

Dr. David Uihwan Lee MD<sup>1</sup>, Ki Jung Lee<sup>2</sup>, Kevin Chang<sup>2</sup>, Olivia Hofheinz<sup>2</sup>, Harrison Chou<sup>2</sup>, Gregory Hongyuan Fan<sup>2</sup>, and Dr. Nathalie H. Urrunaga MD MS<sup>1</sup>

## Background and Aims

Given that transjugular intrahepatic portosystemic shunt (TIPS) is often used as bridge therapy to ameliorate the symptoms of decompensated liver disease prior to liver transplant (LT), it is important to determine the risk factors of post-LT mortality in this cohort and to predict mortality using prognostic modeling.

## Methods

The UNOS-STAR registry (2005-2019) was queried to select patients who underwent TIPS prior to LT. We used univariate and multivariate Cox regression to identify factors associated with 90-day mortality (with a p-value threshold of <0.1), crude and adjusted hazard ratios (cHR and aHR). These variables were then used to form standard and bootstrapping-enhanced (BE) receiver operating characteristic (ROC) curves, from which the area-under-ROC (AUC) were calculated. Using a true positivity rate (TPR) of 0.8, specificity, positive predictive value (PPV), and negative predictive value (NPV) were derived for the final ROC. Using the model threshold, the population was stratified into high and low-risk subgroups to compare survival.

