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Why D-neuron?

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Recent pharmacological discovery on trace amine-associated receptor, type 1 (TAAR1) (Borowsky et al. Proc Natl Acad Sci USA 2001, Revel et al. Proc Natl Acad Sci USA 2011) showed possible involvement of trace amines in pathogenesis of psychoses, such as schizophrenia. TAAR1 has many ligands, including tyramine, beta-phenylethylamine (PEA), amphetamines, and 3'-iodothyronamine. So-called D-neurons are putative producer of trace amines, endogenous ligands of TAAR1. The D-neuron is defined "aromatic L-amino acid decarboxylase (AADC)-containing neuron, but not dopaminergic nor serotonergic" (Jaeger et al. Science 1983), i.e., not containing tyrosine hydroxylase nor tryptophan hydroxylase. AADC is an enzyme, also called dopa decarboxylase (DDC). The localization of D-neurons in the central nervous system has been specified into 15 groups, from the spinal cord (D1) to striatum (D15). We showed the decrease of D-neurons in D15 in postmortem brains of schizophrenia, where midbrain dopamine (DA) neurons are heavily innervated (Ikemoto et al. Leg Med 2003). Decrease of D-neurons may cause quantitative reduction of trace amines in the striatum, and may also decrease stimulation of TAAR1 on striatal terminals of ventral tegmental area (VTA) DA neurons. This might increase firing frequency of VTA DA neurons, and might cause DA hyperactivity in the striatum and nucleus accumbens (Bradaia et al. Proc Natl Acad Sci USA 2009, Wolinsky et al. Genes Brain Behav 2007). The D-neuron, probably involved in trace amine cascade, might be a clue for elucidating pathogenesis of psychoses, as well as human mental functions. Thus, signal transduction of D-neurons should further be investigated.

Biography

Keiko Ikemoto MD, PhD had her medical and graduate education in Shiga University of Medical Science, Otsu, Japan, and continued her research on amine neuronal systems in Department of Experimental Medicine, Claude Bernard University (Prof. Michel Jouvet), France, Fujita Health University School of Medicine, National Minami Hanamaki Hospital, and Fukushima Medical University, School of Medicine, Japan. She is the Director, Department of Psychiatry, Iwaki Kyoritsu General Hospital, Fukushima, the Senior Researcher, Fukushima Psychiatric Brain Bank, and Visiting Associate Professor, Shiga University of Medical Science, Japan. She has published more than 40 articles in the international journals of psychiatry and/or neuroscience.

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