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AQUEOUS HERB EXTRACTS EXHIBIT PRONOUNCED NEUROPROTECTION PROPERTIES

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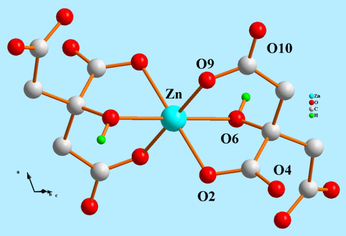
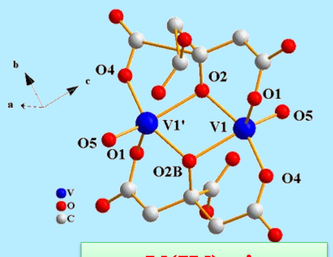
LABORATORY OF INORGANIC CHEMISTRY AND ADVANCED MATERIALS



Zn(II)-cit



V(IV)-cit

INTRODUCTION - Natural products and metal –organic compounds in neuroprotection

In an effort to exploit nature's potency against neurodegeneration, a) extracts of the plant Cronus mas L. were obtained through green chemistry employing β-cyclodextrin, b) the toxicity profile of aqueous extracts from Cronus mas L. was investigated to affirm the atoxic character, and c) the influence of a soluble and bioavailable complex metal ion forms on the extracts was examined to establish the extent of antioxidant power against neurodegenerative processes associated with cellular oxidative stress.[1] In that respect, the aqueous soluble extracts have been investigated in the presence of a hybrid metal-(α-hydroxycarboxylato) compound, i.e. zinc-citrate, in neuronal cell cultures (N2a58, SH-SY5Y). The choice of neuronal cell lines was based on their sensitivity toward oxidative stress, thereby acting as reliable model systems of neuroprotection vs neurodegeneration. The experimental results suggest that the a) plant extracts are atoxic to the neuronal cells over 24, 48, and 72 h (viability, morphology, migration, proliferation) in a concentration (up to 1 mM) and time-dependent manner, b) antioxidant activity of the cells against oxidative stress, induced by H_2O_2, avails itself in a concentration-dependent fashion, and c) activity of the cells is enhanced in the presence of zinc-citrate. The experiments were carried out in a manner reflecting both the a) protective effect of the hybrid metal-organic species, and b) recovery of cell physiology from oxidative stress.[2]

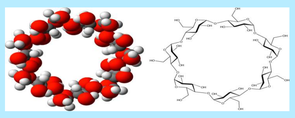
The effect of zinc-citrate, as a well-defined and characterized form of an indigenous physiological metal ion, suggests that its concurrent interactions with the plant extract components and cytosolic targets of the neuronal cells either avert or revert oxidative stress-induced aberrations, essentially proffering effective neuroprotection.[3] The ensuing investigation of the influence of the genetic machinery of the cells under the influence of both the extracts and zinc-citrate is expected to reveal how these two factors exemplify the ultimately observed phenotype, thus reflecting merit to developing appropriately formulated pharmaceutical preparations serving as neuroprotectants in human physiology.

Cronus mas L.

