

Northeast Portuguese Propolis protects against neurotoxic events in cerebral cortical neurons

Susana M. Cardoso,^a Márcio Ribeiro,^b Ildete L. Ferreira,^b Soraia I. Falcão,^c Miguel Vilas-Boas,^c Ana C. Rego^b

^a*CERNAS - Escola Superior Agrária, Instituto Politécnico de Coimbra, Bencanta
3040-316 Coimbra, Portugal.*

^b*Centro de Neurociências e Biologia Celular, Departamento de Zoologia, Universidade de
Coimbra, 3004-517 Coimbra, Portugal,*

^c*CIMO - Escola Superior Agrária, Instituto Politécnico de Bragança, Campus de Sta.
Apolónia, 5301-855 Bragança, Portugal.*

scardoso@esac.pt

Propolis is a sticky substance that honeybees manufacture by mixing secreted substances from their metabolism with plant exudates, pollen and waxes. This product has been used in folk medicine for centuries. Currently, it is extensively used in foods and beverages and is claimed to improve human health. Propolis is known to have a wide range of biological properties, including anti-microbial, anti-inflammatory, anti-tumoral and antioxidative activities [1]. Indeed, oxidative stress and apoptosis has been implicated in both aging and several neurodegenerative disorders.

The chemical composition of propolis is very complex, varies with geographic origin, depending on the local flora and typically contains resin composed of flavonoids and related phenolic acids (50%), beeswax (30%), essential oils (10%), pollen (5%) and other organic compounds (5%). Recently, the phenolic profile of propolis from the Northeast of Portugal has been described [2]. Accordingly to this study, its phenolic composition fits well with that of propolis from temperate zones, as it is mainly rich in pinocembrin, chrysin and pinobanksin-3-*O*-acetate.

The present study investigated the potential neuroprotective effect of a phenolic enriched extract from the Northeast of Portugal propolis against hydrogen peroxide (H₂O₂)-induced neurotoxicity, in primary cultures of rat cerebral cortical cells. Exposure of neuronal cells to propolis (0.01–1 µg/mL) for 24 h did not affect cell viability of non-stimulated cells or those treated with H₂O₂, as measured by the Alamar Blue assay. Still, propolis pre-treatment attenuated the formation of reactive oxygen species and the increase in caspase-3 activity, a key mediator of apoptosis, in H₂O₂-stimulated cells. Altogether, these results suggest that the Portuguese propolis can be a good source of nutraceuticals for the prevention of neurological diseases linked to oxidative stress.

- [1] Martos, V.M., Navajas, Y.R., Lopez, J.F., Alvarez, J.A.P. (2008) Functional Properties of Honey, Propolis, and Toyal jelly. *J. Food science* 73: R117-R124.
- [2] Falcão, S.I., Vilas-Boas, M., Estevinho, L.M., Barros, C., Domingues M.R.M., Cardoso, S.M. (2010) Phenolic characterization of Northeast Portuguese propolis: usual and unusual compounds. *Anal. Bioanal. Chem.* 396: 887-897.