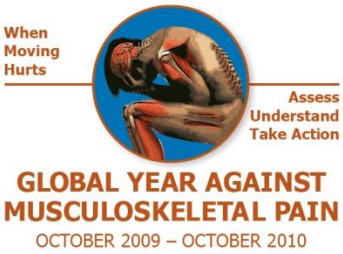

• **FACT SHEET No. 3**

Assessment of Musculoskeletal Pain: Experimental and Clinical

Introduction

Key characteristics of musculoskeletal pain are (i) diffuse aching pain, (ii) referred pain to distant somatic structures, (iii) deep-tissue hyperalgesia (general and localized), (iv) transition from acute to chronic pain, and (v) disturbed muscle function with reduced contraction force. Methods for quantitative assessment of musculoskeletal pain characteristics provide clinically relevant information allowing clinicians to plan, optimize, and possibly revise treatment procedures. In addition, these methods can be used as research tools when exploring the fundamental mechanisms involved in musculoskeletal pain and provide information on the mode-of-action of analgesic compounds under development or currently used for treatment.

Pathophysiology

The sensation of musculoskeletal pain results from the activation of group III (A· -fiber) and group IV (C-fiber) polymodal muscle nociceptors [9]. These nociceptors can be sensitized by release of neuropeptides from the nerve endings. This process of sensitization may eventually lead to hyperalgesia and sensitization of dorsal horn neurons manifested as prolonged neuronal discharges, increased responses to defined noxious stimuli, response to non-noxious stimuli, and expansion of the receptive field [9]. Human, mechanistic and quantitative pain assessment tools provide the opportunity to translate those fundamental findings into a clinical setting.

Sensitization of deep-tissue nociceptors followed by sensitization of central mechanisms is the best explanation for the transition from acute to chronic pain involving widespread deep-tissue hyperalgesia and expanded areas of pain distribution and referred pain [2]. In addition, descending inhibitory control of pain seems to be impaired in people with chronic musculoskeletal pain.

Clinical Features

The sensory manifestations of musculoskeletal pain comprise a diffuse aching pain in the muscle, pain

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referred to distant somatic structures, and modifications in the superficial and deep sensitivity of the painful areas. These manifestations are different from cutaneous pain which is normally superficial and localized around the injury with a burning and sharp quality. Pain localization is poor in skeletal muscles, and it is difficult to differentiate pain arising from tendons, ligaments, and bones as well as from joints and their capsules. Referral of muscle pain is typically described as a sensation from deep structures, in contrast to visceral referred pain which is located both superficially and deeply. Kellgren [8] was one of the pioneers in the experimental study of the diffuse characteristics of exogenous muscle pain and of the actual locations of referred pain on selective activation of specific muscle groups. Similar characterization has been seen clinically by activations from myofascial trigger points (spontaneous from active and evoked from latent) [10].

Visual analogue scales (VAS), verbal descriptor scales (VDS), the McGill Pain Questionnaire (MPQ), and similar scales and questionnaires may be very helpful for the assessment of perceived pain intensity and quality. Musculoskeletal pain is most frequently characterized by descriptors as “drilling,” “aching,” “boring,” and “taut.”
Muscle pain and musculoskeletal pain have implications for many aspects of daily life and quality of life, and questionnaires have been developed to assess different dimensions of generalized and regional pain problems (e.g., the General Function Score, the Roland and Morris Disability Scale, and the Oswestry Pain Disability Index) [12]. More recently an attempt has been made to use the PainDetect Questionnaire for classification of back pain.

Quantitative Sensory Tests in Musculoskeletal Pain
Quantitative methods exist to assess the pain sensitivity and associated mechanisms related to musculoskeletal structures. These methods are based on the application of standardized painful stimulus paradigms to musculoskeletal structures to evaluate how sensitive the structure is to specific stimulus modalities [5].
Pressure algometry is the most commonly used quantitative technique to assess tenderness in myofascial tissues and joints. A reduction in pressure pain thresholds or increased pain ratings when many sites are assessed may be an indicator of widespread hyperalgesia.

Application of repetitive painful pulses is a useful tool to investigate temporal integration/summation and the involvement of central integrative mechanisms. Temporal summation means that repetitive stimulation with the same stimulus intensity gives rise to gradually increasing pain responses; e.g. repeated pressure stimulation can be used to assess the degree of temporal pain summation [6] which is also facilitated in chronic musculoskeletal pain patients [11]. Fibromyalgia patients show increased and prolonged responses to repetitive stimulation which can be inhibited by, e.g. compounds interacting with the involved central mechanisms (e.g. ketamine, an NMDA-receptor antagonist).

Referred pain can be assessed experimentally from muscles by intramuscular injection of various chemical substances such as hypertonic saline, capsaicin, and glutamate [4] or clinically by activating latent trigger points. Several chronic musculoskeletal pain conditions (e.g., low back pain, fibromyalgia, and osteoarthritis) are associated with expanded areas of referred pain [4]. It is important clinically to investigate for pain projection areas and referred pain areas as their expansion may be an indicator of

increased central gain.

The balance between descending inhibition and facilitation can be assessed experimentally. Painful heterotopic conditioning stimuli (thermal, mechanical, electrical, or chemical) decrease the pain perception induced by phasic noxious stimulation applied elsewhere in the body (termed conditioning pain modulation). Recent data have shown that endogenous pain modulation is impaired in people with fibromyalgia [7], osteoarthritis [1], and most other chronic pain conditions [3]. Profiling musculoskeletal pain patients for both conditioning pain modulation and temporal pain summation provides valuable information regarding the degree of sensitization [13].

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