

POTENTIAL EFFECTS OF REACTIVE OXYGEN SPECIES.

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OBJECTIVE

Reactive oxygen species (ROS) or free radicals are one of the major offenders to provide oxidative damage to biological macromolecules.

These unstable ROS are known to cause or aggravate a variety of chronic diseases such as cancer, cardiovascular diseases, arthritis, neuro-degenerative diseases as well as aging, diabetes, obesity, and also other less known pathologies.

MATERIALS AND METHODS

ROS correspond to a type of unstable molecules that contains oxygen and that easily reacts with other molecules in a cell.

A significant increase of ROS in cells may cause damage to DNA, RNA, and proteins, and may cause cell death.

Most ROS are generated as by-products during mitochondrial electron transport.

The sequential reduction of oxygen through the addition of electrons leads to the formation of a number of ROS including: superoxide, hydrogen peroxide, hydroxyl radical, hydroxyl ion, and nitric oxide.

RESULTS

Tumor cells of another kind of activated cells can also express increased levels of antioxidant proteins to detoxify from ROS, suggesting that a delicate balance of intracellular ROS level is required for cancer cell function, in this pathological process. As such a number of defense mechanisms have evolved to meet this need and provide a balance between production and removal of ROS.

An imbalance toward the pro-oxidative state is often referred to as “oxidative stress”.

Cells have a variety of defense mechanisms to improve the harmful effects of ROS. Superoxide dismutase (SOD) catalyzes the conversion of two superoxide anions into a molecule of hydrogen peroxide (H_2O_2) and oxygen (O_2). In the peroxisomes of eukaryotic cells, the enzyme catalase converts H_2O_2 to water and oxygen, and thus completes the detoxification initiated by SOD. Glutathione peroxidase is a group of enzymes containing selenium, which also catalyse the degradation of hydrogen peroxide, as well as organic peroxides to alcohols.

CONCLUSION

There are a number of non-enzymatic small molecule antioxidants that play a role in detoxification. Glutathione may be the most important intra-cellular defense against the deleterious effects of ROS