

# UroPredict: Machine learning model on real-world data for prediction of kidney cancer recurrence

## UroCCR-120

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## KEY OUTCOMES

A machine learning (ML) model was developed for predicting individual postoperative disease-free survival (DFS) using real-world prospective data from the UroCCR network

The ML model outperformed the predictive performance of most usual risk scores while also being able to handle incomplete data

## BACKGROUND



Surgery is standard of care for localized renal cell carcinoma (RCC)



Predicting risk of kidney cancer recurrence after surgery can inform the most appropriate care plan for individuals



ML has the potential to predict outcomes more accurately than traditional tools

## OBJECTIVES

- 1° Predict individual DFS from baseline multimodal data
- 2° Stratify patients into risk groups to identify populations with very low and high risk of recurrence within 5 years following surgery

## MODEL DEVELOPMENT

- >200 demographic and clinical variables extracted
- Participating sites randomly assigned to training or testing cohorts 2:1
- ML model developed and evaluated
- SHAP (SHapley Additive exPlanations) values computed to explain each patient's predicted probability of recurrence within 5 years following surgery

## FINDINGS



3,372 patients undergoing surgery for localized or locally advanced RCC were included from the French UroCCR database

2000 - 2020  
Median follow-up = 30 months



The best results in **DFS prediction** were obtained using Cox PH models that included 24 clinical, pathological, and biological variables

**iAUC | 0.81**

[IC95% 0.77 - 0.85]



**TUMOR SIZE**



**HISTOLOGICAL SUBTYPE**



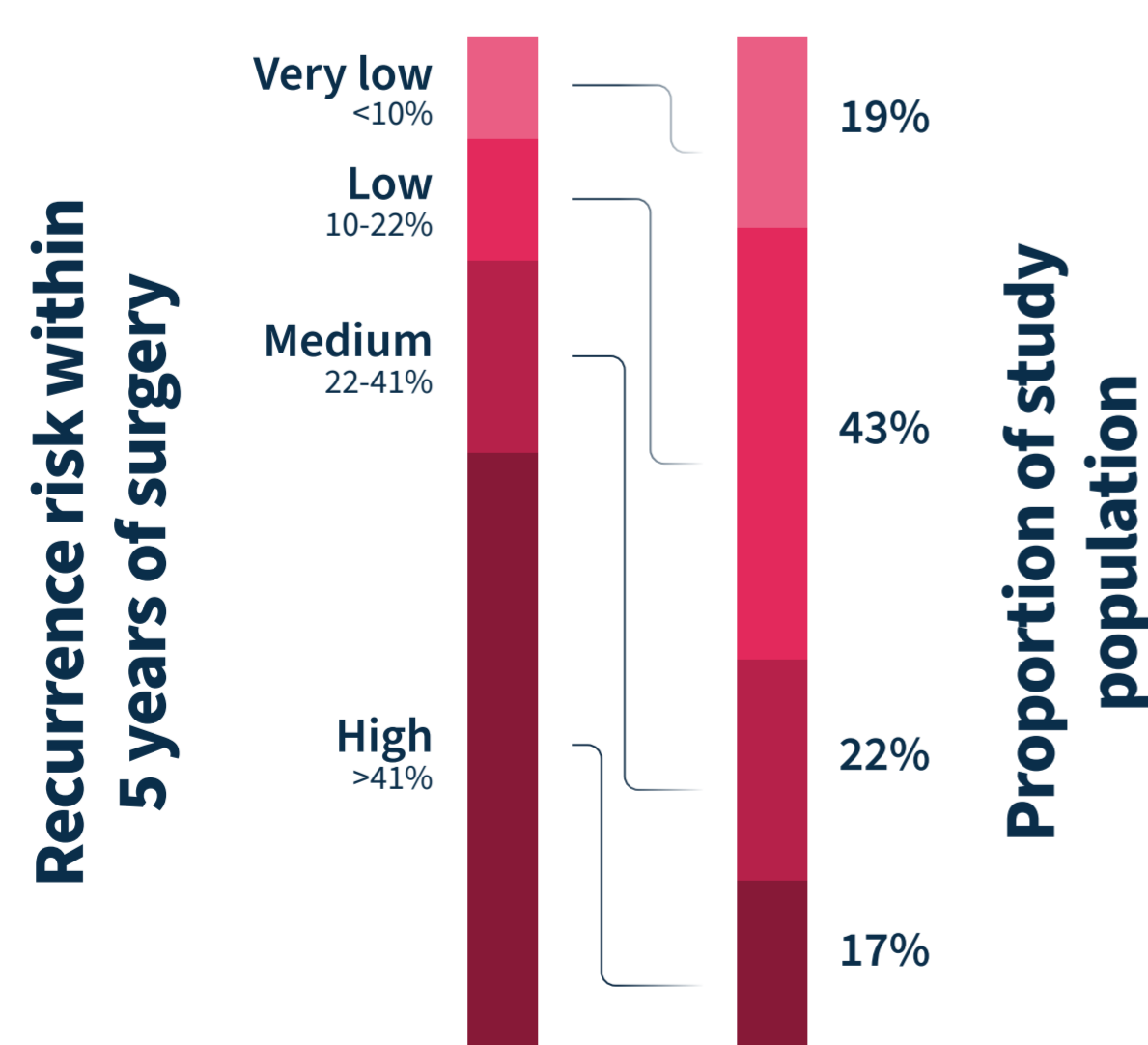
**AGE AT SURGERY**

were the most important features of the ML model

Patients were **stratified into four prognostic categories** with good discrimination

**iAUC | 0.79**

[IC95% 0.74 - 0.83]



The ML model outperformed 3/4 prognostic scores classically used in guidelines and clinical trials

**GRANT | p<0.001**

**SSIGN | p<0.01**

**UISS | p<0.001**

The ML model was available for twice as many patients as the Leibovich-2018



Margue G, et al. NPJ Precis Oncol. 2024 Feb 23;8(1):45.

UroCCR is one of the world's largest collaborative kidney cancer databases, a French national network of 53 multidisciplinary teams collecting clinical and biological data from routine care



## ABBREVIATIONS

**DFS**, disease free survival  
**GRANT**, GRade, Age, and Tumor  
**ML**, machine learning

**RCC**, renal cell carcinoma  
**SSIGN**, Stage, Size, Grade, and Necrosis  
**UISS**, University of California at Los Angeles Integrated Staging System

**Disclaimer:** Technology and concepts in development. May not be available for sale.