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Model-Based Insulin Sensitivity as a New Biomarker of Sepsis Diagnosis in the Intensive Care Unit

By: [Shukeri, WFWM](#) (Shukeri, Wan Muhd W. F.)^[1,2]; [Jamaludin, UK](#) (Jamaludin, U. K.)^[3]; [Ralib, AM](#) (Ralib, Md A.)^[1]; [Mat-Nor, MB](#) (Mat-Nor, M. B.)^[1]

IJUM MEDICAL JOURNAL MALAYSIA
 Volume: 20 Issue: 2 Pages: 19-26
 Published: APR 2021
 Document Type: Article

Abstract

INTRODUCTION: Currently, there is a lack of real-time biomarker to diagnose sepsis. Insulin sensitivity (SI) may be determined in real-time using mathematical glucose-insulin models, but its effectiveness as a diagnostic test of sepsis remains unexplored. We aimed to explore the diagnostic value of model-based SI as a new biomarker of sepsis in a mixed cohort of diabetic and non-diabetic patients newly admitted to the intensive care unit (ICU). **MATERIALS AND METHODS:** In this cross-sectional study, we analysed SI levels derived from the Intensive-Control-of-Insulin-Nutrition-Glucose model in septic (n=45) and non-septic (n = 41) patients upon their ICU admission. The diagnostic value of model-based SI for sepsis was determined through analysis of the area under the curve (AUC) of the receiver operating characteristic curve. **RESULTS:** Baseline SI levels were significantly lower in patients with sepsis than those without sepsis (0.560 (SD=0.676) vs. 1.097 (SD=1.473) x 10⁻⁴ L/mU/min, P = 0.037). However, the AUC of 0.588 revealed that model-based SI was a poor diagnostic test of sepsis in the mixed cohort of diabetics and non-diabetics. In a separate analysis among the non-diabetics (n=19), model-based SI predicted sepsis with clinically valid performance (AUC 0.911). **CONCLUSION:** Presence of sepsis significantly reduced SI in the critically ill patients but a low SI could predict sepsis only in the non-diabetic cohort.

Keywords

Author Keywords: [insulin sensitivity](#); [insulin resistance](#); [sepsis](#); [intensive care units](#)

Author Information

Reprint Address:

International Islamic University Malaysia Int Islamic Univ Malaysia, Dept Anaesthesiol & Intens Care, Kulliyah Med, Kuantan 25200, Pahang, Malaysia.

Corresponding Address: Mat-Nor, MB (corresponding author)

+ Int Islamic Univ Malaysia, Dept Anaesthesiol & Intens Care, Kulliyah Med, Kuantan 25200, Pahang, Malaysia.

Addresses:

+ [1] Int Islamic Univ Malaysia, Dept Anaesthesiol & Intens Care, Kulliyah Med, Kuantan 25200, Pahang, Malaysia

+ [2] Univ Sains Malaysia, Sch Med Sci, Dept Anaesthesiol & Intens Care, Kota Bharu, Kelantan, Malaysia

+ [3] Univ Malaysia Pahang, Dept Mech Engr, Pahang, Malaysia

E-mail Addresses: basri.matnor@gmail.com

Funding

Funding Agency	Grant Number
Ministry of Higher Education under Fundamental Research Grant Scheme	FRGS/1/2018/TK03/UMP/02/3

[View funding text](#)

Publisher

INT ISLAMIC UNIV MALAYSIA, KULLIYAH MEDICINE, JALAN SULTAN AHMAD SHAH, KUANTAN PAHAN, 25200, MALAYSIA

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Research Areas: General & Internal Medicine

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