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Ευρωπαϊκό Ταμείο Περιφερειακής Ανάπτυξης

ΕΠΑνΕΚ 2014-2020
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Με τη συγχρηματοδότηση της Ελλάδας και της Ευρωπαϊκής Ένωσης

NANOMYTHiC

INNOVATIVE NANOCARRIERS FOR THE TARGETED AND PROLONGED TREATMENT OF CANCER AND DEMYALINATING DISEASES OF THE CENTRAL NERVOUS SYSTEM (T2EDK-00501)

with the co-funding of Greece and European Union

Nowadays, more than 1.5 billion people worldwide suffer from neurodegenerative disorders such as Multiple Sclerosis, Parkinson's, Alzheimer's and others. Neurodegenerative diseases are the fourth leading cause of death and 10 million new cases per year are reported. The development of therapeutic agents that could enhance re-myelination or prevent degeneration is a major challenge for neuroscientists. Recently, antibodies against two myelin-derived neuronal regeneration inhibitors have been developed, particularly Nogo-A (Ozanezumab) and LINGO-1 (Opicinumab). The inhibition of the above proteins has beneficial effects on demyelinating animal models, and specific antibodies are used in clinical studies, aimed at re-myelination and neuroprotection. Hence, this field of Neurodegenerative diseases is of immense interest in the pharmaceutical industry. In this context, effective and targeted administration with suitable biocompatible polymeric carriers is a feasible goal for the production of new and innovative pharmaceutical formulations. Polymers are widely used as active pharmaceutical drug-delivery vehicles and almost all novel formulations, currently produced, contain biocompatible polymers. This project aims to develop new controlled release drugs for some of the most serious diseases with enormous socio-economic significance and burden, such as neurodegenerative diseases. Many therapeutic approaches are in preclinical or clinical trials and include new drugs, reformulation and pharmacokinetic optimization of existing ones. Despite the progress made in recent years, effective tackling of these diseases remains a challenge, and even small improvements have significant social and economic impacts. We intent to test new compounds such as anti-LINGO and anti-NOGO antibodies with proven anti-degenerative activity and to prepare novel pharmaceutical formulations for their targeted and controlled administration to give new directions and tools in the fight of neurodegenerative disorders.

Publication in a scientific journal and Poster in an international conference:

Nogo-A and LINGO-1: Two Important Targets for Remyelination and Regeneration. I. Kalafatakis, F. Papagianni, K. Theodorakis and D. Karagogeos. International Journal of Molecular Sciences, 2023, 24(5), 4479; https://doi.org/10.3390/ijms24054479

Testing of a-Lingo-1 and a-Nogo-A and preparation of innovative formulations for their targeted and controlled administration in cuprizone-induced demyelination model. I. Kalafatakis, F. Papagianni, E. Christodoulou, I. Koumentakou, K. Theodorakis, D. Bikiaris, D. Karagogeos. 9th Conference of Hellenic Academy of Neuroimmunology, Thessaloniki 8-11 December, 2022.

TESTING OF ANTI-LINGO-1 AND ANTI-NOGO-A AND PREPARATION OF INNOVATIVE FORMULATIONS FOR THEIR TARGETED AND CONTROLLED ADMINISTRATION IN CUPRIZONE-INDUCED DEMYELINATION MODEL

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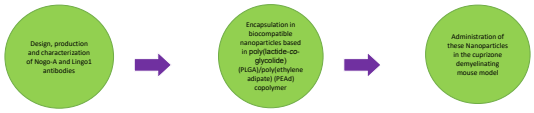
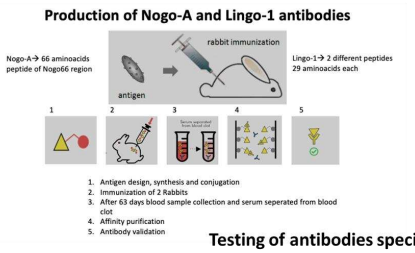
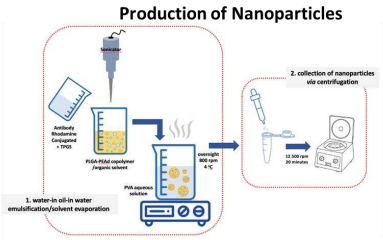
INTRODUCTION

