

DNA repair gene linked to male infertility

April 18 2019



Credit: CC0 Public Domain

A key DNA repair gene known as X-ray repair cross-complementing group 1, or XRCC1, plays a vital role in maintaining genomic stability and is highly expressed in the early stages of sperm cell development (also known as spermatogenesis). To date, however, the exact mechanisms of XRCC1 have been unclear.

A recent animal study published in *The FASEB Journal* examined the

role of XRCC1 in the spermatogenesis of [mice](#). To conduct the experiment, a group of researchers observed a control group of wild-type mice, as well as mice with XRCC1 conditionally knocked out in their [primordial germ cells](#). Using these two groups, researchers compared expression of XRCC1 protein in the testes, the size and weight of the testes, [body weight](#), sperm concentration and motility, and more.

Overall, the study demonstrated that an XRCC1 deficiency resulted in infertility in male mice due to impaired spermatogenesis. Specifically, researchers found that the XRCC1-knockout mice exhibited smaller testes, as well as lower sperm concentration and motility than the wild-type mice. They also demonstrated that an XRCC1 deficiency in primordial germ cells was linked to stemness disruption, DNA damage, oxidative stress, and apoptosis. The experiment showed that while N-acetylcysteine (NAC) treatment was able to partially reverse several of these conditions, it was unable to restore fertility or reverse the apoptosis caused by XRCC1 deficiency.

"Even modest DNA damage in human spermatozoa can reduce fertility and increase the risk of disease in offspring," explained Aihua Gu, a researcher at State Key Laboratory of Reproductive Medicine, Institute of Toxicology; Key Laboratory of Modern Toxicology, Ministry of Education School of Public Health in China. "Now that we know XRCC1 plays a crucial role in maintaining normal spermatogenesis in mice, further study should explore potential treatments that could reverse male infertility caused by XRCC1 deficiency."

"XRCC1 has long been known as a guardian of genome integrity in many cell types, and this new study moves its role into the important context of spermatogenesis," said Thoru Pederson, Ph.D., Editor-in-Chief of *The FASEB Journal*.

Provided by Federation of American Societies for Experimental Biology

Citation: DNA repair gene linked to male infertility (2019, April 18) retrieved 7 May 2024 from <https://medicalxpress.com/news/2019-04-dna-gene-linked-male-infertility.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.