

Efficacy of Antioxidants in the Clinical Management of Infertile Men

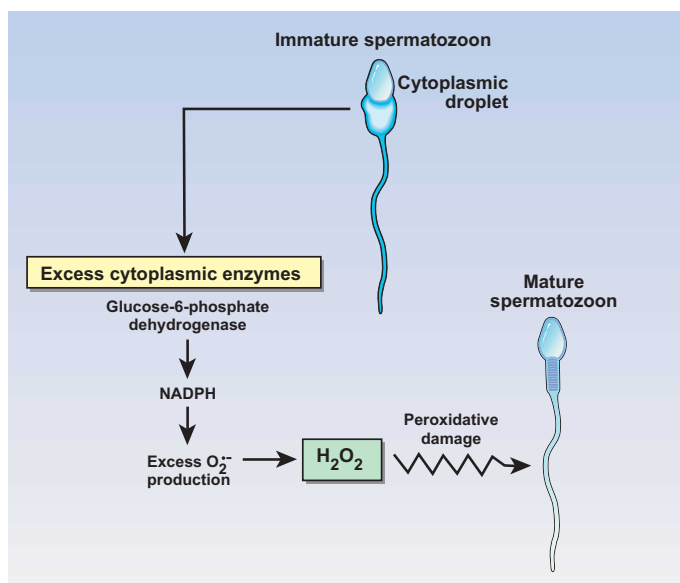
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Reactive oxygen species (ROS) are highly reactive free radicals generated during metabolic reactions. Excessive production of these radicals causes oxidative stress (OS), which is detrimental to the fertilizing capacity of the spermatozoa. Human seminal plasma contains a variety of enzymatic and non-enzymatic antioxidants that act as free radical scavengers to protect spermatozoa against OS. The enzymatic antioxidants are superoxide dismutase, catalase and glutathione peroxidase and the non-enzymatic antioxidants include vitamin C (ascorbic acid), vitamin E

(α -tocopherol), pyruvate, glutathione, and carnitine.

High levels of ROS can be detected in the semen of 30% to 80% of infertile men. As a result, strategies that reduce levels of OS are needed to treat male infertility. A thorough work-up can help identify known causes of OS, which should be addressed first. In addition, high levels of ROS can be reduced by increasing the scavenging capacity of the seminal plasma.

Although many clinical trials have demonstrated the beneficial effects of antioxidants in selected cases of male infertility such as: patients with male accessory gland in-



Mechanisms of oxidative stress-induced cell damage.

fection, varicocele, oligo-astheno-teratozoospermia and raised OS indices, others have found no benefit. Pregnancy, the most relevant outcome parameter of fertility, was assessed in only a few studies.

The table summarizes some of the important antioxidants used in the treatment of male infertility in the literature and their effect on routine semen parameters, levels of ROS, lipid peroxidation, sperm DNA damage, and pregnancy rates.

The cumulative evidence from the literature suggests that antioxidant supplementation for at least 3 months (preferably 6 months) may be helpful in the treatment of selected groups of patients with male infertility.

Treatment that uses a combination of antioxidants such as L-carnitine and acetyl-carnitine, vitamin E and N-acetyl-L-cysteine, and selenium plus vitamins A, C and E appears to be more effective than treatment with a single antioxidant.

In conclusion, current evidence supports the use of a variety of systemic antioxidants for management of selected cases of male infertility with OS. However, a consensus is still required on the type and dose of antioxidants to be used. There is an urgent need for multi center, large-scale, double-blind studies to prove conclusively that antioxidant use is beneficial in the treatment of these patients.

Antioxidants and Their Effects in Patients with Infertility*

Antioxidants	Dose	Duration	Parameters improved
Vitamin E	200-1200 mg	2-6 months	Concentration, motility, morphology, viability, ROS levels, MDA levels, DNA damage levels, zona binding rates, pregnancy rate
Vitamin C	200 mg	2 months	Concentration, motility, MDA levels, DNA damage levels, pregnancy rate
Glutathione	400-600 mg	2 months	Concentration, motility, morphology, MDA levels, DNA damage levels
Selenium	100-225 mg	3-5 months	Motility, morphology, viability, MDA levels, pregnancy rate

* The dosages and duration shown were either using single antioxidant or as part of combination with other compounds. ROS – Reactive oxygen species; MDA – Malondialdehyde.