MATERIALS AND METHODS

Methodology of extract retrieval from *Cornus mas L.*

Cornus powder



β-cyclodextrin

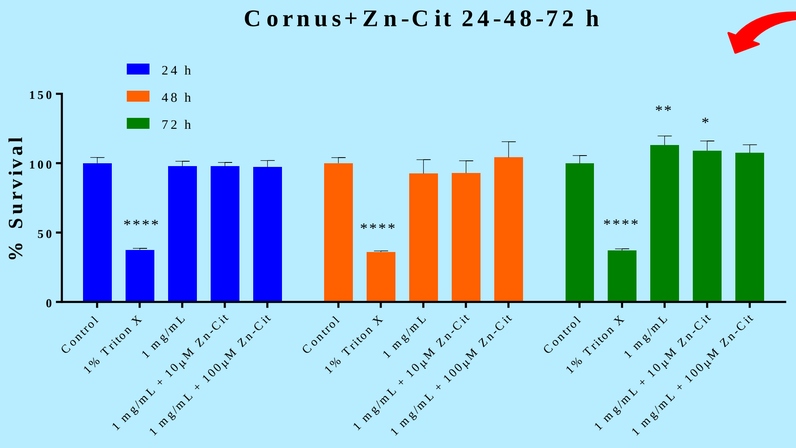
Encapsulation

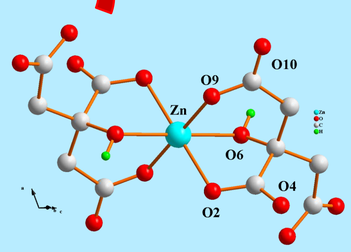
Powder encapsulated extracts

Total Phenolic Content = 6.48±0.09 mgGAE/g dry extract

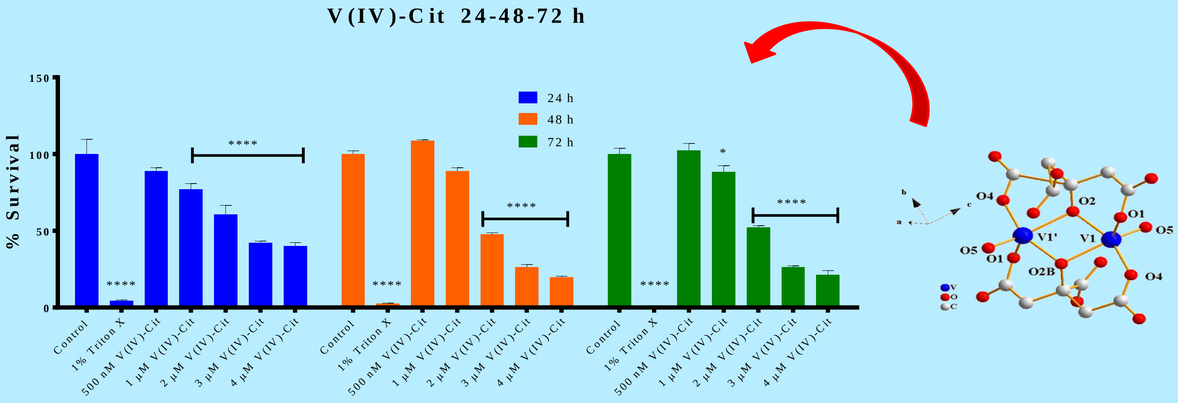
RESULTS

Toxicity investigation of water-soluble extracts in neuronal (SH-SY5Y) cell lines with Zn(II)-cit in time- and concentration-dependent manner





Toxicity investigation of water-soluble extracts in neuronal (SH-SY5Y) cell lines with V(IV)-cit in time- and concentration-dependent manner



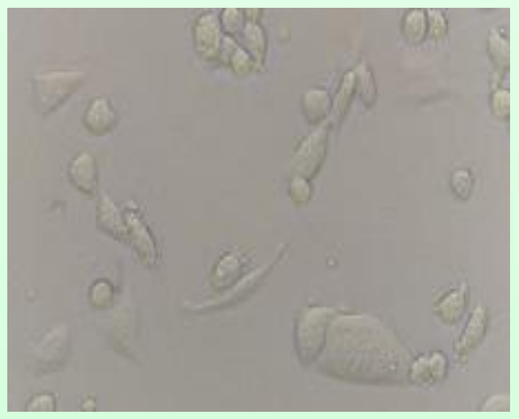
CONCLUSIONS

- Water soluble extract of Cornus mas L. have been produced and was further use in the investigation of toxicity profile in neuronal cell lines and in vitro antioxidant activity.
- Supplementation of Zn(II)-Cit in Cornus mas L. extracts shows increase in antioxidant ability of the extracts, mainly when the supplemented extract is added after H_2O_2 exposure.
- The natural chemotacticity of the cells is enhanced in the presence of Zn(II)-Cit and V(IV)-cit, in the presence and absence of the extracts.

