

ZINC AND MALE REPRODUCTION

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Zinc (Zn) is a trace mineral essential for normal functioning of the male reproductive system: for testicular development and spermatogenesis.

Zn has many biologically significant interactions with hormones. Bishop and co-workers observed that Zn has a role in the production, storage and secretion of individual hormones as well as in the effectiveness of receptor sites and end-organ responsiveness. Among the most notable effects of Zn on hormone production and secretion are those related to testosterone (conversion of testosterone to 5 α -dihydrotestosterone), insulin, adrenal corticosteroids and also it is irreplaceable for spermatogenesis and the development of the primary and secondary sex organs in the male.

Zn in human semen to play an fundamental role in the physiology of spermatozoa. In seminal fluid helps to stabilize the cell membrane and nuclear chromatin of spermatozoa. Other roles in male reproduction include: may have a regulatory role in the process of capacitation and acrosome reaction. The ability of Zn to reduce oxidative stress in sperm was also identified, although this was negatively associated with sperm decondensation. It is established, that Zn can counteract the oxidation by binding sulphhydryl groups in proteins and by occupying binding sites for iron and copper in lipids, proteins and DNA.

Zn deficiency associated with decreased testosterone levels, gonadal dysfunction, decreases testicular weight and causes shrinkage of seminiferous tubules. The gonads are the most rapidly growing tissues in the body, and vital enzymes involved in nucleic acid and protein synthesis are Zn metalloenzymes. Zn has also been reported to be the primary factor responsible for the antibacterial activity of the seminal plasma. Zn may have a role in sperm production and/or viability, in the prevention of spermatozoa degradation, and in sperm membrane stabilization. Zn concentration in seminal plasma is known to correlate with count sperm concentration, motility and viability. Men with infertility due to an abnormally low sperm count may benefit from taking supplemental Zn in case of its established deficiency in blood or sperm.

Thus, the main aspects of zinc of male reproduction: testicular steroidogenesis, testicular development, oxygen consumption of spermatozoa, nuclear chromatin condensation, acrosome reaction, acrosin activity, sperm chromatin stabilization, testosterone synthesis and conversion of testosterone to 5 α -dihydrotestosterone.