

# Free Radical Research

Official Journal of the Society for Free Radical Research–European Region and the Society  
for Free Radical Research–Asia



**Editors-in-Chief**

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**Abstracts of the Society for  
SFRR – Europe Meeting 2009,  
Rome, August 26–29, 2009**

**Conclusion:** Delphinidin can protect NO from superoxide inactivation in an in vitro model of oxidative stress. Equivalent concentrations of resveratrol did not show a similar effect.

#### PIII-4

##### Effects of quercetin on apoptosis, p53 and iNOS gene expression in ischemia-reperfusion induced rat kidney

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**Introduction:** Renal ischemia/reperfusion (I/R) injury is the major cause of acute renal failure and may also be involved in the development and progression of some forms of chronic kidney disease. The aim of this study is to evaluate the effects of quercetin on apoptosis, p53 and iNOS gene expression on kidney in I/R induced rats.

**Materials and Methods:** 42 Sprague-Dawley rats were used for this study. The animals were divided in 3 groups. Control, I/R and Quercetin + I/R group (50 mg/kg quercetin). After reperfusion animals were sacrificed and kidneys were removed.

**Results:** Biochemical results, MDA levels were significantly decreased in quercetin group compared to the I/R group, however GSH levels were increased with quercetin treatment according to the I/R group. Histological results, in the general tissue evaluation accomplished with Hematoxylin&Eosine, in the I/R group, evidently there were edema vascularisations and partly infiltration areas belonging to inflammatory cells. It is determined that, the number of apoptotic cells in the quercetin treatment group is less than the apoptotic cells in the I/R group. The p53 were expressed in I/R group but decreased quercetin treatment group. iNOS gene expression analysis accomplished with Real-Time PCR, it is observed that the expression of iNOS gene increased in the I/R group, but when the relative concentration is considered together with the GAPDH reference gene the differences were not statistically meaningful.

**Conclusion:** Quercetin, decreased apoptotic cell number, p53 expression and iNOS gene expression level according to I/R group, so these data revealed that quercetin has protective effects on renal tissue I/R injury.

#### PIII-5

##### Tocopherols composition of Portuguese wild mushrooms with antioxidant capacity

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In the last years nineteen different mushroom species from Northeast Portugal, one of the European regions with higher wild mushrooms diversity, were evaluated, by our team, for their antioxidant properties, in order to valorise them as a source of nutraceuticals [1]. Nevertheless, assuming that the proportion of used mushrooms among the undiscovered and unexamined ones is only 5%, there are thousands of species with possible benefit for mankind. Therefore, we intend to go on in the study of this matrix, documenting their nutraceutical potential and retaining the information for a better management and conservation of this natural resource and related habitats. The antioxidant properties and antioxidants composition of eighteen more Portuguese wild mushrooms were evaluated, in order to contribute to the overall characterization of these products. Their radical scavenging capacity, reducing power and inhibition of lipid peroxidation measured in liposomes solutions was fully studied. Furthermore the tocopherols composition was determined by HPLC-fluorescence. The analysed mushrooms contain powerful antioxidants such as phenolics (0.51 to 7.90 mg/g) and tocopherols (0.02–8.04 µg/g). β-Tocopherol was the vitamer detected in higher amounts, while δ-tocopherol was not detected in the majority of the samples. All the species proved to have antioxidant activity being more significant for *Hygrophoropsis aurantiaca* (EC50 values lower than 1.35 mg/ml) due to the contribution of antioxidants such as phenolics (7.90 mg/g) and tocopherols (0.02–1.94 µg/g).

**Acknowledgment:** PTDC/AGR/56661/2004 project and BPD/38008/2007 grant.

#### Reference

[1] Ferreira et al., *Cur. Med. Chem.* 2009, 16, 1543.

#### PIII-6

##### Brain ascorbate depletion is exacerbated by high dietary fat in guinea pigs suffering from long-term marginal vitamin C deficiency

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**Background:** Millions of people worldwide can be diagnosed with chronic vitamin C deficiency according to the accepted definitions. Furthermore subjects with a low intake of vitamin C tend to live an unhealthy life style with an increased intake of fat and cholesterol. Similar to humans, guinea pigs depend on dietary vitamin C. We have recently shown that severe vitamin C deficiency preferentially induce oxidative stress and damage in the brain of neonatal guinea pigs, and that vitamin C is the primary antioxidant in the brain. However, it is not known how the brain is affected by long-term marginal deficiency or if a poor diet rich in cholesterol and fat might accelerate vitamin C depletion in the brain.

**Methods and Results:** Female Duncan Hartley guinea pigs were fed diets that combined adequate / marginally insufficient amounts of vitamin C with low / high amounts of fat and cholesterol for up to 6 months. Ascorbate status in brain tissue was measured and oxidative stress was assessed by malondialdehyde. Brain ascorbate significantly declined with the insufficient diet and high fat and cholesterol significantly exacerbated this ascorbate depletion in the brain irrespective of vitamin C content of the diet. Malondialdehyde levels did not change between groups suggesting that oxidative damage was not induced by marginal vitamin C deficiency.

**Conclusion:** Guinea pigs kept on a low vitamin C diet to induce chronic deficiency (not scurvy) show a 50% reduction in the levels of brain ascorbate. These levels further deteriorate when the diet is also high in fat and cholesterol. The implications of selective brain ascorbate depletion on brain function are discussed.

#### PIII-7

##### Selenite and tellurite in combination with auranofin in cisplatin sensitive and resistant cancer cells: effects on TrxR and on cellular redox environment

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Selenium is an essential trace element and, currently, several seleno-proteins have been identified. Among them the two major mammalian selenoenzymes are thioredoxin reductases and glutathione peroxidases, which act as components of the thioredoxin and glutathione systems. The inhibition of these two systems creates dramatic cellular consequences as the balance between formation and removal of reactive oxygen species is altered and a redox shift involving thiols occurs. This causes an increase of mitochondrial membrane permeability leading to the release of proapoptotic factors able to trigger apoptosis.

Recently, thioredoxin system has emerged as a new target for anticancer drug development since thioredoxin reductase is overexpressed in different tumor cells.

The effects of selenite and tellurite treatment in human ovarian cancer cells are reported and compared. Results showed that both selenite and tellurite, at relatively low concentrations, are able to stimulate the activity and expression of mitochondrial and cytosolic thioredoxin reductases in cisplatin sensitive (2008) and resistant (C13\*) phenotypes. On these basis, we have investigated the cellular effects induced by further challenging selenite or tellurite treated cells with auranofin,