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Internal Medicine: Open Access

Opinion Article

D-Serine Intra-Body Dynamics Reflect the Cause of Kidney Diseases

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ABOUT THE STUDY

Chronic Kidney Disease (CKD) is a worldwide problem, affecting over 10 million people in Japan and 850 million worldwide. CKD is caused by a variety of factors, including a chronic impairment in kidney structure or function, including Glomerular Filtration Rate (GFR). The causes of CKD include immunological, diabetic, aging-related, rare and intractable disorders, and unknown causes. The prognosis and therapy of CKD vary depending on the cause, and pathological analysis of the kidney biopsy samples frequently gives critical information for making a diagnosis and assessing disease activity. Despite its importance, kidney biopsy carries risks and is only performed when the benefits outweigh the risks. As a result, biomarkers that can aid in the diagnosis of renal illnesses are being researched.

D-serine is currently becoming recognised as a biomarker for renal disease. D-Serine, one of the D-amino acids, is a mirror-imaged enantiomer (chiral body) of serine that, unlike the common L-serine, is only found in trace amounts in nature. A two-dimensional high-performance liquid chromatography (2D-HPLC) device was used to precisely assess the quantities of D-serine in human samples. The 2D-HPLC technology improved the precision of measuring the trace amount of D-serine in human blood. D-serine levels in the blood give important clinical information since they correlate with one of the kidney functions, GFR, and also indicate the prognosis of the kidney in CKD patients. Furthermore, urine D-serine excretion provides extra information for the identification of renal disorders. As a result, assessing D-serine levels in blood and urine excretion to assess intra-body dynamics is valuable for monitoring kidney function and disease activity.

These findings raise the question of whether renal disorders alter these dynamics differently depending on their cause. If this is the case, monitoring intra-body dynamics of D-serine may aid in determining the cause of CKD. This study explored the ability of D-serine to detect the aetiology of kidney illnesses by assessing the D-serine dynamics of patients with CKD who had kidney biopsies conducted.

The sample preparation from human plasma and urine was modified from the prior description. In brief, 20 times the volume of methanol was added to the sample, and an aliquot (10 L of the supernatant formed from the methanol homogenate) was placed in a shade brown tube and utilized for derivatization (1.0 L of the plasma was used for the reaction).

With minor modifications, sample preparation from human plasma and urine was carried out as previously described. In brief, 20-fold quantities of methanol were added to the sample, and an aliquot (10 L of the supernatant obtained from the methanol homogenate) was placed in a shade brown tube and utilised for NBD derivatization (1.0 L of the plasma was used for the reaction).

After drying the solution under reduced pressure, 20 L of 200 mM sodium borate buffer (pH 8.0) and 5 L of fluorescent labelling reagent [40 mM 4-Fluoro-7Nitro-2,1,3-Benzoxadiazole (NBD-F) in anhydrous MeCN] were added and the solution was heated for 2 minutes at 60°C. An aqueous 0.1% (v/v) TFA solution (75 L) was added, and 2 L of the reaction mixture was put to 2D-HPLC.

CONCLUSION

Finally, assessing the intra-body dynamics of D-serine is important for the identification of primary renal disorders. D-serine monitoring may lead specific therapy for the aetiology of kidney disorders, including LN. Using D-serine assays, this study points the way forward for precision medicine.

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Received: 02-Jan-2023, Manuscript No. IME-23-22165; **Editor assigned:** 05-Jan-2023, PreQC No. IME-23-22165 (PQ); **Reviewed:** 20-Jan-2023, QC No. IME-23-22165; **Revised:** 30-Jan-2023, Manuscript No. IME-23-22165 (R); **Published:** 08-Feb-2023, DOI: 10.35248/2265-8048.23.13.390

Citation: Khanjo I (2023) D-serine intra-body dynamics reflect the cause of kidney diseases. Intern Med. 13:390.