OMEGA-3 (ω3) FATTY ACIDS IN THE LIVER INSULIN SIGNALING PATHWAY: THE ROLE OF Gαq11 PROTEIN

The metainflammation, a characteristic phenomenon of obesity, seems to be primarily responsible for the development of insulin resistance in type 2 diabetes (DM2). It’s known that Omega-3 (ω3) fatty acids have anti-inflammatory properties mediated by GPR120 receptor. The Gαq11, protein which is coupled to the GPR120 receptor, seems to be able to improve the insulin signaling in liver despite of the inflammatory process and its mechanism of action seems to be independent of the hormone. Thus, the aim of this study was to evaluate the Gαq11 protein and GPR120 receptor participation in insulin signaling. Swiss mice and NOD (non obese and diabetic), 6 weeks old, received a single dose (500 uL), orogastric route, of flaxseed oil, source of ω3. After 4 hours fragments of liver were removed for Western blotting, RT-PCR and hepatic glycogen production analysis. The protein content of GPR120, GPR40, Gαq11, p-Akt, p-GSK3, p-Foxo, PEPCK, G6 Pase and GS as well as the association between Gαq11 / PI3-K were evaluated. Intraperitoneal insulin tolerance (ITT) and glucose tolerance (GTT) tests were performed. The acute orogastric stimulation (4h) with flaxseed oil, ω3 source, was sufficient to induce association between Gαq11 / PI3-k proteins and increase the activity of insulin pathway key proteins involved in hepatic glucose control. However, the oil treatment induced no significant changes in gene expression analysis. Significant reduction (P <0.05) in fasting glucose and pronounced increase (P <0.05) of glycogen content were observed in the liver of animals treated with ω3 compared to their controls. These findings strengthen the hypothesis that these nutrients appear to be important tools for nutritional action, not just for the DM2 but also as an adjunct to the DM1 treatment.

Key words: Diabetes; Omega-3; Gαq11.