Beta Cell Function

New Approach to screen beta cell function from nitric oxide assessment in obese population for large scale.

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Abstract

Background: Today, approximately 27% of Americans are obese (BMI > 30 kg/m^2) and this condition increases the prevalence of metabolic syndrome and diabetes. The UKPDS study suggests that loss of β cell function can begin at least 10 years before diagnosis and mean β cell function was already less than 50% at diagnosis.

The aim of this research was to assess in obese patients, the possibility to detect the loss of β cell function using a new approach via nitric oxide (NO) assessment from the a combination of technologies.

Method: 115 obese patients (93 women and 22 men) mean age 39 (range 17– 62) , candidates to bariatric surgery were included in the study and were undergoing for laboratory tests including fasting blood glucose, fasting insulin plasma, and for an examination with the E.S Complex (LD Technology, Miami, Florida, USA).

20 patients are undergoing metformin treatment and 63 patients were undergoing antihypertensive agents, patients undergoing insulin or secretagogues treatment were excluded from the study.

The Electro sensor complex (ES Complex) provides a new way to assess NO production using 5 technologies managed by software: 1) Galvanic skin response 2) photoelectrical plethysmography 3) heart rate variability analysis, 4) bio impedance analysis and 5) blood pressure oscillometric measurements.

The Homeostasis model assessment 2, percent β cell function (HOMA2 % β) algorithm had been calculated from the fasting blood glucose and the fasting insulin plasma using free software provided by The University of Oxford Diabetes Trial Unit.

The Electro sensor complex, percent β (ESC % β) algorithm had been calculated from the E.S Complex data and statistical neural network.

Statistical analysis was performed to correlate of ESC-% β and HOMA2-% β using the coefficient of correlation and the Spearman's coefficient of rank correlation.

Also, Receiver operating characteristic (ROC) curves was performed to determine the specificity and sensitivity of ESC-% β to detect HOMA2-% β value < 100.

Results:

The coefficient of correlation ESC- % β and HOMA2-% β is r=0.72 (using Log values) and the Spearman's coefficient of rank correlation (rho) was 0.799 and significance level for (P < 0.0001).

ESC-% β had a sensitivity of 77.14 % and specificity of 78.21 % (cutoff <=157 corresponding at 40% after conversion in scale 0-100 %) to detect HOMA2-% β value <100 (P < 0.0001).

Conclusion: The ESC-% β algorithm has a high predictive correlation with the HOMA 2-% β, and good specificity and sensitivity to detect HOMA2-% β value < 100, therefore, the ES Complex providing nitric oxide assessment will be a new way to screen the β cell function in obese population for large scale. Hence a tool which is easy to administer, non-invasive, and cost-effective would be of advantage and of great benefit for beta cell function screening in obese patients.

Keywords: β cell function, electro sensor Complex, nitric oxide assessment, ESC- % β algorithm, HOMA2-% β algorithm, obese population, large scale screening.