Metabolomic profile of low copy-number carriers at the salivary α-amylase gene suggests a metabolic shift towards lipid-based energy production

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Low serum salivary amylase levels have been associated with a range of metabolic abnormalities, including obesity and insulin resistance. We recently suggested that low copy-number at the AMY1 gene, associated with lower enzyme levels, also increases susceptibility to obesity. To advance our understanding of the effect of AMY1 copy-number variation on metabolism, we compared the metabolomics signatures of high and low copy-number carriers. We analyzed, using mass spectrometry and NMR, the sera of healthy normal-weight women carrying either low (LA: ≤4 copies; n=50) or high (HA: ≥8 copies; n=50) AMY1 copies. Best fitting multivariate models (empirical P<1x10⁻³) of MS and NMR data were concordant in showing differences in lipid metabolism between the two groups. In particular, LA carriers showed lower levels of long- and medium-chain fatty acids, and higher levels of di-carboxylic fatty acids and 2-hydroxybutyrate (known marker of glucose mal-absorption). Taken together, these observations suggest increased metabolic reliance on fatty acids in LA carriers through β- and ω-oxidation and reduced cellular glucose uptake with consequent diversion of acetyl-CoA into ketogenesis. Our observations are in line with previously-reported delayed glucose uptake in LA carriers after starch consumption. Further functional studies are needed to extrapolate from our findings to implications for biochemical pathways.

Biography
Abdelilah Arredouani has joined QBRI in March 2012 as a Scientist. He comes from Weill Cornell Medical College in Qatar where he served since March 2010 as a Senior Postdoctoral Research Associate in the Department of Physiology and Biophysics, where he studied the trafficking of Orai1, the calcium channel that mediates the store-operated calcium influx in non-excitable cells. He holds a special Master’s in Molecular Biology and Biotechnology Management and a PhD in Cell Physiology from Belgium. During his PhD, he studied the role of the endoplasmic reticulum calcium stores in glucose-induced insulin secretion from the pancreatic beta cell in the context of type-2 diabetes.

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