

Abstract Submission No.: A-1251**Predicting postdonation kidney function in living kidney donors using machine learning techniques**

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Objectives : The prediction of kidney function after kidney donation and appropriate selection of living donors are crucial for living-kidney donation. We aimed to develop a prediction model of postdonation kidney function after a living kidney donation using machine learning.

Methods : This retrospective cohort study using electronic medical records was performed in 823 living kidney donors from 2009 to 2020. The entire dataset was randomly divided into training (80%) and test (20%) sets. The main outcome was the postdonation estimated glomerular filtration rate (eGFR) at 12 months after nephrectomy. We compared the performance of various machine learning techniques as well as traditional regression models. The best-performing model was selected according to the mean absolute error (MAE) and root mean square error (RMSE).

Results : The mean age was 45.2 ± 12.3 years, and 48.4% were males. The mean predonation and postdonation eGFRs were 101.3 and 68.8 ± 12.7 mL/min/1.73 m², respectively. The XGBoost model with feature importance, including eGFR, age, serum creatinine, 24-hour urine creatinine, 24-hour urine sodium, creatinine clearance, cystatin C, cystatin C-based eGFR, computed tomography volume of the remaining kidney/body weight, normalized GFR of the remaining kidney measured through a diethylenetriaminepentaacetic acid (DTPA) scan, and sex, showed the best performance with an MAE of 6.23 and RMSE of 8.06. The proportion of predicted eGFR values within 5% or 10% of the actual eGFR value were 0.39 and 0.58, respectively.

Conclusions : The performance of machine learning technique using XGBoost was sufficient in predicting postdonation eGFR. We developed a web application titled Kidney Donation with Nephrologic Intelligence (KDNI) for ease appliance in clinical practice.