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209 - IDENTIFICATION OF OXYGEN-18 ISOTOPE OF BREATH CARBON DIOXIDE AS A NON-INVASIVE MARKER TO DISTINGUISH TYPE 1 AND TYPE 2 DIABETES

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Resumen

Introduction: There is a pressing need to develop a new and an effective strategy for early detection of T1D and to precisely distinguish T1D from type 2 diabetes (T2D). The aim of the present study was to find out the potential link between the erythrocytes carbonic anhydrase (CA) activity and ^{18}O-isotopic exchange of breath CO_2 in T1D and T2D.

Methods: Fasting and post-dose breath and blood samples were collected simultaneously after ingestion of 75-gm normal glucose dissolved in 150-mL water. Blood samples were analysed to measure the CA activity. The breath samples were utilised to measure the carbon dioxide isotopes ($^{12}C^{16}O^{16}O$, $^{13}C^{16}O^{16}O$ and $^{12}C^{16}O^{18}O$) by a laser based high-precision carbon dioxide isotope analyzer.

Results: The CA activities are markedly altered during metabolism of T1D and T2D and this facilitates to oxygen-18 (^{18}O) isotopic fractionations of breath CO_2. In our observations, T1D exhibited considerable depletions of ^{18}O-isotopes of CO_2, whereas T2D manifested isotopic enrichments of ^{18}O in breath CO_2, thus unveiling a missing link of breath^{18}O-isotopic fractionations in T1D and T2D**.** The optimal diagnostic cut-off points were determined to be $\delta_{DOB}{}^{18}O‰ = 2.1‰$ and $\Delta CA = 3.15$ U/min/mL for screening T1D and T2D individuals.

Conclusions: Our findings suggest the changes in erythrocytes CA activities may be the initial step of altered metabolism of T1D and T2D, and breath ^{18}O-isotope regulated by the CA activity is a potential diagnostic biomarker that can selectively and precisely distinguish T1D from T2D and thus may open a potential unifying strategy for treating these diseases.