

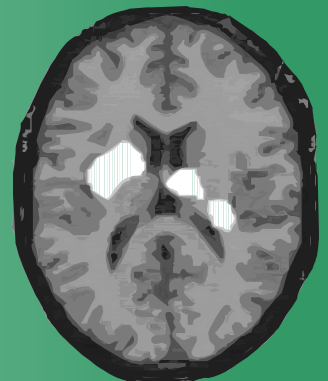
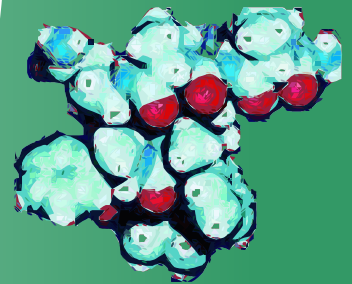
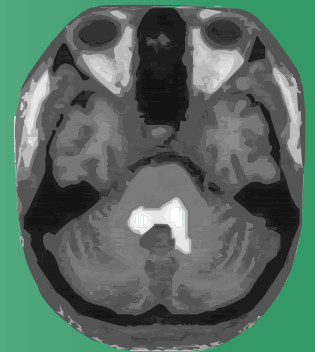
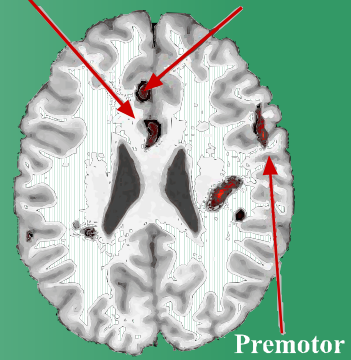
Fibromyalgia Syndrome:

A Clinical Case Definition and Guidelines for Medical Practitioners

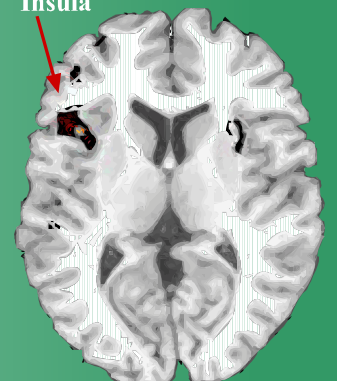
An Overview of the Canadian Consensus Document

Bruce M. Carruthers
Marjorie I. van de Sande

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**Fibromyalgia Syndrome:
A Clinical Case Definition and Guidelines for Medical Practitioners
An Overview of the Canadian Consensus Document**

**Bruce M. Carruthers, M.D., C.M., FRCP(C)
Marjorie I. van de Sande, B. Ed., Grad. Dip. Ed.**

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Cover design by Robert J. van de Sande.

Pictures on cover (top to bottom): 1. fMRI indicates a greater number and extent of pain relevant brain regions in response to painful stimuli and represent some but not all regions of pain relevant activity. 2. SPECT scan indicates significant reduced regional cerebral blood flow (rCBF) in the pontine tegmental. This reduced rCBF suggests less nerve cell activity, an objective neurological abnormality. 3. Substance P molecule 4. SPECT scan indicates significant hypoperfusion (denoted by lighter shading) of rCBF in the right thalamic region of the brain. The subject's right is the reader's left. 5. fMRI indicates greater activity in the contralateral anterior insular cortex in response to painful stimuli. (Note: It is unclear at this time whether the responses indicated in 1 and 5 are specific to FMS patients or apply in general to painful conditions.)

This booklet is an overview of

**Fibromyalgia Syndrome: Canadian Clinical Working Case Definition,
Diagnostic and Treatment Protocols - A Consensus Document**

Anil Kumar Jain, Bruce M. Carruthers, Co-Editors. Marjorie I. van de Sande, Stephen R. Barron, C.C. Stuart Donaldson, James V. Dunne, Emerson Gingrich, Dan S. Heffez, Frances Y-K Leung, Daniel G. Malone, Thomas J. Romano, I. Jon Russell, David Saul, Donald G. Seibel.

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DEVELOPMENT OF THE CANADIAN CONSENSUS DOCUMENT FOR FMS

The National ME/FM Action Network of Canada spearheaded the drive for the development of an expert consensus document for Fibromyalgia Syndrome (FMS). In response to increasing numbers of patients inquiring about doctors knowledgeable concerning FMS, the Network sent a questionnaire to doctors across Canada asking what items would be most helpful in assisting them with their FMS patients. The physicians concurred that a clinical definition, and diagnostic and treatment protocols, were of prime importance.

The National ME/FM Action Network then approached two clinicians knowledgeable about FMS and experienced in its diagnosis and treatment. Dr. Bruce Carruthers of British Columbia and Dr. Anil Jain of Ontario kindly agreed to co-author a draft document. Lydia Neilson, President of the National ME/FM Action Network, met with the Honourable Alan Rock, then Minister of Health, to discuss the results of the doctors' survey and the draft document. The Honourable Alan Rock responded by stating the draft clinical definition was "a milestone in the fight against this complex and tragic condition".

Health Canada established the "Terms of Reference". One stipulation was that at least one member of the panel had to be nominated by each of the five stakeholder groups of government, universities, clinicians, industry, and advocacy. There were to be at least ten members on the panel, four of whom could come from outside of Canada. Panel members had to be practicing MDs actively treating and/or diagnosing FMS, or MDs or Ph Ds involved in clinical research of the illness. Their mandate was to develop a clinical definition that addressed a broader

spectrum of the pathogenesis of the illness, as well as to provide diagnostic and treatment protocols for medical practitioners. The members of the panel would have autonomy over their consensus document.

Health Canada selected an Expert Consensus Panel for FMS. The thirteen-member Expert Consensus Panel received more than forty nominations, including numerous nominations from each stakeholder group. The members of the Consensus Panel represented clinicians, university medical faculty, and researchers in the area of FMS. Collectively, the members of the panel had diagnosed and/or treated more than twenty thousand FMS patients.

Health Canada planned for a Consensus Workshop to be held on March 30 to April 1, 2001. Crystaal (Biovail Pharmaceuticals) funded the workshop without having any involvement with or influence over the Consensus Document. They hired Science and Medicine Canada to organize and facilitate the workshop.

The draft document went through three rounds of revisions prior to the Consensus Workshop where the document received consensus, in principle, with directives for various members to revise some sections. The document was compiled by Marjorie van de Sande and the revised document was sent to the panel. There was 100% consensus by the panel members on the final Consensus Document. The Consensus Document has become known as the "Canadian Consensus Document for FMS".

Importance of a Clinical Definition

The Greek origin of syndrome is *syn-* together, and *-drome* - a track for running. One must determine the tracks of travel and observe the travel of a patient's syndrome components. Because research definitions define a static collection of symptom entities, they have ignored or downplayed the critical dynamic features of this syndrome, as lived by patients. The normal pain/fatigue pattern directly related to felt causal action and adjusted in activity/rest rhythms is broken in FMS. The breakdown in the activity/rest rhythm pattern results in cumulative pain and physical and cognitive fatigue. It is important for the clinician to observe the dynamics of the whole cluster of symptoms in their interaction, additive effects, and the disruption to patients' lives over periods of time.

INTRODUCTION

In response to the demand for a clinical definition of fibromyalgia syndrome (FMS), the Expert Consensus Panel, selected by Health Canada, established clinical criteria that encompass the potential pathophysiological dysfunctions, and developed an integrative approach to the diagnosis and treatment of FMS¹.

Classification

The prominent feature of FMS is chronic, widespread musculoskeletal pain, but it is usually accompanied by numerous other multi-systemic dysfunctions. **Fibro** refers to the fibrous tissue, **myo** refers to the muscles and **algia** refers to pain. Fibromyalgia is assigned number M79.0 and is classified as non-articular rheumatism in the World Health Organization's International Classification of Diseases (ICD). FMS is in the "generalized" category of the

large group of *soft-tissue pain syndromes*, implying that a systemic process involves the musculoskeletal system globally. Compelling evidence of physiological and biochemical abnormalities identifies FMS as a distinct pathophysiological clinical disorder.

Etiology

Before the onset of FMS, most patients enjoyed an active, healthy lifestyle. There is consistent documentation that a physical trauma, particularly a whiplash or spinal injury, can trigger FMS in some patients. Other associated physical traumas include surgery, repetitive strain, childbirth, viral infections and chemical exposures. A genetic predisposition may be suggested in cases where more than one separated family member is afflicted. Some cases of FMS have a gradual onset with no obvious cause.

EPIDEMIOLOGY

Prevalence

Epidemiological studies indicate between 2 and 10 percent of the general population, or between 600,000 and 3 million Canadians, have FMS. It is two to five times more prevalent than rheumatoid arthritis. A Canadian study² suggests that 3.3% or one million of non-institutionalized adult Canadians have FMS. A prevalence study³ of randomly selected school-aged children suggests that 6.2% meet the criteria for FMS. It affects all age groups, including children, all racial/ethnic groups, and all socioeconomic strata. There is a higher prevalence in females. The generally more flexible, delicate skeletons, less massive muscles, and narrower spinal canals of females may make them more prone to neck and spinal injuries. A whiplash injury study suggests those with persistent symptoms have a significantly narrower cervical spinal canal (particularly females)⁴. Females produce more neurotransmitters that increase pain signals and

fewer neurotransmitters that decrease pain signals than males. A PET study suggests that when endogenous tryptophan is depleted, there is only a 7-fold drop in the synthesis of serotonin in males but there is a dramatic 42-fold drop in the synthesis of serotonin in females⁵. Both the direction and magnitude of the brain's response to pain differs in males and females, with females being more sensitive to pain⁶.

Natural Course

An eight-year multi-centre study suggests that generally once FMS has been established, patients do not improve symptomatically and there is a slight worsening of functional disability⁷. A 15 year study⁸ indicates that all patients in the study still have FMS but there is some variation in symptom severity. Individual prognosis must remain a clinical estimate because the prognosis for an individual patient cannot be predicted accurately with certainty.

DIAGNOSTIC GUIDELINES

The Expert Consensus Panel adopted the 1990 American College of Rheumatology criteria, which have good sensitivity and specificity, and also included a broader

spectrum of the potential symptomatic expressions of FMS to form a clinical working case definition.

CANADIAN CLINICAL WORKING CASE DEFINITION OF FMS

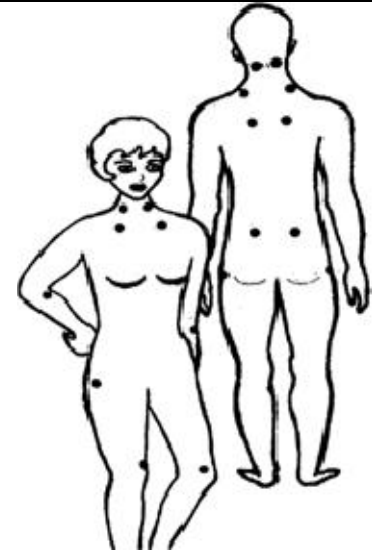
The two compulsory pain criteria (adopted from the American College of Rheumatology 1990 Criteria^{*9}) are merged with Additional Clinical Symptoms and Signs to expand the classification of FMS into a Clinical Working Case Definition of FMS.

