- Abstract -

EFFECTS OF NEUROTRANSMITTERS ON THE INTRACELLULAR CALCIUM CONCENTRATION IN RAT TRIGEMINAL GANGLION NEURONS

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This study was carried out to elucidate the regulation mechanism of synaptic transmission in trigeminal sensory nucleus. Trigeminal ganglia (TG) were removed from rat, weighing 100-150 gm, and single neuron of trigeminal ganglion was acutely isolated by enzyme dissociation. Intracellular calcium concentration of TG neuron was determined with Fura-2 by microscopic fluorospectrophotometry. Glutamate (0.1 mM), its NMDA-receptor antagonist, MK-801 (10 μM) and its non-NMDA-receptor antagonist, CNQX (50 μM), was added to normal Ca bath solution. Glutamate showed dose-dependent increase in intracellular calcium concentration of TG neurons. Under the Ca free bath solution, responses to glutamate was not observed. 10mM Mg²⁺ attenuated the responses of glutamate on the intracellular calcium of TG neuron. Effects of glutamate and NMDA on the intracellular calcium of TG neuron were inhibited by MK-801 and its action was reversible. Effect of glutamate on the intracellular calcium of TG neuron was not inhibited by CNQX. This result might suggest that presynaptic NMDA receptors exist in TG neuron and they may play an important role in the regulation of neurotransmitter release and synaptic transmission.

Keywords: trigeminal ganglion, glutamate, intracellular calcium concentration, NMDA receptor, MK-801, CNQX

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