

Book Review

Molecular and Cellular Physiology of Neurons

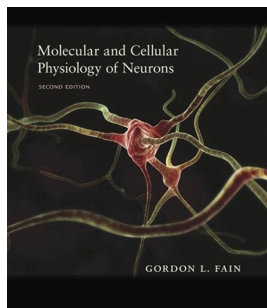
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Gordon L. Fain
Second Edition
Harvard University Press

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This second edition of the *Molecular and Cellular Physiology of Neurons* by Professor Gordon Fain is a masterpiece. The book is a concise and updated version of its previous 1999 edition of a textbook, which is well written and with easy to understand topics that are fundamental for those who are deeply interested in understanding the detailed principles of neuronal physiology at the molecular level.

It is divided into five parts:

Part one: Electrical properties of cells and hemostasis

Part two: Active propagation of neuronal signals

Part three: Synaptic transmission and ligand-gated channels

Part four: Metabotropic transmission and neuromodulation

Part five: Sensory transduction

The book starts by giving an introduction to the electrical properties of cell membranes, then proceeding to membrane potentials, ion permeability, and ion homeostasis.

Following that, the classic experiments of Hodgkin and Huxley are presented. This is followed by newer experiments on voltage-gated channels.

Then, the experiments of Katz, Miledi, and their colleagues on synaptic transmission are described followed by the proteins responsible for transmitter release and the postsynaptic receptors responsible for rapid excitatory and inhibitory transmission in the central nervous system.

Following that the receptors, G proteins, effector molecules, and second messengers responsible for metabotropic synaptic transmission are described. In addition to the detailed and updated molecular principles, Fain has beautifully integrated them to the clinical settings. For example, in the part two, chapter seven, in regard to the diversity of ion channels, Fain beautifully summarizes in Box 7.1 the location of mutations in sodium channel (channelopathy) provoking different types of epilepsy, which are essential for clinicians involved in understanding and designing better treatment for different epileptic patients.

In the part five, chapter sixteen, in regard to photoreceptors and olfactory receptor neurons, in

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Box 16.2, he discusses the mutations in a variety of photoreceptor genes producing diseases such as retinitis pigmentosa and Leber's congenital amaurosis and the result of gene therapy after the insertion of a normal gene for the affected protein in these children with significant improvement in their vision.

In addition, cellular and molecular mechanisms of long-term potentiation followed by molecules and cellular events responsible for sensory transduction is described.

This is a book for any clinician, scientist, and those who want to understand in-depth the physiology and molecular basics of how neurons communicate with each other and their deficiencies at the molecular level, which may provoke diseases.

By going into in-depth analysis of the points mentioned by Fain, new treatment options will be discovered for future treatment of different diseases and disorders of the nervous system.