Fibromyalgia
Diagnosis and Treatment - Part 2

Part 1 - November 2008
Definition, Prevalence, Diagnosis

Part 2 - December 2008
Etiology (Cause)

Part 3 - January 2009
Treatment
Etiology (Cause)

The cause of fibromyalgia is not fully understood yet, though it may involve abnormalities in peripheral and central sensory processing,[23] which may be triggered by viral infections, Lyme disease, hepatitis C, hormonal and endocrine changes, drugs, vaccines, and physical trauma.[8,17,18,19,20,21,24,25,26].

Central sensitization leads to functional changes in the central nervous system which reduce pain threshold, enlarge neuron receptive fields, and increase spinal cord neuron excitability.[23] Once central sensitization has occurred, only minimal input is required for an increased response to pain and the maintenance of a chronic pain state.[23,27,28]
SPECT Scans

Nuclear medicine utilizes SPECT (Single Photon Emission Computerized Tomography) technology to perform brain scans.[39] This records brain functioning by measuring perfusion (blood flow).[39] In patients with fibromyalgia, cerebral blood flow is altered.[39] Furthermore, the larger alternations in perfusion have been linked to increased symptom reports.[39] Significant hyperperfusion has been found in regions of the brain known to be involved in the sensory dimension of pain processing.[40]

One SPECT study examined a blockade of facilitatory descending modulation of pain with ketamine.[41] Midbrain rCBF showed a greater increase after ketamine and was correlated with a reduction in pain.[41]

Another SPECT study found that young women with fibromyalgia had a significantly higher radioactivity uptake ratio in the right and left caudate nucleus.[42] Significant correlations exist between regional cerebral blood flow, morning stiffness, and sleep disturbance.[42] There was a significant increase in rCBF of caudate nuclei, a reduction in the pons, some cortical regions activity, and an increase in IL 8, IL2r levels, findings which were more prominent in patients with low depression rates.[42]

Gi Protein

Gi protein is hypofunctional in fibromyalgia and unaltered in neuropathic pain, rheumatoid arthritis, and osteoarthritis. Furthermore, patients with fibromyalgia showed basal cAMP levels which were higher than the controls.[38]
Neurotransmitters

Reduced dopamine, norepinephrine, and serotonin levels have been found in the cerebrospinal fluid of fibromyalgia subjects.[29] Dopamine is an important neurotransmitter (messenger) which facilitates critical brain functions. Imbalanced dopamine activity can cause brain dysfunction and disease. Classified as a catecholamine, dopamine improves nerve conduction, is a natural pain killer, and assists in lessening movement disorders such as that seen in Parkinson’s disease.

Studies show an association between fibromyalgia and a disruption of dopaminergic neurotransmission, which results in reduced dopamine metabolism within the pain neuromatrix.[30,31] This has been demonstrated in both PET scans and an increased prolactin response to a buspirone challenge test[30,31]

These reduced levels result in decreased presynaptic inhibition of pain-related primary afferent neurons.[33] Serotonin also has important roles in other domains often altered in fibromyalgia patients, including regulation of mood, sleep, and pain perception.[34,35]

Serotonin inhibits the release of substance P and other pain processing neurotransmitters.[32] Elevated levels of cerebrospinal substance P found in fibromyalgia patients may be related to reduced serotonin.[33,34] Patients with fibromyalgia detect pressure and stimuli at the same levels as control groups; however, they experience pain at lower levels than controls.[35,36]
Environmental Factors

Various “stressors” such as viral infection, physical trauma, and exercise can both initiate and trigger fibromyalgia.[8,37] Illness or injury may damage the corticotropin-releasing hormone nervous system that activates the sympathetic nervous system and reduces cellular immune function.[8,37] In patients with fibromyalgia this system functions suboptimally, leading to increased physiologic response.[8,37]

Environmental factors may trigger the development of chronic pain disorders in individuals with a genetic predisposition.[44] Intolerance to certain foods and chemicals is linked to fibromyalgia.[8] These intolerances are best described as hypersensitivities rather than immunoglobulin E-mediated allergic reactions.[8] Serum glutathione and catalase levels were significantly lower in subjects with fibromyalgia, a finding that was significantly correlated with the level of morning stiffness.[43] Furthermore, a significant correlation was found between serum nitric oxide levels and pain. [43]

Mimicking Conditions

There are several conditions which mimic fibromyalgia and should be ruled out and/or treated. [8] They include hypothyroidism, polymyalgia rheumatica, autoimmune disorders, hepatitis C, sleep apnea, chiari malformation, and celiac disease. [8]
References