

Chronic Pain-from Inflammation & Behavior

A Newsletter from Robert S. Gallup, Ed.D.



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Finding Inflammation in Behavior

While in private practice in the 1970's I noticed that many of the childrens' and teens' behavior, learning, and sensory problems worsened when they were having allergic symptoms or infections. They were less attentive, slower to learn, less tolerant of vestibular stimulation, less coordinated, and less emotionally adaptive. I advocated to parents, teachers, therapists, and physicians that the causes of the children's underlying immune reactions be treated as key variables towards improving learning, behavior, and general function, with excellent results.

Inflammation plays a key role in neurological function and visa versa. The functional link between the Immune System and Nervous System was established for me at that time. My long term interest in this connection brought me to the two or three references to "Psychoneuroimmunology" after a thorough computer based search in 1987. Not being deterred by my then somewhat limited training in biological sciences, I have developed a useful understanding of what is known about the interrelationships of brain, behavior, and immunity. I have become familiar with neuropeptides, cytokines, the hypothalamic-pituitary-adrenal axis, exogenous ligands, beta adrenergic receptors, acute phase response, neurogenic inflammation, and more.

Applying these understandings (Applied Psychoneuroimmunology) on a daily basis while working as a rehabilitation therapist in "physical disabilities" within the medical business has often brought special help to patients and regular examples of extraordinary recovery. This approach recognizes implicitly that emotions/perceptions are critical mediators of all physiology. Healing and real change is absolutely initiated from within. Regardless of egos, degrees, or licenses, the most that another can do is to have the privilege to assist, support, and witness. I have experienced significant chronic pain and functional challenges most of my life. My own Bodymind has been a great beneficiary of the application of this science and approach.

The purpose of this Newsletter, (planned to be published three times a year) is to promote the sharing of the science, its applications, and victories in the context of improving the quality of life for the many that suffer from chronic pain.

Chronic Inflammation is The Problem

"Chronic Pain," is pain that continues or recurs after its initial appearance, and course of treatment. The treatments may be pharmacological, non-pharmacological, and/or surgical. A recent Supplement to the Journal of the American Osteopathic Association stated that over 80% of visits to doctor's offices are fostered by complaints of pain, and that pain accounts for more than \$75 billion in medical costs. I have lived with chronic pain since childhood. I work as a healthcare practitioner within the medical business, often with chronic pain sufferers. I can give front-line testimony to the limited effectiveness of the treatments for "chronic pain." I believe that there are two major parts to this problem. The first is that it has not been well understood how chronic pain comes from chronic inflammation. The second is that it has not been well understood that chronic inflammation is often a direct result of the way we emotionally react, what we put in our mouths, our structural alignment, and how we use our bodies to perform activities of daily living: our Lifestyle. The level of pain and its affects on our lives can only change through changed emotional and social patterns, changed diet, improved structural alignment, and improved body mechanics.

Inflammation is a Hot Topic

Testing for C-reactive protein as a measure of circulating inflammation is now recommended by the Center for Disease Control and the American Heart Association for the 40% of U.S. adults who are already judged to be at risk for heart disease. Evidence has been building that inflammation is a major trigger for acute cardiac events, even more so than high cholesterol. It is suggested that inflammation affecting blood vessels can be circulating as a result of inflammation in another organ such as gums or urinary tract. Also, some recent studies sponsored by pharmaceutical companies find that some Serotonin Re-uptake Inhibitors (SSRI's) significantly inhibit the ability of pro-inflammatory cytokines (PIC's) to induce "sickness behavior" including Depression.

