Polyphenolic compounds protect and repair oxidative DNA damage in a neuronal cell model

JP Silva[1], AC Gomes[1,2] and OP Coutinho[1]

[1]CBMA – Molecular and Environmental Biology Centre, University of Minho, 4710-057 Braga, Portugal; [2]Institute of Molecular Medicine, Faculty of Medicine of Lisbon, 1649-028 Lisboa, Portugal

Email: jpsilva@bio.uminho.pt

The excessive intracellular accumulation of reactive oxygen species (ROS) can cause a disturbance in the cells natural antioxidant defence systems, resulting in damage to all biomolecules, including nucleic acids. In fact, oxidative DNA damage is sometimes difficult to repair, being described as the type of damage most likely to occur in neuronal cells. In this study, the protective effects of three polyphenolic compounds, luteolin, quercetin and rosmarinic acid, against oxidative DNA damage induced in PC12 cells, a neuronal cell model, were investigated by the Comet assay. Although luteolin and quercetin prevented the formation of strand breaks to a greater extent than rosmarinic acid, this last one presented the highest capacity to repair strand breaks formation. In addition, rosmarinic acid was the only compound tested that increased the repair of oxidized nucleotidic bases induced with the photosensitizer compound Ro 19-8022. The activity of repair enzymes was indicated by the *in vitro* base excision repair assay, using a cell-free extract obtained from cells previously treated with the compounds to incise DNA. The quantification of the expression of OGG1 and APE1 repair genes by *real time* RT-PCR indicated a regulation, at the level of OGG1, by rosmarinic acid. The data obtained is indicative that the effect of rosmarinic acid seems

to be more specific for DNA repair mechanisms, rather than acting directly on ROS scavenging, as it is the case for luteolin and quercetin. Therefore, these results suggest the importance of these polyphenols, and in particular rosmarinic acid, as protecting agents against oxidative stress-induced DNA damage that commonly occurs in neurodegenerative diseases.

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