Postnatal growth of the intrauterine growth retarded rat

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Children born small for gestational age (SGA) due to intrauterine growth restriction (IUGR), often catch-up (CU) in their growth. Only a small percentage remains growth retarded. Why IUGR children do or do not CU, is not fully understood. Children with CU appear to have a higher risk developing insulin insensitivity compared to non-CU (NCU) children. Animal studies have shown a more clear correlation, namely that CU rats are glucose-intolerant and insulin-resistant, on the other hand NCU rats show an increased insulin sensitivity. Insulin sensitivity is influenced by growth hormone and insulin-like growth factor I, respectively antagonizing and agonizing the insulin receptor. In summary these data indicate a close relationship between insulin sensitivity and the somatotropic axis. To investigate the postnatal effect of IUGR on the somatotropic axis a modified Wigglesworth rat model was used by ligating the uterine arteries at day 17 of gestation. After natural delivery the pups were defined as IUGR (<-2 SD), small (-2 till –1 SD), normal (-1 till +1 SD) and large (>+1 SD). A sham-operated group served as control. After birth the pups were weighed regularly until adulthood. Males as well as female pups, which were born as IUGR, did not CU in weight (p<0.05) when compared to all groups. However, when comparing small, normal and large pups with control pups, the statistical differences disappeared from day 15-20 onward. In conclusion, the present study describes a useful rat model to investigate the effects of IUGR with or without CU depending on the severity of growth retardation.

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