

# Correlations of HOMA2-IR and HbA1c with Algorithms Derived from Bioimpedance and Spectrophotometric Devices

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## Abstract

### Background

Homeostasis model assessment of insulin resistance (HOMA2-IR) and HbA1c, markers of metabolic syndrome and glycemic control, were compared with Electro Sensor (ES) Complex software algorithms. ES complex software integrates data from Electro Sensor Oxi (ESO; spectrophotometry) and Electro Sensor-Body Composition (ES-BC; bioimpedance).

### Methods

One hundred forty-eight Brazilian obese candidates for bariatric surgery underwent complete physical examinations, laboratory tests (fasting plasma glucose, fasting plasma insulin, and HbA1c) and ES complex assessments. HOMA2-IR was calculated from fasting plasma glucose and fasting plasma insulin using free software provided by The University of Oxford Diabetes Trial Unit. ES complex–insulin resistance (ESC-IR) and ES complex–blood glucose control (ESC-BCG) were calculated from ESO and ES-BC data using ES complex software. Correlations between HOMA2-IR and ESC-IR and between ESC-BCG and HbA1c were determined.

### Results

ESC-BGC was correlated with HbA1c ( $r = 0.85$ ). ESC-BCG values  $>3$  were predictive of HbA1c  $> 6.5\%$  ( $\phi = 0.94$ ; unweighted  $\kappa = 0.9383$ ). ESC-IR was correlated with HOMA2-IR ( $r = 0.84$ ). Patients with ESC-IR score  $>2.5$  or  $>3$  were more likely to have metabolic syndrome or insulin resistance, respectively, compared with HOMA2-IR value  $>1.4$  and  $>1.8$ , respectively. ESC-IR performance was evaluated by receiver operating characteristic curves. The areas under the curve for metabolic syndrome and insulin resistance were 0.9413 and 0.9022, respectively.

## Conclusion

The results of this study in Brazilian subjects with obesity suggest that ES complex algorithms will be useful in large-scale screening studies to predict insulin resistance, metabolic syndrome, and HbA1c  $>6.5\%$ . Additional studies are needed to confirm these correlations in non-obese subjects and in other ethnic groups.

## Keywords

Obesity Insulin resistance Metabolic syndrome  
Electro Sensor Complex software HOMA2-IR HbA1c

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## Notes

## Acknowledgments

We thank LD Technology for providing the system used in this study.

## Conflict of Interest

This study was not sponsored. The authors have no conflicts of interest to declare.

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