___ **1. Compulsory HISTORY of widespread pain.** Pain is considered widespread when all of the following are present for at least three months:

- ___ pain in both sides of the body
- ___ pain above and below the waist (including low back pain)
- ___ axial skeletal pain (cervical spine, anterior chest, thoracic spine or low back). Shoulder and buttock involvement counts for either side of the body. "Low back" is lower segment.

___ **2. Compulsory PAIN ON PALPATION at 11 or more of the following 18 tender point sites:**

- ___ **Occiput (2):** at the suboccipital muscle insertions
- ___ **Low cervical (2):** at the anterior aspects of the intertransverse spaces (the spaces between the transverse processes) at C5 – C7
- ___ **Trapezius (2):** at the midpoint of the upper border
- ___ **Supraspinatus (2):** at origins, above the scapular spine near its medial border
- ___ **Second rib (2):** just lateral to the second costochondral junctions, on the upper rib surfaces
- ___ **Lateral epicondyle (2):** 2 cm distal to the epicondyles (in the brachioradialis muscle)
- ___ **Gluteal (2):** in upper outer quadrants of buttocks in the anterior fold of muscle
- ___ **Greater trochanter (2):** posterior to the trochanteric prominence
- ___ **Knee (2):** at medial fat pad proximal to the joint line



FMS Tender Points (TrPs)

___ **3. Additional Clinical Symptoms and Signs:** In addition to the compulsory pain and tenderness required for research classification of FMS, many additional clinical symptoms and signs can contribute importantly to the patients' burden of illness. Two or more of these symptoms are present in most FMS patients by the time they seek medical attention. On the other hand, it is uncommon for any individual FMS patient to have all of the associated symptoms or signs. As a result, the clinical presentation of FMS may vary somewhat, and the patterns of involvement may eventually lead to the recognition of FMS clinical subgroups. These additional clinical symptoms and signs are not required for research classification of FMS but they are still clinically important. For these reasons, the following clinical symptoms and signs are itemized and described in an attempt to expand the compulsory pain criteria into a Clinical Case Definition of FMS:

- ___ **Neurological manifestations:** Neurological difficulties are often present such as hypertonic and hypotonic muscles; musculoskeletal asymmetry and dysfunction involving muscles, ligaments and joints; atypical patterns of numbness and tingling; abnormal muscle twitch response, muscle cramps, muscle weakness, and fasciculations. Headaches, temporomandibular joint disorder, generalized weakness, perceptual disturbances, spatial instability, and sensory overload phenomena often occur.
- ___ **Neurocognitive manifestations:** Neurocognitive difficulties usually are present. These include impaired concentration and short-term memory consolidation, impaired speed of performance, inability to multi-task, easy distractibility, and/or cognitive overload.
- ___ **Fatigue:** There is persistent and reactive fatigue accompanied by reduced physical and mental stamina, which often interferes with a patient's ability to exercise.
- ___ **Sleep disturbance:** Most FMS patients experience nonrefreshing sleep. This is usually accompanied by sleep disturbances including insomnia, frequent nocturnal awakenings, nocturnal myoclonus, and/or restless leg syndrome.

* Compulsory ACR criteria reprinted with permission of John Wiley & Sons, Inc. See reference 9.

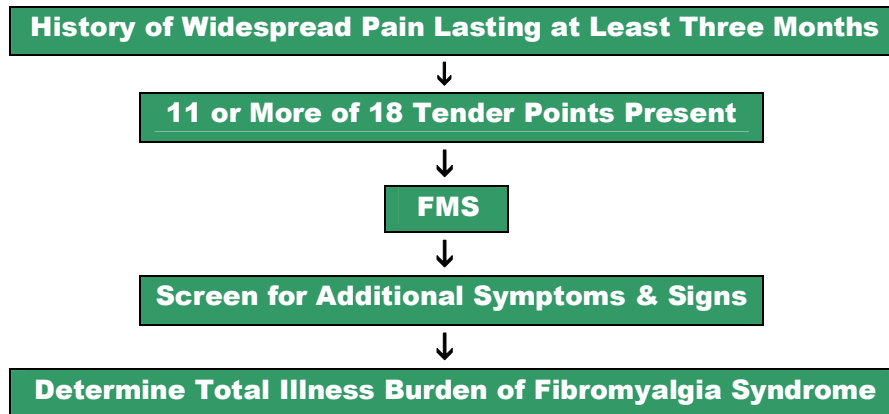
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- **Autonomic and/or neuroendocrine manifestations:** These manifestations include cardiac arrhythmias, neurally mediated hypotension, vertigo, vasomotor instability, sicca syndrome, temperature instability, hot/cold intolerance, respiratory disturbances, intestinal and bladder motility disturbances with or without irritable bowel or bladder dysfunction, dysmenorrhea, loss of adaptability and tolerance for stress, emotional flattening, lability, and/or reactive depression.
- **Stiffness:** Generalized or even regional stiffness that is most severe upon awakening and typically lasts for hours usually occurs, as in active rheumatoid arthritis. Stiffness can return during periods of inactivity during the day.

Jain AK, Carruthers BM, co-editors; van de Sande MI, et al. Fibromyalgia Syndrome: Canadian Clinical Case Definition, diagnostic and treatment protocols – A Consensus Document. *Journal of Musculoskeletal Pain* 11(4):3-107, 2003. Co-published simultaneously in "The Fibromyalgia Syndrome: A Clinical Case Definition for Practitioners". © Copyright 2004 Haworth Press. Available at Document Delivery Service: 1-800-722-58-57 docdelivery@haworthpress.com <http://www.HaworthPress.com> Reprinted with permission.

Application Notes

- **Digital palpation** examination is performed with an approximate force of 4 kg/1.4 cm² (standardize on a weight scale), which will partially blanch the blood from under the thumbnail. The patient must state that the palpation was painful to be considered "positive". "Tender" is not considered "painful".
- **Validity** of the two compulsory pain criteria for the purposes of research study yielded 88.4% sensitivity and 81.1% specificity.
- **Focus of the clinical definition:** The following hourglass diagram indicates the steps in first narrowing the compulsory criteria to establish FMS and then expanding the spectrum of symptoms and signs and the distress they can cause to establish the total illness burden.



General Considerations in Applying the Clinical Case Definition

- **Determine the patient's total illness burden** by assessing all of the patient's symptoms and their impact on the patient's lifestyle demands, occupations, etc.
- **Coherence of symptoms:** Symptoms should fit a pattern that is identifiable as FMS.
- **Identify secondary symptoms and aggravators.** Symptom dynamics and interactions and the effects of aggravators should be noted.
- **Quantify the severity of major symptoms, and their impact on lifestyle.** When the symptom severity and severity hierarchy profile chart is completed every six months or so, it will help orient treatment, assess its effectiveness, and assist in assessing prognosis and disability. Impact on lifestyle should be compared to the patient's pre-morbid health and activity level.

Symptoms and Signs

1. Pain and Neurological Manifestations

A comprehensive biological model suggesting dysregulation among the central nervous system (CNS), autonomic nervous system (ANS), and

body organs systems is emerging. **Functional Imaging** studies support the theory that many signs and symptoms of FMS originate from dysfunction of the CNS and altered processing of

sensory input¹⁰. Indications of thalamic¹¹ and caudate hypoperfusion in SPECT scan analysis¹² of FMS patients are further supported by similar findings using PET scans in chronic neuropathic pain states¹³. However, a study¹¹ aligning a MRI scan, to enable precise anatomic localization, over a SPECT scan showed a reduction of regional cerebral blood flow (rCBF) within the pontine tegmentum. This finding suggests reduced nerve cell activity, an objective neurological abnormality. The precise location of this deficit previously was not known to be part of a well-known system in the brain stem that modulates pain signals traveling up the spinal cord, through the brain stem to the higher centers of the brain. PET scan analysis of skeletal muscle in the paralumbar spine suggests a significantly lower metabolic rate of glucose utilization, an increased glucose backflow from tissue into the vascular space, and a markedly reduced rate of phosphorylation in FMS patients¹⁴. A fMRI study identified consistent involvement of the thalamus, caudate nuclei, sensory cortex, prefrontal cortex, occiput and cerebellum in response to painless and painful stimuli¹⁵. Another fMRI study¹⁶ indicated that the FMS group exhibited significantly greater activity in the prefrontal, supplemental motor, insular and anterior cingulate cortices in response to nonpainful, warm stimuli and greater activity in the contralateral insular cortex in response to painful stimuli. There was also greater activity in prefrontal, supplemental motor, insular, and anterior cingulate cortices in response to nonpainful, warm stimuli. MRIs indicated that a subset of patients diagnosed with FMS had cervical stenosis¹⁷. A qEEG spectral assessment¹⁸ suggests FMS patients with the least psychological distress and experienced pain had the greatest Alpha power and relatively little Theta. Those with the greatest psychological distress and experienced pain had the greatest Theta power and relatively little Alpha. Decreased delta activity in both patient groups may be associated with reduced deep restorative sleep and thus can distinguish FMS from myofascial pain syndrome (MPS)¹⁸.

Chronic generalized pain may be primarily a central nervous system phenomenon, an abnormality in the brain's sensory perception and processing of pain, even though the onset may be related to a peripheral event. Neurochemical factors may play an important role in the amplification and distortion of pain signals in the

nociceptive process. A PET study indicated that when endogenous tryptophan was depleted, the drop in the synthesis of serotonin was 7-fold in males and a dramatic 42-fold in females⁵. The combination of elevated levels of some pro-nociceptive agents (amplifying pain signals), such as findings of an approximate three-fold elevation of substance P (SP) in the cerebral spinal fluid (CSF)¹⁹, and deficiencies in some anti-nociceptive agents (suppressing signal transmission of noxious stimuli), such as free plasma tryptophan, allow elevated levels of pain signals to be sent to and from the brain and body. This theory is supported by the inverse correlation of elevated levels of CSF SP, which lowers the threshold of synaptic excitability resulting in increased pain signals and sensitization and functions in both the central and peripheral nervous systems, and hypoperfusion of the thalamic and caudate nuclei^{12,20}, which are involved with processing nociceptive stimuli. Elevated levels of nerve growth factor in the CSF, which may be associated with the growth of SP-containing neurons and involved in neuroplasticity, have been found in patients with primary FMS but not in those with associated pain conditions²¹. Zinc and/or magnesium deficiency may influence increased excitability of N-methyl-D-aspartate (NMDA) receptors²². In animal experiments on constricted or injured spinal cords, there was increased production of dynorphin A.

