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Dennis Ang. "Diagnosis, etiology, and therapy of fibromyalgia", Comprehensive Therapy, 04/1999


R. Canovas. "Virtual reality tasks disclose spatial memory alterations in fibromyalgia", Rheumatology, 08/04/2009

Fibromyalgia is a common, but poorly understood, syndrome characterized by diffuse chronic musculoskeletal pain (Abeles, Pillinger, Solitar, & Abeles, 2007). Individuals with fibromyalgia often have a variety of other somatic symptoms and mood disorders, which further limit functional ability, emotional well-being, and adversely impact quality of life. Patients generally describe the path to fibromyalgia diagnosis as long and stressful (Arnold, Crofford, et al., 2008). The average fibromyalgia patient uses more medication and outpatient services than other chronic pain patients and resulting health care costs more than twice that of the average health care user (Schweinhardt, Saura, & Bushnell, 2008). For individuals with fibromyalgia, difficulties associated with living with chronic pain, and the challenges of management, are compounded by the nonspecific and invisible nature of the condition (Cunningham & Jillings, 2006). This paper presents the myriad of challenges faced by individuals suffering from fibromyalgia, and by the health care providers who diagnose and manage these patients. It focuses on two distinct populations: the middle aged and older adult with fibromyalgia. Current definition, epidemiology, pathophysiology, presentation, and multi-component treatment options for fibromyalgia are outlined and analyzed as reflected by relevant research. An algorithm is presented as a suggested guide for evaluation and diagnosis of the patient presenting with widespread chronic musculoskeletal pain. Definitions

Fibromyalgia is a chronic pain syndrome characterized by continuous, widespread musculoskeletal pain,
in the absence of an alternate cause (Williams & Clauw, 2009). It is also referred to as fibromyalgia syndrome, and is now considered a disorder of pain regulation. Fibromyalgia is often classified under the term central sensitization (Goldenberg, 2009). Pain, felt bilaterally above and below the waist, is accompanied by a constellation of symptoms often including generalized morning stiffness, non-restorative sleep, fatigue, dyscognition, irritable bowel and/or bladder, dyspepsia and/or esophageal dysmotility, headache, facial pain, and temporomandibular disorders (Chakrabarty & Zoorob, 2007; Peterson, 2007; Williams & Clauw, 2009). Epidemiology Fibromyalgia is estimated to be present in 2 percent to 10 percent of populations studied, although its prevalence is thought to be underestimated (Rutledge, Mouttapa, & Wood, 2009; Clauw and Crofford, 2003; Chakrabarty & Zoorob, 2007). The complex nature of fibromyalgia is likely responsible for limited epidemiological data resulting in probable underestimation, because subjects presenting with fibromyalgia symptoms often remain undiagnosed (Lawson, 2008). The ratio of females to males with a diagnosis of fibromyalgia is 9:1, and eighty-five percent of patients seeking treatment are female (Schweinhardt, et al., 2008; Shaver, 2004). The disorder is found in most countries, in most ethnic groups, and in all types of climates (Langford & Gilliland, 2008). A strong familial link in development of fibromyalgia has been noted. First degree relatives of individuals with the disorder are eight times more likely of developing the disorder than individuals in the general population (Williams et al. 2009). Moreover, relatives of individuals with fibromyalgia
are much more likely to have related disorders, such as irritable bowel syndrome, temporomandibular disorder, headaches, and other regional pain syndromes (Williams et al. 2009). Studies have recently identified specific genetic polymorphisms associated with an increased risk of developing fibromyalgia, and all involve metabolism or transport of monoamines (Williams et al. 2009). Monoamines play a critical role in the human stress response, heightened pain sensitivity and affective vulnerability (Williams et al. 2009). Pathophysiology In 1904, the term fibrositis was used to describe muscular pain commonly observed in clinics at the turn of the century, and the term suggested inflammation of fibrous muscle tissue. Other clinicians in the early 20th century believed the pain associated with the condition was caused by muscle tension or by psychogenic rheumatism. These early causal hypotheses defined the syndrome as a rheumatological disease (Williams et al. 2009). The term fibromyalgia was created in the mid-1970’s as a more descriptive term because there was a lack of evidence for actual connective tissue inflammation in patients presenting with this constellation of symptoms. Fibromyalgia is no longer believed to be caused by an inflammatory condition, or by mechanical damage of the periphery, such as occurs in osteoarthritis and rheumatoid arthritis (Williams et al. 2009). Research has moved into exploration of the central neural mechanisms of fibromyalgia. Studies have examined central pain processing, hypothalamic pituitary adrenal axes, and the autonomic nervous system.
Research currently focuses on the underlying causes of allodynia (pain from normally non-noxious stimuli) and hyperalgesia (heightened response to painful stimuli). Increased tenderness to pressure, also referred to as mechanical hyperalgesia, or mechanical allodynia, is the most consistent finding in fibromyalgia research (Williams et al., 2009; Cook, et al., 2004; Gracely, Petzke, Wolfe & Clauw, 2002). Pain-testing paradigms have helped eliminate potential biases of self-report in perception of subjects’ tenderness to pressure sensation (Williams et al., 2009; Cook, et al., 2004; Gracely, Petzke, Wolfe & Clauw, 2002). Current research data points to central mechanisms that augment pain, referred to as wind-up, or other mechanisms that attenuate the activity in descending anti-nociceptive pathways. Heightened response to evoked painful stimuli has been corroborated recently by functional brain-imaging techniques that permit visualization of brain and nervous system structures purportedly involved in pain processing.
Hyperalgesia to stimuli applied to the skin and a decreased threshold to heat, cold, and electrical stimuli are also reported by patients with fibromyalgia, along with decreased nociceptive thresholds with auditory tones.

