

# Cellular Mechanisms of Sensory Processing

The Somatosensory System

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# Cellular Mechanisms of Sensory Processing

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## PREFACE

The research field of somatosensory processing in mammals has experienced revolutionary changes in recent years. Accumulation of basic and clinical data has greatly accelerated, and new phenomena have emerged. With the aid of new, refined methods, molecular and cellular changes have been described, underlying the signal transduction-transmission between the internal/external environment and the central nervous system have been described. The discovery of the interaction between the nervous and the immune system has, for example changed our view on the development of inflammatory diseases, while the cloning of genes encoding different trophic factors has boosted studies revealing profound changes in the regeneration of neurons, and induction of changes in phenotype. The study of the pre- and postsynaptic modulation of transmitter release, and the examination of the combined effects of amino acid and peptide transmitters has become recently possible by using cultured cell lines and in vitro techniques. Although it is in embryonic state, computational properties of single DRG cells under normal and pathological conditions are being investigated. Results soon or later will have a great impact on pain research and consequently ultimately in clinical pain management.

This brief introduction indicates how our knowledge of the somatosensory system has increased dramatically recently. However, many investigators cultivate only a very specific field in the growing area of somatosensory research and find it difficult to integrate a more universal knowledge of their work. To process the large body of information requires interaction between scientists investigating different aspects of the same system or phenomenon. On the other hand some aspects in somatosensory research are neglected because of technical difficulties (e.g. signal transduction in peripheral receptors). In this case results derived from studies in non-neural systems or in lower vertebrates may fill the gap and provide information for further studies.

Given this background, we organised a symposium, to provide the opportunity for integration of expertise in studying the function of the somatosensory system at the cellular level. The content of this book is based on the presentations at this NATO Advanced Research Workshop with the title *The Cellular Mechanisms of Sensory Processing*, held in Wye College (United Kingdom) from 31st March to 3rd April 1993.

As almost all speakers contributed to the book, the sequence of the presentations is reflected in the organisation of the chapters. Authors were deliberately given freedom to decide on the material which they wanted to present

and discuss, and so some chapters provide more results and speculative discussion while others incorporate less data and focus on reviewing recent development. In order to give some structure to the book, chapters which give a review of a certain area will precede others which present more original findings. We believe that this format is particularly important in this book, because of the diversity of topics discussed.

I regret that even though the primary afferents and the spinal cord are a "fragment" of the sensory nervous system they are far more complicated than all of the aspects of present research concerning this area could be properly discussed within a workshop and presented in a covering book. Even as the meeting and the publication concentrate solely on cellular mechanisms, there remain many gaps which could be filled. Unfortunately we could not invite all colleagues working in this field therefore the book may represent debatable views, but I hope that it gives the reader a general view on the recent development and hot topics in the research field of the somatosensory system.

The chapters of this book were reviewed by the chairmen of each session which made inevitable delays, but the organising committee thought it necessary for the benefit of the publication. We encouraged the contributors to discuss controversial issues and allowed the presentation of unpublished original, even controversial, observations. Therefore some chapters contain data which are open to criticism with the view that they may trigger further experimental work and debate.

The workshop was sponsored by the Scientific Affairs Division of NATO. We would like to express our appreciation to NATO for the financial support and help. We are most grateful to the Wellcome Trust to fund the attendance of young British scientists and to Sandoz Institute for Medical Research, Ily Lilly, Amersham and Pfizer for financial support.

I am most grateful to Dr Andy Dray, Prof. Srdija Jęftinija, Prof. Peter W Reeh and Prof. Clifford J. Woolf who helped to organise the meeting as members of the organising committee. I was fortunate to have some enthusiastic colleagues, Dr Alyson J. Fox, Dr Istvan Nagy and Dr Stephen W.N. Thompson, who gave their best professional skills to run the meeting, and Miss Amanda Noble who helped me with the secretarial work. I wish to offer my thanks to all of the contributors and to everyone who helped with this project.

L. A. Urban

*I wish to dedicate this book to Prof. Patrick D. Wall whose contribution made a major impact on our present understanding of the spinal sensory processing.*

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