MS02-4 **Dynamic regulation of synaptic transmission by astrocytes mediated by monocarboxylic acid transporters**

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Identification of active release of "gliotransmitters" from glial cells lead to a novel concept that astrocytes are not simply passive cells supporting energy-demanding neuronal activities but rather are so active as to affect the neuronal activities. Despite considerable acknowledgements in these years of this novel "glia-neuron interaction" concept, an issue of "how and when astrocytes affect neuronal signaling" still remains a topic of debate. On the other hand, the high energy demand of neurons is met mostly through glucose and lactate supply from the astrocytes, which is made possible by specific transporters expressed in neurons and astrocytes. Monocarboxylate transporters (MCTs) are the key molecules in lactate transfer from astrocytes to neurons (Magestretti et al), however, their function during normal neuronal activity remains still unclear. In acute brain slices, we analyzed effects of replacing glucose with lactate and selective blockade of MCTs on the neuronal and synaptic activities and found that a major part of excitatory postsynaptic responses, but not the membrane polarization or action potential generation, depends largely on the energy supplied through MCTs. Here we propose a novel therapeutic strategy of targeting molecules underlying glia-to-neuron energy supply including the MCTs against CNS diseases including a wide variety of neuronal degenerative diseases.