

FIBROMYALGIA RESEARCH REVIEW

JOANNA RAWLING

This month we will be discussing the idea that fibromyalgia syndrome is a "sensitivity to everything" syndrome, and the concept of "central sensitivity" syndromes.

DID THE PRINCESS ON THE PEA SUFFER FROM FIBROMYALGIA?

"The princess on the pea" is a Danish fairy tale by Hans Christian Anderson, which was first published in 1835. It formed part of Anderson's first volume of fairy tales "Eventyr, fortalte for Born" (Fairy Tales, Told for Children), and was also known as "The Real Princess" or "How to tell a True Princess".

The fairy tale relates the story of a prince, who longed to marry not just any girl, but a real princess. One stormy night a knock came at the town gate. The old king answered the door and, to his great surprise, found a young girl, soaked to her skin from the rain. In spite of her appearance, the visitor claimed that she was a real princess. The queen decided to test the young girl's claim to nobility by placing a pea in the girl's bed. On top of the pea, the queen stacked 20 mattresses, and on top of the mattresses, the queen stacked 20 eiderdown feather beds! The princess lay on this all night, and the following morning the queen asked how she had slept. "Oh, very badly!", the young girl replied. "I have scarcely closed my eyes all night. Heaven only knows what was in the bed, but I was lying on something hard, so that I am black and blue all over my body. It's horrible!" Now the queen knew that the girl was a true princess - only a real princess could be so sensitive as to feel a pea underneath so many layers..... Or should that be corrected to "only a real princess and a fibromyalgia sufferer could be so sensitive".....?!

Researchers from Sweden have suggested that the princess on the pea suffered from fibromyalgia syndrome (FMS), which is characterised not only by a heightened sensitivity to pain, but also by fatigue and sleep disturbances, just like those experienced by the princess on the pea. Sleep is divided into various ordered stages that can be monitored by recording electrical activity of the brain. In healthy individuals, the initial phases 1 and 2 of drowsiness/light sleep are followed by successively deeper stages of phase 3 and 4 sleep. Deep sleep, in particular stage 4, is important for the release of hormones essential for muscle growth and repair. However, an interruption of deep sleep is observed in FMS patients, many of whom fail ever to attain stage 4 sleep. In addition, many FMS patients experience cognitive dysfunction, characterised by impaired concentration and short-term memory loss, which are symptoms common to other sleep disorders. Interestingly, investigators were able to reproduce many symptoms of FMS, (aches, stiffness, fatigue and tenderness), by using noise to disturb stage 4 sleep in healthy volunteers, emphasising the important role of sleep in FMS. The princess's heightened sensitivity to pain may have led to her disturbed night's sleep. However, since deep sleep is required to balance the level of chemicals in the central



nervous system, it is possible that failure to obtain deep sleep further perpetuates pain sensitivity, setting up a vicious cycle.

Acupuncture is a complementary therapy in which fine needles are inserted into the skin at specific points on the body. Acupuncture is used to treat chronic pain, and may work by stimulating the production of the body's natural painkillers, endorphins. Although recent reviews examining the efficacy of acupuncture in FMS have concluded that acupuncture has no specific effect, the Swedish authors of an article published in "Acupuncture Medicine" highlight the fact that most studies have focused only on the ability of acupuncture to improve pain. In contrast, they observed an amelioration of not only pain, but also sleep and cognitive dysfunction in response to acupuncture, suggesting that sleep and related symptoms should be taken into account when evaluating the effect of acupuncture on FMS. Clinical studies support this view, since acupuncture has been shown to affect insomnia and alertness. Furthermore, the findings of the authors referenced below demonstrated great variability among individuals, which may also explain why previous studies examining the effect of acupuncture on large groups of FMS sufferers have missed the potential benefits of this complementary therapy.

There is clearly some debate as to whether acupuncture improves fibromyalgia pain in clinical studies, however sufferers may benefit from an improvement in a number of FMS symptoms, in particular improved sleep, following an individualised acupuncture treatment plan. It would be interesting to hear the experiences of FaMily readers who have undergone acupuncture treatment programmes and no longer feel like "the princess on the pea."

Lundeberg, T. and Lund I. 2007. *Acupunct. Med.* 25:184-197. "Did the Princess on the Pea suffer from fibromyalgia syndrome? The influence on sleep and the effects of acupuncture."

Rehabilitation Medicine, University Clinic, Danderyds Hospitals, AB Stockholm, Sweden.

FIBROMYALGIA PATIENTS MAY BE MORE SENSITIVE TO SOUND.

Although fibromyalgia syndrome (FMS) is thought to primarily result from dysfunctional pain processing, there is growing evidence that FMS patients also display greater sensitivity to sensory stimulation, including touch, sound, heat and electrical stimulation. It has been suggested that FMS sufferers fail to inhibit pain signals following repetitive, non-painful stimuli, a condition termed "sensory amplification." However, despite this emerging evidence, there have been relatively few rigorous studies that conclusively prove the heightened sensitivity of FMS patients to sensory stimulation. For instance, many studies rely on a gradual increase in the intensity of the stimulus, therefore the study may be biased since the patients are "expecting" a greater stimulus, and therefore increased pain.

To address these issues, researchers from the University of Michigan tested 31 FMS patients and 29 healthy control subjects for their sensitivity to pressure and sound stimuli. Following a hearing test, all participants were subjected to pressure and auditory stimulation. Pressure pain sensitivity was evaluated by applying 5-second pressure to the thumbnail, either ascending in intensity or in random order. Patients were asked to rate their pain on a scale of 0-20, (0 signifying no pain). Similarly, participants were asked to judge loudness discomfort levels in response to auditory stimuli, either ascending or in random order. As expected, FMS patients displayed a greater sensitivity to thumbnail pressure and auditory tones, compared with healthy control subjects. In support of these findings, FMS patients reported significantly greater sensitivity to every-day sounds.