The pain of FMS may be described as burning, searing, sharp, shooting, stabbing, throbbing, deep aching, tingling, feeling bruised all over, aching in bones, exhausting, etc. or any combination of these. Pain and fatigue may be induced by exercise and there is a slow recovery period. Myofascial trigger points are commonly found in FMS patients and myofascial pain syndrome (MPS) should be considered a concomitant diagnosis.

a. Characteristics of FMS Pain

- **Allodynia** is a reduced pain threshold from a stimulus which would not normally be painful.
- **Hyperalgesia** is an abnormally high sensitivity and perceived greater intensity of pain to a stimulus that would be expected to produce some pain.
- **Persistent pain:** The duration of pain from a stimulus is longer than would be expected.
- **Pronounced summation effect and after-reaction** to a painful stimulus often

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occurs.

- **Hyperalgesia in skin:** Affected dermatomes produce more pain when a pin is drawn across the skin.
- **Tenderness:** Pain that does not radiate to a distant site may be experienced on palpation of tender points and is independent of widespread pain. Tender points are generally where ligaments, tendons, and muscles attach to the bone.

Muscles, ligaments, tendons, fascia, and the periosteum are sensitive to pain. Injuries to ligaments, such as a whiplash injury, can over-stretch and fray their cable-like structure. Ligaments are difficult to heal because they have a poor blood supply, particularly where they attach to the bone. Lax ligaments allow the joint to move beyond its normal range of motion, which compresses or irritates sensory nerves, and causes pain, numbness and/or tingling. The muscles around the joint tend to react to these pain signals by contracting and becoming chronically taut in their attempts to stabilize the joint and prevent further damage.

b. Other Features of FMS Pain

- **Widespread pain:** Pain that is felt bilaterally, as well as above and below the waist, is considered widespread. A soft tissue injury, such as a whiplash injury, may initiate local or regional pain that over the course of months becomes generalized, widespread pain with positive tender points. This suggests that FMS involves abnormalities in the pain processing interaction between the peripheral and CNS.
- **Non-anatomical distribution:** Global or regional non-anatomical pain may occur unexpectedly, fluctuate, and is often migratory.
- **Delay in onset after prodromal injury or event**
- **Diffuse arthralgia:** The pain in joints occurs without redness and swelling of the joints, which differentiates it from rheumatoid arthritis (RA).
- **Shortness of breath, and atypical chest pain resembling angina**
- **Low back pain** may be accompanied by shooting, sciatica-like leg pain. Concomitant piriformis pain and compression of the sciatic nerve may

occur.

- **Leg cramps** occur in approximately 40% of patients²³.
- **Generalized stiffness:** Studies suggest that morning stiffness of more than 15 minutes duration occurs in 79%²⁴ to 83%²⁵ of patients. Stiffness can reoccur during the day, usually after periods of non-activity.
- **Chronic headache:** Approximately 50-60%^{24,25} of patients experience severe tension headaches involving cervical and shoulder girdle muscle contraction. Migraine-like headaches may occur and may be preceded by visual disturbances.
- **Temporomandibular joint disorder** is common and is usually caused by chronic contraction of the muscles involved in the joint movement in FMS patients.

c. Other neurological manifestations

Mismanagement of sensory information may be due to dysfunction of neurotransmitters/receptors and abnormal gating (the process whereby the prefrontal cortex assigns relative importance to sensory input) resulting in dysregulation of the signal to noise ratio²⁶. This dysregulation may result in a lower tolerance of noxious stimuli.

- **Hypersensitivity to vibration**
- **Positive Romberg test**
- **Abnormal tandem gait and interference aggravation.** Even when tandem gait and serial 7 subtraction test results are normal when done independently, many patients have difficulty or are unable to do them concurrently.
- **Abnormal twitch response associated with myofascial pain syndrome.**
- **Muscle and/or generalized weakness and fasciculations**
- **Dysesthesia:** Atypical patterns of numbness (approximately 65%²⁴) and tingling often occur in the feet and hands and may be accompanied by swelling. Patients may undergo unsuccessful surgery for carpal tunnel syndrome. Therefore, such surgery should not be done unless there is confirmed median nerve injury and thenar wasting or weakness of opponens strength.
- **Perceptual disturbances, and temporal and spatial instability:** Difficulty with visual accommodation and

focusing, loss of depth perception, and an inability to distinguish figure/ground may result in the patient appearing clumsy and an inability to accommodate walking on uneven surfaces. Temporal instability may result in difficulty in sequencing actions.

- **Overload phenomena:** Patients may be hypersensitive to noise, light, odours, speed and to mixed sensory modalities. Cognitive, motor, perceptual, and emotional overload causes a worsening of other symptoms and may result in patients becoming temporarily immobilized.
- **Cervical cord compression myelopathy** may produce local dysfunction at the implicated cervical roots and abnormal long tract signs. A thorough neurological investigation including MRI of the foramen magnum and cervical spine should be done on patients with abnormal neurological presentations. Early diagnosis and treatment of spinal stenosis give better results.

2. Neurocognitive Dysfunction

Slowed processing of information may be related to sleep dysfunction, chronic pain, headaches and cognitive fatigue²⁷. A dysfunction of the prefrontal cortex, which helps regulate the hippocampus in its production of new memories, may result in a failure to integrate information, or misinterpret information as being novel because the cognitive context is absent or unavailable²⁸. Dysfunction of REM sleep and hippocampal neural firing during slow wave sleep may play a role in difficulties in concentration and attention, and ease of distraction resulting in poor initial learning and memory consolidation²⁹. Concentration difficulties may also be related to hypoactivity of the frontal lobes when awake³⁰.

Patients who also meet the criteria of myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS) generally have more severe neurocognitive problems. Symptoms vary but often reflect slowed cognitive functioning related to cognitive fatigue. "Fibro fog" is a term often used to refer to the confusion, forgetfulness, and difficulties with concentration, word retrieval and speaking, short-term memory consolidation, and susceptibility to interference that FMS patients often experience. Physical and cognitive overload and/or fatigue may lead to a worsening of other symptoms.

3. Fatigue

An abnormal sympathetic/parasympathetic ratio in nocturnal heart rate variability at the cardiac sinus node may be involved in morning fatigue³¹. A controlled study using PET, ligand=18F-Fluorodeoxyglucose³² indicated that FMS patients showed a significantly lower rate of skeletal muscle glucose utilization, increased glucose backflow from tissue in the vascular space, and a marked reduction of the rate of phosphorylation, which may contribute to muscular fatigue because muscles require a steady rate of glucose.

Patients generally awaken feeling more exhausted than when they went to bed. Post-exertional fatigue, weakness, increased pain and stiffness, and worsening of other symptoms are typical. Onset may be immediate or delayed and recovery time is abnormally long. Fatigue may also appear unexpectedly or inappropriately, and may be migratory in nature. The fatigue and muscle exhaustion and/or weakness may be overwhelming, but is generally less severe than that experienced in ME/CFS. The pathological components of fatigue should be identified in order to provide appropriate treatment³³. Most FMS patients experience muscular fatigue associated with paretic or spastic muscle dysfunction generated by movement and relieved by moderately long rest. Structural fatigue is generated by failure of the supportive structure to withstand pressure/load due to abnormalities of the skeleton, particularly in the joints or discs. Arousal fatigue, due to poor sleep quality and quantity, often occurs. Oxygenation fatigue is caused by insufficient oxygen being delivered to the brain and tissues. Muscle contractures of the chest wall may cause alveolar hypoventilation. In metabolic fatigue, the cells are unable to transform substrates of energy into useful functions and the metabolic abnormality must be corrected.

4. Sleep Dysfunction

Polysomnographic electroencephalography (EEG) recordings indicate that FMS patients do not spend adequate time in the deep restorative delta wave stages 3 and 4 non-REM sleep, and there is intrusion of rapid alpha waves³⁴. Sleep disturbance may play an important role in the genesis of painful tender points (Te Ps) because a research study³⁵ indicated that healthy people who were deprived of stage 4 sleep by auditory stimuli exhibit painful Te Ps. Thus, it is important to identify patients who need to adjust their sleep

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schedule in order for them to receive adequate sleep from those who have pathological sleep disorders before diagnosing them with FMS. A diminished 24-hour heart rate variability may be involved with sleep disturbances³¹. A polysomnographic study indicated that FM patients had a drop in overnight oxygen saturation of hemoglobin in arterial blood³⁶.

Pathogenic sleep dysfunctions including sleep onset difficulties, fragmented sleep, nocturnal vigilance, non-restorative sleep, morning exhaustion, and abnormal diurnal variation of sleep rhythms and energy levels are common. Studies suggest that approximately 50%³⁷ of FMS patients have nocturnal myoclonus, which may be related to an autonomic disturbance of the sympathetic nervous system, and approximately 30%²³ have restless leg syndrome. Treatable sleep disorders including obstructive and central sleep apnea and upper air-way resistance syndrome should be considered and tested for as indicated.

5. Autonomic Dysfunctions

Research evidence³¹ suggests autonomic nervous system (ANS) abnormalities and a general disturbance of internal homeostasis. Abnormal autonomic response to postural orthostatic stress is common. All of the 18 FMS patients who were able to tolerate a 70° tilt for 10 minutes experienced worsening of widespread pain as opposed to none of the controls³⁸. Low resting blood volume, decreased venous return of blood, and/or disturbances of cerebral blood flow may be involved. Heart abnormalities are suggested by increased sympathetic and decreased parasympathetic basal tones identified by electrocardiograms³¹ and failure of the normal marked decrease in their ratio at night. FMS patients have exhibited morphological abnormalities³⁹. Changes in shape and loss of flexibility of red blood cells may reduce the rate of blood flow, and oxygen and nutrient delivery into the tissues and inhibit the ability to dispose of metabolic waste⁴⁰.

- **Neurally mediated hypotension (NMH), dizziness, and vertigo:** Symptoms of NMH occur upon rising from a prone or sitting position, or standing, and include light-headedness, cognitive difficulties, blurred vision, severe fatigue, pallor, tremulousness, and syncope. A transient sense of imbalance, dizziness and lightheadedness associated with neck extension or rotation may be caused by a

transient contact of the cord with the bony spinal canal. Infrequently, incapacitating vertigo may occur with the symptoms of the room spinning, dizziness, nausea, vomiting, and often nystagmus and tinnitus. Patients, who have had head trauma, often have impaired hearing acuity.

- **Loss of thermostatic and vasomotor stability:** Body temperature may be subnormal and vasomotor instability often has an unusual distribution. Neuropathic pain may be associated with vasoconstriction and result in part of the body becoming colder. Painful movements may be followed by excessive sweating, and chilling may precipitate pain. The pilomotor reflex may be hyperactive and may occur when pressure is applied to a tender point.
- **Neurogenic or trophic edema,** particularly of the feet and hands, is common. Peau d'orange effect may occur on skin over muscles positive for MPS, whereas non-pitting trophic edema triggered by the end of a matchstick leaves a clear indentation for minutes. Loss of dermal hair and other trophic changes may occur.
- **Sicca syndrome:** Approximate 30% of patients have sicca symptoms of dry eyes and mouth.
- **Respiratory and cardiac irregularities:** Breathing dysregulation may occur; chest wall pain and contractures of chest muscles may contribute to alveolar hypoventilation. Patients may experience regulation abnormalities of heart rate and/or cardiac arrhythmias.
- **Intestinal irregularities and bladder dysfunction** is common. IBS, occurring in approximately 40% of FMS patients, may be associated with substance P and serotonin involvement in motility or L4-S1 disc disease or spinal stenosis. Bladder dysfunction may be associated with allodynia and pain sensitivity.

