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D-Serine is useful for the rapid and precise measurement of kidney function

A team of researchers led by the National Institutes of Biomedical Innovation, Health and Nutrition (NIBIOHN) and Osaka University established a new method to measure glomerular filtration rate (GFR), a primary kidney function, by calculating the clearance of D-serine.

The research group evaluated the clearance of D-serine when assessing GFR through the inulin clearance measurement in living kidney transplant donors and recipients. Consequently, they found that the D-serine clearance strongly correlated with GFR and was less biased than the creatinine clearance, a conventional marker for renal function.

Chronic kidney disease is a global problem, and its frequency is increasing with the aging population. Evaluation of GFR is essential for better clinical practice to reduce the number of dialysis patients; however, the current evaluation of GFR has several limitations, including a labor-intensive procedure for the inulin clearance, the gold standard of GFR, a major bias for the creatinine clearance, and imprecise estimation of estimated GFR (eGFR). Endogenous molecules potentiating the precise assessment of kidney function with low biases are still necessary for important clinical decisions, including drug administration design, transplant donor selection, and staging of kidney disease.

L- and D-amino acids are mirror-image enantiomers, and L-amino acids are exclusively present in the human body. “A trace amount of D-serine is present in human blood and reflects kidney function,” says study lead author Masataka Kawamura. He says “We are investigating the potential of D-serine for the precise assessment of kidney function.”

The research group evaluated the urinary excretion rate (clearance) of D-serine in living kidney transplant donors and recipients. The clearance of D-serine was calculated based on the D-serine levels in the blood and urine that, measured using a two-dimensional high performance liquid chromatography system, which is the most accurate and sensitive system for measuring D-amino acids.

Remarkably, the clearance of D-serine agreed well with GFR. The low bias as a measure of GFR was an advantage for the D-serine clearance. The degree of bias against GFR was smaller than that of the creatinine clearance. Additionally, the combinational analysis of clearances of D-serine and creatinine could measure GFR with high performance.

“D-Serine turned out to be of great clinical importance,” says the study senior author of the study, Tomonori Kimura. According to him, “D-Serine may solve the problem of kidney disease with more than 800 million patients in the world. Measuring D-serine is applicable



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in a wide range of clinical fields and for drug development.”

The article, “Measurement of glomerular filtration rate using endogenous D-serine clearance in living kidney transplant donors and recipients” was published in *EClinicalMedicine* at DOI: 10.1016/j.eclinm.2021.101223 on December 6, 2021 (Japanese time).

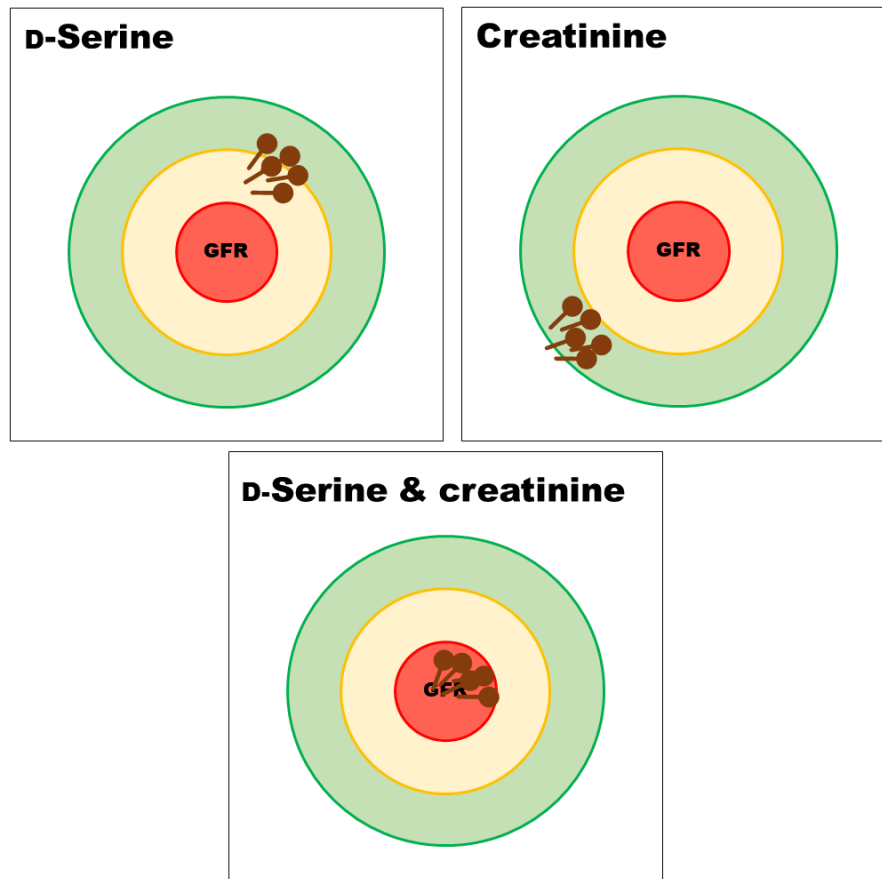


Figure. D-Serine is useful for the measurement of glomerular filtration rate (GFR). The clearance of D-serine has an advantage of lower bias against GFR compared to that with the creatinine clearance. Combinational clearance measurement of D-serine and creatinine can serve as a measure of GFR with precision and low bias.