Sources and Molecular Mechanisms of Oxidative Stress, and its Role in disease

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Abstract:

The utilization of oxygen in biological systems is associated with the formation of reactive oxygen species (ROS). While ROS have some beneficial roles through the involvement in redox regulation and intracellular signaling of the cell, they can readily react with biologically relevant molecules and modification or damage of DNA, proteins, lipids and carbohydrates have been related to pathogenesis of various diseases. To uphold the delicate balance between ROS levels and oxidative damage, cells utilize a multilayered defense system of enzymatic and non-enzymatic antioxidants. Oxidative stress occurs when there is a disturbance in the balance between oxidant-antioxidant states in favor of the oxidant environment, leading to a disruption of signaling and redox regulation and/or molecular damage and pathological processes. Oxidative stress as cause, result or epiphenomenon in degenerative disease and the free-radical theory of aging will be discussed.

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