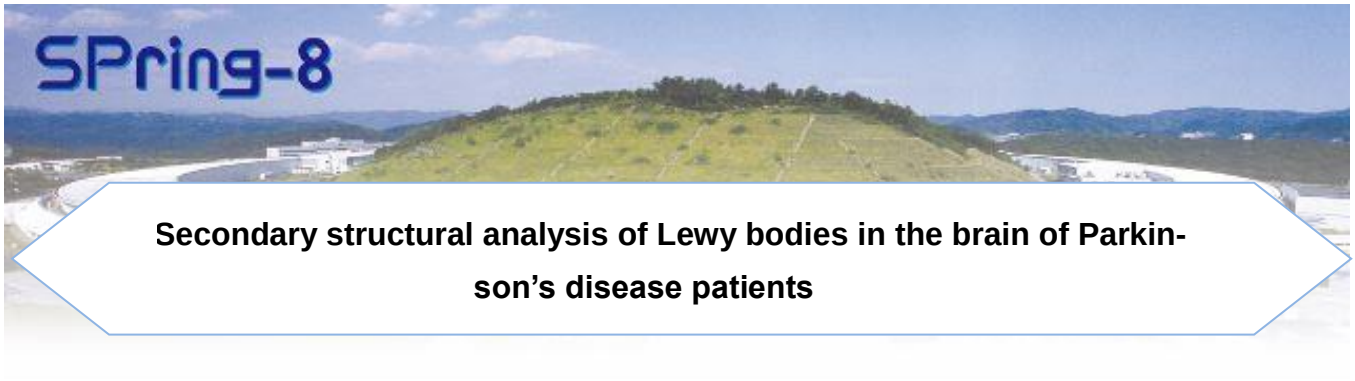

Secondary structural analysis of Lewy bodies in the brain of Parkinson's disease patients

A group of researchers led by Dr. K. ARAKI and Prof. H. MOCHIZUKI at Osaka University Graduate School of Medicine, in cooperation with Dr. N. YAGI (JASRI/SPring-8), succeeded in elucidating the secondary structure of Lewy bodies (LBs) in the brain of Parkinson's disease (PD) patients for the first time with synchrotron Fourier transform infrared micro-spectroscopy (FTIRM).

LBs had been considered to be a key element of pathogenesis for PD. Although structural analysis for LBs with an electron microscope had been made, it provided no secondary structural information of proteins in LBs, which is important for the development of drugs.

In recent years, many researchers have focused on the new treatment to inhibit the formation of abnormal protein aggregates, which can delay the onset and progression of PD. This research result and method may provide important clues to the development of epoch-making treatment for PD.

LBs, which mainly consist of α-synuclein (α-syn), are neuropathological hallmarks of patients with PD. The fine structure of LBs is unknown, and LBs cannot be made artificially. Nevertheless, many studies have described fibrillisation of recombinant α-syn purified from *E. coli*. An extremely fundamental problem is whether the structure of LBs is the same as that of recombinant amyloid fibrils. Thus, the group used infrared synchrotron radiation at SPring-8 BL43IR (FTIRM) to analyse the fine structure of LBs in the brain of PD patients. The results showed a shift in the infrared spectrum that indicates abundance of a β-sheet-rich structure in LBs. Also, 2D infrared mapping of LBs revealed that the content of the β-sheet structure is higher in the peripheral region (halo) than in the core, and the central region (core) contains a large amount of proteins and lipids.

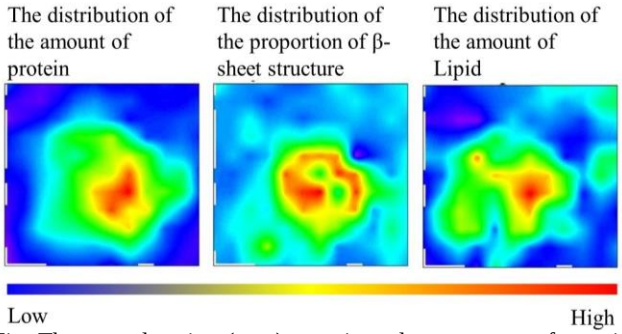

Fig. The central region (core) contains a large amount of proteins (left) and lipids (right). In contrast, the content of the β-sheet structure (middle) is higher in the peripheral region (halo) than in the core.