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Development Stage:

Pre-clinical studies

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Publications

McConnell et al., 2024
Mol. Ther. Nucl. Acids 35
<https://doi.org/10.1016/j.omtn.2024.102251>
Massey et al., 2023, ACS Sens. 8:
3116-3126
<https://doi.org/10.1021/acssensors.3c00757>

Seeking:

Development & pre-clinical
testing partners
Licensees

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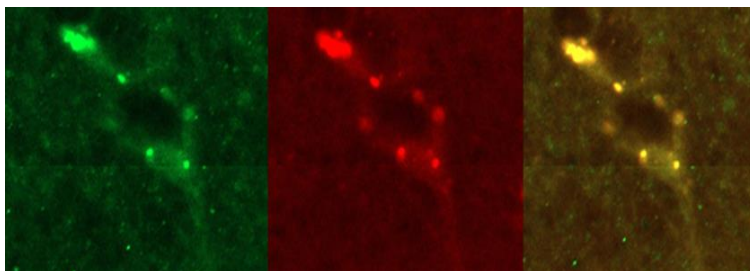
DNA Aptamers to Detect and Prevent Neurodegenerative Diseases

Background

The onset and progression of neurodegenerative diseases is often associated with the formation of protein fibrils and aggregates in the brain. Alpha-synuclein is a protein implicated in Parkinson's disease. There is evidence that the aggregation of this protein into large oligomers/fibrils is a part of the underlying mechanism of this disease.

Description of the Invention

Carleton researchers have developed novel DNA aptamer sequences that bind to alpha-synuclein monomers and inhibit formation of the larger oligomers and fibrils associated with the onset and progression of neurodegenerative disease such as Parkinson's Disease. Data from studies in a mouse model of Parkinson's Disease show that the DNA aptamers, when packaged in liposomes, can cross the blood-brain barrier and bind to alpha synuclein. Further, the DNA aptamers have been incorporated into a diagnostic device where they have been shown to detect low levels of alpha-synuclein in biological samples.



Aptamer delivery to the brain and binding to α synuclein in treated mice.

Fluorescence microscopy images of the distribution of α -syn-1 aptamer and co-localization with α -synuclein in brain tissue of treated mice. Left: anti- α -synuclein antibody (green) Middle: labelled aptamer, delivered by targeting liposome (red). Right: Image overlay showing extensive co-localization.

Key Benefits

- **Response:** Compared with conventional antibodies, aptamers are not typically recognized by the immune system and are not immunogenic or toxic
- **Strong Selectivity:** Aptamers can discriminate between different conformations of the same target protein
- **Synthesis & scalability:** Can be easily generated by chemical synthesis

Applications

- **Diagnostic:** point-of-care and laboratory methods to detect onset and monitor progression of neurodegenerative diseases
- **Therapeutic:** to reduce protein fibrillation and mitigate onset and progression of neurodegenerative diseases