EFFECT AND MECHANISM OF ACTION OF THEOBROMINE ON GLUCOSE HOMEOSTASIS: ANTIHYPERGLYCEMIC AND INSULINOMIMETIC POTENTIAL ROLE

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Theobromine is a nutraceutical compound with some biological actions on lipid and glucose homeostasis. However, its role on the metabolism remains poorly elucidated. Thus, the aim of this study was to evaluate the effect of theobromine in hyperglycemic rats and its mechanism of action on glucose uptake in rat soleus muscle. Male Wistar fasted rats (180-200 g) glucose overloaded (4g/Kg; 8.9 M i.p.) were assayed on glucose tolerance curve, hepatic and muscle glycogen and for serum LDH activity measurement (CEUA UFSC PP00749). Soleus muscles were isolated and incubated with theobromine (50 µM, 50 nM and 50 pM) and 50 nM was chosen for following studies. Samples were incubated with/without specific inhibitors for ¹⁴C-glucose uptake (0.1 µCi/mL) studies. Western Blot evaluated the effect of the compound on GLUT4 expression. Theobromine improved the glucose tolerance, increased the muscle and liver glycogen content and stimulated glucose uptake in muscle. These data suggest an insulinomimetic effect of theobromine on glucose uptake in muscle mediated, in part, by insulin signaling pathways. In addition, the compound increase the GLUT4 mRNA translation. The serum LDH activity did not change after during glucose tolerance test. These results point a potential role of theobromine on glucose homeostasis mediated by glucose uptake, increasing the protein GLUT4 and its translocation in an insulin target tissue, skeletal muscle. Financial support: CNPq, CAPES, PPG-Farmácia – UFSC, PIBIC-CNPq/UFSC.

Key Words: Theobromine; GLUT4; Glucose Homeostasis