The 8<sup>th</sup> AAMLS & 2025 8<sup>th</sup> Congress of Asia Association of Medical Laboratory Scientists in conjunction with 16th Asia-Pacific Forum of Medical Laboratory Sciences



## AI Health Check: Predicting Risks of Coronary **Artery Stenosis and Chronic Kidney Disease**

Shinn-Ying Ho

National Yang Ming Chiao Tung University Institute of Bioinformatics and Systems Biology **Distinguished Professor** 

This presentation introduces two novel and cost-effective risk prediction models, EL-CAS and EL-CKD, developed using evolutionary learning. These models utilize basic health check data to identify high-risk populations for coronary artery stenosis (CAS) and chronic kidney disease (CKD) in the absence of eGFR and UACR testing data. Evolutionary learning employs a dual-objective combination optimization algorithm to identify a set of risk factors (minimal feature set) while simultaneously maximizing prediction accuracy.

In this study, data from 4,937 individuals, including CAS scores and 62 clinical features from basic health checkups, were collected. These features include demographic information, personal medical history, lifestyle questionnaires, and laboratory test results. EL-CAS identified 13 key features (such as GPT, serum uric acid, and high-density lipoprotein HDL) to estimate the CAS risk score. The basic model achieved a positive predictive value of 80% in predicting high-risk populations, significantly outperforming the widely used Framingham cardiovascular disease risk assessment method, which has a predictive value of 65%. When coronary artery calcium score was added as an additional feature, the enhanced model's area under the ROC curve improved to 0.90.



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Due to the lack of clinical eGFR or UACR testing data, high-risk kidney disease patients were previously undetected. By predicting eGFR and UACR values through basic blood and urine tests, secondary prevention of kidney disease becomes crucial. In this study, data from 148,014 samples were collected, covering outpatient, inpatient, and health check data, including 24 clinical features. When applying EL-CKD to 11,646 individuals who had not undergone eGFR or UACR testing, it was found that 1,219 individuals (10.5%), although seemingly healthy, were actually high-risk kidney disease patients.

AI-based health checkups hold the potential to promote early screening and prevention of cardiovascular diseases and chronic kidney disease in both public health and clinical settings.



