



Shaping Tomorrow's Nephrology: Insight-Driven Kidney Care

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Evaluation of Artificial Intelligence in Diagnosing Sarcopenia and Predicting Mortality in Patients with Chronic Kidney Disease

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Objectives : In chronic kidney disease, sarcopenia causes diverse clinical problems and vice versa. Sarcopenia is defined as a reduction in muscle mass and quality, accompanied by a decline in physical performance, and it is difficult to evaluate in actual situations comprehensively. Therefore, muscle mass measurement is currently used first. While artificial intelligence is being actively applied to diagnosis, interpretation, and treatment planning in various diseases, we compared non-contrast computed tomography (CT) integrated with artificial intelligence (AI) solutions with existing methods for diagnosing sarcopenia.

Methods : In this single-center retrospective study, we collected the demographic characteristics, renal function including serum creatinine and dialysis status, and mortality in patients who had a history of visits to nephrology clinic between January 2010 and June 2025. These patients underwent dual-energy X-ray absorptiometry (DXA) and abdominal CT scans within 6-month interval.

Results : 249 patients out of 366 patients (180 men, 186 women), were diagnosed with sarcopenia by DXA. 29 deaths and 26 dialysis-dependent end-stage kidney disease patients occurred during the median follow-up period of 55.5 months. The mean glomerular filtration rate using the 2021 CKD-EPI formula was 90.3 ml/min/1.73 m². AI-driven total skeletal muscle volume and height-adjusted adhesive muscle mass using DXA showed a significant correlation (Spearman's rho = 0.67, p-value <0.01). Specifically, using a cutoff of 1750 cm², the receiver operating characteristic (ROC) curve showed significant mortality prediction for sarcopenia. (DXA ROC 0.702, p = 0.01, AI ROC 0.73, p = 0.02) The total skeletal muscle volume also had statistical significance predicting mortality (multivariate Cox regression, HR -0.998 [95% CI 0.996-0.999], p-value 0.01).

Conclusions : This study evaluated whether an AI-based approach utilizing CT scans could be a viable alternative to DXA. The findings confirmed that AI can effectively predict both sarcopenia and mortality. In the era of radiomics, AI technologies may provide maximal diagnostic information to clinicians with minimal patient risks.