

O32

## Sudoscans performance as a screening, diagnostic and foot ulcer risk predicting tool for diabetic polyneuropathy compared to conventional methods

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### Objective:

Sweat gland innervating nerve is structurally similar and damaged by similar metabolic insult to small sensory nerve in diabetic polyneuropathy (DPN). This study evaluates effectiveness of Sudoscans, a new device for sweat gland function measurement, in detecting diabetic polyneuropathy (DPN) compared to conventional methods.

### Methods:

In this cross-sectional study, 332 Chinese diabetes patients with or without neuropathy underwent neuropathic assessment with Neuropathic Disability Score (NDS), Vibration Perception Threshold (VPT), and nerve conduction studies. Sudoscans measures electrochemical skin conductance (ESC) of hand and feet through reverse iontophoresis. Confirmed DPN was determined by NDS>2 with more than one abnormal nerve conduction velocity (NCV) while increased risk for diabetic foot ulcer by NDS scores≥6. Receiver-operating characteristic (ROC) curve were calculated to evaluate efficacy of Sudoscans compared to VPT.

### Results:

ESC was lower in DPN than normal cohort ( $p<0.001$ ). Feet ESC significantly correlated with hand ESC ( $r=0.701$ ,  $p<0.001$ ), toe VPT ( $r=-0.352$ ,  $p<0.001$ ), NDS score ( $r=-0.245$ ,  $p<0.001$ ), Sural ( $r=0.388$ ,  $p=0.001$ ) and Peroneal ( $r=0.485$ ,  $p<0.001$ ) NCV. On ROC curve, ESC exhibited better screening performance than VPT (AUC=0.925 vs. 0.76) with high sensitivity (77.6%) and specificity (100%) in detecting neuropathy by NDS or NCS and better diagnostic performance (AUC=0.721 vs. 0.676) with 54.34% sensitivity and 78.63% specificity in detecting confirmed DPN. Using NDS≥6 as standard reference, feet ESC had comparable performance to VPT (AUC=0.741 vs. 0.751) in diabetic foot ulcer prediction.

### Conclusion:

Sudoscans is a promising, easy, quick, inexpensive, and quantitative device which should be considered as part of DPN screening especially for busy outpatient clinic.