In vivo Visualization of Tau Deposits in Corticobasal Syndrome by 18F-THK5351 PET

VII. 2. *In vivo* Visualization of Tau Deposits in Corticobasal Syndrome by ^{18}F-THK5351 PET

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CBS is an asymmetric higher cortical dysfunction with parkinsonism, dystonia, and myoclonus[1-4]. ^{18}F-THK5351 is a novel radiotracer with a binding affinity for tau protein deposits[5]. We did not know whether ^{18}F-THK5351 radiotracers detect tau deposits *in vivo* in patients with CBS. We evaluated whether ^{18}F-THK5351 PET can bind to tau pathology in living patients with CBS.

Five patients with CBS and eight age-matched normal controls (NCs) underwent ^{18}F-THK5351 PET scans. Probable CBS was diagnosed based on the modified Cambridge criteria[6]. All patients were right-handed. The NC group was comprised of volunteers with no cognitive or motor function impairments, who did not have any observable cerebrovascular lesions as indicated by MRI scans. This study protocol was approved by the Ethics Committee of the Tohoku University Hospital. Written informed consent was obtained from each patient or his/her guardian(s) after they were given a complete description of the study. We performed image analysis using the PNEURO module in PMOD software (version 3.6). In statistical analysis, we used a repeated measures analysis of variance (ANOVA) followed by Holm-Sidak's multiple comparisons test to compare regional ^{18}F-THK5351 retention in normal controls versus patients with CBS. The analyses were performed using GraphPad Prism6 software.

^{18}F-THK5351 PET images in a patient with CBS (70-year-old female, MMSE score 13) and a NC (61-year-old female, MMSE score 30) are shown in figure 1. We observed high ^{18}F-THK5351 retention in the precentral and postcentral gyri, and basal ganglia in the patient with CBS. ^{18}F-THK5351 retention for the bilateral precentral, postcentral, superior frontal, and superior parietal gyri and globus pallidus and left posterior cingulate gyrus was significantly higher in patients with CBS than in NCs ($p<0.005$). In all patients with CBS, a higher uptake of ^{18}F-THK5351 was seen in the regions contralateral to the symptom-predominant side.

Higher accumulation of ^{18}F-THK5351 was seen in the precentral and postcentral gyri, and globus pallidus in patients with CBS than in NCs. The spatial patterns of ^{18}F-THK5351 binding were compatible with tau deposit distributions observed in brain autopsies of patients with CBS[7-9]. These results suggest that ^{18}F-THK5351 PET is able to visualize tau deposits in patients with CBS. One limitation in this study was the relatively small sample size. We therefore could not examine the association between ^{18}F-THK5351 retention and clinical severity in CBS.

^{18}F-THK5351 PET demonstrated high tracer signals in sites susceptible to tau deposition in patients with CBS. ^{18}F-THK5351 should be considered as a clinical tool in the assessment of tau burden in CBS. Future clinical studies should clarify whether the radiotracer is a suitable biomarker for the early diagnosis and monitoring of disease progression in CBS[1].

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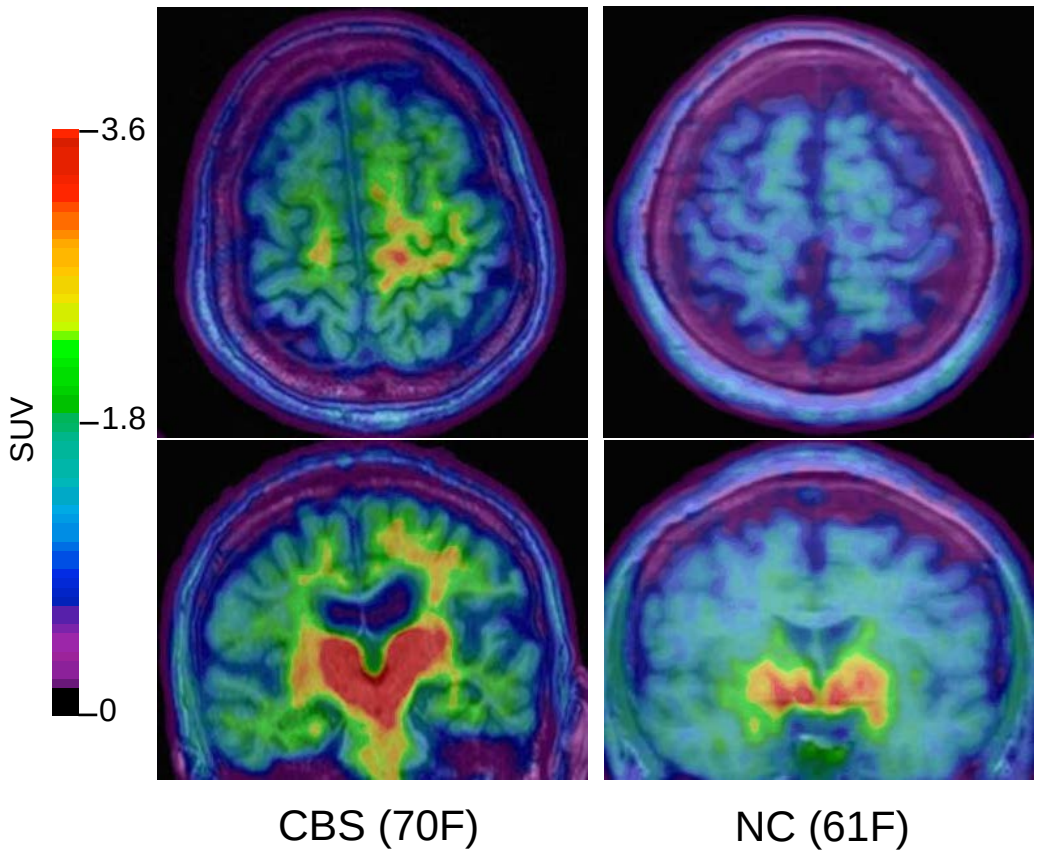

Figure 1. ^{18}F-THK5351 PET images overlaid on MRI data in a patient with corticobasal syndrome (CBS) and in a normal control (NC) subject.
^{18}F-THK5351 retention in the precentral and postcentral gyri, globus pallidus, and putamen was more evident in the patient with CBS than in the NC.