20 24 MULTIDISCIPLINARY CONFERENCE ON SUSTAINABLE DEVELOPMENT

ULST Timisoara
Multidisciplinary Conference on Sustainable Development
30-31 May 2024

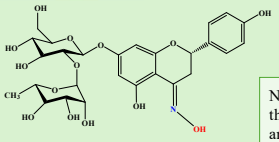
NATURAL HERB EXTRACTS IN ENHANCED NEUROPROTECTION PRODUCTS

K. Tseta[1,*], S. Matsia[1], G. Lazopoulos[1], A. Salifoglou[1]

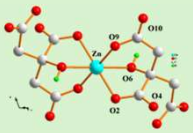
[1] *Laboratory of Inorganic Chemistry and Advanced Materials, School of Chemical Engineering, Aristotle University of Thessaloniki, Thessaloniki 54124, Greece*

E-mail: kyriatseta@cheng.auth.gr

Introduction



Synthetically Modified Flavonoids

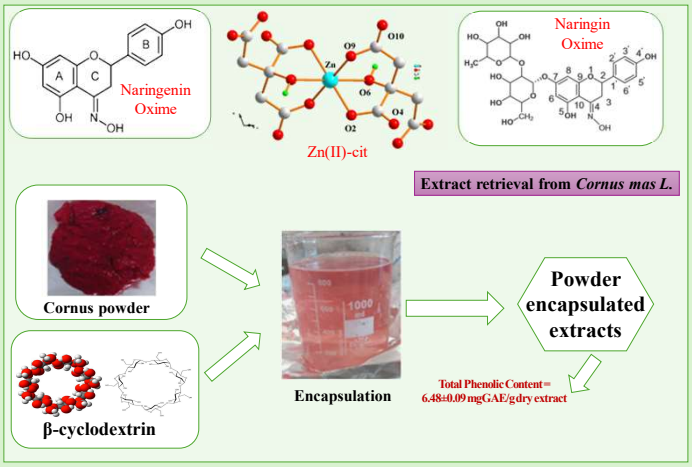


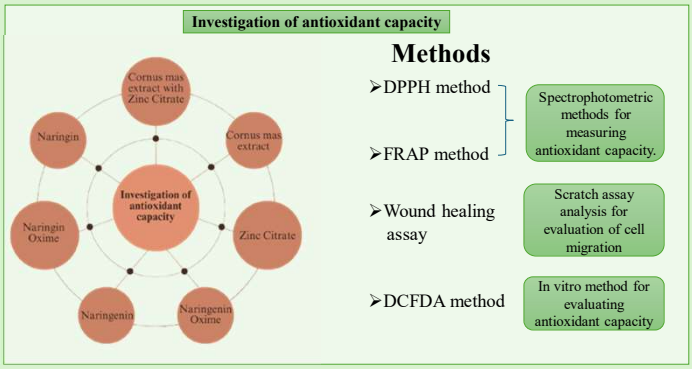
Zn(II)-cit

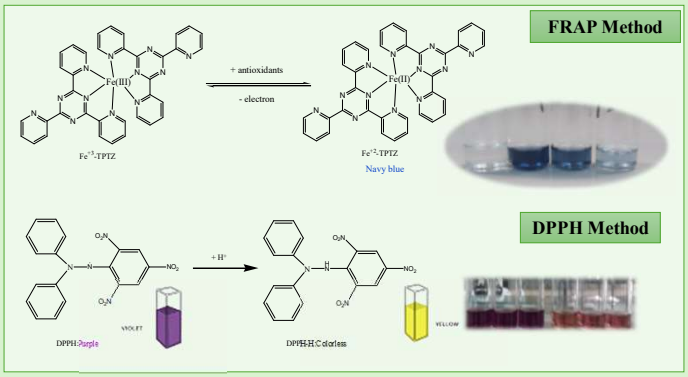
Neurodegenerative diseases (NDs) represent one of the most important public health problems and concerns globally, especially in the elderly people.[1] To that end, neurodegenerative diseases (NDs) include a number of chronic progressive disorders of the central nervous system that are caused by degradation and subsequent loss of neurons.[2] As a response to this aberrant human physiology, natural products have emerged as potential neuroprotective agents in the treatment of neurodegenerative diseases.[3] Hence, the aim of the present research work is centered on the production and isolation of natural product-containing materials and, subsequently, determination of their antioxidant potential and antioxidant activity in vitro, ultimately leading to long term proactive protection against neurodegenerative diseases. In that respect, natural products have been used as starting materials, including a) flavonoid derivatives, such as naringin and naringenin oxime, designed and synthesized in the laboratory, and b) aqueous extracts of the plant *Cornus mas L.* Further investigation of their effect on sensitive neuronal cell cultures was studied in vitro (N2a cell line). Beyond that, the possibility of enhancing the antioxidant activity of the natural extracts with endogenous metal-organic materials, involving physiological zinc (Zn(II)), coordinating physiological substrates, such as citric acid, thus leading to well-known complex species, such as zinc citrate, was also investigated. In that respect, bioanalytical experimental tests, such as DPPH and FRAP photometric analyses, were used in the case of the Cornus extracts, complemented by employing naringin oxime and naringenin oxime derivatives of the natural flavonoids. The in vitro antioxidant activity studied was facilitated through the DCFDA cell staining method. In such a context, various concentrations of tested nascent and hybrid materials chosen for the cultures were investigated for their ability to enter the cells and potentially influence their morphology and motility. The collective biotoxicity profile results, in concert with the antioxidant activity studies, confirm the enhanced antioxidant potential of the new natural products, thus meriting in-depth perusal of their incorporation in proactive preparations protecting brain cells from and averting neurodegeneration.