6. Neuroendocrine Dysfunctions

Research suggests neuroendocrine function disturbances in subsets of FMS patients. Dysregulation of the hypothalamic-pituitary-adrenal (HPA) axis⁴¹ may be involved in diurnal rhythm abnormalities with mild hypocortisolemia and blunted response to physiological stress. Elevated production of prolactin and deficiencies in the production of thyroid stimulating hormone, tetraiodothyronine (T4), and triiodothyronine (T3) in response to the administration of thyrotropin-releasing hormone suggest a

disturbance in the hypothalamic-pituitary-thyroid (HPT) axis⁴². Hypothyroidism is 3-12 times more common in FMS than in controls²⁴. Disturbance of the hypothalamic-pituitary-growth hormone (HPGH) axis may play a role in a deficiency of insulin-like growth factor-1 in FMS patients⁴³. Involvement of the hypothalamic-pituitary-gonadal (HPG) axis may be involved with dysmenorrhea and postmenopausal women often being more symptomatic than premenopausal women⁴⁴. Significantly lower levels of total serum and free serum calcium⁴² and elevated levels of hair calcium and magnesium⁴⁵ suggest a general calcium and magnesium deficiency.

- Hypothalamic/pituitary/adrenal axis and ANS dysregulation may lessen patients' adaptability to stressful and overload situations causing disorientation, anxiety, and worsening of other symptoms.
- Marked weight change is common and may be due hypothyroidism, medication, and/or inactivity.
- Dysmenorrhea often occurs.

7. Stiffness

The cause of morning stiffness that appears without apparent inflammation has yet to be determined. A study on rheumatoid arthritis (RA)⁴⁶ suggests that elevated levels of hyaluronic acid (HA) may correlate with morning stiffness. HA has been found to be dramatically elevated in FMS patients – even higher than found in RA⁴⁷. Co-activation of agonist and antagonist muscles by centrally mediated mechanisms may also be involved in muscle stiffness⁴⁸.

FMS patients usually experience morning stiffness and limited movement that lasts more than 15 minutes. Many patients have to adjust their morning schedule to accommodate their limited movement. Stiffness may reappear during the day, often after periods of inactivity. Morning stiffness is usually more severe on the day following strenuous or extended physical activity.

8. Other Associated Signs

Dysfunction involving muscles, ligaments, and joints can result in musculoskeletal changes associated with pain^{49,50,51}. Patterns of imbalance and other signs usually develop over months or years and are helpful in the clinical assessment.

- **Muscle shortening:** In the neuromuscular dysfunction phase (early phase) of injury, electromyography shows continuous non-voluntary motor activity, which can cause increased muscle tension and spasm. In the

dystrophic phase (later phase) of injury, electromyography indicates non-action potentials in localized bands of spontaneous muscle shortening or contractures. Palpation may reveal ropey or fibrotic bands within groups of muscles. Taut muscles appear weak but are dysfunctional and cause limited range of motion and enthesopathy.

- **Head and neck too far forward posture** is associated with shortening of the sub-occipital extensors and extension of the occipital atlantal joints, which may result in impingement on the vertebral arteries and dural tube.
- **Postural and muscular imbalance patterns and signs of the upper body** include shoulders elevated and adducted forward, internal rotation of the shoulder girdle, and altered angle of and unstable glenoid fossa, with the result that no muscles have the proper pull angle to support the shoulder actions. There may be a domino effect of the altered axis of the glenohumeral joint overstressing the shoulder joint, which overstresses the cervico-cranial junction, and C4/C5 and T4 segments. The taut muscles and abnormal joint movement results in restriction of the joint capsule and reduction of body strength. The length of time a patient can hold his/her arm at a 90° angle from the shoulder predicts the patient's upper body functional strength. (Four minutes indicates 40% of normal upper body strength.)
- **Lateral view postural and muscular imbalance patterns and signs** may show increased lateral and lumbar lordosis, and thoracic kyphosis with a forward pelvic tilt.
- **Posterior view postural and muscular imbalance patterns and signs** may show that the iliac crest is superior and posterior on the side that the shoulder is lower. Kemps and Trendelenburg's tests may be positive indicating sacral-iliac joint fixation. Scapulae may be protracted with one side inferior.
- **Anterior view postural and muscular imbalance patterns and signs** may show that one shoulder is inferior on the same side that the iliac crest is superior. The right first rib and the left clavicle may be superior. C1 and T12 are often subluxed to the same side of the superior iliac crest, and C2 is subluxed in the opposite direction. Taut pectoral muscles may inhibit upper chest breathing and overload accessory respiratory muscles; lower rib cage inhibition may cause poor

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diaphragmatic breathing.

- **Major muscular imbalance patterns of the lower body** may include shortening of the quadriceps muscles causing pain and decreased flexion of the knee, taut hip flexors causing decreased extension of the hips and a forward pelvic tilt causing stress to the lumbar spine (particularly L5/S1), hips and by compensation the T12/L1 junction. Hip flexors, lumbar erector spinae, hamstrings, triceps, surae and adductors are often taut while the gluteal and abdominal muscles are usually inhibited and weak.
- **Functional Short Leg**, caused by spasm and/or contractures of the iliopsoas, quadratus lumborum, latissimus dorsi and incompetence of the sacroiliac segments, is common.
- **Scoliosis** with convexity of the lumbar spine towards the side of the functional short leg and convexity of the thoracic spine in the opposite direction may be present.

imbalance usually develops over time, sometimes years.

Features of FMS in Young People

The severity of numerous symptoms may be similar but the hierarchy of symptom severity tends to differ more dramatically from day to day, and even hour to hour, than in adults. Pain, fatigue, and cognitive difficulties make school very challenging. A supportive letter from the treating physician to the school outlining the patient's medical condition and limitations is helpful. Open communication and feedback among the physician, parents, and school is essential so that strategies can be assessed and adjusted. An informative resource book for teachers and parents, which explains symptoms in young people and provides strategies for educational accommodations and planning is, *TEACH-ME: A Sourcebook for Teachers of Young People with Myalgic Encephalomyelitis/Chronic Fatigue Syndrome and Fibromyalgia Syndrome*⁵².

- **Overall Appearance** of generalized muscle

Clinical Evaluation of Fibromyalgia Syndrome

Assess the total illness burden of the patient, taking a thorough history, a physical examination, and ordering investigations as indicated to rule out other active disease processes.

1. **Patient History:** A thorough history, including a complete description of the patient's complaints as well as estimating their severity and their impact on the patient's ability to function, must be taken before attempting to classify the illness.
 - a. **Presenting Complaint:**
 - date and time of onset
 - trigger or prodromal event, including a careful description of trauma or other triggering event, particularly noting events that cause sudden excessive vertical load on the spine, or lateral loads such as impact from collisions and falls with head injuries.
 - symptoms at onset
 - progression of symptoms
 - duration of symptoms
 - hierarchy of severity and quality of current symptoms
 - identify aggravating/ameliorating environmental factors
 - distinguish primary symptoms from secondary symptoms and aggravators
 - quantify severity of total burden of symptoms and current level of physical function
 - b. **Past History:** The past history should include a comprehensive traumatic history and the patient's response to earlier trauma.
 - c. **Systems Review:** Many symptoms involve more than one system. Attention should be paid to:
 - **Musculoskeletal System** including myalgia and/or arthralgia
 - **CNS** including fatigue with post-exertional exacerbation, neurocognitive complaints, and headaches
 - **Autonomic and Endocrine Systems:** There is a general loss of homeostasis and adaptability: loss of sleep rhythm, loss of thermostatic stability, heat/cold intolerance, vasomotor instability; perceptual disturbances, anxiety, marked weight change, emotional flattening, etc.
 - **Cardiorespiratory System** including delayed postural hypotension, postural orthostatic tachycardia, arrhythmias
 - **GI & GU System** including arrhythmias, irritable bowel syndrome (IBS); bladder dysfunction

- **Psychological:** Estimate general emotional state.

2. Physical Examination

Functional State of Systems: Clinical estimation of the state of functioning and conditioning of the standard body systems should be ascertained. Attention should be paid to:

- Musculoskeletal System:** During the tender point examination, the patient must have pain on palpation of designated tender point sites to meet the diagnosis of FMS. Special attention must be paid to the presence or absence of joint swelling, inflammation, range of motion, quality of movement, and patterns of muscle tension and muscle consistence. Check for scoliosis, functional short leg, and patterns of muscular and postural imbalance. Test upper body strength. Patients should also be assessed for the presence of myofascial trigger points.
- CNS:** A focused neurological assessment including a standard examination for pathological reflexes such as Hoffman’s sign, Babinski’s sign, clonus and hyperreflexia, as well as during neck flexion and extension as these maneuvers will accentuate any compression of the underlying long tracts of the cervical cord. Tandem walk, both forwards and backwards, and Romberg test should be evaluated. Regular re-evaluation for clear signs of neurological disease should be performed every six to twelve months.
- Cardiorespiratory System:** A clinical estimation of the state of conditioning should be ascertained. Measure supine and standing blood pressure, and examine the peripheral pulses and circulatory adequacy. Arrhythmias and low or erratic blood pressure should be noted.
- Autonomic & Neuroendocrine System:** Check for signs of thyroid, adrenal and pituitary dysfunction, vasomotor instability, low body temperature, and sicca syndrome.

3. Laboratory and Investigative Protocol: There is no specific laboratory test for fibromyalgia syndrome. However, it is important to rule out other conditions that may resemble it.

- Routine Laboratory Tests:** CBC, ESR, protein electrophoresis, CPK, CRP and TSH tests
Further Testing: In addition to the routine laboratory tests, additional tests should be chosen on an individual basis depending on the patient’s case history, clinical evaluation, laboratory findings, and risk factors for co-morbid conditions. Many of these tests may be ordered after referral to a specialist. Clinicians should carefully evaluate the cost/benefit ratio of any investigative test for each patient and avoid unnecessary duplication of tests.
- Further Laboratory Testing:** If indicated, additional investigations may be done including tests for **pituitary-adrenal axis function, and status of calcium metabolic indicators** such as iPTH and 24-hour urine collections for calcium and phosphorus. If indicated, consider serum magnesium, blood glucose, serum electrolytes, Fe, B12 and folate levels, creatinine, DHEA sulfate, liver function, and routine urinalysis. **Cardiac assessment** such as ECG and Holter-monitoring, and **neurological tests** such as electromyography, and nerve conduction tests may be indicated. **Special risk factors and/or comorbid conditions** may indicate the need for one or more of the following tests: rheumatoid factor, antinuclear antibody, diurnal cortisol levels, 24-hour urine free cortisol and/or other appropriate thyroid and adrenal testing, total and free testosterone, estradiol, osteoarthritis, Western blot test for Lyme disease, chest x-ray, and TB skin test.
- Imaging**
 - **X-rays** of the cervical and lumbar spine, with flexion and extension views are useful to determine mechanical problems including malalignments.
 - **Total body bone scan** may be useful to rule out inflammatory or destructive lesions in the skeletal systems.
 - **MRI and CT:** Patients with an appropriate history or positive neurological findings should have MRI or CT of the relevant part of the spine, such as imaging of the neck in extension.
- Tilt-Table Testing:** If NMH is suspected, it should be confirmed by tilt-table testing prior to prescribing medication.
- Sleep Studies:** Sleep studies should be ordered if a treatable sleep disorder is suspected. They can also be useful to establish presence of alpha-wave intrusion in non-REM sleep that is typical of FMS.
- sEMG and qEEG:** These tests can be useful but are expensive and not covered by provincial health plans.