Both findings suggest a generalized decrease in nociceptive threshold. A recent study by Geisser et al (2008) tested both the auditory and the pressure threshold in fibromyalgia. This study showed that such individuals displayed low thresholds to both types of sensory stimuli, and the shared variance between the two thresholds was indicative of a common underlying mechanism. The concept that fibromyalgia might reflect generalized neurobiological amplification of sensory stimuli has been demonstrated from functional imaging studies, which suggest that the insula is the most consistently hyperactive neurocortical region of the pain matrix.

The insula is thought to play a critical role in sensory integration,
both sensory and emotional processing of sensations (Williams et al., 2009). Advances in functional neuroimaging, including SPECT (single-photo-emission computed tomography), fMRI (functional MRI), and PET (positive emission tomography) have permitted imaging investigation in the past ten years and substantial evidence from such studies suggest that central factors are important in pain processing in individuals with fibromyalgia (Williams et al., 2009). Neuro-imaging study results, coupled with research findings in the more general area of pain, point to a narrow range of pain tolerance, and possibly sensory tolerance, before the sensation is perceived as noxious (Williams et al., 2009). Brain imaging studies of fibromyalgia patients have shown hypothalamic hypoperfusion, and decreased gray matter density in the thalamus (Schmidt-Wilcke et al., 2007; Schweinhardt et al., 2008). Other studies have demonstrated thalamic hypoperfusion related to neuropathic pain of central and peripheral origins (Garcia-Larrea et al., 2006; Schweinhardt et al., 2008). Fibromyalgia patients exhibit evidence of a dysfunctional dopamine system, and dopamine agonists are effective in alleviating pain in some patients.

Dopamine is involved for brain functions, including cognitive functioning (such as memory and concentration), pleasure, motivation, and motor control; therefore, an impaired dopaminergic system may contribute to the affective and motivational symptoms of individuals with fibromyalgia.
syndrome (Schweinhardt et al, 2008; Yunus & Aldag, 1996). It has been noted that the incidence of restless leg syndrome, strongly associated with dopaminergic pathway disturbance, is significantly increased in fibromyalgia.

(Schweinhardt et al, 2008; Yunus & Aldag, 1996). Fibromyalgia patients also show an increased prolactin response to the buspirone challenge test, suggesting increased dopamine sensitivity (Malt, Olafsson, Aakvaag, Lund, & Ursin, 2003; Schweinhardt et al, 2008). A recent PET study showed decreased binding potentials for exogenously administered mu-opioid receptor in the ventral striatum, anterior cingulated cortex, and the amygdala. All are areas of the brain implicated in modulating pain and emotions (Harris et al, 2007; Schweinhardt et al, 2008).

An analysis of gray matter density in patients with fibromyalgia and that of healthy controls, showed a reduction in gray matter in the posterior cingulated cortex (PCC) in fibromyalgia patients. The PCC is active in orientation toward self-relevant sensations, so abnormalities in
this area may be due to ongoing processing of spontaneous pain (Schweinhardt et al., 2008; Wik, Fischer, Bragee, Kristianson, & Frederickson, 2003). Abnormalities in the serotoninergic system has been thought to contribute to fibromyalgia. Serotonin metabolites are lower in patients with fibromyalgia, in addition to lower levels of dopamine and noradrenaline metabolities (Clauw et al., 2003; Schweinhardt et al., 2008). What is largely believed to be an underlying central pain and sensory stimuli processing impairment associated with fibromyalgia, is impacted by genetic and environmental factors that affect physiological, psychological, behavioral, and cognitive systems. Other pathophysiological processes studied in association with fibromyalgia include 1) familial and genetic predisposition; 2) environmental stressors as triggers; 3) HPA (hypothalamic-pituitary-adrenal axis) and autonomic nervous system dysfunction; 4) pain and sensory processing; and 5) cognitive, behavioral, and psychological factors.

