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Editorial:

OXIDATIVE STRESS RESEARCH

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Oxidative stress remains one of the most intensively studied and most frequently cited fields in toxicology. A perfect example is the conclusive review article by Cederbaum et al. (2009) illustrating how ethanol leads to increased generation of reactive oxygen species and depletion of antioxidants, key mechanisms that may finally lead to liver cirrhosis. Besides ethanol, several other chemicals were studied with regard to their ability to generate reactive oxygen species, including uranium, arsenic, aluminium perfluorooctanesulfonamides, benzimidazole anthelmics and the non-genotoxic liver carcinogen piperonyl butoxide. A second cutting-edge topic in the field of oxidative stress centres on anti-oxidative compounds, which may exert anti-carcinogenic activities. A frequently-cited example is the review article of Yang et al. (2009) on the activities of polyphenolic compounds. The authors attempt to differentiate "fact from fancy" concerning the hypothesis that drinking tea can protect from cancer.

Table 1: Oxidative stress research

Key message	Reference
Menadione is used as a vitamin K source in animal feed. However, menadione, in concentrations as low as 1.0 µM, decreased the proportion of blastocysts using a reactive oxygen species-dependent mechanism. Insulin-like growth factor-1 antagonized the effect of menadione, this time using a mechanism independent of ROS generation.	Moss et al., 2009
Aluminium, the most widely distributed metal in the environment, produces oxidative stress and impairs mitochondrial bioenergetics in neurons (review).	Kumar and Gill, 2009
Perfluorooctanesulfonamides are large scale industrial chemicals, but relatively little is known about their toxic mechanisms. This study demonstrates that N-ethyl perfluorooctanesulfonamidoethanol is metabolized to perfluorooctanesulfonate in rats which increased superoxide dismutase activity.	Xie et al., 2009
Arsenic enhances generation of reactive oxygen species and malondialdehyde in a human hepatocyte cell line, which coincided with an unexpected increase of intracellular glutathione.	Wang et al., 2009a
4-n-Nonylphenol augments vascular contractile responsiveness in rats by enhanced activity of vascular oxidant enzymes.	Hsieh et al., 2009
Oxidative damage and nitric oxide depletion by sub-chronic exposure to methylmercury are responsible for hypertension.	Grotto et al., 2009
Chronic ethanol consumption increased reactive oxygen species and depleted antioxidants.	Cederbaum et al., 2009; Hengstler et al., 2009a (editorial)

Table 1 (cont.): Oxidative stress research

Key message	Reference
Propyl gallate is a synthetic antioxidant widely used in processed food and cosmetics. However, in this study propyl gallate produced increased as well as decreased ROS levels depending on the incubation time.	Han et al., 2009
Oxidative DNA damage is repaired less in individuals with the Cys 326 Cys variant of the codon 326 nOGG1 polymorphism.	Ke et al., 2010
The ability to activate antioxidant defence systems determines the susceptibility of individual proximal tubular cells to lead acetate.	Wang et al., 2009b
Thermoluminescence assay quantifies oxidative stress with similar sensitivity as conventional markers, such as thioborbitoric acid reactive substances and malondialdehyde. An advantage is that cell and tissue material can be directly included into the assay without preprocessing or extraction procedures.	Schumann et al., 2009
Myeloperoxidase is a key enzyme in benzene metabolism generating the ultimate genotoxic intermediates.	Westphal et al., 2009
Alpha-tocopherol ameliorates the CCl_4-induced decrease in hepatic vitamin C concentration.	Iida et al., 2009
Uranium induces apoptosis in lung epithelial cells by generation of oxidative stress.	Periyakaruppan et al., 2009
Diphenyl ditelluride causes oxidative stress in the cerebral cortex of rats.	Stangherlin et al., 2009
The most sensitive indicators of the peroxidative damage induced by tert-butyl hydroperoxide in rat hepatocytes are changes in intracellular glutathione concentrations and compromised mitochondrial membrane potential.	Cervinková et al., 2009
This review discusses the antioxidative activities of polyphenolic compounds in tea.	Yang et al., 2009 (review); Hengstler et al., 2009b (editorial)
The antioxidative polyphenol, resveratrol shows a protective effect on lipopolysaccharide-induced acute phase response in rats.	Sebai et al., 2009
Administration of the benzimidazole, anthelmintic oxfendazole caused oxidative stress and tumour promotion in rat liver.	Dewa et aL., 2009
Piperonyl butoxide induces oxidative stress in the livers of rats only when given above a threshold dose of 0.25 % in the diet of rats.	Muguruma et al., 2009
Mitochondrial uncoupling is a protective mechanism against acute iron overload.	Pardo Andreu et al., 2009
Exogenously administered metallothionein attenuates carmustine-induced oxidative stress and protects against pulmonary fibrosis in rats.	Helal and Helal, 2009

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