

Development of a mixed-meal that impacts carotid-body mediated cardiorespiratory and metabolic parameters - a pilot study

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Introduction: The carotid bodies (CB) have been recently implicated in the genesis of metabolic diseases in animal models. The CBs respond to circulating insulin to increase heart rate, respiratory rate and blood glucose levels. In humans, this mechanism is not well characterized.

Objectives: To develop a balanced standardized mixed meal that evokes changes in cardiorespiratory parameters related to CB function in men.

Methods: This pilot-study was performed in healthy volunteers recruited at Polytechnic of Leiria Health Sciences School. To assess CB activity the volunteers were fed either a mixed meal or a standard glucose tolerance test (OGTT) after a 12 hour fasting period, in different days. The mixed meal (388 kcal) had a macronutrient distribution of 54% of carbohydrates, 23% of lipids and 18% of protein; composed of 60g of oat, 15 g of whole milk powder, 25 g of lyophilized strawberries, 20 g of protein and 80ml of water. The OGTT consisted of 200 ml of water and 75 g of sugar (300kcal). Both meals were ingested within 10 minutes. Cardiorespiratory parameters were monitored by means of a biomedical device for real time biosignal acquisition and interstitial glucose was monitored continuously.

Results: Mixed meal glucose excursion curve stabilized 30 minutes after the ingestion. The plasma glucose variation was similar after mixed meal ($\Delta = 16,6\text{mg/dl}$ glucose, latency= 21min) and OGTT ($\Delta = 20,8\text{mg/dl}$ glucose, latency=20min), even though the slope of the curves were significantly different ($0,8\text{mg/dl/min}$ vs $2,7\text{mg/dl/min}$). Heart rate varied significantly after OGTT but not after mixed meal in healthy volunteers ($\Delta = 0,1\text{bpm}$ vs $3,7\text{ bpm}$, respectively).

Conclusion: Compared to OGTT, the mixed meal tested caused a steadier increase in plasma glucose, being suited to be used as a test meal to determine variations in CB-related cardiorespiratory parameters.

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