Research shows a relationship between neurobiologic, psychosocial, and behavioral components in pain syndromes (Antai-Otong, 2005; Peterson, 2007). The interaction of functional abnormalities in these areas interact to manifest in symptoms and result in functional decline (Williams et al., 2009). It has been suggested that fibromyalgia is a stress-related disorder. Observation of decreased gray matter density in the
The perihippocampal gyrus has been observed in regions of the brain associated with pain modulation and/or stress, including the cingulate, insular and medial frontal cortices, parahippocampal gyri, and thalamus (Kuchinad, et al., 2007; Schmidt-Wilcke et al., 2007; Schweinhardt et al., 2008; Staud, 2007; Okada, Tanaka, Kuratsune, Watanabe, Sadato, 2004; Villarreal et al., 2002). These findings are significant because similar abnormalities in the perihippocampal gyrus have been reported in other stress-related disorders, such as chronic fatigue syndrome and posttraumatic stress disorder (PTSD) (Kuchinad, et al., 2007; Schmidt-Wilcke et al., 2007; Schweinhardt et al., 2008; Staud, 2007; Okada, Tanaka, Kuratsune, Watanabe, Sadato, 2004; Villarreal et al., 2002).

Atrophy of the hippocampus and other brain areas, including the amygdala and prefrontal cortex, follows elevated glucocorticoid levels. It is suggested that elevations associated with the diurnal rhythm and stressful experiences might be sufficient.
to produce structural changes in the hippocampus in susceptible individuals, and such changes are not caused merely by sustained stress levels of adrenal steroids (McEwen, 2000; Schweinhardt et al, 2008). Impairment of the HPA axis, which may be due to the impact of early life stress, severe, or prolonged stress, is a strong predictor for the development of chronic, widespread pain.

It is suggested that the structural and neurochemical changes identified in fibromyalgia patients could all be caused by exposure to stress by vulnerable individuals. Their susceptibility to develop widespread chronic pain following exposure to stress, could likely be related to their genetic predisposition (McBeth et al, 2007; Schweinhardt et al, 2008). Fibromyalgia patients often associate onset of illness following trauma, surgery, or a motor vehicle accident, often in the craniocervical region. The development of fibromyalgia has been estimated to be 13 times more common after neck injuries than following lower extremity injuries.

Patients also report neurologic symptoms, such as paresthesias, blurred vision, numbness, and weakness.
with numbness estimated to be present in up to 84% of patients. These symptoms overlap with symptoms of patients with abnormalities such as Arnold Chiari I malformations, spinal stenosis, and positional cervical compression.

Blinded, controlled studies have not been done to date to systematically assess objective neurologic findings in this patient population (Watson, Buchwald, Goldberg, Noonan & Ellenbogen, 2009). Pain is affected by psychological factors, including psychiatric disorders, and psychosocial influences.

Major depression, anxiety disorders, and personality disorders can coexist with fibromyalgia and have a negative effect on pain. While chronic pain often accompanies psychiatric conditions, they should not be viewed as the same condition. Treatment of a coexisting psychiatric condition in a patient with chronic pain is not likely to fully impact chronic pain. Both conditions need to be treated, usually with different interventions. Neuroimaging studies show that the augmented pain perception seen in fibromyalgia patients occurs whether the patient has depression or not (Williams et al, 2009). Relevant Clinical Issues Age at Presentation The most common age group of individuals with fibromyalgia is 45 to 60 years of age. Epidemiological studies report prevalence of the condition increases
Fibromyalgia is also found in males, children, adolescents, and older adults. Prevalence steadily increases up to age 80, and declines thereafter (Chakrabarty & Zoorob, 2007). Symptoms experienced by patients with fibromyalgia are highly unique to the individual; however,

- **the cardinal symptom of fibromyalgia is diffuse, aching musculoskeletal pain.** Patients may describe the pain as burning, gnawing, soreness, or stiffness, and often

- **complain of muscle pain after even mild exertion.**

Patients frequently describe a sensation of swelling in their joints; however, there is no evidence of edema or inflammation of examination (Goldenberg, 2009). Some degree of pain is persistent. Although

- **the pain may initially be localized in the neck and shoulder,** it eventually involves multiple muscle groups. Typically, patients complain of axial pain in the neck, middle, and lower back, chest wall, arms, and legs (Langford & Gilliland, 2008). Morning stiffness is usually present and often

- **improves during the day in some, but not in all patients.**

Fatigue is estimated to be

- **present in more than 90% of cases, and may be the chief complaint.** Patients often are light sleepers, who awaken frequently during the night, and have trouble getting back to sleep. Not surprisingly, they often wake up feeling tired. Fibromyalgia patients may have numbness of their hands and/or feet...
and have a greater sensitivity to a cold environment. Patients report slowed thinking and loss of short-term memory. Some patients experience *migraine type* headaches.

