Alteration of parvalbumin expression and perineuronal nets formation in the anterior cingulate cortex of *Fabp3* KO mice

Yui Yamamoto[1,3], Kohji Fukunaga[2], Yuji Owada[3], Keiju Kamijo[1]

[1]Dept. Anatomy, Tohoku Med. and Pharm. Univ., [2]Dept. Pharmacology, Tohoku Univ. Grad. Sch. Pharm., [3]Dept. Organ Anatomy, Tohoku Univ. Grad. Sch. Med.

Polyunsaturated fatty acids (PUFAs) are essential for brain development and function. Increasing evidence has shown that an imbalance of PUFAs is associated with various human psychiatric disorders, including autism and schizophrenia. Fatty acid-binding proteins (FABPs), cellular chaperones of PUFAs, are involved in their intracellular trafficking, signal transduction, and gene transcription. Previously, we showed that FABP3 is strongly expressed in the parvalbumin-expressing interneurons (PV neurons) of the mouse anterior cingulate cortex (ACC), which is a component of the limbic cortex and is important for the coordination of cognitive and emotional behaviors. In addition, FABP3 regulates GABA synthesis through transcriptional regulation of *Gad67* in the ACC and that methionine restores normal *Gad67* expression and behaviors in *Fabp3* knockout (KO) mice. In this study, we analyzed the density and the percentage of PV neurons surrounded by perineuronal nets (PNNs) in the ACC of adult *Fabp3* KO mice. PNNs are key components of extracellular matrix that enwrapping PV neurons and regulate synaptic plasticity. PV density increased in the ACC of adult *Fabp3* KO mice, whereas the number of PV-neurons remained unchanged. The density of PNN and the number of PNN-positive PV neurons were significantly increased in the ACC of adult *Fabp3* KO mice. These findings demonstrate that FABP3 is involved in the control of expression of PV and formation of PNNs in the ACC, thus suggesting the importance of PUFA homeostasis in the ACC for maturation of PV neurons.