



- **FACT SHEET No. 1**

Musculoskeletal Pain

Introduction

Musculoskeletal pain is a known consequence of cumulative trauma injury, repetitive strain, or overuse. It can be acute or chronic, focal or diffuse. Low back pain is the most common example of chronic musculoskeletal pain, although pain can also develop in upper and lower extremities as a consequence of neuropathies, tendonitis, tendinosis, myalgia, and even stress fractures.

Epidemiology and Economics

- Musculoskeletal pain often occurs as a consequence of daily activities (both occupational and not), sports or military activities, and are a leading cause of pain and physical disability.
- Low back pain is most prevalent and most common work-related injury in Western society.
- Muscle strain injuries account for up to 50% of sports injuries and have high rates of re-injury; tendon overuse injuries account for 7% of all injury-related physician office visits; carpal tunnel syndrome currently affects 6% of the population.
- These disorders constitute an enormous burden to society in terms of human suffering, lost productivity, and healthcare costs have doubled in cost since 2010.

Pathophysiology

The pathophysiology of musculoskeletal pain is not completely clear, but inflammation, fibrosis, tissue degradation, and neurosensory disturbances have been implicated.

- **Causes:** Although acute trauma may be a causal factor, many result from cumulative small amplitude forces occurring with overexertion, repetitive activities, forceful actions, and prolonged static positioning.
- **Inflammation:** Injury induces increased pro-inflammatory cytokines and mediators in affected tissues and systemically. This increase can induce peripheral nociceptor sensitization.
- **Fibrosis:** Inflammation can induce fibrotic scarring (increased collagen within and between cells and tissues), which reduces gliding of tissues during movement and increases tissue strain due to adherence of adjacent structures, leading to more pain.



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- Tissue degradation: Increased inflammatory mediators induce increases in matrix metalloproteinases (enzymes that degrade extracellular matrices), lowering tissue load tolerance and leading to further injury and more pain.
- Neurosensory disturbances: Levels of neurotransmitters, e.g., substance P and calcitonin-related peptide, often elevate in affected tissues, dorsal root ganglia, and spinal cord dorsal horns, leading to peripheral nociceptor sensitization or central amplification of pain.

Clinical Features

The pain can be acute or chronic, diffuse or focal (even multifocal), in musculoskeletal or associated neural tissues.

- Clinical symptoms include:
 - local symptoms of pain or widespread and persistent pain.
 - peripheral nerve irritation, and may eventually lead to decreased nerve conduction velocity.
 - weakness, such as reduced finger or grip strength.
 - limited motion and stiffness.
- Symptoms progressively increase with greater tissue injury and inflammation in affected anatomical sites.
- Symptoms are exacerbated by work-related or personal stress, for example, poor control over one's work, difficult relationships and time pressure.
- Symptoms have diurnal fluctuation. At first, symptoms subside with cessation of work (i.e., between shifts, overnight, over weekends, and during vacations). As exposure persists and tissue injury progresses, symptoms may be insufficiently alleviated by rest.

Diagnostic Criteria

Diagnoses include peripheral neuropathies; tendonitis or tendinosis (e.g., elbow, rotator cuff, bicipital, or wrist or Achilles tendons); joint sprains or strains; myositis and myalgia; osteoarthritis; and lower back pain. Options for screening, surveillance and diagnosis mostly depend on self-reported symptoms or functional abilities.

- Local, chronic, intermittent or persistent pain in musculoskeletal tissues can be tested using a Visual Analogue Scale (VAS) for pain, or the Body Part Discomfort Scale.
- Disability (e.g., weakness) can be tested using the Roland Morris Disability Questionnaire (RMDQ), Disabilities of the Arm, Shoulder and Hand (Dash) or Quick Dash.
- Nerve conduction velocity values (for nerve compression)
- Images changes, i.e., MRI indices of rotator cuff tears
- Several studies have focused on examining for serum biomarkers that could be used to stage severity of the musculoskeletal disorders, e.g., levels of C-reactive protein or tumor necrosis factor alpha.

Treatments

Management is typically multimodal:

- Physical therapy, primarily with an exercise program (aerobic, strengthening, stretching),



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- together with physical modalities, such as heat or ice.
- Splinting and/or orthoses
- Use of nonsteroidal anti-inflammatory drugs (NSAIDs), e.g., ibuprofen.
- Reduction in workload or increased rest.
- Stress management/behavioral intervention.
- Massage therapy methods may help reduce delayed onset muscle soreness, stiffness, fatigue, carpal tunnel syndrome and tissue fibrosis.

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