Functional cooperation of alpha-synuclein and tau is essential for neurogenesis and neuron's maintenance in hippocampus

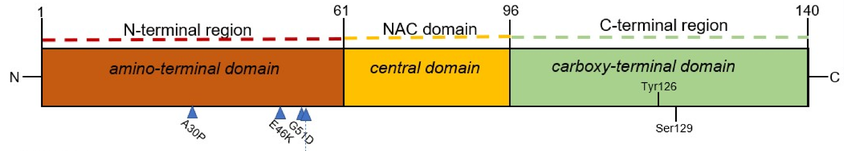
Yu Fu, Shengming Wang, Shinji Hirotsune

Department of Genetic Disease Research, Osaka Metropolitan University Graduate School of Medicine, Osaka 545-8585, Japan

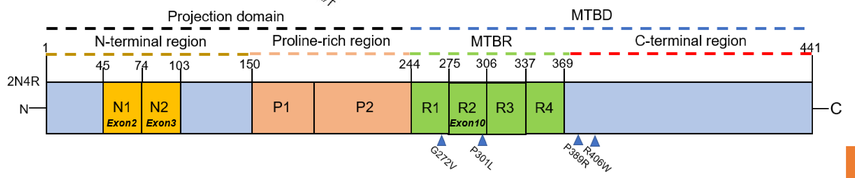
Introduction

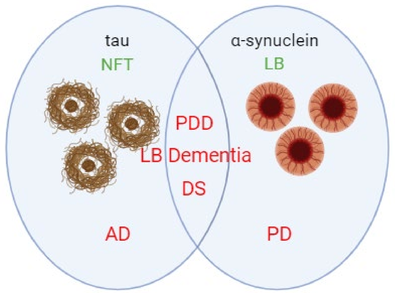
Alpha-synuclein (αSyn) and tau are typically characterized as intrinsically disordered proteins and are implicated in various neurodegenerative diseases, including Alzheimer's disease (AD) and Parkinson's disease (PD).

αSyn



Tau proteins





Phosphorylated αSyn and hyperphosphorylated tau have showed pathological cooperative influence in PD&AD patients' brain

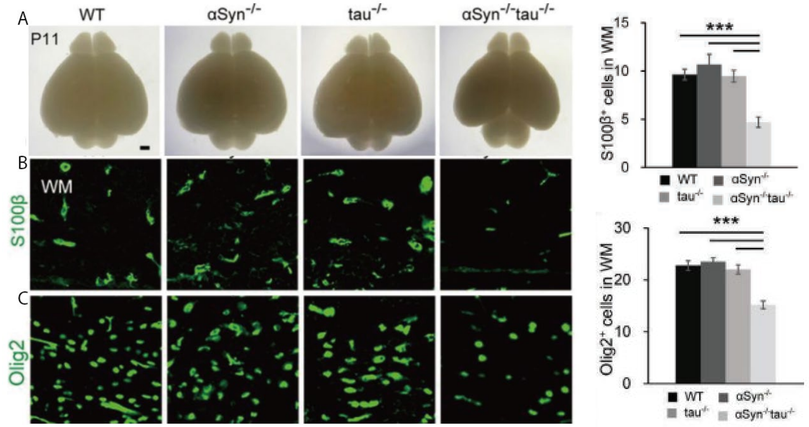
Hypothesis

- Diminished gliogenesis by losing αSyn and tau may cause disorders in Central Nervous System
- Loss the teamwork of αSyn and tau may cause adult-neurogenesis inhibition in Central Nervous System

Research aims

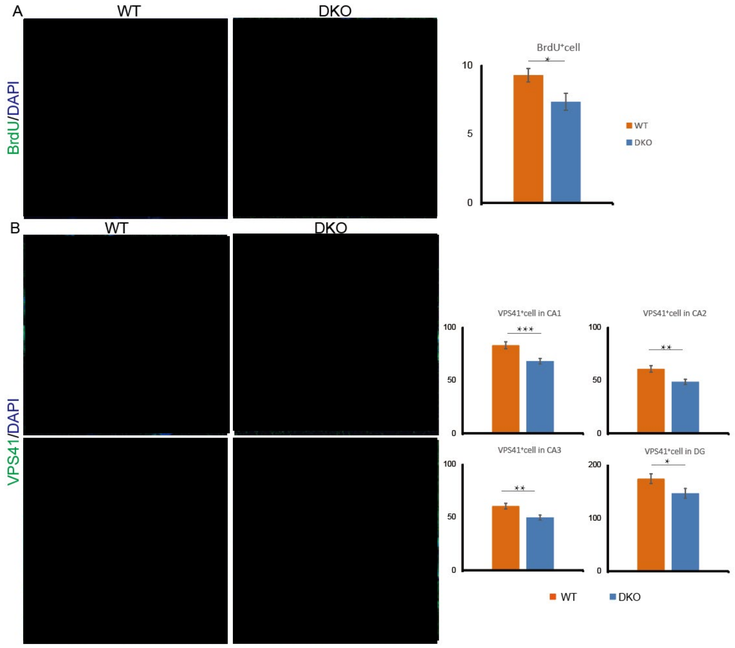
- Clarify the relationship between the loss of α-syn and tau with abnormal amyloid-β aggregation
- Clarify the physiological functions of αSyn and tau, and further open a new gate for Neurodegenerative disease treatment

Result

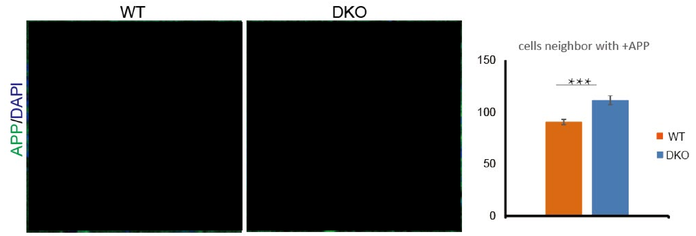


(A) DKO mouse brain size decrease after born (B) Astrocyte loss in DKO brain

(C) Oligodendrocytes loss in DKO brain; WM: White matter



Newborn and mature neuron decrease in DKO hippocampus



Amyloid-β oligomers increase in DKO hippocampus

Future project