*light-headedness, dizziness, anxiety, or depression. Symptoms are exacerbated by stress, anxiety, cold and damp weather, and overexertion. Patients often feel better during warmer weather and while on vacation* (Langford & Gilliland, 2008). Cognitive difficulties experienced by fibromyalgia patients include confusion, memory lapses, difficulty with words, and with concentration. The collective cognitive impairment is commonly known as *fibro fog* (The Arthritis Foundation, 2006). Fibromyalgia patients may have *a variety of other poorly understood pain syndromes, such as irritable bowel syndrome,* pelvic pain, frequency, and urgency suggestive of interstitial cystitis. Additional symptoms may include ocular dryness, multiple chemical sensitivity and allergies, palpitations, dyspnea, vulvodynia, dysmenorrhea, sexual dysfunction, weight fluctuations, night sweats, dysphagia, dysgeusia, and other intolerance. (Langford & Gilliland, 2008; The Arthritis Foundation, 2006). Diagnosis

*Fibromyalgia is diagnosed through a combination of patient history and physical examination* (Arnold et al, 2008).

*Specific and sensitive tools for establishing a differential diagnosis or for assessing effects of treatment in fibromyalgia patients are still in development. Fibromyalgia patients usually require observation over a period of time to*
firmly establish the diagnosis and rule out similar conditions. The differential includes drug-induced myopathies, hypothyroidism,

connective tissue, autoimmune, and rheumatologic disorders such as spondyloarthropathy, dermatomyositis, polymyositis, systemic lupus erythematosus, and polymyalgia rheumatica (Quisel, Gill, & Walters, 2004; Peterson 2007). Other possible diagnoses, which require testing for exclusion, include mononucleosis, diabetes, multiple sclerosis, Sjogren's syndrome, and Lyme disease (Peterson, 2007).

In 1990, the largest diagnostic criteria study, conducted by the American College of Rheumatology (ACR), enrolled 293 fibromyalgia patients and 265 patients with chronic rheumatic disorders, including low back pain, neck and arm pain, osteoarthritis, and rheumatoid arthritis.

The requirement that both widespread musculoskeletal pain and excess tenderness, in at least 11 of 18 predefined sites, results in 80% sensitivity and specificity in differentiating patients with fibromyalgia from controls who have other chronic painful disorders. These criteria have been validated in broad-based population studies, and are
thought to be purported to be highly reliable (Goldenberg, 2009). In practice, a patient may actually be diagnosed with fibromyalgia, without satisfying the recommended number of tender points.

Moreover, the criteria are subjective, because both are based entirely on the patient report (Goldenberg, 2009). The ACR defined the criteria for Fibromyalgia Syndrome (FMS) as follows: 1) a history of widespread pain. Pain is considered widespread when all of the following are present: pain on both sides of the body, above and below the waist, in addition to axial skeletal pain (cervical spine, anterior chest, thoracic spine or lower segment spine), and 2) pain, on digital palpation with an approximate force of 4 kg,

in at least 11 of the following 18 sites: occiput, low cervical, trapezius, supraspinatus, second rib, lateral epicondyle, gluteal, greater trochanter, and knee (Wolfe et al., 1990). According to the ACR,

a tender point is not considered positive, unless the subject states that the palpation was painful, not merely tender.

