

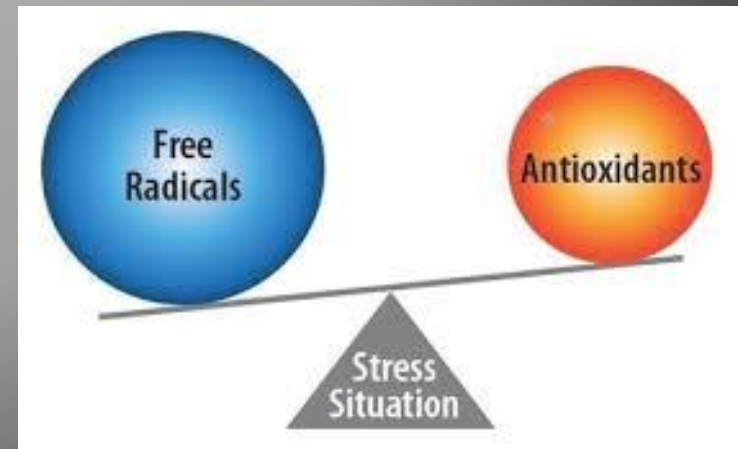
Oxidative stress & Reproductive Physiology



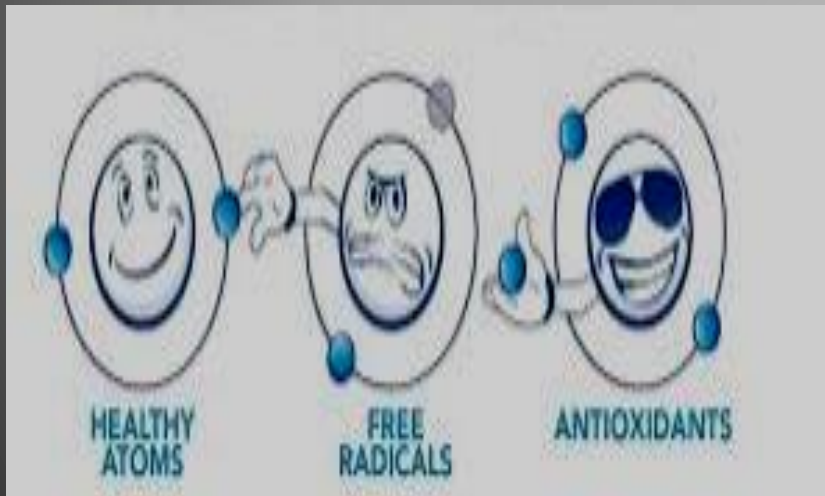
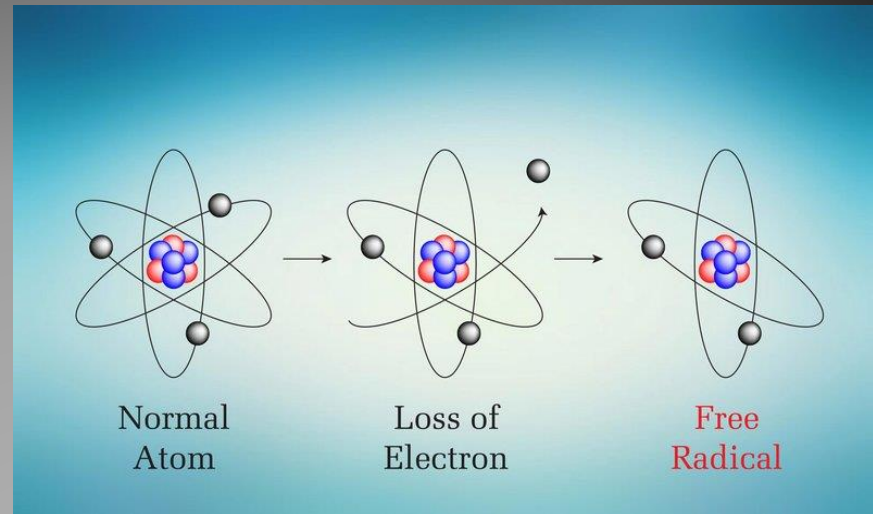
What is Oxidative Stress ?

Oxidative stress is the imbalance between the formation of Reactive Oxygen Species (ROS) and other free radicals and body's ability to detoxify and repair the damage caused by them.

