

## Chapter 1

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# Overview of Musculoskeletal Pain and Introduction to the Functional Medicine Matrix Model

### Introduction

Musculoskeletal disorders are extremely prevalent and represent a major cause of human suffering, healthcare expenses, and lost productivity, yet patients with these disorders face a series of difficult and often insurmountable obstacles to getting the relief they seek. Many standard medical interventions show high rates of inefficacy and iatrogenesis in addition to their high costs,<sup>1,2,3</sup> and pervasive deficiencies in musculoskeletal knowledge exist among healthcare providers<sup>4,5,6,7,8</sup> (with exceptions<sup>9</sup>). Further, many standard medical textbooks deprioritize nutritional and other nonsurgical and nonpharmacological interventions despite proof of efficacy shown in replicable, high-quality clinical trials published in top-tier medical journals. For example, many painful neuromusculoskeletal disorders can be alleviated and often effectively treated with nutritional interventions, but physicians trained only in standard medicine receive little to no training in nutrition and are therefore generally unable or unwilling to use these science-based interventions to help their patients.<sup>10</sup> In addition, despite the more than 800 articles documenting the role of nutritional interventions in the direct or adjunctive treatment of rheumatoid arthritis, the 17th edition of *The Merck Manual* published in 1999 reports that “food and diet quackery is common and should be discouraged.”<sup>11</sup>

Combined, these factors present a picture of a field of medicine that is clearly in need of a pervasive paradigm shift in both physician training and patient management in order to improve the effectiveness and cost-effectiveness of care.<sup>12</sup> Functional medicine provides this paradigm shift. By incorporating evidence-based medicine into a conceptual framework that facilitates pattern recognition, functional medicine allows the effective prevention and treatment of disease based on an appreciation of human physiology as a highly interconnected and interdependent biological system (rather than marginally related organ systems). The power of this approach is evident in research documenting tremendous reductions in disease severity, mortality, and healthcare expenses when patients are enrolled in integrative treatment protocols for various conditions; many examples of such research will be cited in this monograph. A description of functional medicine from The Institute for Functional Medicine (IFM) is provided in Table 1.1, while a more comprehensive explanation is provided in the *Textbook of Functional Medicine*.<sup>13</sup>

Since approximately 1 of every 7 (14% of total) visits to primary healthcare providers is for the treatment of musculoskeletal pain or dysfunction,<sup>14 15</sup> every healthcare provider needs to have: (1) knowledge of important concepts related to musculoskeletal medicine, (2) the ability to recognize urgent and emergency conditions, (3) the ability to competently perform orthopedic examination procedures and interpret laboratory assessments, and (4) the knowledge and ability to design and implement effective treatment plans and to coordinate patient management. Clinicians utilizing a functional medicine approach to patient care must be knowledgeable in the details of integrative physiology and nutritional biochemistry and must possess the clinical acumen necessary to ensure safe and

expedient patient care. These traits are of particular necessity when a serious condition is presented. Life-threatening and limb-threatening neuromusculoskeletal problems are notorious for presenting under the guise of an apparently benign complaint such as fatigue, headache, or simple joint pain.

**Table 1.1—Principles of Functional Medicine**

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**Functional medicine** is a science-based field of health care that is grounded in the following principles:

- **Biochemical individuality**, which describes the importance of individual variations in metabolic function that derive from genetic and environmental differences among individuals.
- **Patient-centered** medicine, which emphasizes *patient care* rather than *disease care*, following Sir William Osler’s admonition that “it is more important to know what patient has the disease than to know what disease the patient has.”
- **Dynamic balance** of internal and external factors.
- **Web-like interconnections** of physiological factors in the human body, which functions as an orchestrated network of interconnected systems, rather than individual systems functioning autonomously and without effect on each other. For example, we now know that immunologic dysfunctions can promote cardiovascular disease, that dietary imbalances can cause hormonal disturbances, and that environmental exposures can precipitate neurological syndromes such as Parkinson’s disease.
- **Health as a positive vitality**—not merely the absence of disease.
- **Promotion of organ reserve** as the means to enhance health span.

Functional medicine is grounded in scientific principles and information widely available in medicine today, combining research from various disciplines into highly detailed, yet clinically relevant models of disease pathogenesis and effective clinical management.

Source: <http://www.functionalmedicine.org/about/whatis.asp>

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The purpose of this monograph is to provide healthcare professionals with an overview of the functional medicine assessment and management strategies that are applicable to painful neuromusculoskeletal disorders, as well as an examination of the research that supports these strategies. Chapter 1 will review the state of the evidence and present the functional medicine teaching tools and clinical models that are based on that evidence. Chapter 2 will provide an overview of assessments and treatments used by functional medicine practitioners treating pain conditions; special attention will be given to the abundant research supporting interventions such as diet; fatty acid, vitamin, and mineral supplements; protein and amino acids; botanicals; and physical medicine. A practical clinical approach to 4 common conditions (migraine, low back pain, fibromyalgia, and rheumatoid arthritis) will follow in Chapters 3, 4, 5, and 6. Finally, Chapter 7 will provide clinical case reports that illustrate how this complex array of possible interventions is applied to the challenge of effectively identifying and treating patients in pain.