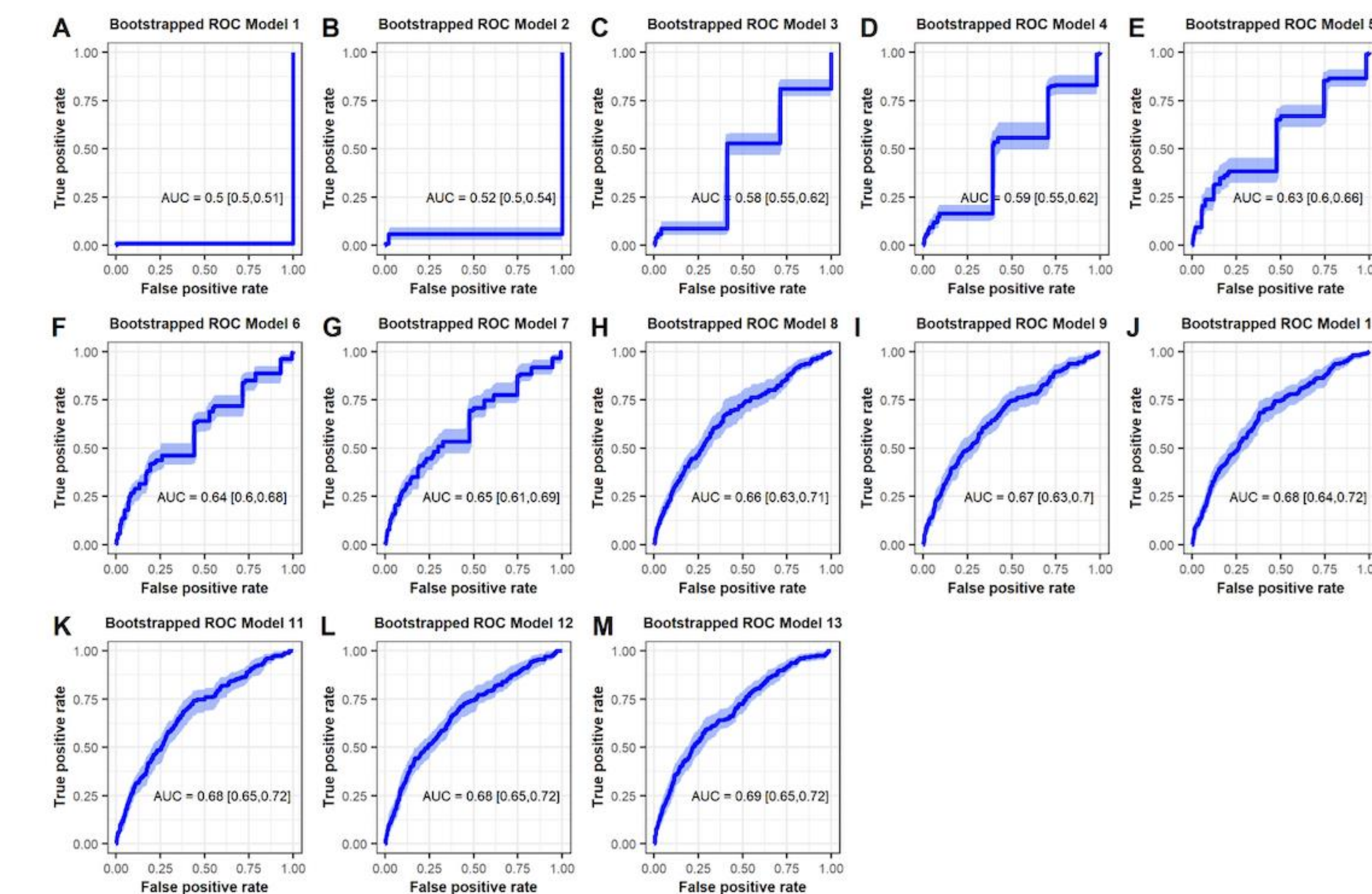
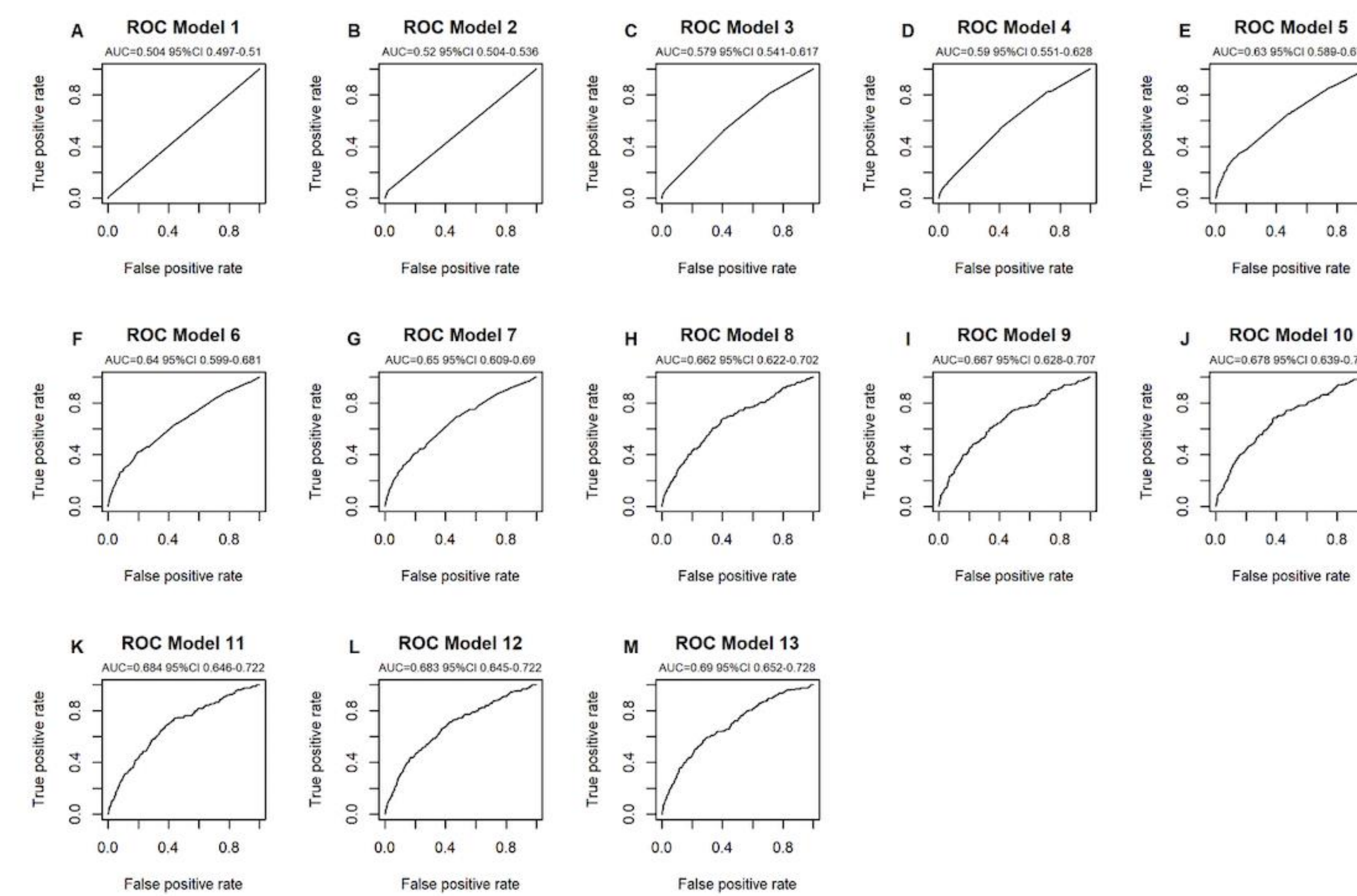
## Results

