

# Virology

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Parkinson's disease (PD), Alzheimer's disease (AD) and amyotrophic lateral sclerosis (ALS) are devastating neurodegenerative diseases causing dementia and/or various motor abnormalities. Hallmark characters of these diseases are generations of neurotoxic protein aggregates of  $\alpha$ -synuclein in PD, Tau in AD and TDP-43 protein in ALS, in the cytoplasm of affected neurons. However, the mechanism how these neuropathogenic proteins form aggregates and how these aggregates show neurotoxicity in these diseases are not fully understood. We found that USP10 and G3BP1 proteins regulate the formation and toxicities of these neuropathogenic protein aggregates. The purpose of our study is to elucidate the molecular mechanism of pathogenesis underlying these diseases and develop a therapeutic drug targeting against these neuropathogenic proteins to cure the diseases. We also have been studying HTLV-1-associated myelopathy (HAM/TSP), a neurodegeneration caused by human T-cell leukaemia virus type 1 (HTLV-1) infection .



## Research interests

1. Molecular mechanisms controlling neurotoxicity of Tau,  $\alpha$ -synuclein and TDP-43 in neurodegenerative diseases.
2. Roles of G3BP1 and USP10 proteins in neurotoxicity of Tau,  $\alpha$ -synuclein and TDP-43 in neurodegenerative diseases.
3. Molecular pathogenesis of a neurological disease caused by HTLV-1.

## Materials and methods for collaborations

1. Knockout mice of Usp10 and G3bp1.
2. Expression plasmids encoding G3BP1, USP10 or their mutants.
3. Tools of molecular characterizations of neuropathogenic protein toxicities.

## Links to additional info

1. Sergei A, et al. G3BP1 inhibits ubiquitinated protein aggregations induced by p62 and USP10. Sci. Rep., 9;9:12896, 2019.  
<https://www.nature.com/articles/s41598-019-46237-1>
2. Piatnitskaia S, et al. USP10 is a critical factor for Tau-positive stress granule formation in neuronal cells. Sci. Rep., 22;9:10591, 2019.  
<https://www.nature.com/articles/s41598-019-47033-7>
3. Takahashi M, et al. USP10 Is a Driver of Ubiquitinated Protein Aggregation and Aggresome Formation to Inhibit Apoptosis. iScience. 30;9:433-450, 2018.  
[https://www.cell.com/iscience/fulltext/S2589-0042\(18\)30196-2](https://www.cell.com/iscience/fulltext/S2589-0042(18)30196-2)
4. Lab HP (English). <https://www.med.niigata-u.ac.jp/vir/indexe.html>