
Preface

Signal Transduction-Single Cell Techniques was compiled in response to a rapidly expanding field with an increasing number of possibilities and technical aspects. This laboratory manual provides not only insight into a variety of powerful single cell techniques, but also gives background information and step-by-step protocols for practical applications. In doing so, *Signal Transduction-Single Cell Techniques* is suitable for both single cell specialists and for researchers from outside the single cell field. In addition, the manual contains useful material to be used in teaching related courses.

To study signal transduction in single cells, one has to master many different techniques. Most of these techniques are complicated, contain many pitfalls and require a detailed knowledge of their physical basis. Here, the emphasis is placed on techniques used for handling of cells in experiments and on electrophysiological and fluorescence techniques. The various chapters deal with the theoretical background, the actual recording methods, and analysis of the recorded signals – every chapter being a complete guide. Pitfalls are indicated and useful tips provided.

In Part I, "Handling of Cells in Single Cell Experiments", there are guidelines for the construction of single cell measurement perfusion chambers, ideas for temperature control and microapplication of drugs, and the application of laser microsurgery. Part II, "Ion Channel and Membrane Potential Measurements Using the Patch-Clamp Technique", provides multiple examples of the application of different patch-clamp measurement configurations in various cell types from both animal and plant systems. A variety of methods is described in each chapter, enabling the reader to compare and choose the most suitable method for the desired application. In addition, a complete course guiding the reader (experimenter) through the theoretical and practical background of the patch-clamp technique using electrical simulation circuits (without the necessity of having a patch-clamp setup available) is included. Part III, "Fluorescence to Measure Intracellular Ions", introduces the use

of fluorescent ion sensitive probes, and examples using flow cytometry, microfluorescence, ion imaging and confocal microscopy are given. Emphasis is put on calibration and validation of the different measurement techniques.

With this laboratory manual as a guide, one should be able to perform the experiments described in a well-equipped laboratory without the continuous support of an expert in the field.

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