Video Article

The 2009 Lindau Nobel Laureate Meeting: Erwin Neher, Physiology or Medicine 1991

Erwin Neher[1]
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Abstract

Erwin Neher, born in 1944 in Landsberg Germany, shared the 1991 Nobel Prize in Physiology or Medicine with Bert Sakmann for their pioneering work measuring the activity of single ion channels in cells. Their techniques have been developed into an array of cell recording methods, including cell-attached and whole cell recording patch clamp recordings. Inspired in part by Hodgkin and Huxley s work modeling action potentials in the squid giant axon, Neher pursued a career in biophysics, a field that had not yet been fully established. Following completion of his Ph.D. and post-doctoral work under H.D. Lux at the Max Planck Institute f r Psychiatrie, he joined a physical chemistry lab to learn how to perform single channel recordings in artificial membranes.

Wishing to perform these types of recordings in living cells, Neher, with his friend and colleague Bert Sakmann, modified existing recording methods in hopes of significantly reducing background noise. Instead of puncturing the cell membrane, they placed the pipette onto the surface of the cell. This isolated a small patch of membrane, which they hoped would decrease the size of the signal source and increase impedance. As it turned out, getting a seal to form between the patch pipette and the cell proved to be somewhat difficult. After systematically adjusting the system, they finally achieved a high enough impedance and thus low enough background noise level and produced the first recordings of single ion channel activity in cells, which were published in 1976.

Years later, they found by chance that the application of a small amount of suction to the pipette resulted in the formation of a giga-ohm seal. This represented a 100-fold increase in impedance, which drastically lowered the background noise and allowed them to perfect the technique and develop several recording methods. The technique was picked up by a vast number of laboratories that have since shaped it into what it is today: a versatile method to study ion channels, membrane turnover, and the downstream processes controlled by them.

Dr. Neher is now a director at the Max Planck Institute for Biophysical Chemistry, where he heads the Department for Membrane Biophysics. In his current work he focuses on short-term synaptic plasticity, applying his techniques to obtain simultaneous pre-synaptic and post-synaptic whole-cell recordings to study the molecular mechanisms that fine tune synaptic responses.

Video Link

The video component of this article can be found at http://www.jove.com/video/1563/

References

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