In an healthy body, ROS and antioxidant remains in balance. When this balance is disrupted and overabundance of ROS occurs, it is called oxidative stress.



Free Radicals- They are defined as the unstable atoms that can damage cells, causing illness and aging. Eg- O_2^- , H_2O_2 etc.



Antioxidant-They are the chemical compounds that inhibits the chain reactions that produces free radicals and thus prevents oxidative stress. Eg- Ascorbic acid, catalase enzymes etc.

Causes of oxidative stress

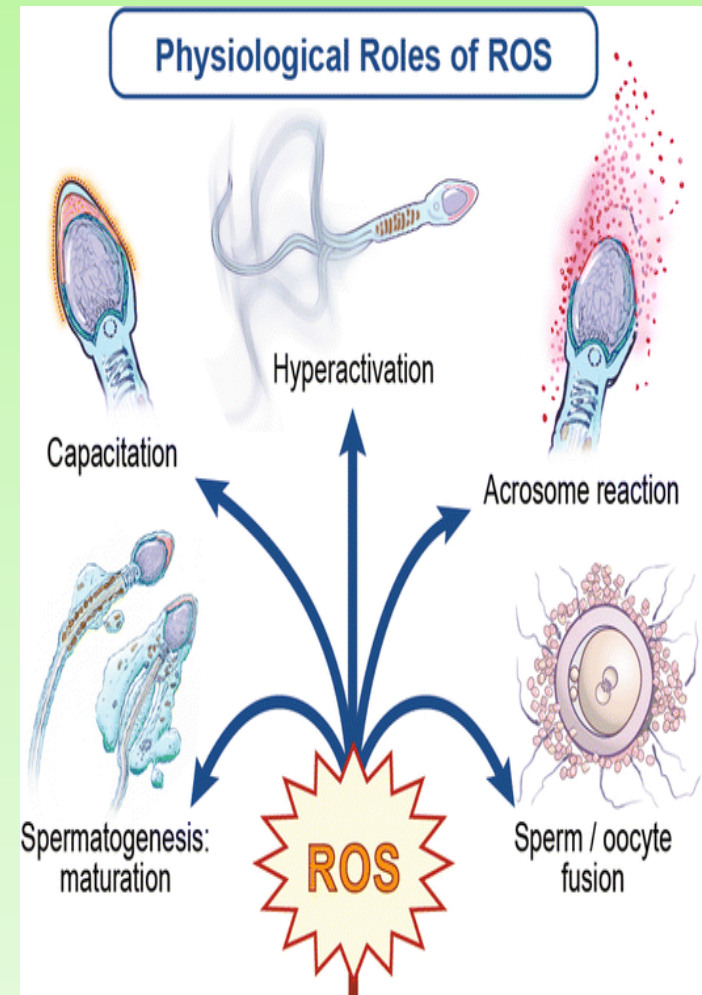
- ▶ Exposure to toxins
- ▶ Smoking, Alcohol intake,
- ▶ Lack of nutrients in diet,
- ▶ Intake of fast foods,
- ▶ Air and water pollutions,
- ▶ Lack of physical activities,
- ▶ Wrong medications and treatments,
- ▶ Excessive Exercises,
- ▶ Mental stress etc.



In short, whatever we do produces free radicals, but their quantity matters.

