Development of a novel therapy for α-synucleinopathy using regulatory T cells

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Project Outline

Parkinson's disease (PD) and multiple system atrophy (MSA) are diseases with abnormal aggregation of α-synuclein (αSyn) and are called α-synucleinopathies. MSA is a neurological intractable disease that progresses more rapidly than PD, with a wheelchair in about 5 years, bedridden in about 8 years, and fatal outcome in about 9 years. There is no effective curative treatment for α-synucleinopathy, and effective drugs are extremely scarce, especially in MSA. Patients, families and society are eagerly awaiting the development of treatments for these diseases.

Recently, the involvement of immune cells in the pathological progression of α-synucleinopathy has been reported: in the substantia nigra of PD patients, microglial activation and inflammatory cell infiltration are observed, and T cells that react to αSyn are present in them. Similarly in MSA, inflammatory microglial responses and the presence of T cells in the putamen and substantia nigra, where aggregates of αSyn are found, have been shown. In the peripheral blood of PD patients with early onset PD, the immune cell profile has been shown to be biased toward inflammatory tendencies and correlated with the severity of motor symptoms, compared to healthy controls. These suggest that suppression of neuroinflammation is a promising therapeutic target for inhibiting the progression of α-synucleinopathy.

Regulatory T cells (Tregs) are a group of specific T cells identified by co-investigator Sakaguchi et al. that prevent inflammation and induce immune self-tolerance by suppressing the activation and proliferation of lymphocytes that react with self-tissue. In animal models of PD, Treg dysfunction is observed, resulting in increased inflammation and neurodegeneration, and similar Treg dysfunction has also been observed in patients.

Thus, we believe that the efficient suppression of neuroinflammation by activation of Tregs could be applied to the treatment of α-synucleinopathy. In this study, we will examine the possibility of suppressing the onset or progression of α-synucleinopathy by administrating of novel Tregs with high immunomodulatory activity and IL-2 to a mouse model of α-synucleinopathy.

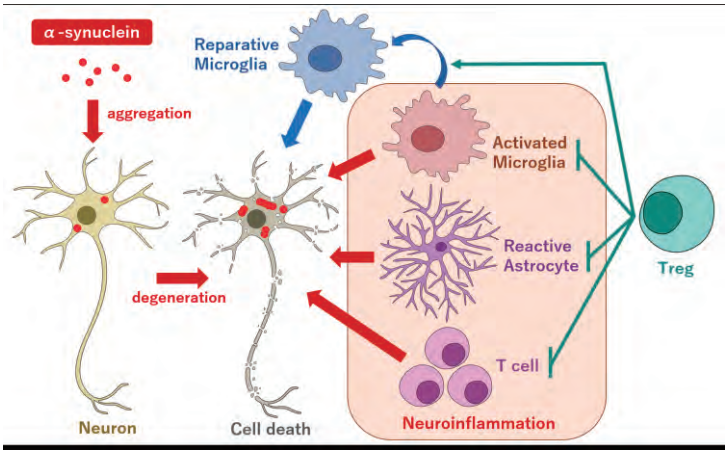

Figure. Neuroinflammation and Treg actions associated with abnormal alpha-synuclein aggregation.

Target diseases: Parkinson's disease, multiple system atrophy
Patent Information: None
Technology features: Development of new treatment methods
Marketability and development challenges: Time and cost required for Treg preparation
Details of desired corporate collaboration: Unknown at this time