The ACR criteria requires that widespread pain must be present for three months, while the presence of a second clinical disorder does not exclude the diagnosis of fibromyalgia.
The optimal number of tender points for use in clinical diagnosis is controversial. A number less than 11 may be appropriate, although the ACR criteria use 11 as the minimum number required for diagnosis. In a study of 200 subjects, half with clinical diagnosis of fibromyalgia, the presence of ≥ 6 tender points had a sensitivity and specificity of 80 to 87%, respectively (Goldenberg, 2009). In the study population, the sensitivity and specificity of a threshold of ≥ 11 tender points were approximately 50 to 95 percent, respectively. Use of pain diagrams, instead of the tender point examination, yielded similar diagnostic utility. It is suggested that, until additional studies are reported, the ACR criteria of ≥ 11 of 18 tender points be used for both clinical trials and diagnosis (Goldenberg, 2009). Currently, laboratory analysis or imaging tests are not useful in the diagnosis of fibromyalgia; however, laboratory tests are usually required to rule out other conditions. These tests include complete blood count, complete metabolic panel (CMP), hepatic and renal panel (if not included in the CMP), rheumatoid factor, creatinine phosphokinase, T3, and T4, thyroid-stimulating hormone,
A comprehensive physical and history, including musculoskeletal and neurologic examination should be routinely performed to exclude arthritis, connective tissue disorder, or neurologic condition. In addition, a rheumatology, neurology, and psychiatric evaluation are recommended to arrive at an accurate diagnosis of fibromyalgia (Peterson, 2007; Goldenberg, 2009). Prognosis The development of a cure for fibromyalgia syndrome is unlikely until the causes and mechanisms of this syndrome are well defined. Most patients with fibromyalgia continue to have chronic pain and fatigue (Peterson, 2007). Approximately 10 to 30 percent of patients with fibromyalgia report that they are work disabled, a higher percentage than some other groups with chronic pain (Goldenberg, 2009).
Certain psychological factors may be associated with a better prognosis.

A study of 198 patients reported the following shared beliefs:

1) an increased sense of control over pain;
2) a belief that one is not disabled;
3) a belief that pain is not a sign of damage. Behaviors associated with better outcomes included:
1) seeking help from others;
2) decreased guarding during examination;
3) exercising more; and
4) pacing activities

(Gracely et al., 2004). A meta-analysis concluded that clinicians can expect that only one out of four fibromyalgia patients will experience an improvement in symptoms, even with appropriate treatment. Fibromyalgia patients must be educated to understand that, although total relief from all symptoms may not be possible, studies show that a multi-component treatment regime of education, psychological support, medication, and exercise can improve their daily functioning and sense of well-being.

(Peterson, 2007). Discussion Clinical presentation
Some clinicians may not recognize fibromyalgia as a diagnosis, may classify the condition as a psychiatric disorder, or simply dismiss it altogether as lacking credibility. Patients are left feeling confused, invalidated, and frustrated as they are left to cope with the impact of the many challenging symptoms and adverse effects on their quality of life. This scenario is slowly changing, as clinicians become more aware of the condition, through publication of scientific studies and new treatment options (Arnold, et al., 2008). Qualitative studies of fibromyalgia patients used individual patient interviews to explore their personal experience of living with the syndrome.

In these studies, patients consistently described symptom domains that interfered with their function and quality of life (Arnold et al., 2008; Cunningham & Jillings, 2006). Patients share a common theme of their difficulty dealing with a disorder that has no visible outward signs, and they are concerned that their physicians do not take them seriously (Arnold et al., 2008; Cunningham & Jillings, 2006). The restricted definition published by the ACR does not address other symptoms that accompany fibromyalgia, the most common of which are poor sleep quality, morning stiffness, and fatigue. Interestingly, the prevalence of fibromyalgia in the general population in the United States, using the
ACR classification criteria, was reported to be 3.4% in women and 0.5% in men, which are considerably lower than recent estimates as high as 10% (Chakrabarty & Zoorob, 2007; Clauw & Crofford, 2003; Langford & Gilliland, 2008; Rutledge, et al., 2009). While the publication of the ACR criteria led to a marked interest in fibromyalgia research, many questions remain unanswered. Most notably, there has not been consensus on the cause of fibromyalgia syndrome, treatment, or even whether it should be considered as a distinct clinical entity (Abeles et al., 2007). The ACR criteria was originally intended for use only in clinical studies but have been widely relied upon by clinicians as a basis for diagnosis. Use of the ACR criteria in this way has led to certain misconceptions about fibromyalgia syndrome, i.e., it is solely a chronic pain condition, a discrete illness of the peripheral muscles, and usually associated with psychiatric illness (Williams et al 2009; Abeles et al, 2007).

Clinical trials of fibromyalgia treatment have incorporated some of the symptom domains and impact described by patients in previous qualitative studies. A lack of consensus exists about the full set of domains that should be evaluated in treatment trials or to be evaluated as part of routine assessment. A recent study attempted to elicit and assess important symptom domains and the impact of fibromyalgia.
The syndrome on patients' quality of life and functioning from a patient's perspective (Arnold et al., 2008). The goal was to collect the information to contribute to an overall effort to overcome shortcomings of existing outcome measures in fibromyalgia.

Focus groups were conducted with 58 fibromyalgia patients, who identified symptom domains that had the greatest impact on their quality of life.