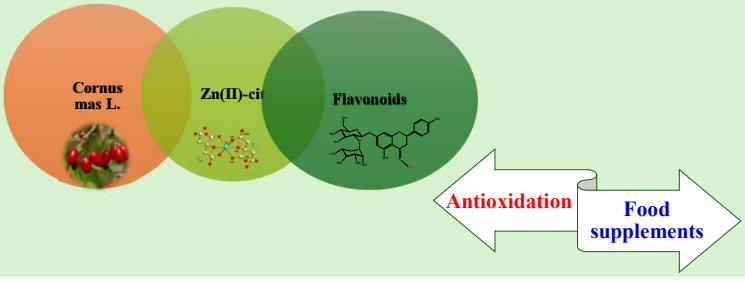
Cornus mas L.

Methods and Materials

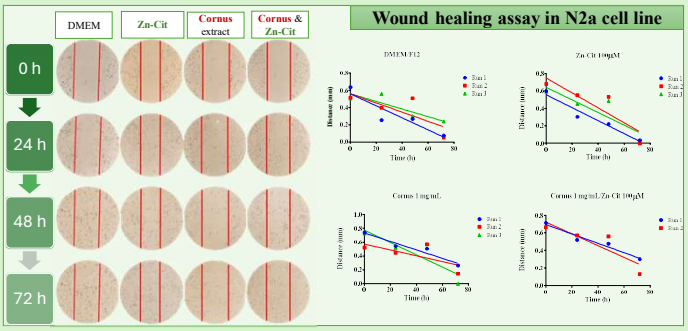


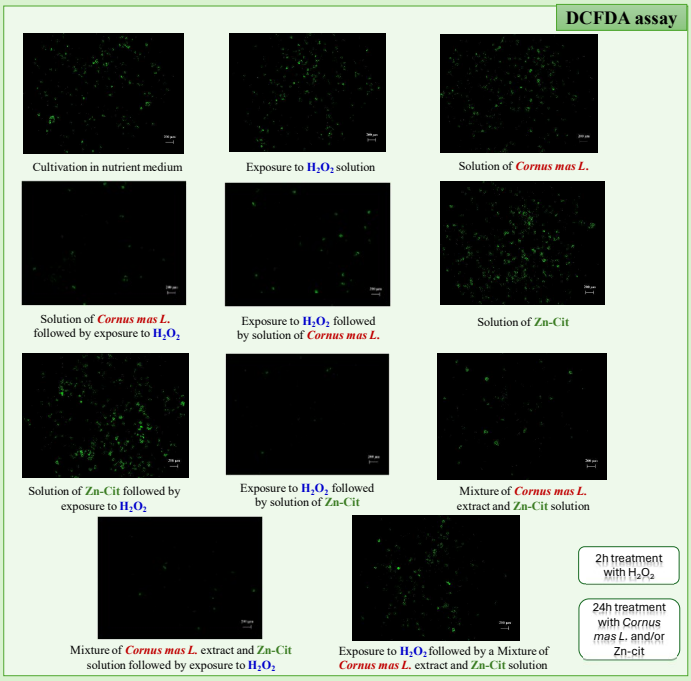






Results and Discussion





Conclusions – Future Goals

- ❑ Photometric methods showed high antioxidant content, especially in Naringin Ox and Naringenin Ox.
- ❑ Cranberry extract demonstrated neuroprotective and anticancer potential through confirmed antioxidant action.
- ❑ Zinc-Citrate exhibited intense antioxidative characteristics, enhancing effects when combined with cranberry extract.
- ❑ No cytotoxicity or adverse effects were observed, indicating potential therapeutic use against neurodegenerative diseases and oxidative stress.
- ➢ Promising investigations into Zinc-Citrate's pharmacological action, particularly its potential neuroprotective role against neurodegeneration, along with exploration of combined effects of these compounds for effective drug development against neurodegenerative diseases.

Literature

[1] Di Paolo M, Papi L, Gori F, Turillazzi E. (2019). *Int. J. Mol. Sci.*, 20(20), 5170.
[2] Pham L, et al. (2021). *Neurobiol. Dis.*, 148, 105151.
[3] Sairazi N.S.M, Sirajudeen K.N.S. (2020). *Evidence-Based Complementary and Alternative Medicine*, 6565396, 30.