Intrauterine growth restriction affects postnatal testis maturation in rats

V Pampanini 1, D Germani 2, A Puglianiello 3, JB Stukenborg 4, A Reda 5, J Savchuk 4, R Kjartansdóttir 6, S Cianfarani 1,3 and O Söder 4.

1 Department of Women’s and Children’s Health, Karolinska Institutet, Stockholm, Sweden.
2 Department of Systems Medicine, Tor Vergata University, Rome, Italy.
3 Dipartimento Pediatrico Universitario Ospedaliero “Bambino Gesù” Children’s Hospital – Tor Vergata University, Rome, Italy.
4 Centre for GeoGenetics, Natural History Museum of Denmark, University of Copenhagen, Copenhagen, Denmark.

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.

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.

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 days post-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.