OBESITY

EFFECTS OF
PATERNAL OBESITY

Paternal obesity might affect the metabolic health of following generations, report researchers from Australia and New Zealand.

The effects of maternal obesity on the metabolic health of offspring have been extensively studied. However, the effects of paternal obesity on offspring metabolic health in the absence of altered glucose homeostasis had not been adequately investigated.

“Using mice, we determined the effect of paternal exposure to a high-fat diet to a level that induces obesity but not altered glucose homeostasis, on the metabolic function of their offspring into late adulthood,” explains lead researcher Tod Fullston of the University of Adelaide, Australia. “We also tracked the transgenerational effects of a grandpaternal high-fat diet on the metabolic health of an F2 generation.”

The researchers fed F0 male mice a high-fat diet or a normal diet for 8–10 weeks and analysed the expression of mRNAs and microRNAs and the global DNA methylation status in the testis of these mice to shed light on potential transmissible effects of obesity in sperm. Mice mated to the F0 male mice and F1 mice were fed a normal diet.

Paternal obesity increased the weight and insulin resistance of F1 male and female mice and led to obesity in F1 female mice. “Paternal transmission of obesity to females and metabolic disturbance to males had not been observed before,” says Fullston. “Furthermore, this obesity and altered glucose homeostasis was transmitted with incomplete penetrance and with milder impact to the F2 generation.”

Sperm microRNA content and DNA methylation status in the F0 males was modulated by diet-induced obesity. “These epigenetic alterations to sperm might, in part, explain the phenotypes that are transmitted to F1 and F2 generations by F0 paternal obesity,” suggests Fullston.

If the findings are translatable to humans, then “this study serves as a reminder that paternal health is also an important consideration prior to conception,” comments Fullston.

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Original article Fullston, T. *et al.* Paternal obesity initiates metabolic disturbances in two generations of mice with incomplete penetrance to the F₂ generation and alters the transcriptional profile of testis and sperm microRNA content. *FASEB J.* doi:10.1096/fj.12-224048