Sound and pressure sensitivity were found to be related with each other, in both fibromyalgia and healthy control groups, suggesting the existence of a common underlying mechanism for both. The researchers therefore hypothesise that FMS may result from "a global disturbance in sensory processing, rather than an isolated abnormality in pain processing." However, it is not known whether the heightened sensory sensitivity observed among FMS patients is a cause or a consequence of FMS.

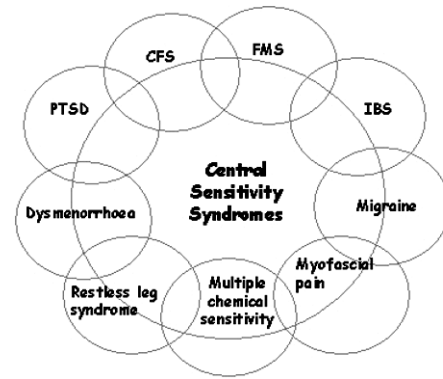
Neuroimaging studies that permit visualisation of brain activity have previously suggested that FMS patients display heightened brain responses to pain, in particular in the region of the brain known as the insula. Interestingly, regions of the insula are thought to be involved in the response to a variety of sensations arising from within the body, including pain, temperature, itching, touch, hunger, thirst and muscular sensations. Future neuroimaging studies may be able to reveal whether sufferers of FMS and other chronic pain conditions experience heightened responses to noise within this region of the brain. In conclusion, the current study suggests that FMS is associated with a dysfunction of the central nervous system (brain and spinal cord) in sensory processing. These findings may therefore explain why so many fibromyalgia patients report pain arising from everyday stimuli, including bright lights, loud noises and extreme temperatures.

Geisser, G., Glass, J. M., Rajcevska, L. D., Clauw, D. J., Williams, D. A., Kileny, P. R. and Gracely, R. H. 2008. "A psychophysical study of auditory and pressure sensitivity in patients with fibromyalgia and healthy controls." *J. Pain* [E.pub ahead of print].

Chronic Pain and Fatigue Research Center, Department of Internal Medicine, Division of Rheumatology, University of Michigan, Ann Arbor, USA.

IS FIBROMYALGIA REALLY A "CENTRAL SENSITIVITY SYNDROME"?

The Rheumatologist Muhammad Yunus from the University of Illinois has grouped fibromyalgia syndrome (FMS) with several other similar syndromes, including chronic fatigue syndrome (CFS), irritable bowel syndrome (IBS), migraine, post traumatic stress disorder (PTSD) and restless leg syndrome (see diagram). Together, they are termed "central sensitivity syndromes", however other researchers have come up with alternative names. As Yunus describes in the article referenced below, some of these names ("polysymptomatic somatisers", "idiopathic pain disorders" and "psychosomatic syndromes") are of no help to the patient. Other names can even be considered as irresponsible, including "fashionable diagnoses", "medically unexplained symptoms" and "nondisease".



The term "somatisation disorder" is often applied to FMS. Somatisation is defined as a physical expression of psychological distress, and "somatisation disorder" refers to a psychiatric condition that has also been termed "hysteria" or "all in the mind"; hardly helpful for the FMS patient. However, brain imaging studies of patients suffering from central sensitivity syndromes have consistently demonstrated a heightened response to pain, which is thought to be mediated by abnormal levels of neurotransmitters (chemicals found in the brain and spinal cord that transmit pain signals). Yunus argues that these physical findings, combined with the consistent presence of tender points in FMS patients, argues against the classification of FMS as a psychological or somatisation disorder.

So what exactly are central sensitivity syndromes, and does fibromyalgia really belong to this group of illnesses? Central sensitisation is characterised by hyperalgesia (excessive sensitivity to painful stimuli, i.e. pressure), allodynia (excessive sensitivity to normally non-painful stimuli, i.e. touch), expansion of the receptive field of pain (pain that extends outside the area supplied by the affected nerves, and an unpleasant burning, throbbing or tingling quality to pain). Central sensitisation is mediated by biochemical changes in the central nervous system, which lead to hyperexcitability of nerve cells to painful and non-painful stimuli alike. Findings from studies conducted on FMS patients suggest that central sensitisation may result either from an excess of chemicals (neurotransmitters) that transmit pain, e.g. substance P, or by a decrease in neurotransmitters that normally act to inhibit pain, e.g. serotonin and dopamine. In addition, it is thought that a host of other, multiple factors may combine to sustain or amplify central sensitisation, including genetics, hormones, viral infection, poor sleep, environmental stimuli (weather, noise, chemical pollution, childhood experiences) and psychological distress. It is likely that an interaction between biology and psychology leads to the development of a central sensitisation syndrome. However, it is hard to draw the line between where biology ends and psychology begins, since psychological factors may be determined by genes, and mediated by biochemicals! The association of FMS with IBS, CFS and migraine, combined with the abnormal levels of neurochemicals and brain activity found in FMS patients strongly suggest that fibromyalgia syndrome should be classified as a central sensitisation syndrome. Finally, Yunus comments that "This term, central sensitivity syndromes, that incorporates both biological and psychosocial components, will foster research in appropriate areas and improve physician-patient communication for optimal care."

Yunus, M. B. 2007. "Central Sensitivity Syndromes: A New Paradigm and Group Nosology for Fibromyalgia and Overlapping Conditions, and the Related Issue of Disease versus Illness." *Semin. Arthritis. Rheum.* [E.pub ahead of print].
Section of Rheumatology, The University of Illinois College of Medicine at Peoria, Peoria, Illinois, USA.