Preface

The clinical importance of pain from musculoskeletal structures is obvious. Musculoskeletal pain is a diagnostic and therapeutic problem, and further insights into the peripheral and central neurobiological mechanisms are needed to improve diagnosis, therapy, and the implementation of mechanism-based treatment regimes. It has become increasingly evident that muscle hyperalgesia, referred pain, referred hyperalgesia, and widespread hyperalgesia play an important role in chronic musculoskeletal pain. Besides the sensory consequences of musculoskeletal pain, the motor control systems are also affected, changing the drive to the muscles and the related biomechanics.

This book integrates the research findings within the field of musculoskeletal pain into a comprehensive publication that will update the reader on novel mechanisms involved in the sensory and motor characteristics of such pain. The authors attempt to translate findings from basic animal studies, and from human experimental pain studies, into potential clinical mechanisms.

The historical perspective of muscle pain investigations is extensive. Articular and muscular forms of rheumatism had been differentiated by the 18th century. Muscular rheumatism was defined as pain and stiffness in muscle and soft tissue. Other authors note the use of alternative terms: Muskelschwiele (muscle callus; defined in 1843), "muscular rheumatism" (1900), fibrositis (1915), Myogelose (muscle gelling; 1919), Muskelhärten (muscle hardenings; 1925), myalgia (1942), myogelosis (1942), nonarticular rheumatism (1951), and myofascial pain (1952) (Reynolds MD. The development of the concept of fibrositis. J Hist Med Allied Sci 1983;38:5–35; Simons DG. Muscular pain syndromes. In: Fricton JR, Awad E, editors. Myofascial pain and fibromyalgia. New York: Raven Press; 1990, pp 1–41). In the 1930s, Lewis and Kellgren pioneered the experimental approach to the study of muscle hyperalgesia and referred pain in humans and introduced the concept of experimentally induced muscle pain. Some of the first systematic recordings from thin-caliber muscle afferent fibers in animals were made in the early 1960s by Paintal (J Physiol 1960;152:250–270) and Iggo (J Physiol 1961;155:52–53),

who reported responsiveness to noxious and innocuous stimuli. The next major breakthrough in muscle pain physiology was in the mid-1970s, when Mense, Kniffki, and Schmidt thoroughly characterized a subgroup of thin-afferent nerve fibers as muscle nociceptors. This work was later followed by numerous animal investigations addressing the central consequences of peripheral muscle nociception. For over a decade there has been extensive work on translating the basic animal findings to clinical manifestations, especially in experimental muscle pain studies in humans. Over the last 10 years the relative publication rate per year within the field of musculoskeletal pain has been higher than for pain in general. This trend reflects the need to develop new pharmacological targets for chronic musculoskeletal pain (including fibromyalgia), which is now a major focus of many pharmaceutical companies.

This volume includes contributions mainly based on presentations from the 7th IASP Research Symposium, "Fundamentals of Musculoskeletal Pain," which took place in May 2007 at Aalborg University's Center for Sensory-Motor Interaction and was organized by Profs. Thomas Graven-Nielsen and Lars Arendt-Nielsen. More than 180 clinicians and basic scientists participated in the 3-day symposium. The symposium attracted participants from Europe and from 18 countries outside Europe, including Australia, Brazil, Canada, Egypt, Israel, Japan, New Zealand, Russia, and Switzerland. Twenty-seven plenary lectures were given by invited international speakers, and there were also poster presentations and oral presentations based on peer-reviewed accepted abstracts.

The present book is organized in three main sections: (I) Basic Mechanisms of Muscle Pain, (II) Key Factors Determining Muscle Pain Sensitivity, and (III) Effects of Muscle Pain on Motor Function. The first section focuses on morphology and functional types of peripheral muscle nociceptors; on central neurophysiological mechanisms involved in nociception, such as central sensitization and descending modulation of spinal mechanisms; and on cortical representation of muscle nociception. The potential human correlates are outlined. The next section presents factors that can influence muscle nociceptive mechanisms, including genetics, gender, chronic pain, analgesics, and pain from other tissues. Part III outlines the effects of musculoskeletal pain on muscle function in

contributions covering lower back, neck, and jaw muscle systems together with advanced neurophysiological assessments of muscle function, from proprioceptive afferents to motor units. Each section emphasizes the translational aspects and includes contributions from animal studies, human experimental studies, and clinical findings. All authors are sincerely acknowledged for meeting our publication deadlines with their enthusiastic contributions of high-quality manuscripts and for their help with peer reviews.

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