If the patient has any abnormalities in the screening blood tests such as high ESR, abnormal ANA, RA, etc., it is recommended that the patient be followed for a number of months to allow time for the maturation of

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symptoms that may be due to another condition.

Concurrent Conditions: Assuming the clinical criteria are satisfied, the presence of other diseases generally does not rule out the diagnosis of FMS. Restless leg syndrome, irritable bowel/bladder syndrome, vasomotor instability, TMJ, and sicca may have a temporal coherence to FMS and are considered part of the syndrome.

Differential Diagnosis: There are many medical conditions that can be similarly characterized by widespread pain, paresthesias, stiffness, and/or fatigue. These include:

Systemic immune arthropathies: e.g. rheumatoid arthritis, systemic lupus erythematosus, psoriatic arthritis, ankylosing spondylitis, polymyositis and temporal arteritis/polymyalgia rheumatica.

Skeletal malignancies such as multiple myeloma, bony metastases

Neuromuscular disorders including multiple sclerosis, myasthenia gravis, polyneuropathy

Endocrine disturbances including primary and secondary hyperparathyroidism, renal osteodystrophy, osteomalacia, hypothyroidism, hypoadrenalism

It is important not to attribute symptoms of FMS to other illnesses as it may lead to unnecessary and sometimes potentially toxic medications being prescribed.

Patients who meet the criteria for FMS should be evaluated to see if they also meet the criteria for myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS), as many of the symptoms are similar. Myofascial pain syndrome also should be indicated and considered concomitant.

Jain AK, Carruthers BM, Editors. van de Sande MI, Barron SR, Donaldson CCS, Dunne JV, Gingrich E, Heffez DS, Leung FY-K, Malone DG, Romano TJ, Russell IJ, Saul D, Seibel DG. Fibromyalgia Syndrome: Canadian Clinical Working Case Definition, Diagnostic and Treatment Protocols – A Consensus Document. *J MSP* 11(4): 3-108, 2003. © Copyright 2003 Haworth Press Inc. Document available: 1-800-HAWORTH, docdelivery@haworthpress.com <http://www.HaworthPress.com> Reprinted with permission.

Differences Between Fibromyalgia Syndrome and Myalgic Encephalomyelitis / Chronic Fatigue Syndrome (ME/CFS)

Pain is the most prominent feature of FMS and it is often triggered by a physical trauma. ME/CFS is often triggered by a viral infection and there is usually greater fatigue, post-exertional malaise and cognitive, cardiac, and immune dysfunction. Some patients meet the criteria of both FMS and ME/CFS.

Differences Between FMS and Psychiatric Disorders

FMS is not synonymous with psychiatric disorder. Attention should be paid to the characteristics, dynamics of progression, and correlation of symptoms.

1. Depression: Some patients may develop reactive depression from the pain syndrome but the incidence of this depression is similar to that found in RA patients⁵³. Features of FMS including pain, multiple painful tender points, headaches, irritable bowel syndrome, bladder dysfunction, neurally mediated hypotension, taut muscles, functional short leg, scoliosis, abnormal joint movement, premenstrual syndrome, atopy, endometriosis, TMJ, and unsuccessful carpal tunnel surgery are not common features of depression. Numerous objective research findings can distinguish FMS from depression such as the level of substance P in the cerebrospinal fluid which is substantially higher in

FMS, and HPA axis function which is hypoactive in FMS and hyperactive in depression.

- 2. Childhood abuse:** Attempts to associate FMS with childhood abuse⁵⁴ can be put to rest by the prospective study by Raphael et al.⁵⁵ 676 adults, who were so severely abused as children that they were identified by public court records 20 years later, were compared with a control group of 520 in a blinded study. A relationship between unexplained pain and depression was found in those who had **not** been abused but no relationship was found in those who had been physically abused.
- 3. Somatoform disorder:** Somatoform patients often have a history of complaints prior to the age of 30 whereas FMS most often onsets between the ages of 35 and 50. Somatoform disorder can only be diagnosed by excluding general medical conditions or substance abuse. Physiological abnormalities including elevated levels of CSF substance P, dysregulated pain physiology and abnormalities identified in SPECT scans clearly demonstrate FMS is a pathophysiological medical condition.

TREATMENT GUIDELINES

A treatment program must be carefully planned and individualized to accommodate symptom diversity and severity. Monitor the effectiveness of treatments in reducing the impact of the patient's illness burden.

Goals and Therapeutic Principles/ Guidelines

- 1. Patient empowerment is a major therapeutic goal.** Encourage patients to trust their knowledge of their body and experiences. It is vital to the physiological and psychological well-being of patients that they are able to maintain autonomy over the pacing and complexity of activities.
- 2. Symptom Severity, Hierarchy Profile, and functionality** should be assessed at the initial visit and then approximately every six months. Note the effects of treatments and aggravators.
- 3. State of well-being** is achieved by appropriate treatment that assists the orderly change of returning the body to its pre-illness state.
- 4. The treating physician knows the patient best** and should direct and coordinate treatment and rehabilitative efforts.
- 5. All rehabilitative personnel must be knowledgeable about FMS.**
- 6. The pathophysiology of FMS must be respected and reflected in all treatment.** Total illness burden, symptom interaction, fluctuation of activity boundaries (even from hour to hour), low endurance, and overload phenomena are due to abnormal physiology and must be respected. Focus on reducing symptomatology and maintaining function.
- 7. The philosophy of the program must be conducive to healing.** Involve patients in establishing realistic goals and individualized programs appropriate to their impairments and fluctuating activity boundaries that will maximize healing and minimize stress. Begin a program at a level that will ensure success, pace it to coincide with increased levels of ability, and optimize patients' functionality within their boundary limitation. Patients should be encouraged to recognize aggravators, take rests when needed, not exceed their activity boundaries, plan alternative strategies for times of symptom flare-up, and then explore ways to gently extend their activity boundaries, if and when able.

Self-Powered Lifeworld Adjustments and Self-Help Strategies (SHS)

It is important for all patients to make self-powered lifeworld adjustments and develop self-help strategies in order to minimize the effects of chronic pain, muscular and general fatigue, disturbed sleep, lack of endurance, etc. Assessment by an occupational therapist knowledgeable about FMS may be appropriate in some cases to assist patients in modifying their daily routines and alert them to adaptive devices.

1. Education

- Meet with the patient and his/her meaningful others as soon as possible after the diagnosis to discuss the illness, develop SHS, and provide educational information. An educational resource for patients is the National ME/FM Action Network website www.mefmaction.net, which also contains links to many other national and international websites.
- Assist patients in recognizing early warning signs in order to prevent "crashes". Encourage patients to pace their activities, and rest when needed so that they can be as active as possible within their activity boundaries without exacerbating symptoms.
- Assist patients in establishing an environment that is conducive to healing – simple, serene, and supportive.
- Provide information on relaxation, stress reduction, energy conservation techniques, and environmental modifications. (Much of this information is contained in the appendices of the Consensus Document.)
- Encourage patients to keep their body warm if they feel cold or experience severe pain.
- Patients should be encouraged to avoid known aggravators as much as possible such as overexertion, change in sleep schedule, overhead reaching, prolonged muscular or mental activity, excessive stress, air travel,

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temperature extremes, loud noise, caffeine, aspartame, alcohol, nicotine, allergen exposure, chemical exposure, etc.

2. Self-Development:

- Encourage patients to
- trust their feelings and experiences, and know their values, needs, and sensitivities
- set aside a time to rest and do something they enjoy
- set personal and activity boundaries and find their optimal activity/rest rhythm
- gradually explore ways to extend boundaries at **their own pace, if and when able.**

3. Maximize Sleep:

Patients should be encouraged to

- conserve energy by pacing daytime activities and alternating activity and rest periods
- establish a wind-down period before a regular bedtime. Do quiet activities or listen to relaxation tapes before going to bed
- take a hot bath before bed to relax and warm their body, and use a hot water bottle if necessary
- give their body proper postural support, such as using contoured cervical and lumbar pillows

- establish an environment that is conducive to sleep and reserve bed for sleep and sex
- keep the bedroom as a “worry-free sanctuary”
- do calming meditations if sleep is impossible

4. Diet and Nutritional Considerations:

Patients should be encouraged to

- eat a balanced, nutritious diet and eat meals at regular times
- keep their body well hydrated
- take a multi-enzyme tablet with meals if indicated or if they have irritable bowel syndrome
- take nutritional supplements as needed and discussed in treatment

5. Body Movement and Fitness:

Patients should be encouraged to

- learn good body mechanics for lifting, standing, sitting, etc
- stay active within their limitations
- avoid work that exceeds their intensity and duration limitations
- adopt and maintain exercises that are appropriate for them

Self-Powered Exercises for FMS

Although exercise is the most prescribed non-pharmaceutical treatment, there is no reliable evidence that would explain why exercise should reduce FMS pain⁵⁶. In a systematic review⁵⁷ of 1,808 multi-disciplinary studies, only 2 studies including exercise for FMS met the criteria for methodology, and the results were disappointing. Jones et al.⁵⁸ reviewed 26 studies of FMS exercise programs, which also did not provide a consensus that exercise was beneficial for FMS patients. The generally disappointing results combined with attrition rates running as high as 60% and 61% (some studies failed to disclose their attrition rates) suggest these programs failed to meet the patients’ needs.

Exercise programs should adhere to the previously stated goals and guidelines and the following guidelines, which are a combination of those developed by Jones and Clark^{56,59}, exercise physiologists who are knowledgeable about the pathophysiology of FMS, and information from the Consensus Panel.

1. Guidelines for Exercise for FMS Patients

- **Initial Patient Evaluation:** Before

prescribing any exercise, make a thorough assessment of the patient’s history and examination, with particular attention to pain generators and risk factors including prior injuries, taut muscles, painful myofascial trigger points, lax or injured ligaments and/or tendons, osteoarthritis in weight bearing joints, cardiac function, orthostatic intolerance, balance problems, etc. Increased muscle tone and shortening, muscle imbalance, and hypermobile or restricted joints must be identified and corrected. The connections of the lumbosacral spine where it is joined to the pelvis at the sacroiliac joints must be assessed because weakened ligaments can allow the sacrum between the iliac bones to become locked in an abnormal position or displaced causing muscle contractures and imbalance.

