

## **In vitro study of the cytoprotective effects of chitosan polymeric nanoparticles carrying active ingredients in response to exogenous stimuli of oxidative nature**

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Scenario: Oxidative stress plays a central role in the pathophysiology of neurodegenerative diseases. Therefore, it is urgent to promote researches aimed at identifying antioxidant systems capable of protecting and/or correcting the pathological processes in a targeted manner. Nanotechnological approaches provide many advantages to drug delivery systems, also several studies showed the neuroprotective activity of the chitosan nanoparticles (NPs). Hence, our aim is to promote cellular protection from oxidative insults in vitro, through the use of functionalized chitosan nanoparticles targeting both specific cell lines and mitochondria and carrying anti-oxidant substances, including plant extracts.

Methods Used: Folic acid functionalized NPs were prepared according to the ionic gelation technique, and their physicochemical characteristics were evaluated. Different concentrations of chitosan nanoparticles were screened to investigate the cytotoxicity in Hela cells by MTT assay. *Gentiana lutea* plants were collected in Pollino National Park and secondary metabolites were extracted from flower and leaves with EtOH 80% for 24h. Extracts were subjected to HPLC analysis. Selected concentrations of extracts were screened to investigate the cytotoxicity in SH-SY5Y cells by MTT assay.

Results: NPs had a narrow size distribution ( $PI < 0.3$ ), small sizes ( $< 400$  nm) and high colloidal stability. Cell viability was higher than 80% after 72 h of incubation with empty systems in the range of concentrations investigated. Plant tissue extract chromatograms showed specific tissue profiles. Further, in vitro tests showed a cytoprotective effect against ethanol-induced damage in SH-SY5Y prompted by the free extracts.

Perspectives: in vitro tests for oxidative stress and mitochondrial functionality assessment will be performed, also in neuron-like differentiated SH-SY5Y, using functionalized NPs carrying compounds with anti-oxidant activity.

*Keywords: Chitosan Nanoparticles, Oxidative stress, Plant extracts*

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