Noninvasive Skin Fluorescence Spectroscopy Is Comparable to Hemoglobin A1c and Fasting Plasma Glucose for Detection of Abnormal Glucose Tolerance

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Abstract

Aim:

We compare performance of noninvasive skin fluorescence spectroscopy (SFS), fasting plasma glucose (FPG), and hemoglobin A1c (A1C) for detection of abnormal glucose tolerance (AGT).

Methods:

The NSEEDS trial evaluated SFS, FPG, and A1C in an at-risk population of 479 previously undiagnosed subjects from nine US centers, each of whom received a 75 g, 2 h oral glucose tolerance test (OGTT). Skin fluorescence spectra were collected and analyzed with SCOUT DS® devices. Disease truth was AGT, defined as OGTT ≥140 mg/dl. Abnormal glucose tolerance sensitivity, false positive rate (FPR), and receiver operating characteristic (ROC) curves were computed for each measurement technique. Skin fluorescence spectroscopy reproducibility was also assessed.

Results:

The AGT sensitivity of SFS was 68.2%, higher than that of FPG (thresholds of 100 and 110 mg/dl) and A1C (thresholds of 5.7% and 6.0%). The FPR of SFS was 37.7%, comparable to A1C at the 5.7% threshold (30.7%). Partial ROC areas of SFS, FPG, and A1C were similar for FPRs of 20–50% (average sensitivities of 64.0%, 59.0%, and 68.6%, respectively). The interday coefficient of variation for SFS was 7.6%.

Conclusions:

Skin fluorescence spectroscopy has similar screening performance to FPG and A1C and is a viable approach for detection of AGT.

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