Optogenetic-Based Regulation of Autophagy against Tauopathies

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Technology description

A minimally invasive optical induction system has been developed to transiently alter autophagic flux, specifically targeting and reducing pathological tau proteins.

Background

The uncontrolled misfolding and aggregation of microtubule-associate protein Tau (MAPT) into neurofibrillary tangles (NFTs) has been identified as a common component in a number of neurodegenerative diseases, such as, Alzheimer’ s disease, Pick’ s disease, and other dementias. Efforts have shown that a deficiency in endogenous autophagic clearance results in a subsequent build-up of pathological tau (p-Tau) proteins, which contribute to the impairment of microtubule stability resulting in neuronal cell death. Transcription factor EB (TFEB), a regulator of autophagy flux, promotes the natural clearance of p-Tau and its regulation has the potential to prevent NFT pathology. Unfortunately, a constant activation of TFEB poses many risks to whole cell bioenergetics as well as increased toxicity in co-morbid conditions of ischemia or traumatic brain injury. Thus, it is of high importance to identify a mechanism to spatially and temporally control autophagy flux when necessary.

Technology Description

Researchers at the University of New Mexico have developed a minimally invasive optical induction system to transiently alter autophagic flux, specifically targeting and reducing pathological tau proteins. Utilizing a novel optogenetic gene expression system, the device drives TFEB gene expression upon optical stimulation. The light-regulatable gene expression of TFEB enables the directed control of autophagic flux, leading to the reduction of excessive p-Tau accumulation. Tunable control of TFEB expression may have beneficial effects on the prevention and treatment of neurodegenerative diseases.

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by filing patents and copyrights and transferring the technologies to the marketplace. We connect the business communication (companies, entrepreneurs and investors) to these UNM technologies for licensing opportunities and the creation of startup companies.

Application area

Prevention and treatment of tau related neurodegenerative diseases
Controlled regulation of protein build-up via autophagic flux alterations
No risk of toxicity or burdened cellular bioenergetics
Optogenetic gene expression of autophagic processes via optical induction

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