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Plasmatic ceramides profile in adolescents and its association with hepatic steatosis independently of obesity

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Objective: To assess the association between plasma ceramides and hepatic steatosis (HS) in adolescents, independently of obesity.

Material & Methods: Ninety-four adolescents from two previous studies conducted and published by our crew were included. Study subjects were stratified in three groups: normal weight (n=18), obesity (n=34) and obesity + HS (n=42). The presence of HS was defined when AST/ALT ratio was <1. Ceramides subspecies (C14:0, C16:0, C18:0, C24:0 and C24:1) were determined by LC/MS.

Results: All ceramides correlated inversely with the AST/ALT ratio and directly with ALT levels in plasma; the strongest correlation was observed among C14:0 ceramide (r=-0.54 and r=0.41, respectively; P<0.001). Furthermore, significant correlations were observed between cholesterol and all ceramides except for C24:1 ceramide. Fasting insulin and HOMA-IR correlated directly with ceramides C14:0, C18:0 and C24:1. For assessing HS, a cut-off points of 10.3 nmol/L for C14:0 Ceramide reported a sensitivity of 92.7% and a specificity of 73.5% when normal weight and obesity groups (n=52) were compared against obesity + HS group (n=42). Positive and negative predictive values were 77.5% and 90.2%, respectively.

Conclusions: plasma ceramides are closely associated with hepatic steatosis in adolescents. C14:0 ceramide could be a novel biomarker of HS independently of obesity.

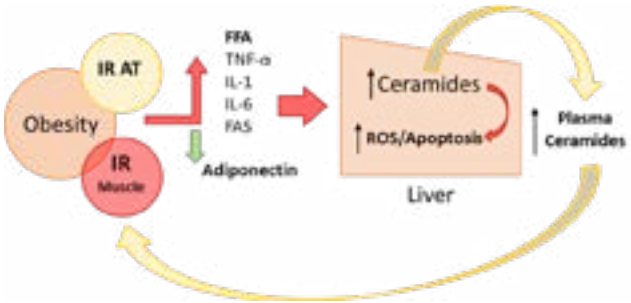

Figure 1. *Obesity and insulin resistance increase the production of pro-inflammatory cytokines and free fatty acids delivery to the liver that promotes ceramides production. In the hepatocyte ceramides increase apoptosis through ROS mechanism. The increase of ceramides in the liver facilitate its release into the circulation, which in turn affects insulin sensitivity in muscle tissue. IR= insulin resistance, AT= adipose tissue, FFA= free fatty acids, ROS= reactive oxygen species.*

Recent Publications:

1. Maldonado Hernández J, Saldaña Dávila G E, Piña Aguero M I, Núñez García B A and López Alarcón M G (2017) Association between plasmatic ceramides profile and AST/ALT ratio: C14: 0 ceramide as predictor of hepatic steatosis in adolescents independently of obesity. Canadian Journal of Gastroenterology and Hepatology 2017:3689375.
2. Maldonado-Hernández J, Martínez Basila A, Salas Fernández A, Navarro-Betancourt J R, Piña Aguero M I and Bernabe García M (2016) The 13C-glucose breath test for insulin resistance assessment in adolescents: comparison with fasting and post-glucose stimulus surrogate markers of insulin resistance. Journal of Clinical Research in Pediatric Endocrinology 8(4):419-424.

3. Bernabe Garcia M, López Alarcon M, Salgado Sosa A, Villegas Silva R, Maldonado Hernandez J, Rodriguez Cruz M and Gordillo Alvarez V (2016) Enteral Docosahexaenoic Acid Reduces Analgesic Administration in Neonates Undergoing Cardiovascular Surgery. Annals of Nutrition and Metabolism 69(2):150-160.

4. Bernabe-Garcia M, Lopez-Alarcon M, Villegas-Silva R, Mancilla-Ramirez J, Rodriguez-Cruz M, Maldonado-Hernandez J and Lagunes-Salazar S (2016) Beneficial effects of enteral docosahexaenoic acid on the markers of inflammation and clinical outcomes of neonates undergoing cardiovascular surgery: an intervention study. Annals of Nutrition and Metabolism 69(1):15-23.

5. Salas Fernández A, Maldonado-Hernández J, Martínez Basila A, Martínez Razo G and Jasso-Saavedra F (2015) The 13C-glucose breath test is a valid non-invasive screening tool to identify metabolic syndrome in adolescents. Clinical Chemistry and Laboratory Medicine 53(1):133-138.

Biography

Jorge Maldonado-Hernández has his expertise in the development of non-invasive methods and biological markers for the diagnosis of metabolic disorders as hyperhomocysteinemia, insulin resistance and non-alcoholic fatty liver disease. He has extensive experience in the management of analytical techniques such as isotope ratio mass spectrometry, gas chromatography and liquid-mass chromatography. Recently, he has been interested in the effect of dietary lipids on the biosynthesis of ceramides in human muscle tissue.

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