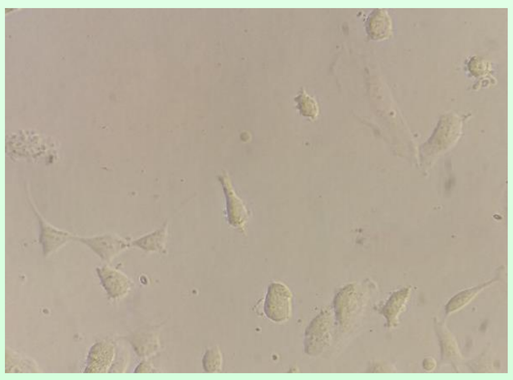
FUTURE GOALS

- Study of the enhancement of the antioxidant ability of the extract in presence of metal-organic compounds, using ROS dye (DCFDA).
- Study of the expression levels of specific genes related to the antioxidant ability of the neuronal cells
- Investigation of anti-inflammatory profile

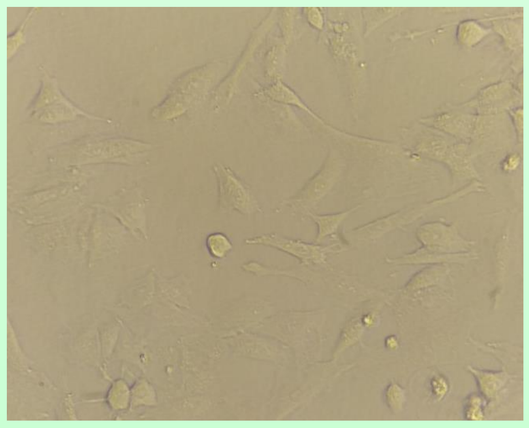
Morphology of neuronal (N2a58) cell treated with cornus extract enriched with Zn(II)-cit at different time points



