

Mechanisms of Male Infertility: Role of Antioxidants

Defective sperm function is the most common cause of infertility, and until recently, was difficult to evaluate and treat. Mammalian spermatozoa membranes are rich in poly unsaturated fatty acids and are sensitive to oxygen induced damage mediated by lipid peroxidation. Hence, free radicals and reactive oxygen species [ROS] are associated with oxidative stress and are likely to play a number of significant and diverse roles in reproduction.

The excessive generation of reactive oxygen species by abnormal spermatozoa and by contaminating leukocytes [leukocytospermia] has been identified as one of the few defined etiologies for male infertility. Moreover, environmental factors, such as pesticides, exogenous estrogens, and heavy metals may negatively impact spermatogenesis since male sperm counts were lower. Limited endogenous mechanisms exist to reverse these damages.

In a normal situation, the seminal plasma contains antioxidant mechanisms which are likely to quench these ROS and protect against any likely damage to spermatozoa. However, during genitourinary infection/inflammation these antioxidant mechanisms may downplay and create a situation called oxidative stress. Assessment of such oxidative stress status [OSS] may help in the medical treatment of male infertility by suitable antioxidants. The cellular damage in the semen is a result of an improper balance between ROSS generation and scavenging activities. Therefore, numerous antioxidants such as vitamin C, vitamin E, glutathione, and coenzyme Q10, have proven beneficial effects in treating male infertility.

A multi-faceted therapeutic approach to improve male fertility involves identifying harmful environmental and occupational risk factors, while correcting underlying nutritional imbalances to encourage optimal sperm production and function.

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