Findings revealed that fibromyalgia has a substantial negative impact on patients' lives, due to reported pain, sleep disturbance, fatigue, depression, anxiety and cognitive impairment.

In addition, the syndrome had a substantial negative impact on social and occupational ability to function. As a result, relationships with family and friends were disrupted, and they experienced social isolation. The focus group participants also reported reduced activities of daily living and leisure activities, avoidance of physical activity, loss of career and/or ability to advance in their careers or education.
Implications for practice include recommendations for comprehensive assessment of the multiple symptoms domains associated with fibromyalgia, as well as its impact on multidimensional aspects of function as a routine part of the care of the fibromyalgia patient (Arnold et al., 2008).

Relevant clinical issues for the older adult

Fibromyalgia syndrome affects 7% of women between the ages of 60 to 79 years. There is increasing evidence that fibromyalgia is a genetic disorder; therefore, health care providers should obtain a thorough family history in the older adult with the suspected condition (Weiner, 2007). Fibromyalgia in the older adult is less likely than in younger patients to be manifested by chronic headaches, anxiety, and symptoms aggravated by weather, mental stress, or poor sleep.
Chronic pain, defined as pain persisting beyond three to six months, is a treatable condition affected by an estimated 50% of community-dwelling older adults and more than 75% of long-term care facility residents (Weiner, 2007). Chronic pain has numerous consequences for the older adult, including impaired physical function, depression, anxiety, disrupted appetite, and excessive use of health care resources. Chronic pain should be aggressively treated in this population (Weiner, 2007). The health care provider should keep three general principles in mind, and communicate the following to the older patient: 1) chronic pain is a syndrome, which requires treatment to afford an optimal clinical outcome; 2) chronic pain is treatable but may not be curable; 3) improvement is the rule, not the exception; and 4) it is often possible to improve functional ability to a greater extent than the severity of pain is reduced (Weiner, 2007).

Aerobic exercise is an important component of treatment in the...
Medications, such as selective serotonin reuptake inhibitors (SSRIs), pregabalin, and cyclobenzaprine, may be effective in targeting pain, fatigue, reduced activity tolerance, and sleep disturbance. Amitriptyline, a recommended medication for treatment of fibromyalgia in the middle aged adult, should be avoided in the older adults due to its anticholinergic, sedating, and hypotensive effects in these patients (Reuben et al., 2009). The use of cyclobenzaprine is also recommended for treatment of fibromyalgia in the middle aged adult; however, high doses in the elderly caused drowsiness and dizziness. Therefore, use the lowest dose possible. Due to its anticholinergic effects, it is not the skeletal muscle relaxant of choice in the elderly (Turloski, Lance & Tomsik, 2009). The older adult should be referred for interdisciplinary treatment, that may include cognitive-behavioral therapy, along with instruction in self-management techniques and taught to pace participation in aerobic exercise (Weiner, 2007). Chronic pain may co-exist in older adults with dementia. Those with dementia may have exaggerated fear responses to pain, which can amplify the pain experience (Weiner, 2007). Pharmacologic and non-pharmacologic therapies should also be offered to the older adult with dementia (Weiner, 2007). Treatment After years of clinical research, great ambiguity regarding treatment for fibromyalgia continues. Available therapies include pharmacologic treatment, and nonpharmacologic therapies, including
patient education, exercise, cognitive-behavioral therapy (CBT), and alternative therapies, usually in combination. Most agree that a combination of therapies may be the best approach (Navarro, 2009). A recent systematic review of the efficacy of multicomponent treatment of fibromyalgia syndrome included nine randomized controlled clinical trials with 1,119 subjects in the meta-analysis (Hauser, Bernardy, Arnold, Offenbacher & Schiltenwolf, 2009).

There was strong evidence that multicomponent treatment reduces pain, fatigue, depressive symptoms, and limitations.

Multicomponent treatment was shown to improve health-related quality of life, self-efficacy pain, and physical fitness in the short term.

There was no evidence of its efficacy on pain, fatigue, sleep disturbances, depressive symptoms, health-related quality of life, or self-efficacy pain in the long term. While there was strong evidence that positive effects on physical fitness can be maintained in the long term,
strategies to maintain the benefits of multicomponent treatment in the long term need to be developed

(Hauser, Bernardy, Arnold, Offenbacher & Schiltenwolf, 2009). Treatment should begin by educating the patient about fibromyalgia syndrome, and developing realistic treatment goals together. Patients may need referral to a mental health professional for cognitive-behavioral therapy (CBT)

if they have persistent symptoms, significant impairment of physical function, and a high level of emotional stress.

