

# BDR SEMINAR (Kobe & online hybrid)

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**Friday, April 21, 2023**

13:00-14:00

1F Auditorium, DB Building C, Kobe / Broadcast online via Zoom

Zoom meeting URL will be announced on the event day by e-mail.

※Non-BDR members: Please register from the following link.

<https://krs1.riken.jp/m/bdrseminarregistration> (Registration deadline: April 18)

## Epidemiological spread models of alpha-synuclein in Parkinson's Disease

### Summary

Parkinson's disease (PD) is a progressive neurodegenerative condition marked by cortical and subcortical brain atrophy. It is now known to be caused by the prion-like propagation of misfolded alpha-synuclein, supporting Braak's hypothesis, first proposed 20 years ago. The pattern of neurodegeneration is explained by a combination of brain connectivity and local vulnerability.

I will present data from several human and animal studies that test the roles of connectivity and local vulnerability in shaping the progression of the disease. Our group has developed a spreading model inspired by infectious-disease epidemiology to map the propagation of misfolded alpha-synuclein. This Susceptible-Infectious-Recovered (SIR) model assumes that alpha-synuclein molecules become misfolded, propagate along the connectome, and cause tissue damage when they accumulate.

We use MRI and clinical data from PD patients and people with REM Sleep Behaviour Disorder, a prodrome of PD, to test the model. In addition, we apply the same model to postmortem pathology in mice after injection of alpha-synuclein preformed fibrils.

We find that the pattern of brain atrophy in de novo PD is compatible with a propagating process with an epicenter in the substantia nigra. The SIR model recapitulates the observed atrophy pattern, and supports connectivity-based propagation.



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