A total of 3984 patients who underwent pre-LT TIPS were selected. The following variables were identified: donor history of infections (cHR: 0.73 95%CI 0.56-0.97; aHR: 0.70 95%CI 0.53-0.92), donor hematocrit level (cHR: 0.98 95%CI 0.95-1.00; aHR: 0.97 95%CI 0.94-0.99), donor BMI level (cHR: 1.02 95%CI 1.00-1.04; aHR: 1.03 95%CI 1.00-1.05), cold ischemia time (cHR: 1.04 95%CI 1.01-1.08; aHR: 1.04 95%CI 1.01-1.08), recipient INR (cHR: 1.13 95%CI 1.06-1.21; aHR: 1.09 95%CI 1.00-1.20), recipient creatinine (cHR: 1.25 95%CI 1.13-1.40; aHR: 1.11 95%CI 0.98-1.26), recipient history of portal vein thrombosis (cHR: 1.35 95%CI 0.96-1.91; aHR: 1.41 95%CI 0.99-1.99), grade 3-4 hepatic encephalopathy (cHR: 2.24 95%CI 1.46-3.44; aHR: 1.52 95%CI 0.96-2.42), recipient ICU stay (cHR: 2.58 95%CI 1.91-3.50; aHR: 1.66 95%CI 1.06-2.62), donor diabetes history (6-10 years cHR: 1.90 95%CI 1.00-3.59; aHR: 1.91 95%CI 1.00-3.65), donor cause of death as cerebrovascular accident (cHR: 1.74 95%CI 1.21-2.50; aHR: 1.80 95%CI 1.24-2.63), recipient epinephrine support (cHR: 2.99 95%CI 1.58-5.65; aHR: 2.93 95%CI 1.54-5.59), donor history of intracranial malignancy (cHR: 4.13 95%CI 1.03-16.62; aHR: 3.92 95%CI 0.89-17.23). The final standard and BE-ROC model showed AUC of 0.69 95%CI 0.65-0.73 and 0.69 95%CI 0.65-0.72. For the final standard model, with a TPR of 0.8, the parameters included specificity of 0.433, PPV of 0.071, and NPV of 0.976. Finally, the cohort was stratified into high and low-risk groups and survival between these groups was compared at various time points: 30-day (p=0.008), 90-day (p=0.002), 1-year (p<0.001), and 5-year (p<0.001).