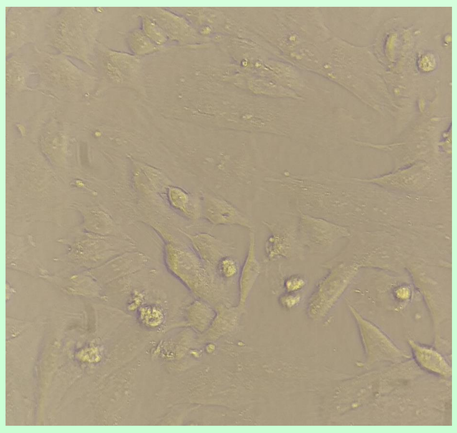
t=0 h



t=24 h



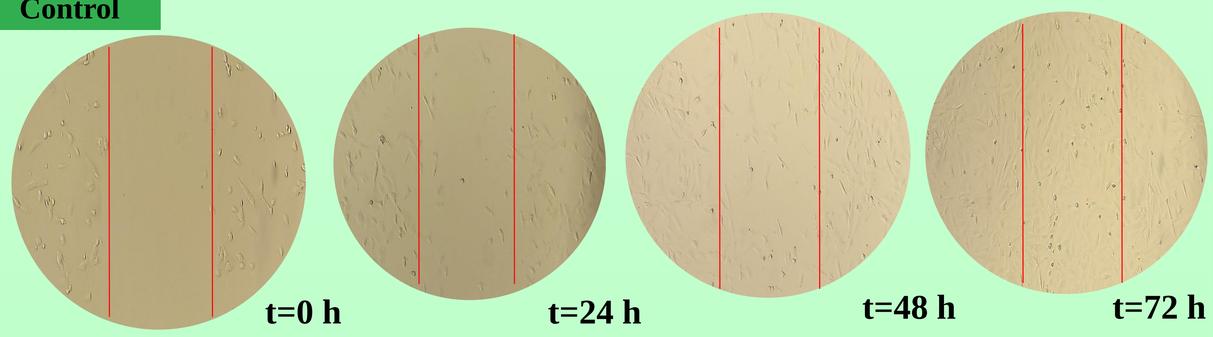
t=48 h



t=72 h

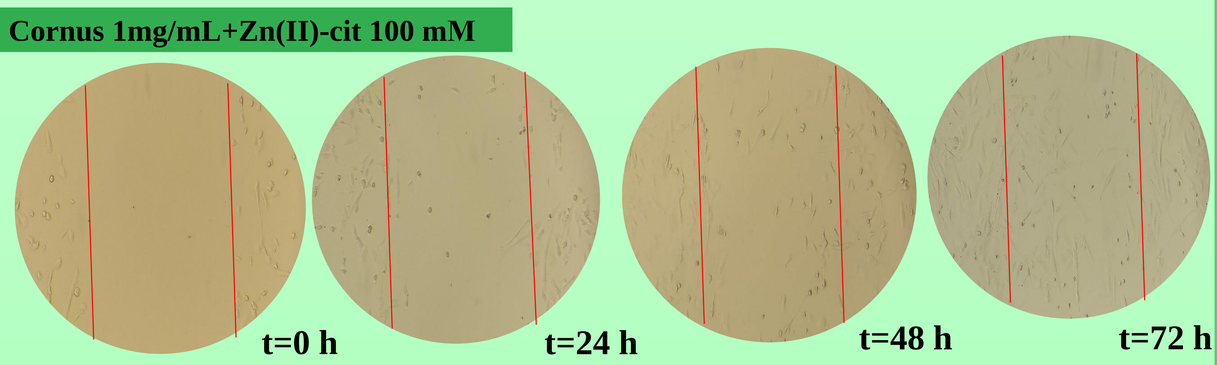
Chemotoxicity of neuronal (SH-SY5Y) cell treated with Cornus extract enriched with Zn(II)-cit at different time points

Control

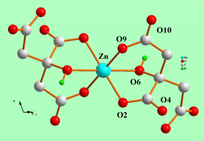


t=0 h t=24 h t=48 h t=72 h

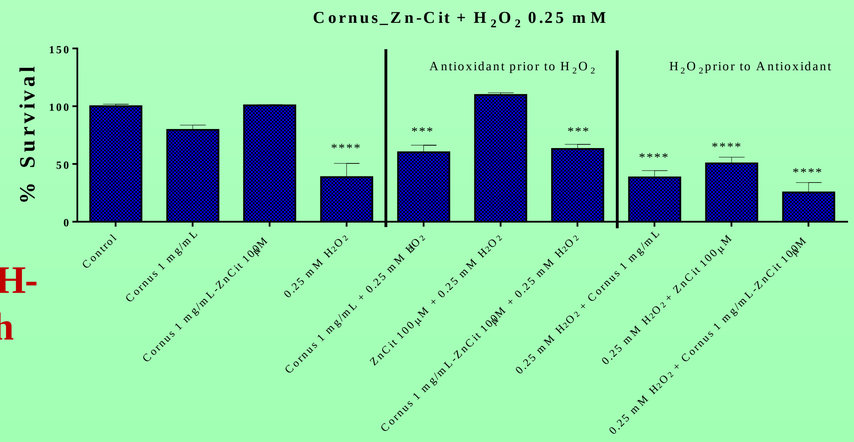
Cornus 1mg/mL+Zn(II)-cit 100 mM



t=0 h t=24 h t=48 h t=72 h



In-vitro antioxidant activity in neuronal (SH-SY5Y) cells after 24 h



Literature

1. Kawahara M, Tanaka KI, Kato-Negishi M. Nutrients. 2018, 10(2):147.
2. Tsave O, Halevas E, Yavropoulou MP, J Inorg Biochem. 2015, 152:123-137.
3. Kim Y., Koo H.G., Shin D.H. et al. J Struct Chem. 2010, 51:382–385.

Acknowledgements

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