

Effects of in utero high fat and high sucrose diet exposure on postnatal growth and pubertal development

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The prevalence of obesity continues to rise worldwide. ItThis comes with a growing concern about the effect of a high-fat diet during pregnancy on child's health. We therefore investigated the effects of a high fat-high sucrose (HFHS) diet during gestation on pubertal development and reproduction in offspring using a rat model.

Dams were exposed to HFHS (45% fat, 40% sugar) *ad libitum* 5 weeks before mating until 1 week after the birth of pups. We studied the effect of HFHS diet *in utero* on female and male pup growth and pubertal development. Animals were studied at postnatal day (PND) 25 (juvenile females) or PND 35 (juvenile males), at puberty, 24 hours after puberty (post-pubescent) and during adulthood.

Juvenile female and male pups exposed to HFHS diet during gestation showed a lower body weight compared to controls.

Females had a lower weight from PND14 to PND 42 (2way ANOVA: $F(3,48) = 5,371$ p-value = 0,0029). Moreover, juvenile females exposed to HFHS *in utero* had a lower gonadal white adipose tissue (gWAT) (t-test, p-value =0,0015, mean +- SD: 0,007 +- 0,002) compared to control (mean +- SD: 0,027 +- 0,015).

Lower gWAT (t-test, p-value = 0,0005, mean +- SD: 0,10 +-0,04) persisted in post-pubescent females exposed to HFHS compared to control females (mean +- SD: 0,21+-0,05).

Expoed males had a lower weight from PND 21 to PND42 (2way ANOVA: $F(3,54) = 2,872$, p-value = 0,0446). However, gWAT weight was only decreased (Mann-Whitney, p-value = 0,0289, $U=9$, mean rank CTL: 10,71, mean rank HFD: 5,62), mean +- SD: 0,37 +-0,02) in post- pubescent males exposed to HFHS *in utero* compared to controls.

Gestational exposure to HFHS diet did not affected pubertal timing in females or males. Juvenile females exposed to HFHS *in utero* had a lower ovary weight (t-test, p-value =0,018, mean +- SD: 0,013 +- 0,001) compared to control (mean +- SD: 0,017 +- 0,003) females, but ovaries weight in post-pubescent females was no more affected. Post-pubescent males exposed to HFHS *in utero* had a lower testis weight (t-test, p-value = 0,016, mean +- SD: 0,84 +-0,08) compared to controls (mean +- SD: 1,01 +- 0,085).

In conclusion, exposure to HFHS diet *in utero* impaired postnatal growth in male and female juveniles. It did not appear to affect puberty timing but testis weight was decreased in HFHS exposed males while ovarian weight was not affected.