

Mechanisms underlying the development of mental disorders revealed using novel PET tracer recognizing AMPA receptors

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Glutamate AMPA (alfa-amino-3-hydroxy-5-methyl-4-isoxazole propionic acid) receptors (AMPA receptors) play central roles in neuronal functions. However, clinical translation of knowledge on AMPARs accumulated in a number of animal studies has been limited due to the inability to visualize AMPARs in living human brain. Thus, we developed positron emission tomography (PET) tracer for AMPARs based on the compound already known to bind to AMPARs specifically. Using this tracer, we carried out the clinical study to examine the densities of AMPARs in some patients with mental disorders. Some diseases showed the strong correlation between the disease severity and the density of AMPARs. Interestingly we could reproduce the same phenotype of patients in the mouse where the expression levels of AMPARs were changed as seen in these patients with genetic manipulation. This bidirectional approach between animal and clinical researches is promising to delineate the specific brain regions responsible for the development of mental disorders and can contribute to the development of novel drugs and therapies toward mental disorders.