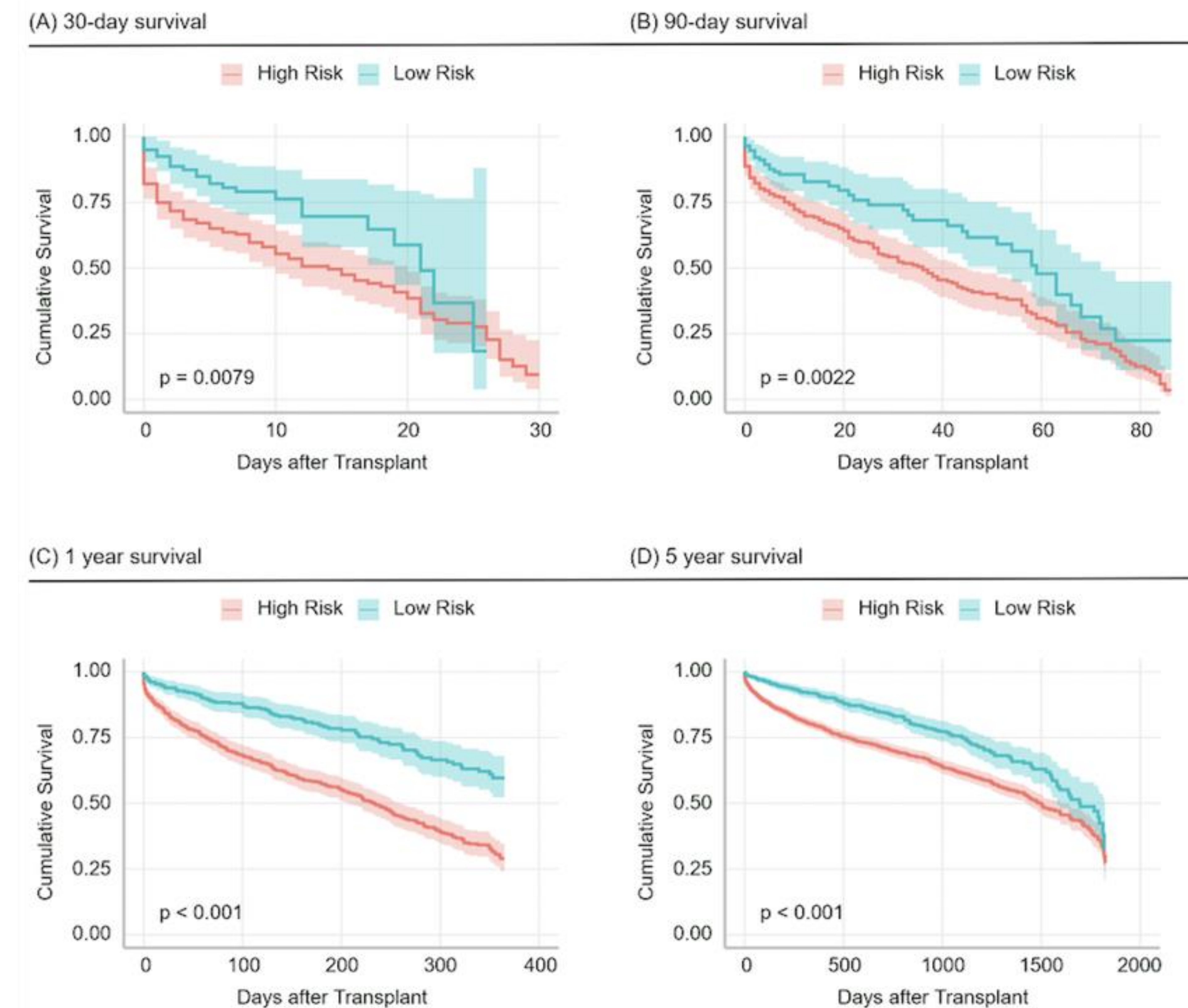
## Conclusion

This study identifies the risk factors of post-LT death in patients who received pre-LT TIPS and furthermore uses risk factors to model the outcome. The risk factors and the developed model could hold clinical utility in predicting death in TIPS patients who undergo LT.

## ROC Curves



## Survival of Low and High-Risk Groups



<sup>1</sup> University of Maryland School of Medicine, Division of Gastroenterology and Hepatology, 22 S Greene St, Baltimore, MD 21201, USA

<sup>2</sup> Liver Center, Division of Gastroenterology, Tufts Medical Center, 800 Washington Street, Boston, MA 02111, USA