

Special Issue

Latest Advances in Oxidative Stress and Brain Injury

Message from the Guest Editor

Recent research underscores the critical role of reactive oxygen species (ROS) and oxidative stress in brain injury, spanning traumatic, degenerative, and endogenous insults. The excessive production of ROS due to excitotoxicity and depletion of the endogenous antioxidant system induces peroxidation of cellular and vascular structures, protein oxidation, and inhibition of the mitochondrial electron transport chain, causing oxidative cellular damage. While ROS imbalance disrupts cellular homeostasis—triggering lipid peroxidation, protein oxidation, and mitochondrial dysfunction—new evidence highlights mitochondrial DNA damage, neuroinflammation, and blood–brain barrier (BBB) disruption as key amplifiers of secondary injury. The increase in the defense mechanisms using exogenous antioxidants may be neuroprotective, but their clinical translation remains limited by bioavailability and timing.

Guest Editor

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