神経細胞播種密度と自発的シナプス電流の関係

Influence of the neuron primary culture density on the synapse spontaneous channel current

◦王志宏 [1,2],宇野秀隆 [1,2],栗田裕子 [1,2],高田紀子 [3],宇理須恒雄 [1,2]
名大未来社会 [1]，JST・CREST[2]，分子研 [3]
Zhi-Hong Wang[1,2], Hidetaka Uno[1,2], Yuko Kurita[1,2], Noriko Takada[3] and Tsuneo Urisu[1,2]
Nagoya Univ. IIFS[1], JST・CREST[2], IMS[3]
E-mail: zhwang@gvm.nagoya-u.ac.jp

The measurement of the ion-channel current, which provides the information with the activity of ion channel proteins and the release of neuro-transmitter molecules at the synapse, is considered to be the most useful way for analyzing the very complex neuron-network function. Using the incubation type planar patch clamp method, we have measured the synapse spontaneous channel current of neuron primary culture hippocampus. In the case of low density as shown in Fig. 1(a) (density: $6.9\times10^3/cm^2$), channel current is isolated and simple which can be analyzed as miniature excitatory postsynaptic current (mEPSC) mediated by nonNMDA receptors (Fig. 1(b)). On the other hand, the higher density as shown in Fig. 1(c) (density: $3.2\times10^4/cm^2$), channel current is complex which are the mixture of singular neuronal channel current and bursting firing channel currents (Fig. 1(d)). Studies of these interaction between channel current with neuro-transmitter molecules activity, we have chance to understand the mechanism of neuron communication hence to find the cause of neuronal disease and therapy. The high-throughput incubation type planar patch clamp technique can give us most promising chance to resolve these problems.

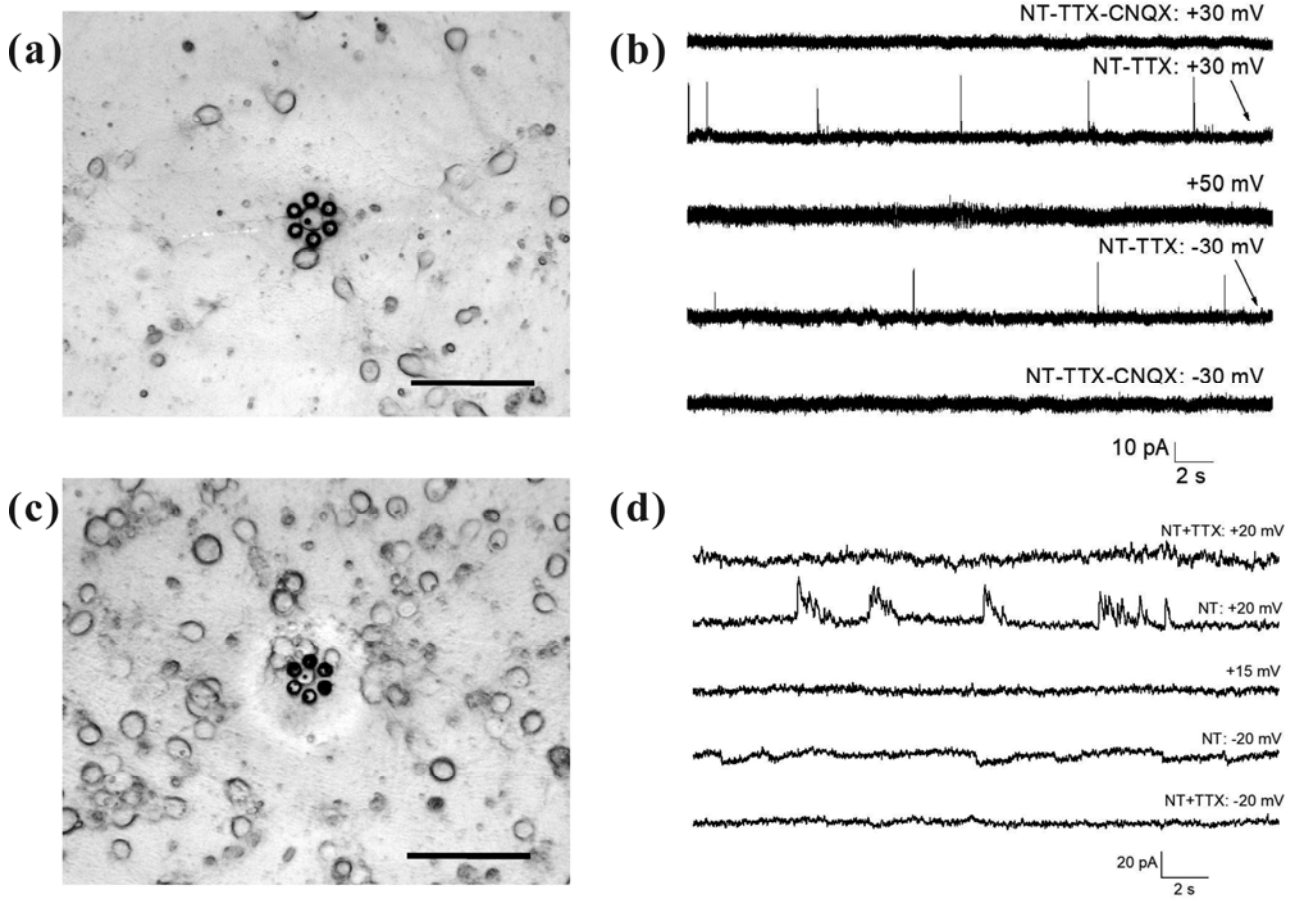

Fig.1.(a) Bright field image of neuron after 24 days culture observed before channel current measurement (density: $6.9\times10^3/cm^2$). (b) Observed spontaneous channel current recordings after primary culture 24 days. TTX (1μM) or CNQX (25 μM) are added to the bath solution. Scale bar is 100 μm. (c) Bright field image of neuron after 23 days culture observed before channel current measurement (density: $3.2\times10^4/cm^2$). (d) Observed spontaneous channel current recordings after primary culture 23 days. TTX (1μM) is added to the bath solution. Scale bar is 100 μm.