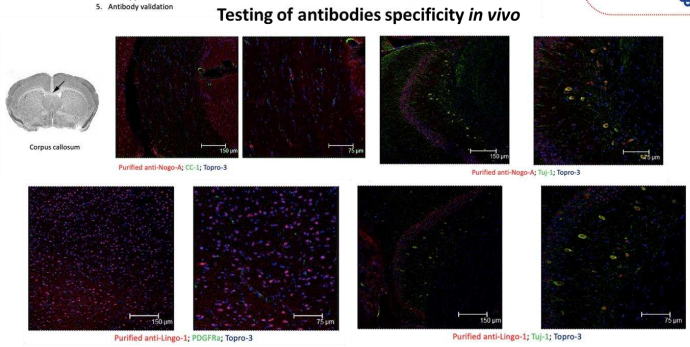
- Neurodegenerative disorders, including multiple sclerosis, are currently on the rise. The development of therapeutic agents that could enhance remyelination or prevent degeneration is a major challenge for neuroscientists.
- Recently, antibodies to two myelin-derived neuronal regeneration inhibitors have been developed, more specifically antibodies to Nogo-A and LINGO-1. The inhibition of the above proteins has beneficial effects on demyelinating animal models and specific antibodies against them are used in clinical studies aimed at remyelination and neuroprotection.
- In this context, effective and targeted administration with suitable biocompatible polymeric carriers is a feasible goal for the production of new and innovative pharmaceutical formulations. The polymers are widely used as active pharmaceutical drug delivery vehicles and almost all the novel formulations currently produced contain biocompatible polymers.

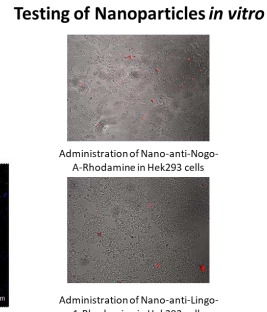
AIM OF THE STUDY:

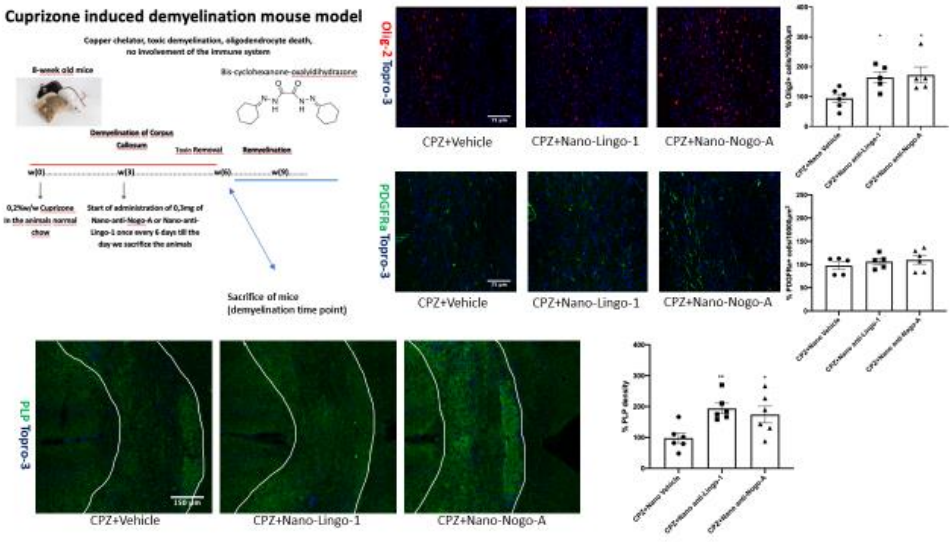












To sum up…

- Production of antibodies against Nogo-A and Lingo-1
- Encapsulation of these antibodies in biocompatible nanoparticles
- Administration of them in the cuprizone-induced demyelination mouse model **increased myelin density** in the lesion area
- Administration of them in the cuprizone-induced demyelination mouse model did not change the number of OPCs in the lesion area
- Administration of them in cuprizone induced demyelination mouse model **increased the number of oligodendrocytes in the lesion area, indicating an increase in mature oligodendrocytes**

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