SAY WHAT???

GATE THEORY OF PAIN, CONVERGENCE AND SUMMATION

Melzack and Wall are best known for the Gate Control Theory of pain transmission, right?

An explanation as to why thoughts and emotions influence pain perception was proposed by Ronald Melzack and Patrick Wall. They said a gating mechanism exists within the dorsal horn of the spinal cord. **Small** (pain receptors) and **large** ("normal" receptors) **nerve fibers** synapse on **projection cells** (P), which go up the spinothalamic tract to the brain, and **inhibitory interneurons** (I) within the dorsal horn.

Interplay among these connections determines when painful stimuli go to the brain:

1. With no input, inhibitory neurons prevent projection neurons from sending signals to the brain (gate is **closed**).
2. Normal input occurs with more or only large-fiber stimulation. Both inhibitory and projection neurons are stimulated, with inhibitory neurons preventing projection neurons sending signals to the brain (gate is **closed**).
3. Nociception (pain reception) occurs with more or only small-fiber stimulation inactivating inhibitory neurons. Projection neurons send signals to the brain informing it of pain (gate is **open**).

Descending pathways from the brain close the gate, inhibit projector neurons and diminish pain perception, explaining a few things about pain perception. Rubbing or shaking your hand after banging your finger stimulates normal input to projector neurons, closes the gate and reduces pain perception.

That's what we learned in Chiropractic College/University.

In practice, all of us have learned that nothing is so cut and dry, therefore we go to more seminars and read more books and studies to hopefully help fill in the gaps in education.

I've taken over a million and a half dollars worth of seminars in my career, and for quite a few years purchased and read, cover-to-cover, over a thousand dollars per month of professional books and journals to help fill in the gaps.

I actually read ALL of Melzack and Wall's book *The Challenge of Pain*.

They quote William K. Livingston, 1943:

"I was brought up in a medical generation in which…pain was [considered to be] a primary sensation dependent upon the stimulation of a specific sensory ending by a stimulus of a certain intensity, and conducted along a fixed pathway to ring a special bell in consciousness. Pain was as simple as that… The

idea that anything might happen to sensory impulses within the central nervous system to alter their character, destination, or the sensation they registered in consciousness was utterly foreign to my concept. But in practice I found that it was incredibly difficult to make this concept consistent with clinical observations." P. 97

To restate, pain was considered more or less an "it hurts here, so that's what needs to be treated" idea. He found that it hardly EVER worked that way. **Neither did Melzack and Wall**.

They talked about application to **ALL pains**: "It will be seen that **summation**-the excitatory effects of **converging inputs**-provides important clues to understanding the causes and treatment of these pains" p. 126

"A more reasonable explanation is that abnormal information processing in the central nervous system allows these remarkable summation phenomena to occur…The pain in these syndromes cannot be attributed to any single cause. There are, instead, multiple contributions…all of these inputs appear to act on structures in the central nervous system that summate the total activity to produce nerve impulse patterns that ultimately give rise to pain…" p. 94

"The pains and trigger zones may spread to unrelated parts of the body where no pathology exists. This is further evidence that the central neural mechanisms involved in pain receive inputs from multiple sources. The organization of these mechanisms does not reflect the precise dermatomal (or segmental) innervations of the body by the somatic nerves." P. 95

Hence, "As a result of the persistence of low back pain despite orthopaedic surgery, neurosurgery and countless drugs-most fail to work and some, such as tranquillizers, increase depression-it is not surprising that psychological therapy has become an important new approach to the problem." P. 385

Basically, although a patient has pain in a certain location, that locale may have nothing to do with the cause of pain and there may be 3 or 10 or 25 sources of the pain that need to be addressed before the pain fully subsides. All of these sources converge and summate in the spot where the pain is perceived.

A thorough examination can help uncover and pinpoint most or all of the underlying sources of symptoms when just working on the area of symptom or adjusting the associated spinal segment or the supposed trigger point source fails to secure relief.