- **Optimize medical management** before introducing exercise. Patients whose pain and concomitant conditions are under control may benefit from gentle exercise to maintain functionality. However, patients with weakened ligaments or tendons, abnormal joint movement, taut muscles and muscle

imbalance, concomitant arthritis or muscle disease, or those who also meet the criteria for myalgic encephalomyelitis/chronic fatigue syndrome have less tolerance for exercise. Ligaments must be strengthened and taut muscles released before any strengthening or endurance exercises are introduced.

- **As much care must be taken in prescribing exercise as prescribing medication** and be specific for the physiological pathology of FMS and adapted to the patient's abilities/limitations.

If ligaments are overstretched or damaged, they are difficult to heal because they have a poor blood supply, particularly where they attach to the bone. The joint may be hypermobile because lax/injured ligaments do not hold the joint in place properly, or the joint is restricted because muscles around the joint tend to react to pain signals by contracting in attempts to pull the joint back into its correct position and stabilize it to prevent further damage. The resulting abnormal joint movement and contracted muscles, which are dysfunctional, are important considerations because taut muscles have a lower excitability threshold and increase the level of pain. These muscles activate, even when they shouldn't, and they inhibit their antagonistic muscles, which appear to be weak but are dysfunctional.

2. Principles of a Self-Powered Exercise Program

The professionals must be knowledgeable about FMS pathophysiology and adhere to the following:

- **Emphasize low intensity exercise and functionality and minimize muscle microtrauma.** *Tight muscles must be warmed and stretched before trying to strengthen the weakened and inhibited muscles.* There are no exercises that will strengthen or heal ligaments and tendons. Progressive degeneration and increased weakness of long-lasting taut muscles is caused by exceeding their tensile strength. Warming and stretching taut muscles, if possible, should be the focus for such patients as releasing taut muscles will reduce the stress on ligaments and joints. Avoid movements that produce eccentric muscle contractions and stiffness. *Above all else, avoid worsening the patient's condition.*

- **Minimize central sensitization:** Avoid overload of sensory input of dysfunctional muscles, which can activate central sensitization and produce reactive pain.
- **Maximize self-efficacy and minimize attrition:** The patient must have autonomy over the intensity and pacing of exercise. Ensure ongoing success by helping the patient determine an appropriate level of activity that will not cause flare-ups.

3. Involve the Patient in Developing an Individualized Exercise Program

Exercise must be specific for the individual patient and each muscle group. The intensity and duration of exercises must be adapted to the patient's abilities/limitations, circumstances and needs. A "one size fits all" approach does not work. FMS patients experience abnormal pain amplification, and post-exertional fatigue. Exercise can increase stiffness when structural abnormalities and/or taut muscles are aggravated. They should be encouraged to listen to their body and stop before their pain worsens. Have patients take their temperature before and after exercise. If their temperature drops after exercise, they have done too much. Patients should be well-hydrated before exercising.

- **Warm-up and warm-down periods** are essential. A hot bath or shower, or the use of hot packs before stretching will lessen pain and muscle injury.
- **Stretching** is essential for loosening tight muscles and relieving pain. Patients should breathe in and, as they breathe out, they should stretch to the point of resistance and hold for a few seconds in order to allow the Golgi tendon apparatus to signal muscle fibers to relax. Patients can increase the stretch range by very gradually and gently increasing the number of breathing and stretching cycles, *as they are able.*
- **Strength training** must focus on muscle toning and functionality. Tight muscles must be warmed and stretched before exercising. If taut muscles cannot be released, the patient should not do strength training for these muscle groups because they will become more dysfunctional.
- **Endurance exercises** should be non-impact loading. Encourage patients to find an activity that they enjoy, such as walking at a comfortable pace or gentle aquacise. Some may be limited to exercising while sitting down.
- **Balance** may be improved by low intensity

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exercise.

- **Pacing must be very gradual and remain under the patient's control.** Self-powered success leads to continued commitment and further success.
 - ✓ **Stretching** can be done for a few minutes a number of times a day.
 - ✓ **Strength training**, for those whose muscles are **not** taut, may be done as follows: day 1 – upper body, day 2 –

none, day 3 - lower body, day 4 – none, then repeat cycle. Warm-up and warm-down of muscles are essential.

- ✓ **Endurance** may begin with 2 or 3 minute periods and increased as able. It may be easier to incorporate 2 or 3 short periods rather than one longer period.
- ✓ **Strength and endurance exercises** may be done on alternate days.

Symptom Management and Treatment

The Consensus Document provides guidelines, dosage, effects, level of evidence, and preferential ranking of commonly used pharmaceuticals (pages 29 – 43). **Start low, go slow!** Many patients are hypersensitive to medication, so begin dosage at a lower level than recommended. Warn patients about possible side effects. Care should be taken in selecting agents with different kinds of toxicity in order to achieve clinical benefit while avoiding toxicity. No pharmaceutical is universally effective. Physicians should be knowledgeable about alternate therapies as they will likely be explored by patients because standard treatments presently do not provide significant reduction of symptoms. Keep the regime as simple, safe, effective, and inexpensive as possible.

1. Pain

- Physical Remedies:** Avoid pain exacerbators such as prolonged sitting, standing, writing, computer work, and any bent over work postures; as well as heavy lifting, housework, and gardening. Relaxation techniques, local heat, a warm bath and gentle stretching of muscles, mobilization of joints, and the use of cervical collars or lumbar support belts may be helpful.
- Pharmaceuticals:** Use acetaminophen as a baseline analgesic. NSAID analgesics, COX-2 inhibitors, short-term use of low dose tricyclic antidepressants (side effects may be severe and patients must be warned about weight gain), SSRIs, anti-convulsants/GABA receptor agonists for pain with neuropathic features, local anesthetics, needling and injection therapies, neurotransmitter precursors, and some patients with severe pain may need narcotics.
- Needling and injection therapies** require a correct diagnosis, a physician with excellent knowledge of muscle and functional anatomy, extensive training and apprenticeship, and

much practice.

Prolotherapy involves injecting a proliferative agent mixed with a local anesthetic into the fibro-osseous junction of damaged ligaments. The local inflammatory response and stimulation of fibroblasts make new collagen and strengthens ligaments. Prolotherapy reduced the pain level and increased functionality in more than 75% of severe FMS patients in one study⁶⁰.

Intramuscular stimulation/dry needling involves inserting an acupuncture needle a number of times into myofascial pain trigger points (TrPs) of taut muscles allowing the muscles to relax. Injections of diluted local anesthetic into myofascial TrPs of a taut muscle band can give temporary relief but is not as successful for FMS patients as those who only have myofascial pain syndrome.

Neural therapy involves injection of a local anesthetic at locations where there has been a disruption of normal function in an ANS pathway.

Acupuncture is believed to rebalance the body's flow of energy and nerve function, and reduce pain.

Botox™ is in its early stages of research - a highly diluted type A has been injected into muscle spasms.

- Alternative Therapies** for pain reduction include chiropractic, physiotherapy, massage therapy, craniosacral therapy, Reiki, TENS, EMG biofeedback, magnetic therapy, negative ionizers, and aromatherapy. Synaptic Electronic Activation Technology (S.E.A. Tech®) may be helpful but it is contraindicated in pregnancy and if pacemakers are present.

2. Fatigue

- Physical Remedies:** Self-Help Strategies (SHS) include setting priorities and

boundaries, balancing activities with rest periods, breathing exercises, using restorative resting postures, simplifying tasks, and using adaptive devices.

- b. Pharmaceuticals:** gabapentin, venlafaxine, DHEA in cases of confirmed deficiency, pyridostigmine. Most pharmaceuticals used to reduce fatigue have short-term effects and may not help overall in endurance, work capacity, or extend crash points.
- c. B12/Cyanocobalamin:** Anecdotal reports suggest that some FMS patients with normal blood counts may benefit from mega dose B12 injections. This benefit may be due to a reduced ability in transporting B12 into the cells or low CNS B12 levels. Draw baseline serum B12 and red cell folate in the morning.
- d. Alternate Therapies:** Gentle massage therapy, bright light therapy, craniosacral therapy, and aromatherapy (for those without chemical sensitivities) may be helpful in some cases.

3. Sleep Disturbance: Sleep quality and quantity must be taken into consideration.

- a. Physical Remedies:** See "Maximize Sleep" in the previous section on SHS. Patients should balance activity and rest periods. Associated sleep dysfunctions should be treated.
- b. Other Remedies:** melatonin, valerian, calcium and magnesium, aroma therapy
- c. Pharmaceuticals:** zopiclone, short-term use of low dose tricyclic antidepressants (side effects may be severe and patients must be warned about weight gain), benzodiazepines, polycyclics, muscle relaxants, and 5-hydroxy-tryptophan is usually used in conjunction with L-dopa +/- carbidopa. **Nocturnal myoclonus** may be treated with clonazepam, pergolide, carbidopa/levodopa.

4. Neurocognitive Manifestations

Physical Remedies: Speech therapy may assist in treating problems with word-finding, information processing, and memory. Mindful meditation, mental exercises, reading within one's ability and then learning new information or skills, as one is able, may be helpful.

5. Autonomic Dysfunctions

Neurally Mediated Hypotension (NMH) and Vertigo

- a. Physical Remedies:** Begin physical remedies first. Lying down at the first sign of dizziness usually relieves NMH symptoms. It

may be helpful for the patient to hold onto something while s/he gets up slowly and avoid standing for long periods. The patient should keep well hydrated and avoid eating large meals. If dizziness is caused by proprioceptive disturbances in the neck, instruct the patient to avoid extension or quick rotation of the neck. Wearing support hose in vulnerable situations such as those involving prolonged standing may be helpful.

- b. Pharmaceuticals:** NMH should be confirmed with tilt-table tests before pharmaceutical intervention. A combination of therapies usually has the best result. With adequate water intake, begin by increasing salt intake, if the patient is not hypertensive. Fludrocortisone may be used for blood volume expansion if salt initially helps but then loses its effectiveness. An alpha 2 agonist such as midodrine may be added as a vasoconstrictor agent. If these therapies are not effective, consider paroxetine. An anti-nauseant such as meclizine may be used for vertigo, but no treatment is very effective. Meditative techniques may assist in mild cases.

Irritable Bowel Syndrome

Conduct food elimination trials to determine food intolerance and adjust diet accordingly. Use antispasmodic and anti-diarrheal agents judiciously, such as pinaverium, hyoscine, or mebeverine.

Bladder Dysfunction: Interstitial Cystitis Syndrome (ICS)

Ensure patients are adequately hydrated but do not drink after 8:00 p.m. Pharmaceuticals often used are oxybutynin and flavoxate.

Hypoglycemia

Patients with hypoglycemia may find it beneficial to eat foods which are low on the glycemic index.