Fibromyalgia patients, who have multiple comorbidities and complex symptoms may benefit from referral to an interdisciplinary pain rehabilitation facility that addresses the medical, physical, and emotional components of the syndrome and related disabilities

(Turk & Wilson, 2009). Treatment should be tailored to the unique needs of the individual fibromyalgia patient, as the combination of symptoms varies significantly. Access to some drugs may be limited by formulary restrictions, and health care providers may not be aware of the latest evidence or FDA approvals (Navarro, 2009).

The Fibromyalgia Impact Questionnaire (FIQ) was developed by clinicians at Oregon Health & Science University in an effort to capture the total spectrum of problems related to fibromyalgia and response to therapy (Navarro, 2009).
has been used extensively as an index of therapeutic efficacy,

and

shown to have a credible construct validity, reliable test-retest characteristics and a good sensitivity in demonstrating therapeutic change.

The latest version of the FIQ can be found at the web site of the Oregon Fibromyalgia Foundation (www.myalgia.com/FIQ/FIQ).

Limitations of American Pain Society Guidelines The American Pain Society (APS) developed evidence-based guidelines for diagnosis and treatment of fibromyalgia in 2005. A consensus panel of experts in pain management performed a comprehensive review of 505 peer-reviewed clinical trials and meta-analyses from the preceding 25 years. Based on the rated evidence, the APS guidelines recommend multiple strategies for treatment, including pharmacologic and nonpharmacologic therapies, and stressed the value of patient education. The panel found strong evidence for CBT, aerobic exercise, and patient education. In pharmacologic therapies, the panel found strong evidence for amitriptyline and cyclobenzaprine, and moderate evidence for serotonin-norepinephrine reuptake inhibitors (SNRIs), SSRIs, tramadol, and pregabalin (Navarro, 2009). There are certain limitations to the APS guidelines. The evaluated studies had heterogeneous treatments, short durations, and inconsistent blinding and controls, limiting their generalizability and practical clinical application. All of the evaluated studies took place before FDA approvals of pregabalin, duloxetine, and milnacipran. Most of the studies focused on pain reduction and did not address other symptoms and outcomes, including patient global improvement and improved physical function (Navarro, 2009). Many experts, including those participating in a recent roundtable of clinical experts to explore issues in the management of fibromyalgia, consider the current fibromyalgia guidelines to have limited utility for practicing clinicians. One important basis for this opinion is that the guidelines do not reflect FDA approvals of three agents for fibromyalgia. The guidelines preceded the FDA
approvals, so the pharmacologic treatments discussed were off-label at that time (Navarro, 2009). Classes of Therapy Pharmacological Many drugs are available for the control of different fibromyalgia symptoms, including SNRIs, SSRIs, anticonvulsants, tricyclic antidepressants (TCAs), muscle relaxants, opioids,

**non-steroidal anti-inflammatory drugs (NSAIDs), and cyclo-oxygenase (COX)-2 inhibitors.**

Only three drugs have received FDA approval for treatment of fibromyalgia. They include Savella (milnacipran), Cymbalta (duloxetine), and Lyrica (pregabalin) (Dadabhoy & Clauw, 2006; Navarro, 2009). The FDA-approved drugs for fibromyalgia belong to classes that have demonstrated efficacy for fibromyalgia management. Available anticonvulsants include pregabalin, and gabapentin, which have been reported to have efficacy in randomized controlled trials (Navarro, 2009). Milnacipran and duloxetine are SNRIs with demonstrated efficacy and safety in fibromyalgia (Dadabhoy & Clauw, 2006; Navarro, 2009). It is believed that their serotonin- and norepinephrine-reuptake inhibiting actions may correct functional deficits in descending pain pathway processing (Stanford, 2009; Navarro, 2009). Venlafaxine and desvenlafaxine, are other SNRIs whose efficacy for fibromyalgia in established clinical trials has not been established (Dadabhoy & Clauw, 2006; Navarro, 2009). Studies fail to confirm the efficacy of NSAIDs and COX-2s in fibromyalgia patients (Navarro, 2009). Short-term studies demonstrated some efficacy with TCAs, but safety and individual ability to tolerate this class of drugs have limited their use. Efficacy of opioids in fibromyalgia clinical trials has not been shown, and this class of drugs has potential for dependence and abuse (Dadabhoy & Clauw, 2006; Navarro, 2009). A few controlled trials have been conducted using muscle relaxants for fibromyalgia patients, with mixed results (Navarro, 2009). Tramadol, which combines opioid activity with SNRI activity, may have some efficacy, but has associated risk of withdrawal symptoms, abuse, and serotonin syndrome (Dadabd & Clauw, 2006; Navarro, 2009). Studies of SSRIs have shown efficacy for mood and fatigue in fibromyalgia, but limited efficacy for pain (Navarro, 2009). Nonpharmacological 

