

Intrauterine growth restriction affects postnatal testis maturation in rats

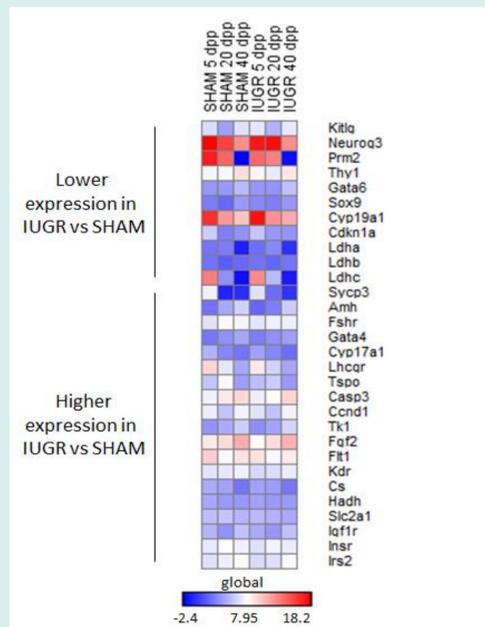
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Conclusions

Different genes involved in fundamental processes within the testis were affected by fetal hypoxia up to pubertal age, suggesting that long term alterations occur as a consequence of IUGR.

Moreover, testosterone production was increased in the pre-pubertal rats, as putative catch-up growth mechanism.

Further analyses are needed to elucidate later consequences of IUGR on testis function.

Introduction

The influence of intrauterine life on long term health is supported by a wealth of epidemiological and experimental studies. A low oxygen and/or nutrient supply to the fetus, resulting in intrauterine growth restriction (IUGR), can affect gonadal development of the offspring, with a potential impact on fertility. Data derived from animal models of placental insufficiency are very limited.

Aim

To investigate the effects of placental insufficiency induced by uterine artery ligation (UAL) on the postnatal rat testis gene expression and testosterone production.

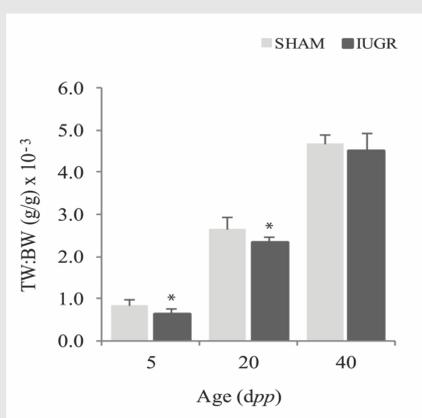


Figure 1. Mean testis weight to body weight ratio $\times 10^{-3}$ in IUGR and sham rats at 5, 20 and 40 dpp. compared to shams; * $P < 0.05$.

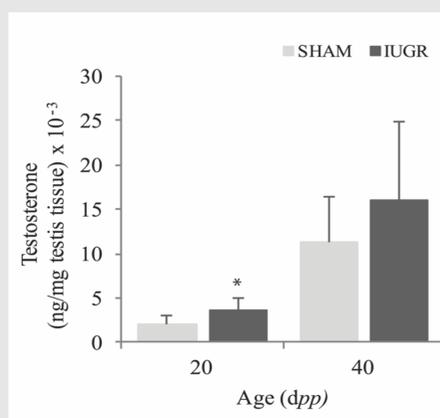


Figure 3. Mean \pm SD of intratesticular testosterone concentrations at 20 and 40 dpp rats (ng/mg testis tissue $\times 10^{-3}$); * $P < 0.05$.

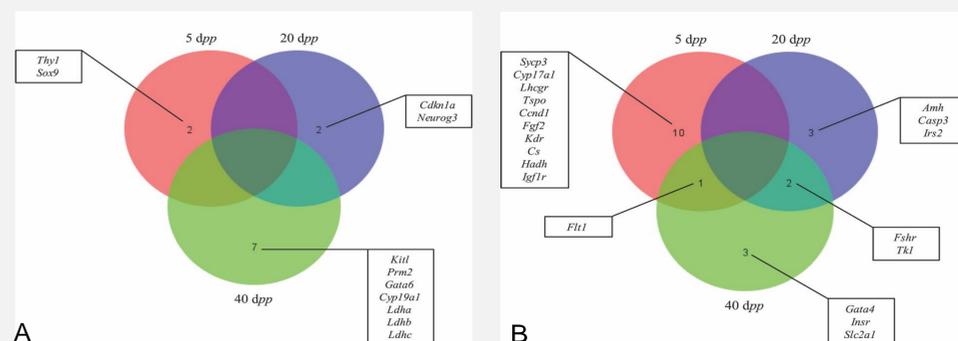


Figure 2 – TaqMan Low-Density Array analysis of gene expression in IUGR and sham animals at 5, 20 and 40 dpp. (A) Specific differences in gene expression between animal groups, with higher expression in IUGR vs sham animals, and (B) lower expression in IUGR vs sham animals.

Results

Testis weights normalized to body weights were significantly reduced at 5 dpp and 20 dpp in IUGR rats, with catch-up at 40 dpp (Fig. 1). The expression of 30 genes among the 90 investigated, involved in regulation of cell cycle, metabolism, angiogenesis, and markers of testicular somatic and germ cells, was dysregulated in IUGR rat testis compared to controls at all time points (Fig. 2). At 20 dpp ITT was significantly increased in IUGR rats (Fig. 3), whereas serum gonadotrophins levels were comparable between the two groups.

Methods

Sprague-Dawley pregnant female rats underwent UAL at day 19 of gestation to generate IUGR offspring, while sham operation was performed for the controls. Offspring were sacrificed at 5, 20 and 40 dayspost-partum (dpp). At sacrifice, testes were excised and weighed. Gene expression was analyzed by TaqMan® Low Density Array (TLDA). Intratesticular testosterone (ITT) and serum gonadotrophins were assessed by ELISA.

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The authors have no conflict of interest to disclose

