

# NANOPARTICULATE COMPLEX OF NICOTINE AND CERIUM OXIDE FOR THE TREATMENT OF PARKINSON'S DISEASE

## Technology Summary

Neurodegeneration results from various causes including genetic mutation, mitochondrial dysfunction, and the inability to handle increasing levels of oxidative or nitrosative. Mounting evidence shows an association with oxidative and nitrosative stress to neurodegenerative diseases. However, the administrations of antioxidants and antioxidant enzymes to treat neurodegenerative diseases in human clinical trials have been less than satisfactory due to issues with bioavailability and stability after administration. Interestingly, nicotine may have protective effects against Parkinson's disease. Cigarettes are a widely accessible product that would allow for a readily available method to deliver nicotine to the blood and brain. However, due to the detrimental effects of smoking on a person's health, this is not a viable option. Nicotine patches address the health issues associated with smoking but do not replicate the protective effect due to its slow approach to the brain.

**Available for license, the invention is a combination of nicotine and ceria nanoparticles coated with agglutinin to provide a therapeutic dose to neurodegenerative or neurological disorders such as Parkinson's disease.** The biodegradable agglutinin coating provides a stable and sustained release of the particles and/or nicotine to neurons and can be further conjugated with a dye to confirm delivery. In addition, this conjugate takes advantage of the anti-oxidant effect of the nanoceria to reduce the oxidant environment, which is also a major mechanism of neuronal damage in Parkinson's disease. In vitro studies demonstrated nicotine's ability to promote protein clearance, thereby halting Parkinson's disease progression.

## Potential Commercial Applications

- Treatment of neurological disorders such as Parkinson's Disease

## Competitive Advantages

- A safe and reliable nicotine delivery system for the treatment of neurological disorders, such as Parkinson's Disease.
- Simple cost-effective treatment alternative

**Development Stage:** *In vitro*

**Inventors:** Syed Imam

## Intellectual Property:

US Patent No. [10,182,994](#) issued 01.22.2019

European Patent No. 3154530 (France, Germany, United Kingdom)

India patent application: 201747000591, filed 01.06.2017

**Product Area:** Drugs

**FDA Reference No:** E-2014-002

## Licensing Contact:

FDA Technology Transfer Program

Email: [FDAInventionlicensing@fda.hhs.gov](mailto:FDAInventionlicensing@fda.hhs.gov)