

A Functional Role of Brain Barriers as a Neural Modulator.

○Masanori Tachikawa and Ken-ichi Hosoya
(Grad. Sch. Med. Pharm. Sci., Univ. Toyama)

It has been well established that brain barriers (i.e., the blood-brain barrier and the blood-cerebrospinal fluid barrier) function as a dynamic regulatory interface between the circulating blood and the brain. However, a functional network between brain barriers, neuron, and glia remains to be understood yet. It is especially crucial to understand a physiological role of brain barrier transporters in regulating the synaptic transmission and neuron-glia development. This can open up new insights into a neural modulating system between brain barriers, neuron, and glia. We have newly found that creatine transporter at the blood-cerebrospinal fluid barrier is involved in the efflux transport of guanidinoacetate, a kind of guanidino compounds. Guanidino compounds are known to be endogenous convulsants which are mainly produced from neurotransmitters and alter GABA and glycine responses on neurons in the mammalian brain. Even though it has been reported that levels of guanidino compounds in the brain were temporally increased at the onset of convulsions, the clearance mechanism from the brain remains unknown. We have also found that creatine transporter mediates various guanidino compounds as well as guanidinoacetate. Our findings suggest that creatine transporter plays an active role in eliminating endogenous convulsants from the brain to prevent their abnormal accumulation in the brain. We are now investigating the functional expression of brain barrier transporters in the developing brain. In this symposium, we will discuss a new functional role of brain barriers as a neural modulator.