A New Tool to Detect Kidney Disease in Chinese Type 2 Diabetes Patients—Comparison of EZSCAN with Standard Screening Methods

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Abstract

Background: EZSCAN (Impeto Medical, Paris, France), a non-invasive device that assesses sweat gland dysfunction using reverse iontophoresis, also detects early dysglycemia. Given the interrelationships among dysglycemia, vasculopathy, and neuropathy, EZSCAN may detect kidney disease in diabetes (DKD).

Methods: An EZSCAN score (0–100) was calculated using a proprietary algorithm based on the chronoamperometry analysis. We measured the score in 50 Chinese type 2 diabetes patients without DKD (urinary albumin–creatinine ratio [ACR] < 2.5mg/mmol in men or ACR < 3.5mg/mmol in women and estimated glomerular filtration rate [eGFR] > 90mL/min/1.73m2) and 50 with DKD (ACR ≥ 25mg/mmol and eGFR < 60mL/min/1.73m2). We used spline analysis to determine the threshold value of the score in detecting DKD and its sensitivity and specificity.

Results: EZSCAN scores were highly correlated with log values of eGFR (r = 0.67, P < 0.0001) and ACR (r = -0.66, p < 0.0001). Using a cut off value of 55, the score had 94% sensitivity, 78% specificity, and a likelihood ratio of 4.2 to detect DKD with a positive predictive value of 81% and a negative predictive value of 93%. On multivariable analysis, DKD was independently associated with EZSCAN score (b = -0.72, P = 0.02), smoking status (1 = never, 0 = current/former) (b = -2.37, P = 0.02), retinopathy (1 = yes, 0 = no) (b = 3.019, P = 0.01), triglycerides (b = 2.56, P = 0.013), and blood hemoglobin (b = -0.613, p = 0.04). Patients without DKD but low EZSCAN score (n = 10) had longer duration of disease (median [inter quartile range], 13[9–17] vs. 8[4–16] years; p = 0.017) and were more likely to have retinopathy (36.7% vs. 5.1%, P = 0.02), lower eGFR (98[95.00–103] vs. 106 [98.5–115], p = 0.036), and treatment with renin–angiotensin system blockers (81.8% vs. 25.6%, p = 0.002) than those with a normal score.

Conclusion: EZSCAN may detect high-risk subjects for DKD in Chinese populations.