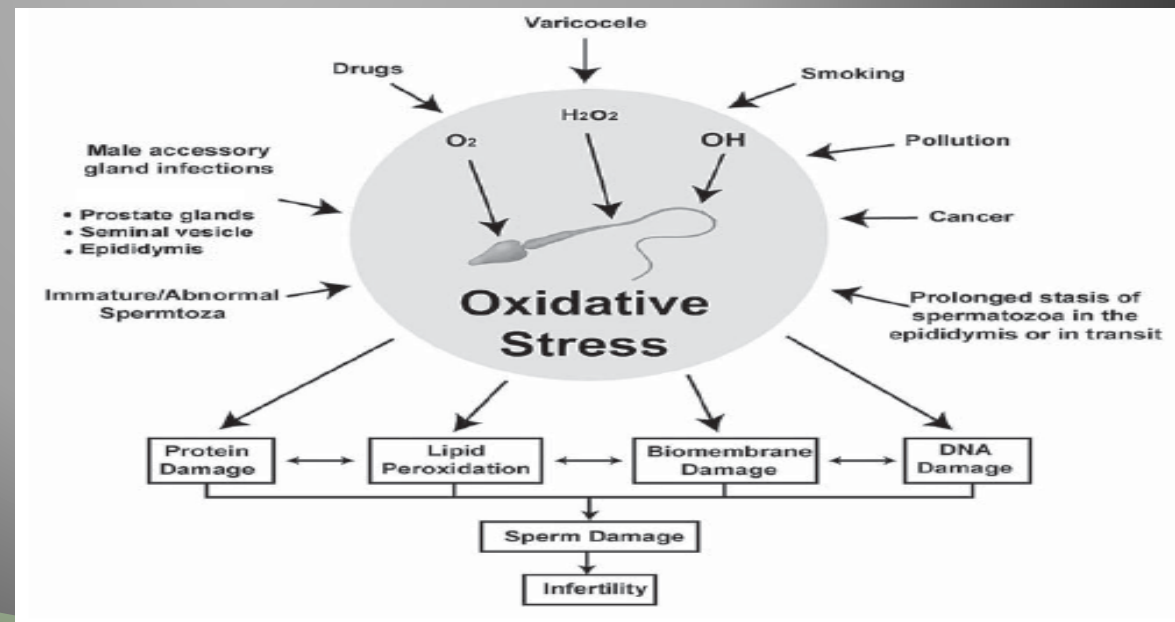
Role of Oxidative stress on Male fertility

- At low levels of ROS, the fusion rates of sperm-oocyte are enhanced.
- The positive role of ROS in sperm capacitation is seen.
- ROS at its lower levels enhances sperm maturation in spermatogenesis.
- It helps in cholesterol efflux from sperm plasma membrane.



Effects of ROS on Male Reproduction

- i. One of the major causes of defective sperm function is oxidative stress.
- ii. High levels of ROS decreases sperm motility.
- iii. In low levels of oxidative stress DNA damage is reduced but in high levels of oxidative stress the sperm chromatin starts to fragment.
- iv. Sperm loses their fertilizing potentials and thus are lead to the apoptotic state . Sperm loses their fertilizing potentials and thus are lead to the apoptotic state.



Role of Oxidative stress in Female fertility

ROS are said to be "double edged sword" i.e. a slight imbalance in their quantity can effect badly on the reproductive functions.

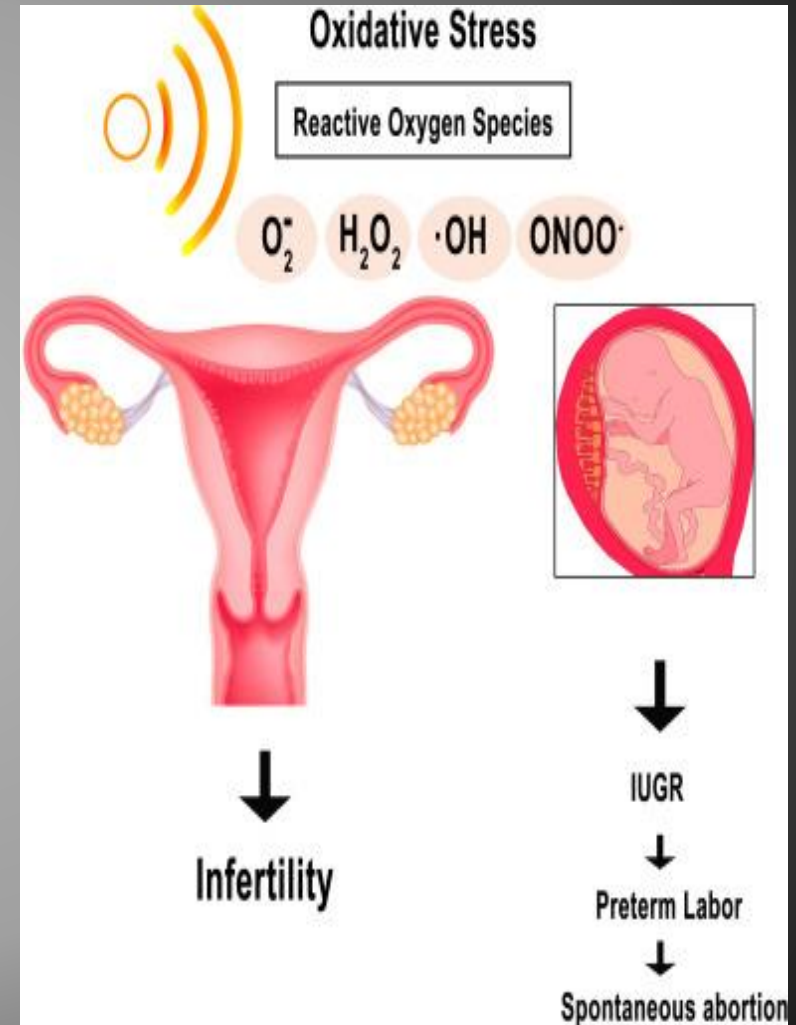
ROS effects multiple physiological processes from oocyte - maturation to fertilization, embryo-development and pregnancy.

