

THE SENSES: A COMPREHENSIVE REFERENCE

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Volume 5
PAIN

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TREATMENT OF HEARING LOSS: VIRAL TRANSFECTION
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Introduction to Volume 5

“There is no coming to consciousness without pain.” Carl Gustav Jung

It has been argued that pain, unlike audition, vision, somatosensation, and olfaction, is not a primary sense, but instead is more of an emotional experience. Most researchers of pain, however, consider pain to be a complex perception evoked by noxious stimuli. Pain is probably far more complicated than the other perceptual modalities described in this series. For example, in the setting of tissue or nerve injury, where pain is persistent, the stimulus that evokes pain can change. In fact, under these conditions innocuous stimuli can readily evoke the perception of pain.

But even these unusual characteristics do not capture the features that make pain among the most complex of perceptions. The International Association for the Study of Pain defines pain as “An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.” In other words, although there is a very discrete anatomical and physiological basis for the detection and transmission of messages that are interpreted as painful, what makes the experience of pain so special is that there is always a profound emotional quality to the experience. For all of these reasons, pain is unquestionably one of the most interesting subjects to address in the *The Senses: A Comprehensive Reference*.

Pain in general, and pain research in particular, is especially exciting as it brings together elements of so many disciplines. This volume is comprehensive. It includes a wealth of information on the molecular biology, anatomy, physiology, and biochemical bases of ‘pain’, both in the normal and injury setting. But this volume also addresses the critical cognitive component of the pain experience, including some of the most provocative cerebral imaging studies that for the first time are providing insights into the gestalt of brain activity that occurs when pain is experienced. There are chapters on the pharmacological basis of the placebo, on the utility of hypnosis for the treatment of pain, and even an essay on consciousness and pain.

This is not a ‘how to treat’ clinical textbook. Nevertheless, the editors are advocates of the new mantra in the field, namely that *chronic* pain is not a symptom of disease, but rather is a disease entity itself, a disease of nervous system function. Therefore, in addition to covering the fundamentals of acute ‘pain’ processing, from the nociceptor to cortical activation, we also cover, in depth, the changes that occur in the setting of injury, including molecular, structural, and biochemical alterations in the properties of nociceptors and central nervous system pathways. Some of the particularly intractable clinical pain conditions are discussed. These chapters not only provide insights into pathophysiology but also clues to pain management.

Of course, a variety of compendia have recently appeared, and many also provide comprehensive reviews of the field. With this in mind, the editors have made a concerted effort to produce a final product that is different. Too often the excitement that epitomizes the field of pain research is buried within, or indeed omitted from, the typical edited book. Some textbooks include the proverbial ‘box’ that highlights an interesting topic, but these are generally very limited. We wanted to bring these topics to the forefront. Our approach is to include, in association with each major chapter, at least one or two cameos that illustrate fascinating and provocative areas of basic and clinical neuroscience that intersect the study of pain.

A few years ago we knew almost nothing about the cortical mechanisms that underlie the pain experience. Today in 2007, some scientists, albeit the minority, believe that cortical imaging can provide an objective measure of the pain experience. A few years ago, the tetrodotoxin-resistant subtype of voltage-gated sodium

channel, NaV1.8, was considered the Holy Grail for the next breakthrough in pain management. How fast things change. The discovery that a loss of function mutation of NaV1.7 underlies a condition of congenital insensitivity to pain and that a gain of function mutation underlies the excruciatingly painful condition of erythromelalgia has dramatically altered the focus, not only of the science community but also of the pharmaceutical industry. The pace of discovery in pain research is indeed remarkable. We hope that this volume conveys the excitement inherent in this discovery process and, most importantly, that it stimulates the next generation of basic and clinical scientists to unravel the mystery of the pain experience.

Allan I. Basbaum and M. Catherine Bushnell