6. Neuroendocrine Manifestations

Anxiety States

- a. Physical Remedies:** Self-Help Strategies assist in developing coping skills. Relaxation techniques such as slow, deep breathing, listening to soothing music, a warm relaxing bath, gentle massage, and gentle swimming or walking, if able, may reduce tension.
- b. Other Remedies:** Aromatherapy and herbs such as lavender and thyme may be helpful.
- c. Pharmaceuticals:** Benzodiazepines used intermittently to avoid dependence, and buspirone

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Depression

- a. Physical Remedies:** Reactive depression may result from having to live with a poorly understood chronic illness that greatly reduces functionality. SHS, gentle massage, and bright light therapy may help. Patients who are severely depressed should be referred for supportive counseling.
- b. Pharmaceuticals:** SSRIs are the first line choice, but usually are ineffective in treating fatigue and may interfere with sleep. Most patients can't tolerate a high enough dosage of tricyclic antidepressants to be effective for the treatment of depression because of their side effects. Bupropion should not be used in close temporal proximity to MAO inhibitors.

Supplements and Herbs

While most nutritional supplements have not undergone strict research studies for FMS, some have been studied in other illnesses. Each patient has a unique biochemistry and needs. Patients with chronic illnesses may require additional nutrients. Sublingual drops, and colloidal or chelated products are usually easier to absorb.

1. Vitamins and Minerals

Generally vitamins are cofactors that aid enzymes in utilizing nutrients. Recommended intake is based on estimated amounts required to prevent overt deficiency symptoms and not on optimal levels for chronic illnesses. A balanced vitamin profile is helpful. The following may be relevant for FMS:

- a. Vitamin E**, an antioxidant, may stimulate the immune system, stabilize nerve membranes and reduce fibrin.
- b. B-Complex** assists in reducing stress and enhancing energy. Folic acid may assist in lowering cholesterol.
- c. Vitamin C**, an antioxidant, may stimulate the immune system, and help combat chronic illness.
- d. Beta Carotene**, a non-toxic precursor to vitamin A, may assist the immune system in combating chronic illness. Note: Excess vitamin A can contribute to musculoskeletal pain.
- e. Calcium** is involved in hundreds of enzymatic reactions and in muscle and nerve action and interaction. Vitamin D assists in the absorption of calcium. However, too much calcium hinders normal nerve and muscle function.
- f. Magnesium Maleate** may lessen fatigue

and prevent muscle cramps. FMS patients may require extra magnesium maleate in comparison to the usual 2:1 ration of calcium to magnesium.

- g. Zinc** enhances muscle and nerve function, collagen formation, and healing.

2. Supplements

- a. Essential Fatty Acids (EFA)** are necessary for cellular membrane integrity, prostaglandin synthesis, and assist in alleviating dry skin. EFAs, which are found in fish of cold water origin, and supplements of salmon oil and evening primrose oil, promote blood flow and nerve impulse transmission.
- b. Lecithin** is involved in nerve, brain and muscle function, and circulation.
- c. NADH** may improve energy and immune function.
- d. MSM (Methylsulfonylmethane)** may strengthen connective tissue and reduce joint pain.
- e. Glucosamine Sulfate** may reduce pain and improve joint mobility.
- f. Glutamine** may improve muscle function and promote growth hormone production.
- g. Procyanidolic Oligomers (PCO)** may protect muscles and help prevent arthritis and bursitis.

3. Herbal Remedies

- a. Ginkgo Biloba** may improve cerebral blood flow and cognition.
- b. Siberian Ginseng** is not a true ginseng and is significantly different from ginseng panax. Siberian ginseng may enhance healing of soft tissue damage and assist the immune system. It can be taken by both males and females.
- c. Valerian** may promote relaxation, calmness, and sleep.
- d. Devil's Claw** may lessen pain in the joints.
- e. Cat's Claw** may reduce pain.

Progress has been made in the knowledge and understanding of FMS but much more research is needed in the areas of etiology, the role of the CNS and injury to the CNS, identifying laboratory and imaging markers, beneficial treatments, and the effects of comorbid diagnoses. It would be helpful to establish subgroups of patients, such as mild and severe cases, those who are in the initial stage or chronic stage, and those with comorbid diagnoses. Clarification of this type of information may assist in the efficient use of treatments for different subgroups as well as suggesting alternative pathogeneses.

Appendix 1: SYMPTOM SEVERITY AND HIERARCHY PROFILE (SSHP)

NAME _____ **DATE** _____

- Rank your symptoms in order of severity, with 1 being your most severe symptom.
- Rate severity of symptoms by putting a check mark in the appropriate column at the right.

Symptoms Severity and Severity Hierarchy Profile					
RANK	SYMPTOM	ABSENT	MILD	MODER- ATE	SEVERE
	Pain: in muscles, joints or headaches				
	Fatigue: persistent marked fatigue that reduces activity level, muscle fatigue				
	Sleep Disturbance: non-restorative sleep, insomnia, or frequent awakenings				
	Cognitive Difficulties: 'brain fog', difficulty in concentration, poor short-term memory, slow speed of performance				
	Functionality: symptoms interfere with being able to carry out daily activities				

Overall symptom severity: _____ mild, _____ moderate, _____ severe
 (Mild – occurring at rest, moderate – symptoms that occur at rest become severe with effort, unable to work, severe – often housebound or bedbound.)

Other troublesome symptoms _____

Which symptoms are constant? _____

Which symptoms come and go? _____

Which symptoms have changed and how? _____

What things aggravate your symptoms? _____

What ways have you found to alleviate symptoms? _____

Describe a recent good experience. _____

Is your body temperature normal? _____ Does it fluctuate? _____

How good is your sleep on a scale of 0-10? (10-good refreshing sleep, 0-no sleep) _____

Which of these conditions troubled you at night? _____ restless leg syndrome, _____ muscle cramps, _____ muscle pain, _____ felt cold, _____ woke up to urinate, _____ nasal congestion, _____ woke up short of breath

How you felt when you woke up. _____ Energetic, _____ Fine, _____ Tired, _____ Exhausted

Do you have stiffness in the morning? _____ no, _____ mild, _____ moderate, _____ severe

If you do have morning stiffness, how long does it usually last? _____

How well are you able to function in your daily living activities on a scale of 1-10?

(10 – able to do daily activities with ease, 1 – unable to do daily activities) _____

Indicate your average sleep, pain, and energy level in the past 24 hours on a scale of 0-10? (0 being no sleep, pain, or energy, 10 being great sleep, extreme pain, and great energy).

_____ Sleep quality, _____ Pain level, _____ Energy level

How do you feel today compared to one month ago?

_____ much better, _____ better, _____ about the same, _____ worse, _____ much worse

Do you have specific concerns or questions you would like to ask? _____

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Appendix 2: SLEEP AND PAIN PROFILE

Name _____ Date _____ to _____

Please complete chart for the week before your next appointment.

Day	Awakening time	Temp. a.m.	Time Slept	Sleep Quality	Pain a.m.	Pain p.m.	Temp. p.m.	Energy level	Bed Time	Min. to fall asleep
Week Avg.										

Temp a.m.: Take your temperature as soon as you awaken, while you are still lying down. Also indicate if you feel cold [C], had cold feet [CF], or cold hands [CH], and if you were stiff [S].

Time Slept: Indicate approximate number of hours and minutes you slept.

Sleep Quality: Good, fair, or poor. Also indicate the number of times you woke during the night including waking up much too early, e.g. if you woke up twice [W2]. Indicate if you know why you woke up – e.g. to urinate, muscle cramps, nasal congestion, etc.

Pain: 0 to 10. 0 being no pain, 10 being the worst pain you have experienced.

Energy Level: Indicate your average energy level for the day - 0 being bedridden, 10 full of energy.

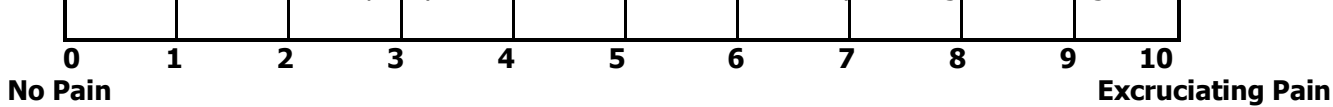
Temp p.m.: Take your temperature before going to bed. Indicate if you feel cold.

Min. to Fall Asleep: Indicate as best you can approximately how many minutes it took you to fall asleep.

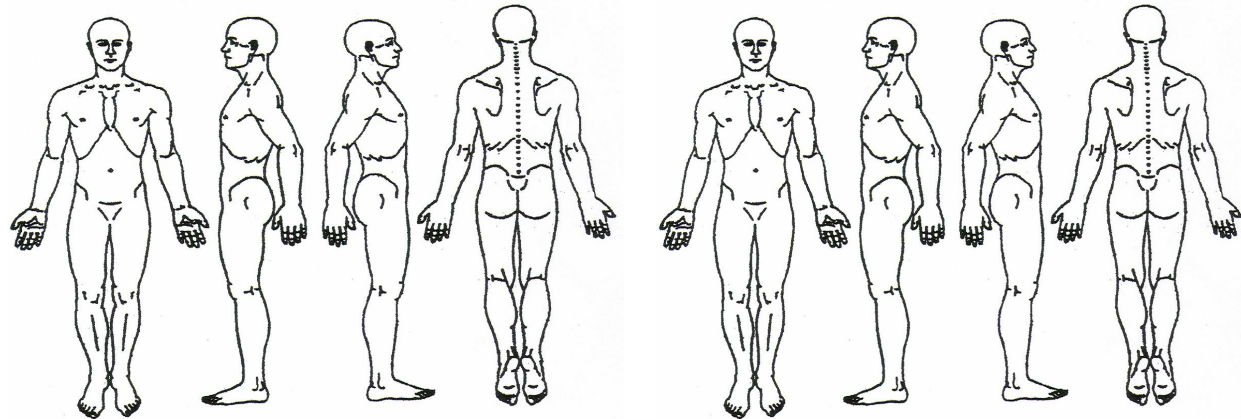
Was anything in particular bothering you this week, e.g. family crisis? _____

Pain Visual Analog Scale [PAIN VAS], Body Pain Diagram

Please indicate the amount of pain you have had in the last 48 hours by marking a "/" through the line.



On the following diagrams, please indicate your areas of: Aching: ===== Burning Pain: xxxxx
 Stabbing Pain: ///// Pins & Needles: ooooo Other Pain: ppppp Describe: _____



Pain on Day 1

Pain on Day 7

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Appendix 3: ASSESSING OCCUPATIONAL DISABILITY

A. Requirements of the Occupational Disability Assessment

1. **Assess symptoms of the patient's disability:** Check the wording for entitlement of the specific disability carrier. Give comprehensive explanations about how the patient's symptoms/condition impose(s) particular functional limitation on the person's ability to engage in the duties of his/her specific job, or any job for which the patient is reasonably qualified by way of education, training and experience, and which would enable the person to earn an income commensurate with that of their present job. *Clinical notes should contain such assessments on a regular basis.*
2. **Assess prognosis:** Care must be taken not to set definite deadlines in anticipating recovery and future employability because inability to meet these deadlines may be interpreted as malingering.
3. **Assess rehabilitative potential:** The treating physician is responsible for the patient's care and is in the best position to assess the patient condition, effectiveness of treatment, and recovery potential. The treating physician should direct all rehabilitative efforts and his/her opinion and advice should never be supplanted by the opinions and proposals of other rehabilitative personnel.
4. **Provide medical opinion:** Give a comprehensive opinion, substantiated by detailed subjective/objective evidence, regarding the impact of the patient's functional limitations, the impact of disability, and whether the patient's condition necessitates him/her to remain off work to prevent further deterioration or s/he is able to return to work.

