Group 13 - Pathophysiology, Signaling

P490 Perinatal programming of cardiometabolic diseases: early alterations in adipose tissue and organ development in animal models

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Purpose: Fetal stress and postnatal overfeeding are associated with programming of cardiometabolic diseases, but their relative role is not clearly established. By using specific animal models we aimed to address this issue comparing the perinatal alterations induced in several organs key for cardiometabolic control.

Methods: Fetal stress was induced by maternal undernutrition (MUN) during pregnancy. MUN rats were fed ad libitum with standard chow from gestational day 1 to 10; with 50% of their daily intake from day 11 to the end of pregnancy and returned back to ad libitum during lactation (12 pups/litter). Postnatal overfeeding (POF) was induced in the offspring from ad libitum fed dams by reducing litter size during lactation (4 pups/litter). Control animals were offspring from dams ad libitum fed both during pregnancy and lactation (12 pups/litter). Tibial length and body, heart, kidney, liver and fat adipose tissue weights, as well as adipocytes size, were assessed in the offspring at weaning (21 days).

A group of MUN offspring was followed to measure body weight along perinatal development.

Results: MUN offspring showed reduced tibial length and body weight from birth with progressive catch-up growth until month two, when body weight reached similar values to control rats. By weaning MUN offspring rats exhibited: 1) hyperglycemia; 2) heart and liver hypertrophy; 3) reduced kidney weight and 4) increased subcutaneous and periorgan fat deposits and adipocyte size. POF offspring also exhibited increased glycemia together with liver, fat and body weight and adipocyte size, but heart and kidney weights were not altered. There were no sex-related differences in either MUN or POF models in any of the parameters studied.

Conclusions: We conclude that accelerated growth during postnatal life, rather than fetal stress, seems to be critical for metabolic control organs alterations. On the other hand, fetal stress induces changes in heart and kidney at an early age which might have a direct role on later cardiovascular disease development.