Abstract

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Fundamental roles of reactive oxygen species and protective mechanisms in the female reproductive system.

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BACKGROUND: Controlled oxidation, such as disulfide bond formation in sperm nuclei and during ovulation, plays a fundamental role in mammalian reproduction. Excess oxidation, however, causes oxidative stress, resulting in the dysfunction of the reproductive process.

DISCUSSION: Antioxidation reactions that reduce the levels of reactive oxygen species are of prime importance in reproductive systems in maintaining the quality of gametes and support reproduction. While anti-oxidative enzymes, such as superoxide dismutase and peroxidase, play a central role in eliminating oxidative stress, reduction-oxidation (redox) systems, comprised of mainly glutathione and thioredoxin, function to reduce the levels of oxidized molecules. Aldo-keto reductase, using NADPH as an electron donor, detoxifies carbonyl compounds resulting from the oxidation of lipids and proteins.

CONCLUSION: Thus, many antioxidative and redox enzyme genes are expressed and aggressively protect gametes and embryos in reproductive systems.

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