B. Medical Documentation

It is essential that documentation of severity of symptoms and disability is done on an ongoing basis.

1. **Medical history:** Document total illness burden, not just the primary diagnosis. The family physician and/or specialist conversant with FMS should document the medical history including the diagnosis, abnormal laboratory findings, objective physiological findings such as OI, severity of symptoms and impact on patient's functional abilities, duration of illness, and response to treatments.
2. **Questionnaires, patient diaries, scales, etc:** Have the patient complete scales on her/his initial visit and then every six months or so. These scales help monitor the patient's status, and assess general function and activities of daily living, effectiveness of treatment, and prognosis. Periodic, structured interviews are useful in assessing symptom severity, interaction, impact and cumulative effects. Symptom fluctuation from day to day and even hour to hour is an important consideration. Discussion of the patient's diary, questionnaires, and scales is helpful.
 - **Symptom Severity and Hierarchy Profile (SSHP)**
 - **Sleep and Pain Profile:** Sleep quality and quantity play an important role in the patient's ability to function in his/her daily activities.
 - **Fibromyalgia Impact Questionnaire:** (Appendix 9 of the Consensus Document) This questionnaire helps measure health status components that commonly affect FMS patients.
 - **Modified Health Assessment Questionnaire**
 - **Daily Activities/Functional Capacity Scale:** Have the patient keep a diary of daily activities and rest periods, including the timing and duration, and specific types of activity performed, as well as aggravators, for one week. The patient should also rank his/her functional level during each day. This ranking will assist in determining symptom interaction, variance and fluctuation, severity and impact, cumulative effects, and long range reactive exacerbations.
3. **Other Documentation:** Documentation of any objective findings should be included.
 - **Computer Science and Application (CSA™) Actigraph:** This small motion detector measures the frequency and intensity of activity at 1-minute intervals for up to 22 consecutive days. The dynamics and variability of symptoms, and the intensity and duration of activity and rest periods may be compared to controls⁶¹.
 - **sEMG and qEEG** usually show abnormalities in FMS patients but are expensive.
4. **Functional Limitations:** Indicate how functional limitations affect ability to do ADL, IADL, rehabilitative programs, and work activities. Consider physical, cognitive, and emotional functional limitations and restriction, interaction of symptoms, lack of endurance, impaired neurocognitive functions, unpredictability of symptom dynamics, fluctuation of symptoms that may occur on a hour-to-hour basis, and the cumulative effects of chronic symptoms and repetitive actions over the long term.

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- 5. Assessment by vocational providers:** Certified occupational therapist knowledgeable about FMS, can provide information regarding the patient's level of function in the home with consideration to employment being a 24 hour focus. Workplace assessments should be conducted on the job site when possible with special attention to physical, mental, emotional, social, environmental demands as well as workplace aggravators. Adaptations of ergonomics, varying job tasks and positions, and flexibility in scheduling may be possible in some cases.
- 6. Assess Prognosis** based on the information obtained from all the above sources and include an estimate of the patient's progress. An eight year multi-centre study suggests that generally once FMS has been established, patients do not improve symptomatically and there is a slight worsening of functional disability⁷. A 15 year study⁸ indicates that all FMS patients in the study still have FMS but there is some symptom variation. Prognosis for an individual patient remains a clinical estimate because prognosis cannot be predicted accurately with certainty
- 7. Provide medical opinion** as to whether the patient is ready to return to work or is disabled and unable to work. Medical management must be optimized and the symptoms under control to avoid aggravating and worsening the patient's medical condition. It is the responsibility of the treating physician, who is responsible for the well-being and long-term care of his/her patient, to determine whether any rehabilitative program is appropriate for an individual patient.

Workplace Aggravators: (Adapted from⁶²)

The following may cause pain, as well as physical and cognitive fatigue:

- prolonged sitting, writing, deskwork, handwork, telephone use, bending over workspace, standing, stairs, driving, and walking more than a tolerated distance
- unsupported extension of arms and reaching overhead
- heavy lifting, carrying, housecleaning, gardening, etc
- computer work, numerical calculations, multi-tasking, tasks requiring remembering or recent events-time sequences
- fast-paced and complex work surroundings, tight deadlines, sensory overload
- change in work hours: shift work, long hours, early hours, no breaks, jet lag
- environmental factors: cold, heat, air pollutants, chemicals; stress

Tests that May Be Used Inappropriately in the Assessment of FMS

Commonly used tests to assess physical capabilities and sincerity of effort do not adequately consider the severity and fluctuation of symptoms or activity levels over a long period.

- **American Medical Association Guide for the Evaluation of Permanent Impairment:** This assessment, which relies on measurements of range of motion and strength, is inappropriate because functional disability in FMS is three dimensional – with the third dimension being how long a time period the patient can sustain repetitive activity.
- **Functional Capacity Evaluations (FCE)** do not assess cognitive fatigue and dysfunction or reflect the complexity or severity of FMS. FCEs lack objective measures to determine sincerity of effort and rely on the subjective interpretation of the observer. Such judgments are based on reliability standards set on healthy subjects and the limited, uncharacteristic, and artificial situation does not assess how fluctuation of symptoms relate to fatigue and/or variable pain level, or indicate the patient's endurance in his/her natural work environment on a full workday schedule. As pain, muscle and cognitive fatigue in reaction to physical and mental exertion may be delayed until the following day, the pain, fatigue, and/or confusion may increase by repetitive activities over a longer period of time and their cumulative effects are not observed in FCEs.
- **MMPI:** The MMPI and MMPI 2 were designed to assess the psychiatric state of physically healthy people. Being normed on healthy people, symptoms such as pain, fatigue, sleep problems, concentration problems, headaches, dizziness, feeling weak, and gastrointestinal problems caused by physical illness are scored as indications of psychological disorders. The inaccurate scoring of these symptoms as psychiatric is compounded by the fact that approximately 40% of the items are scored more than once (up to 6 times) since they appear on more than one scale and thus load for depression, hypochondriasis, and other somatization disorders and build a "neurotic" score. Patients with pain will present a false high score⁶³ but the score will normalize if the pain can be treated effectively⁶⁴. Without taking organically caused physical symptoms into account, the interpretations of MMPIs are erroneous.

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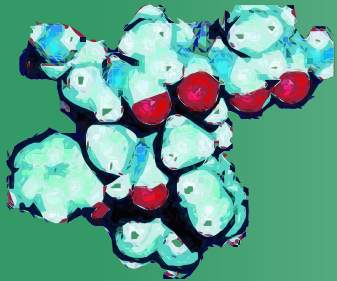
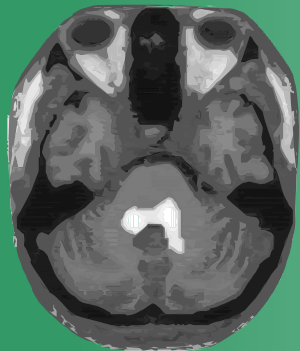
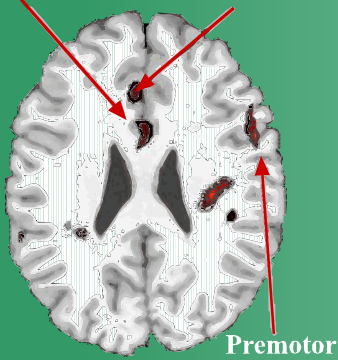
This short overview only provides some highlights from:

Jain AK, Carruthers BM, Editors. van de Sande MI, Barron SR, Donaldson CCS, Dunne JV, Gingrich E, Heffez DS, Leung FY-K, Malone DG, Romano TJ, Russell IJ, Saul D, Seibel DG. Fibromyalgia Syndrome: Canadian Clinical Working Case Definition, Diagnostic and Treatment Protocols – A Consensus Document. *Journal of Musculoskeletal Pain* 11(4): 3-108, 2003.

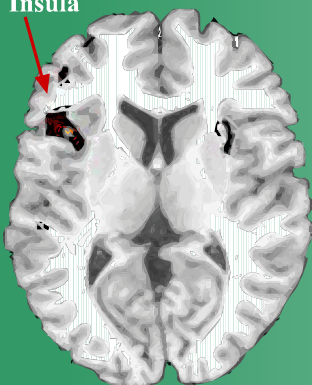
Co-published simultaneously in “The Fibromyalgia Syndrome: A Clinical Case Definition for Practitioners”. Editor: Russell IJ. *The Haworth Medical Press*, 2004.

The full Consensus Document is highly recommended as a comprehensive, informative resource book for medical practitioners.

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Insula



Reviews and Commentaries of

Fibromyalgia Syndrome: Canadian Clinical Working Case Definition, Diagnostic and Treatment Protocols A Consensus Document

“A MONUMENTAL WORK! For the first time, a single text documents signs and symptoms, pathophysiology, physical evaluation, and treatment – all the fine points – that were previously known by only a few skilled specialists. Other physicians have frequently asked me, ‘Is there a reliable and authoritative text dealing with Fibromyalgia Syndrome?’ Until now, I could offer none. This text is an exhaustive and all-encompassing work that WILL HELP ANY PRACTITIONER TO BETTER UNDERSTAND AND MANAGE FIBROMYALGIA. I will recommend it to all my colleagues!”

Charles W. Lapp, MD

**Director: Hunter-Hopkins Center; Charlotte, North Carolina
Assistant Consulting Professor, Duke University Medical Center
Advisory Committee for CFS: US Department of Health & Human Services
Board of Directors: American Association for Chronic Fatigue Syndrome**

“I highly recommend this COMPREHENSIVE, WELL-REFERENCED, AND PRACTICAL TEXT as a required resource for healthcare professionals and patients alike. This work provides a scientifically and clinically sound framework for further study in the field of fibromyalgia. Prepared by well-regarded authorities, the statements and reviews on the levels of evidence that support proposed treatments and causal factors are particularly informative.”

**Roberto Patarca-Montero, MD, PhD, HCLD
US Department of Health & Human Services
Chairman: Education Subcommittee**

“REALLY USEFUL, NOT ONLY FOR PHYSICIANS, BUT ALSO FOR PATIENTS. This book is AN EXCITING CONSENSUS DOCUMENT based on the work on an international panel of experts selected by Health Canada. It deals with the clinical definition, diagnosis, treatment, and international research activities related to the Fibromyalgia Syndrome. In my opinion it should become a bestseller in this field.”

**Dieter Pongratz, Dr. Med.
Professor: Department of Neurology
University of Munich Hospital
Friedrich Baur Institute, Munich, Germany**