

전기생리학적 실험에서의 실질적인 문제점: 생체내 및 시험관내 실험



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Practical Issues in Electrophysiological Experiments: *in-vivo* and *in-vitro*

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There have been tremendous needs of electrophysiological experiments for the study of the detailed electrical properties of biological tissues and cells, using small, thin wire electrodes placed directly in the tissues of animal models, especially from the brain or heart, both *in-vivo* and *in-vitro* experimental settings. In brain, the electrophysiological experiments have been applied to measure neuronal activities, on a variety of scales from single ion channels of neuron to the whole brain levels. This kind of studies can allow us to understand how neurons of the brain communicate with each other through electrical signals that can be measured with the appropriate probes or electrodes. This lecture will introduce recent electrophysiological experiments, relevant to the translational animal models of human neurological disorders, especially epilepsy. In epilepsy, investigation of the electrophysiological characteristics of neurons in epileptic brain tissue is essential. Classically, *in-vitro* slice analysis from epileptic brain, especially from hippocampus, has been emphasized. More recently, *in-vivo* recordings suggest abnormal increase in synaptic excitation as well as some decrease in functional inhibition in epileptic brain. Technical progress of electrophysiological studies can cover single cell and slice recordings to *in-vivo* monitoring from live animals, extended level to cortical and subcortical epileptic network. While not strictly limited in animal experiments, methods have been developed to investigate the active electrophysiological conduction mechanisms of neuronal population, building the computational modeling systems of neuronal network involving generation and propagation of seizure activities in epilepsy. One of the great advantages of computational modeling system is sufficient timescale, close into the microsecond time domain, which can be considered reproducing the properties of neuronal network connections. The aim of this lecture is to introduce recent advances of electrophysiological experiments in epilepsy as well as to share useful experience for common practical issues to researchers pursuing translational studies using electrophysiological experiments.

Key Words: Electrophysiological, *In-vitro*, *In-vivo*, Epilepsy, Animal model

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