In recognition of the diversity of this document’s readership (inclusive of students, recent graduates, experienced professionals, academicians, and policy makers), this monograph on pain will necessarily review some basic concepts; however, this document alone cannot replace professional training in musculoskeletal medicine, nor does it include protocols for patient management and differential diagnosis for each of the neuromusculoskeletal problems seen in clinical practice. This text should be used in conjunction with the clinician’s previous professional training, other textbooks, and best judgment for the delivery of personalized care for each individual patient, including those who present with similar or identical diagnoses. Supportive texts include *Current Medical Diagnosis and Treatment* edited by Tierney et al,<sup>16</sup> *Orthopedic Physical Assessment* by Magee,<sup>17</sup> and *Integrative Orthopedics* and *Integrative Rheumatology* by Vasquez.<sup>18,19</sup> Further, clinicians can note that this monograph is written primarily for routine outpatient management of chronic pain conditions and not acute emergency department situations.

## Background

Historically, prevailing views of disorders of pain and inflammation were conceptually similar to those of most other diseases. Our clinical predecessors did the best they could to understand, describe, and treat the health problems that their patients presented, and the paradigm from which these clinical entities were viewed and addressed was shaped by the social, religious, and scientific views and limitations of their time. However, these premodern clinicians lacked a molecular and physiological understanding of disease origination, and they were restrained by metaphysical and simplistic models of cause and effect. The models they devised for the understanding and treatment of disease generally appear unsatisfactory today in light of the advances in our understanding of disparate yet interrelated fields such as psychoneuroimmunology, molecular biology, nutrigenomics, environmental medicine, and toxicology.

Despite these advances, we as a society and as healthcare providers still carry many of these previous conceptualizations and misconceptions with us. Though we feel that our views and interventions are much more precise and objective, the generalized and phenomenistic approaches that typified premodern medicine still permeate some aspects of clinical care today. For example, we still use the term *stroke* to describe acute cerebrovascular insufficiency, although the term originated from the view that affected patients had been “struck” by the gods or fates, perhaps as a form of punishment for some ethical or religious transgression. Even today, some patients and clinicians interpret health and disease as a form of punishment or as an extension of a spiritual or intrapersonal shortcoming. However, advancing science allows us to disassemble complex events that were previously experienced as *phenomena*, that is, as undecipherable and enigmatic events that overwhelmed comprehension.

Whereas the advancement of our scientific knowledge often leads us to discard previous models and interventions, occasionally modern science helps us to better understand previous interventions that may have been prematurely or unduly discarded. For example, Hippocrates’ admonition to “let thy food be thy medicine, and thy medicine be thy food” experienced decades of devaluation when dietary, nutritional, and other natural interventions were misbranded as quackery. On the contrary, simple, natural interventions such as therapeutic fasting and augmentation of vitamin D3 status (via nutritional supplementation or exposure to ultraviolet-B radiation) have shown remarkable safety and efficacy in the mitigation of chronic hypertension, musculoskeletal pain, and autoimmunity.<sup>20,21,22,23,24,25,26</sup> Furthermore, the appropriate use of vitamin supplements helps prevent chronic disease by numerous mechanisms including modulation of gene transcription, enhancement of DNA repair and stability, and enhancement of metabolic efficiency.<sup>27,28,29</sup>

## State of the Evidence

This monograph will provide a representative survey of current research in the use of dietary, nutritional, and integrative therapeutics commonly utilized in the clinical management of disorders characterized by pain and inflammation. A “blanket statement” to cover all the different assessments and interventions described herein would be necessarily inaccurate, and therefore, each intervention will be considered on the merits of its own rationale, safety, effectiveness, and cost-effectiveness. These considerations must ultimately be viewed within the context of the individual patient’s condition and the overall cohesion and comprehensiveness of the treatment plan.

While all clinicians can appreciate the importance of protocols and clinical practice guidelines, we must also perpetually stress the importance of tailoring treatment to the patient’s unique combination of biochemical individuality, comorbid conditions, drug use, personal goals, and willingness to participate in a health-promoting lifestyle. Standardized protocols and practice guidelines are founded on the fallacy of disease homogeneity and the irrelevance of physiological, psychosocial, and biochemical individuality. As the advancement of biomedical science provides the means for and underscores the importance of customized treatments for each patient, so too has the standard of care begun to shift in the direction of patient individuality. Failure to utilize nutritional interventions