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Oxidative Medicine and Cellular Longevity

Special Issue on

Role of Oxidative Stress in Liver Health and Disease

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The redox status provides a balance for the optimus function of any organ, including the liver. Hepatic diseases represent a health problem with significant morbidity and mortality. Reactive oxygen and nitrogen species (ROS and RNS) are produced by metabolism of normal cells. However, in liver diseases, redox is increased, thereby damaging the hepatic tissue; the capability of ethanol to increase both ROS/RNS and peroxidation of lipids, DNA, and proteins was demonstrated in a variety of systems, cells, and species, including humans. ROS/RNS can activate hepatic stellate cells, which are characterized by the enhanced production of extracellular matrix and accelerated proliferation. Cross-talk between parenchymal and nonparenchymal cells is one of the most important events in liver injury and fibrogenesis; ROS play an important role in fibrogenesis throughout increasing platelet-derived growth factor.

Most hepatocellular carcinomas occur in cirrhotic livers, and the common mechanism for hepatocarcinogenesis is chronic inflammation associated with severe oxidative stress; other risk factors are dietary aflatoxin B(1) consumption, cigarette smoking, and heavy drinking. Ischemia-reperfusion injury affects directly hepatocyte viability, particularly during transplantation and hepatic surgery; ischemia activates Kupffer cells which are the main source of ROS during the reperfusion period. The toxic action mechanism of paracetamol is focused on metabolic activation of the drug, depletion of glutathione, and covalent binding of the reactive metabolite N-acetyl-p-benzoquinone imine to cellular proteins as the main cause of hepatic cell death; intracellular steps critical for cell death include mitochondrial dysfunction and, importantly, the formation of ROS and peroxynitrite. Infection with hepatitis C is associated with increased levels of ROS/RNS and decreased antioxidant levels. As a consequence, antioxidants have been proposed as an adjunct therapy for various liver diseases.

Potential topics include, but are not limited to:

- Free radicals and liver damage
- Mitochondrial dysfunction and oxidative stress
- Flavonoids and the liver
- Methods to evaluate oxidative stress in the liver
- Participation of reactive oxygen and nitrogen species on fibrosis and cancer
- Participation of oxidative stress on alcoholic and nonalcoholic liver disease
- Herbal remedies for liver diseases

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