



## Curriculum Vitae Professor Dr Erwin Neher



Image: MPI for Multidisciplinary Sciences, Göttingen

**Name:** Erwin Neher  
**Date of birth:** 20 March 1944

**Research Priorities:** Patch clamp technique, signal transmission, ion channels, calcium ion concentration, transmitter release, exocytosis, cell membrane channels, neurotransmitters, synaptic plasticity

Erwin Neher is a German biophysicist. His core research area has been signal mechanisms in cells. Neher and the German physician Bert Sakmann were jointly awarded the Nobel Prize in Physiology or Medicine in 1991. The two researchers demonstrated the existence of ion channels in cell membranes, which are an important foundation of signal transmission. The basis for this discovery was the development of the “patch clamp technique”.

### Academic and Professional Career

- since 2011 Head, Emeritus Group Membrane Biophysics, Max Planck Institute (MPI) for Biophysical Chemistry, Göttingen, Germany
- 1989 Fairchild Scholar, California Institute of Technology, Pasadena, USA
- 1986 Honorary Professor, University of Göttingen, Göttingen, Germany
- 1983 - 2011 Director and Head, Department of Membrane Biophysics, MPI for Biophysical Chemistry, Göttingen, Germany
- 1981 Habilitation in Physics, University of Göttingen, Göttingen, Germany
- 1975 - 1976 Research Associate, Yale University, New Haven, USA
- 1972 - 1982 Research Associate, Max Planck Institute for Biophysical Chemistry, Göttingen, Germany
- 1970 - 1972 Research Assistant at the Max Planck Institute of Psychiatry, Munich, Germany
- 1970 PhD in Physics, Technical University of Munich (TUM), Munich, Germany

German National Academy of Sciences Leopoldina

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- 1967            Master of Science, University of Wisconsin, Madison, USA
- 1963 - 1970    Degree in Physics, TUM and University of Wisconsin, Madison, USA

### **Functions in Scientific Societies and Committees**

Co-Editor of various journals, including “Cellular Physiology & Biochemistry” and “European Journal of Physiology”

### **Project Coordination, Membership in Collaborative Research Projects**

- 2002 - 2014    Principal Investigator, Subproject “Quantitative Molecular Microscopy”, Research Centre (FZT) 103 “Molecular Physiology of the Brain”, German Research Foundation (DFG), Germany
- 2001 - 2006    Principal Investigator, Subproject “The Role of the Interaction between AMPA-Receptor Subunits in the Gating of the AMPA Receptor”, Collaborative Research Centre (SFB) 406 “Synaptic Interaction in Neuronal Networks”, DFG, Germany
- 1999 - 2008    Project “Qualitative Recording of Vesicular Release in Central Synapses”, DFG, Germany
- 1996 - 2005    Principal Investigator, Subproject “Kinetic Analysis of Mutations of Secretory Proteins”, SFB 523 “Protein and Membrane Transport between Cellular Compartments”, DFG, Germany

### **Honours and Awarded Memberships**

- 2004            Karl Küpfmüller Ring, Technical University of Darmstadt, Darmstadt, Germany
- since 1998    Member, German National Academy of Sciences Leopoldina, Germany
- 1997            Great Cross with Star and Sash of the Order of Merit, Federal Republic of Germany
- since 1995    Member, Order Pour le Mérite for Sciences and Arts, Federal President, Germany
- since 1994    Foreign Member, Royal Society, UK
- since 1992    International Honorary Member, American Academy of Arts and Sciences, USA
- since 1992    Member, Göttingen Academy of Sciences and Humanities, Göttingen, Germany
- 1991            Nobel Prize in Physiology or Medicine (jointly with Bert Sakmann), Nobel Assembly, Karolinska Institute, Stockholm, Sweden
- 1991            Ralph W. Gerard Prize, Society for Neuroscience, Washington D.C., USA
- 1990            Lower Saxony State Prize for Science, Germany

- 1990 Bristol Myers Squibb Research Award, Bristol Myers Squibb Foundation, New York City, USA
- 1990 Ernst Hellmut Vits Prize, Münster University, Münster, Germany
- since 1989 Member, Academia Europaea
- since 1989 Member, National Academy of Sciences, USA
- 1989 Canada Gairdner International Award, International Research Award of the Gairdner Foundation, Toronto, Canada
- 1987 Gottfried Wilhelm Leibniz Award, DFG, Germany
- 1986 Schunk Prize, Justus-Liebig-Universität Gießen, Gießen, Germany
- 1986 Fidia Research Award Lecture, Fidia Research Foundation, Washington D.C., USA
- 1986 Louisa Gross Horwitz Prize, Columbia University, New York City, USA
- 1984 Adolf Fick Prize, Adolf Fick Foundation, Julius-Maximilians-Universität of Würzburg, Würzburg, Germany
- 1983 W. Alden Spencer Award, Columbia University New York, New York City, USA
- 1982 Harold Lamport Award, New York Academy of Sciences, New York City, USA
- 1982 K.C. Cole Award, American Biophysical Society, USA
- 1979 Feldberg Award, Feldberg Foundation, London, UK
- 1977 Nernst Haber Bodenstein Prize, German Bunsen Society for Physical Chemistry (DBG), Frankfurt am Main, Germany

### Research priorities

Erwin Neher is a German biophysicist. His core research area has been signal mechanisms in cells. Neher and the German physician Bert Sakmann were jointly awarded the Nobel Prize in Physiology or Medicine in 1991. The two researchers demonstrated the existence of ion channels in cell membranes, which are an important foundation of signal transmission. The basis for this discovery was the development of the “patch clamp technique”.

The patch clamp technique is an electrophysiological measuring technique with which minute amounts of current flowing in and between living cells can be measured. To create the technique, the two researchers developed a special glass pipette with a diameter of just one micrometre, which can enclose the cell membrane and measure the current flow within the isolated membrane patch. This extremely sensitive technique made it possible to investigate the characteristics of a single ion channel in the cell membrane.

Neher and Sakmann thus managed to prove for the first time that these channels exist in the cell membrane and that, in almost all cell types, charged elements enter the surrounding environment via hundreds of different types of ion channel. This was an important discovery for medicine, as further research showed that the cause of many diseases such as nerve or muscle pain and epilepsy resides in dysregulation of the flow of ions.

From 1983 onwards, Erwin Neher turned his attention to signal transmission processes within cells. He investigated calcium ion signals in individual cells and developed methods to measure the release of neurotransmitters and hormones from individual cells. In particular, he used the patch clamp technique to study exocytosis, which refers to the fusion of substance-filled vesicles with the cell membrane. By combining optical processes and photolytic manipulation of calcium ions he succeeded in demonstrating the quantitative link between calcium ion concentration and transmitter release.

Erwin Neher studies how the brain manages its flow of information and adjusts links between nerve cells – synapses – within seconds and sub-seconds. He also uses neuronal cell cultures and brain slices to investigate short-term plasticity mechanisms, such as those that underlie depression.