EFFECT OF SMALL LITTER ON GLUCOSE METABOLISM IN SKELETAL AND ADIPOSE TISSUE

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Introduction: Lactation is a critical stage of development. Nutritional intervention during this phase might predispose to metabolic abnormalities such as obesity. Objective: This study aimed to evaluate the impact of higher energy intake during lactation on body mass and energetic metabolism of exercised and sedentary animals. Methods: After birth, litters were standardized to 10 puppies. On the 3rd day of life, litters were adjusted: Small Litter (NR 3 puppies) and Normal Litter (NN 10 puppies). At day 21 animals were weaned and subdivided: NN-sedentary (NN-S), NN-exercised (NN-EX), NR-sedentary (NR-S) and NR-exercised (NR-EX). Swimming protocol (30min/session; 3days/week) was applied between 22-90 days. At day 90, animals were orthothenasiated. Fat deposits were weighed. Muscle and adipose tissue samples were incubated with 5.6 mM glucose with or without insulin (10mU/ml). Results: At 7, 14 and 21 days, NR showed body mass increase (12.3%-28.1%-27.3%) compared to the control. At day 90, NR-S showed body mass gain (11.5%) compared with NN-S. NN-E and NR-E reduced (7.61%-25%) compared with sedentary controls. Retroperitoneal and mesenteric fat deposits increased (47.9%-62.5%) in the NR-S compared to NN-S. NN-E and NR-E decreased (24.5%-28.7%-24.2% and 39.7%-33.7%-23.8%) for retroperitoneal, mesenteric and perigonadal deposits, compared to sedentary controls. Brown fat gains were 118.1% and 137.1% in the NN-E and NR-E compared with sedentary controls. Soleus muscle lactate production increased (31.8%-35%) in NN-E and NR-E. Insulin stimulus increased NN-E lactate production in 28.8%. NR-E perigonadal fat lactate production increased (21.9%) compared to NR-S at baseline condition. Comparing baseline condition to insulin stimulation, NN-S and NN-E increased lactate production (41.9-49.8%) in comparison to the small litter counterparts. Conclusion: Overnutrition stimulated by small litter promoted metabolic changes leading to body mass and fat deposits increase, and altered glucose metabolism in skeletal muscle. Although exercise was not able to interfere in skeletal muscle metabolic programming, it improved both adiposity and body mass.

Obesity, metabolic imprint, lactation