**Exercise** The APS recommends exercise as a first-line treatment. Unfortunately, studies suggest that adherence to exercise recommendations is very low. Barriers to exercise include pain, severity, fatigue, and depression,

all of which can be addressed before and during exercise therapy (Arnold, 2006; Turk & Wilson, 2009). A systemic review concluded that

**walking, simple strength training movements, and stretching activities improved**
functional status, key symptoms, and self-efficacy in women with fibromyalgia, concurrently being treated with medication.

(Rooks et al., 2007). The benefits of exercise were found to be enhanced when combined with targeted self-management education.

(Rooks et al., 2007). A randomized controlled trial to examine the effectiveness of concurrent strength and endurance on muscle strength, symptoms, aerobic and functional performance in postmenopausal women with fibromyalgia showed beneficial effects on symptoms (Valkeinen et al., 2008). It should be noted that for the older adult, especially those with chronic conditions, the maintenance of physical fitness and working toward some improvement are realistic goals for training (Valkeinen et al., 2008). Strong evidence has been shown for the effectiveness of hydrotherapy in the treatment of fibromyalgia syndrome, with improvements noted in pain, health status and tender point count (McVeigh, McGaughey, Hall & Kane, 2008). Hydrotherapy may be better tolerated than in the older adult than more vigorous forms of exercise. Cognitive Behavioral Therapy CBT is also recommended by the APS as a
first-line treatment. The major goals of CBT are to help fibromyalgia patients understand the effects that thoughts, beliefs, and expectations have on their symptoms. Self-management is a central theme of the therapy (Turk & Wilson, 2009).

Studies report that CBT is effective for fibromyalgia patients, whether given individually or in a group setting. Numerous studies concluded that CBT is effective in alleviating symptoms of depression and anxiety, and may be particularly useful for fibromyalgia patients suffering from one of these disorders (Arnold, 2008). Acupuncture There are conflicting reports of the effectiveness of acupuncture for relief of pain in fibromyalgia patients. There are some reports indicating effectiveness of traditional Chinese acupuncture for pain relief in patients with fibromyalgia (Martin, Sletten, Williams & Berger, 2006). A partially blinded, controlled randomized clinical trial found that acupuncture significantly improved symptoms of fibromyalgia. Symptomatic improvement was not restricted to pain relief and was most significant for fatigue and anxiety (Martin, Sletten, Williams & Berger, 2006). In contrast, a systematic review of randomized clinical trials concluded that acupuncture for effective treatment of fibromyalgia is not supported by the results from rigorous clinical trials. However, only five randomized clinical trials met inclusion criteria. Two trials had negative results.
while the other three trials reported positive results. Those that reported positive results were limited by poor study design (Mayhew & Ernst, 2007; Goldenberg, 2009). Complementary/alternative therapies There are few studies examining the effectiveness of

trigger point or tender point injections, EMG-biofeedback, chiropractic, or massage in the treatment of fibromyalgia. Most of the studies are either anecdotal or lack quality control (Goldenberg, 2009). Conclusion Fibromyalgia syndrome remains a complex and often disabling chronic pain disorder. Patients encounter a myriad of confusing symptoms, which they must struggle to make sense of, as they move travel on a long and stressful path to diagnosis. It is the fortunate patient who can consult with a health care provider abreast of the latest study findings and recommendations, and receive treatment options geared toward the best chance of symptom relief and productivity. This arduous journey requires patience and commitment to find a competent provider, and to explore various treatment options, in a trial and error fashion, until they find the regime that offers them the most effective relief. Treatment options must be tailored to meet the special needs of the older adult, who likely has co-existing physical limitations due to aging, as well as changes in their ability to metabolize and excrete medication. Health care providers face their own unique challenges when caring for patients with fibromyalgia, including the difficulty of sorting through an often murky presentation that mimicks many other conditions and diseases. Clinical practice guidelines, such as those published by the ACR, are rapidly becoming outdated, as new research and medications change diagnostic criteria, and management of fibromyalgia. There has been an explosion of research in the past five years, the most exciting of which was possible through the use of developed functional neuroimaging studies of the brain and nervous system in patients with fibromyalgia. Identification of genetic polymorphisms in neurotransmitter systems may soon lead to heightened screening and personalized medicine for improved patient outcomes in response to treatment. Providers must conscientiously follow new developments in fibromyalgia research to provide optimal care to the fibromyalgia patient. References


