Insulin sensitivity and sepsis score: A correlation between model-based metric and sepsis scoring system in critically ill patients

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Abstract

Sepsis is highly correlated with mortality and morbidity. Sepsis is a clinical condition demarcated as the existence of infection and systemic inflammatory response syndrome, SIRS. Confirmation of infection requires a blood culture test, which requires incubation, and thus results take at least 48 h for a syndrome that requires early direct treatment. Since sepsis has a strong inflammatory component, it is hypothesized that metabolic markers affected by inflammation, such as insulin sensitivity, might provide a metric for more rapid, real-time diagnosis. This study uses clinical data from 30 sepsis patients (7624 h in ICU) of whom 60% are male. Median age and median Apache II score are 63 years and 19, respectively. Model-identified insulin sensitivity ($SI$) profiles were obtained for each patient, and insulin sensitivity and its hourly changes were correlated with modified hourly sepsis scores ($SSH_1$). SI profiles and values were similar across the cohort. The sepsis score is highly variable and changes rapidly. The modified hourly sepsis score, $SSH_1$, shows a better relation with insulin sensitivity due to less fluctuation in the SIRS element. Median $SI$ and median $\Delta SI$ of the cohort is $0.4193 \times 10^{-3}$ and $0.004253 \times 10^{-3}$ L/mU.min, respectively. Additionally, median $SI$ are $4.392 \times 10^{-4}$ L/mU min ($SSH_1 = 0$), $4.153 \times 10^{-4}$ L/mU min ($SSH_1 = 1$), $3.752 \times 10^{-4}$ L/mU min ($SSH_1 = 2$) and $2.353 \times 10^{-4}$ L/mU min ($SSH_1 = 3$). Significant relationship between insulin sensitivity across different $SSH_1$ groups was observed ($p < 0.05$) even when corrected for multiple comparisons. CDF of $SI$ indicates that insulin sensitivity is more significant when comparing an hourly sepsis score at a very distinguished level.

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