

# Validation and implementation of low-cost dynamic insulin sensitivity tests

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## **Objective:**

Insulin sensitivity ( $SI$ ) tests can provide important information for type 2 diabetes risk assessment and investigations of metabolism or pre-diabetes. Our group previously presented the dynamic insulin sensitivity and secretion test (DISST) and the real-time quick DISST (DISTq) as low-cost, low-burden and accurate alternatives to established tests. The DISST provides concurrent  $SI$  and endogenous insulin secretion ( $U_N$ ) metrics, the DISTq does not require insulin or C-peptide assays for  $SI$  identification, but can return an immediate result.

This study validates the DISST and DISTq in comparison to the euglycemic, hyperinsulinemic clamp (EIC)

## **Method:**

Fifty participants (with 10  $BMI > 30$ ; 10  $BMI > 25, < 30$ ; and 5  $BMI < 25$  of each gender) underwent the EIC and DISST. The DISST protocol requires 5 samples from a 30 minute protocol similar to the IM-IVGTT. Data from the DISST protocol was sufficient to identify  $SI$  using both the DISST and DISTq parameter identification methods and  $U_N$  from the DISST.

## **Result:**

DISST and DISTq  $SI$  values correlated well to the EIC ( $R=0.81$  and  $R=0.76$ , respectively) and each other ( $R=0.84$ ).  $U_N$  values obtained during the DISST showed clinically relevant distinctions between participants, and clearly differentiated the beta-cell function of impaired glucose tolerant participants who had the same EIC  $SI$ . Participant acceptance of the protocol was high with very minor reported adverse effects.

## **Conclusion:**

The DISST and DISTq correlated well against the EIC compared to most established insulin sensitivity tests. The DISST can better differentiate patients as it provides  $U_N$  metrics that the EIC does not. A computer program makes uptake and use of the model-based DISST and DISTq tests straightforward for clinicians and researchers.