



Patch-Clamp Applications and Protocols (Neuromethods)

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E. Neher and B. Sakman were the first to monitor the opening and closing of single ion channels and membranes by conductance measurements. In 1976, they used firepolished micropipets with a tip diameter of 3-5 μm to record currents from a small patch of the membrane of skeletal muscles, thereby decreasing background membrane noise. In order to reduce the dominant source of background noise—the leakage shunt under the pipet rim between the muscle membrane and glass—enzymatically. Despite these early limitations, a new technique was born—the patch-clamp technique. The final breakthrough came in 1981 when the same authors, in collaboration with O. P. Hamill, A. Marty, and F. J. Sigworth, developed the gigaohm seal. Not only did this improve the quality of recordings, it was now possible to gently pull the membrane patch with the attached pipet off the cell and study its trapped ion channels in isolation. Another offshoot of the gigaohm seal technique was the whole-cell patch-clamp technique, in which the patch is ruptured without breaking the seal. This technique is really a sophisticated voltage-clamp technique and also allows for the altering of cytoplasmic constituents if the experimenter so wishes. The first part of Patch-Clamp Applications and Protocols presents modern developments associated with the technology of patch-clamp electrodes, of cell-free ion channel recording, and of the whole-cell patch-clamp technique.

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