

Project Title:

Digitalizing Kidney Function using Quantitative Rapid Test with a Mobile App for Self-screening and Tracking Chronic Kidney Disease

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Project Abstract/Proposal Summary:

Chronic kidney disease (CKD) is a public health problem with >10% of global prevalence. It is asymptomatic in the early stages and self-propelling, so often diagnosed in the later, incurable stages. Therefore, large-scale screening and continuous tracking are the keys to CKD management. The quantitative level of glomerular filtration rate (eGFR) and urine albumin creatinine ratio (uACR) are important indicators for diagnosing CKD. However, medical practitioners are frustrated by existing mainstream technologies because standard immunoassays and in-vitro diagnostic devices (IVDs) are too costly for large-scale screening, while urine dipstick or rapid tests are low-cost but non-quantitative and proven unreliable. Here, we will develop a kit that digitalizes kidney function for self-screening and tracking CKD. Users only need to load fingertip blood and urine samples onto a quantitative rapid test, which automates sampling, reaction, and converts the concentrations of serum cystatin C (sCysC), urine albumin (uA) and urine creatinine (uCr) into lengths of microparticle accumulation. A mobile app then uses photo-taking to measure and calculate the uACR and eGFR to self-assess kidney function. This digital kit will, for the first time, provide easy operation, low cost, and precise quantification needed for home self-testing, enabling a new model for managing CKD.