Special Issue

Reactive Oxygen Species (ROS) and Metal Ions in Biological Systems

Message from the Guest Editors

A reactive oxygen species (ROS) is a form of oxygen containing molecules with free electrons that often forms in biological systems as a biproduct of cellular metabolism as an oxidative stress response. The mechanism for its formation varies, but this formation can cause damage to many cellular systems. Because of its instability, an ROS can sometimes activate other systems which may play roles in cell signaling. Metal ions and, particularly, redox active transition metals ions are particularly prone to involvement in ROS reactions. Metal ions such as iron can undergo changes in oxidation states when undergoing the Fenton reaction, which generates ROS within living organisms. However, the speciation of metal complexes can be critical for whether ROS are formed or consumed. In excess, ROS can damage nuclear and mitochondrial DNA as well as oxidize essential macromolecules such as enzymes and cytoskeletal proteins; they can also cause lipid peroxidation, which can destabilize biological membranes and result in disease development.

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