

In vitro studies assess the optimal concentration of propolis as a radioprotector

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A team of researchers from the Technical University of Valencia, the University Hospital La Fe, the University of Valencia and the Universitat Autònoma de Barcelona conducted in vitro studies of cytotoxicity (cellular affection) to assess the optimal concentration level of propolis in which this natural substance extracted from bee resin would offer the maximum protection against ionised radiation and not be toxic for blood cells.

According to the results of the research, this optimal concentration level is between 120-500 micrograms/mL. "Within this range can be found maximum protection against radiation-induced damage and the substance does not reveal neither a cytotoxicity nor a genotoxicity effect on non-irradiated human lymphocytes", says Alegria Montoro, head of the Laboratory of Biological Dosimetry at the University Hospital La Fe and lecturer of the Master in Radiological Protection in Radioactive and Nuclear Facilities offered by the UPV.

The conclusions of this study, which receives funding from the Spanish Nuclear Security Council (CSN), represent a starting point for future clinical applications using propolis. The results were published in the journal *Food and Chemical Toxicology*; in August a full revision of the study will be presented at the Annual International Conference of the IEEE Engineering in Medicine and Biology Society EMBC12, which will be held in San Diego, California.

In the study, the team of researchers used four genetic biomarkers,

including the mytotic index and the cell proliferation kinetics, with the aim of determining whether propolis has cytotoxic effects on cells.

"Using these biomarkers makes it possible to discover how a substance affects cell division: a substance which is cytotoxic and modifies the cell division stage would do so by accelerating, slowing down or even stopping the process, and all three effects are negative", explains Alegria Montoro.

The other two biomarkers used are the study of the possible induction of chromosome alterations in non-irradiated cultures at different concentration levels and sister chromatid exchanges (SCEs), a genetic biomarker of exposure to chemical agents.

"With this study we already know the in vitro experimental level, the concentration of propolis to be used to make it act as a radiation protector agent, without being cyto/genotoxic for normal cells. This is the first step, a starting point for future clinical assays. The final objective is to develop capsules containing the adequate dosis of propolis, but many more hours of research are needed before we are able to do this", Alegria Montoro adds.

UAB lecturer Francesc Barquinero, currently on leave to work at the Institut de Radioprotection et de Sûreté Nucléaire (IRSN) headquarters in Fontenay aux Roses, France, participated in the original planning of the study and its design, as well as the interpretation of the results and posterior contextualisation of other studies published.

Antecedents

In 2008, researchers at the Institute for Industrial, Radiophysical and Environmental Safety (ISIRyM) of the Technical University of Valencia and the University Hospital La Fe demonstrated that propolis can reduce by half the damage inflicted on chromosomes by ionised radiations, thus

protecting the DNA from these effects. The new study is fundamental in discovering the range of concentrations in which this substance can have a toxic effect on non-irradiated cells.

Provided by Universitat Autònoma de Barcelona

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