Pathogenic Mechanism of Male Infertility Caused by Peroxisomal DBP Deficiency

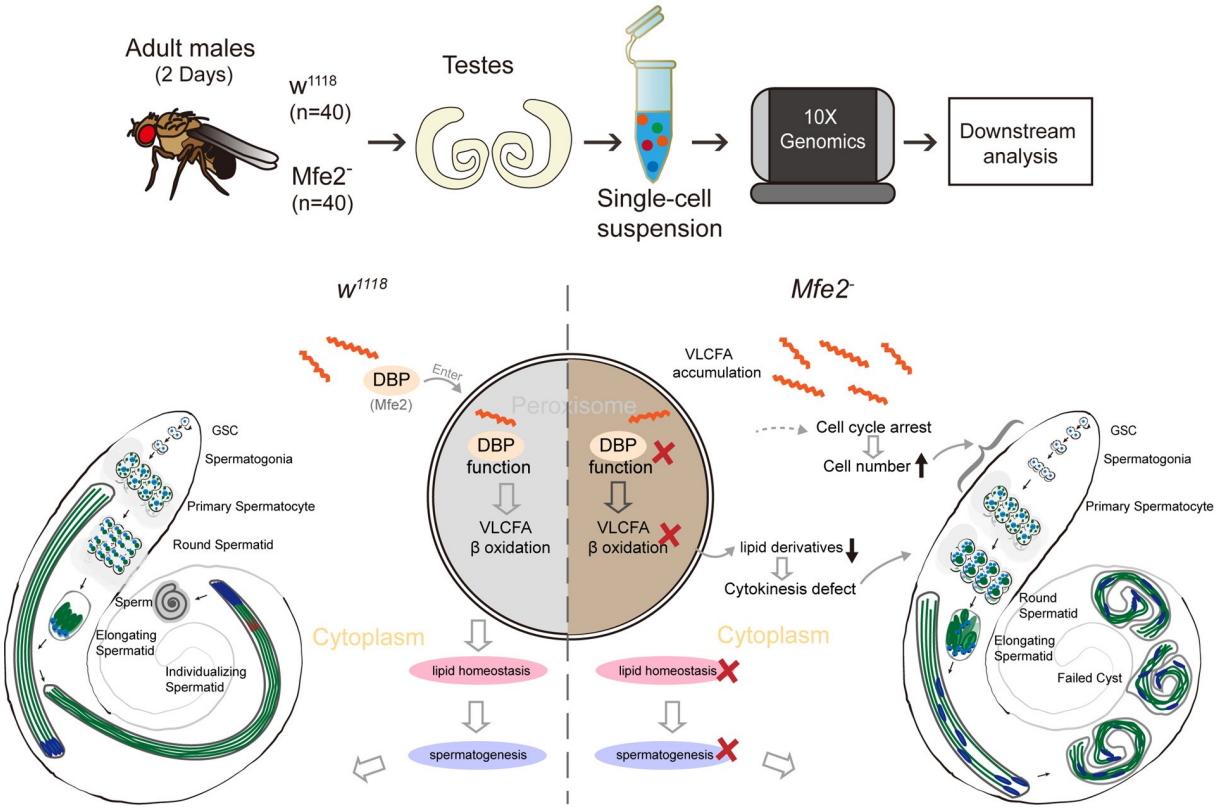
Yang Xiaohang
Institute of Genetics, Zhejiang University International School of Medicine, Hangzhou, Zhejiang, China

Ge Wanzhong
Women's Hospital School of Medicine Zhejiang University, Hangzhou, Zhejiang, China

Abstract

Peroxisomes play a variety of roles in beta-oxidation of fatty acids, where long-chain fatty acids are shortened before entering the mitochondria for further metabolic processes. DBP deficiency is due to peroxisomal protein disorders. Adult patients with DBP deficiency are usually infertile, and the specific pathogenic mechanism is not yet clear. Here, we employ a Drosophila DBP deficiency model combined with scRNA-seq to study the pathogenic mechanism of male infertility in DBP deficient animals. We find that spermatogonia and spermatocytes in mutants undergo cell cycle arrest and display cytokinesis defect. Lipidomic analysis shows that almost all lipid derivatives decrease in mutant testes, including phospholipids and sterols, which are the main lipid molecules of the biofilm system. We also find that the signal of PIP2 and PIP3 on the contractile ring membrane in spermatocytes is weaker as compared to the wild type counterparts. These results shed lights on our understanding of the molecular mechanism of male infertility caused by peroxisomal DBP deficiency.

Figure / Scheme:



Keywords

DBP deficiency, Male infertility, scRNA-seq, Drosophila testis, Cytokinesis.