It is also seen that oxidation stress modulates the age related decline in fertility in females . It also plays an important role in parturition and preterm labor.

Effects of ROS on Female Reproduction

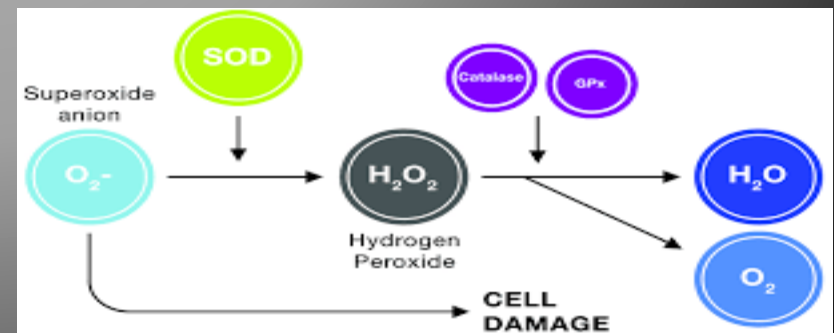
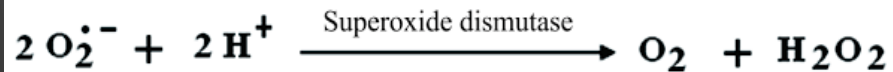
Imbalance of ROS can lead to a number of disorders like-

- i. Endometriosis
- ii. Polycystic Ovarian Disorder
- iii. Unexplained infertility
- iv. Pregnancy complications like spontaneous abortions, placental ischemia, intra uterine growth restrictions etc.



Bio markers of oxidative stress in reproductive system

Some of the enzymes can be used as biomarkers of oxidative stress such as Superoxide dismutase (SOD), Malondialdehyde (MDA), Catalase (CAT) Glutathione Peroxidase etc. These enzymes acts as inhibitors to the chain reactions producing ROS and converts them to H_2O_2 to reduce and give water.



- ▶ In female, Cu-Zn superoxide dismutase, Mn-superoxide dismutase, glutathione peroxidase, lipid peroxides acts as the biomarkers. Their concentration is assayed in the ovarian tissue and follicular fluid. It is studied at their concentration is lower than their serum concentration due to oxidative stress.
- ▶ In males, SOD, MDA, Catalase, Total Antioxidant Capacity (TAC) were assayed as biomarkers for oxidative stress from the seminal fluid. It was concluded that decrease in their concentration results in decrease of sperm count and motility.

Antioxidants-

Antioxidants are able to protect biological systems against the potentially harmful effects of processes or reactions that can cause excessive oxidation.

Antioxidant are broadly divided into two classes- Water-soluble and Lipid-soluble.

Some of the dietary water-soluble antioxidants are-Ascorbic acid (Vit C), Glutathione, Uric acid .

Some of the dietary lipid- soluble antioxidants are- Carotenes, Tocopherol (vitamin E).

Some enzymes that acts as antioxidant are- SOD, Catalase etc. SOD primarily converts the superoxide anion into hydrogen peroxide (H_2O_2). Catalase than catalyses its conversion into water and oxygen.

Eat antioxidants and Stay Healthy....



THANK YOU!