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Cytokines and “Sickness Behavior”

Cytokines are peptides produced by immune cells such as monocytes. Cytokines mediate intercellular communication. Nervous cells also produce peptides, called Neuropeptides. The affects of cytokines can be on the producing cell, a nearby cell, or in a distant part of the body. Cytokines are ligands (“that which binds”) which travel in various fluids such as blood. Their affects occur as a result of their binding to receptors on a particular cell. They can affect the function of any cell or organ, including the brain. Cytokines are produced centrally (by microglia for example) or peripherally. They can cross the “blood brain barrier.” There is much more to be said about cytokines as well as interactions of immune and nervous tissues. For now, the reader is encouraged to consider that cellular communication affecting behavior has at least as much to do with the binding of chemical messengers (“chemical brain”), as synaptic events (“electrical brain”). Also, the reader is strongly encouraged to read *Molecules of Emotion* (1997) by Candace Pert, Ph.D. (A Touchstone Book, Simon & Schuster, New York).

Inflammation is mostly the result of the affects of pro-inflammatory cytokines (PIC's) such as Interleukin 1-beta, Tumor Necrosis Factor, and Interleukin 6. These immunologically derived peptide messengers induce what is termed “sickness behavior,” including hyperalgesia. Other sickness behavior is decreased appetite, anhedona, increased sleep, motor lethargy, decreased coordination, affects on mood, and impaired cognition including memory. PIC's induce the production of cortisol, as well as epinephrine and norepinephrine which usually have anti-inflammatory affects during acute phase in the *initial* cytokine production. Very recent research has shown that pro-inflammatory cytokine production can have a *psychogenic basis*, such as stress. Even though research showing that immune responses can be conditioned dates to the 1920's, cytokine production has been thought to be only a result of infection, mechanical injury, auto-immune process, or another tissue insult. The conditioning research has been well replicated in recent decades. Also, it is known that the thresholds for these pro-inflammatory affects is related to that organ's or cell's previous inflammatory history, and the body's general allostatic load.

So, it may be useful to think of acute pain as a consequence of PIC's from an initial and particular insult such as an infection or mechanical injury, and think of chronic pain as a consequence of recurring PIC production very likely a result of behavior/stress/lifestyle. The stress can be from psychogenic stimuli (emotions), or recurring mechanical injury from poor structural alignment and/or body mechanics. Circulating PIC's from another organ, such as digestive organs as a consequence of ingested substances, and/or

allergy can be additive or by itself result in clinical symptoms such as pain in a targeted organ. For now, auto-immunologically induced inflammation will be left from this discussion. However, there is evidence that this process is also a category of chronic inflammatory process.



I choose to see Me.

This can be Great News!

The major implication here is that the road to change for the chronic pain sufferer is in our own hands. Many have learned that surgery and pharmaceuticals have had limited value. The real goal then becomes changed perceptions and behavior: Lifestyle. From my personal and professional experience it is usually hoped that someone else can “do-something” to or for us to eliminate the pain. Taking pills, finding the latest “alternative treatment”, or even risking our lives with surgery too often feels emotionally easier than going through the personal changes necessary for qualitative change in our attachments to how we live, even when we have pain or disability. ●

A Successful Approach to Chronic Pain

I recommend treating chronic pain from the following perspective and incorporating these ***tools* as appropriate:

1. Inflammation and pain in target tissue/organ(s) is partly a result of previous inflammation lowering the threshold for the current pro-inflammatory affects

*** Taking a complete functional and health history.*

2. There are circulating pro-inflammatory cytokines whose affects are not sufficiently depressed by endogenous opioids, cortisol, or other endogenous anti-inflammatories such as the catecholamines. There are Lifestyle factors contributing to chronic inflammation which results in chronic pain and possibly disability. The sensation of pain is towards the end of the biochemical chain which occurs after the secretion of PIC's.

*** Utilizing interview, inventories, and direct observations which assess social-support-network, life satisfaction, behavioral style, and body mechanics for activities of daily living.*

3. What we put into our mouths, emotional style, social-support-network, body mechanics, and structural alignment are amenable to *conscious change* (usually over a period of time) with support and educated assistance.

*** Diet Records, Support Groups, Psychological Counselors, training in body mechanics, Osteopaths, Physical Therapists, Chiropractors, and Occupational Therapists. Utilizing and teaching such tools as: Thought Field Therapy, Cognitive Behavioral Therapy, various Stress Reduction modalities including Meditation, Biofeedback, Energy Conservation, Adapted Activities of Daily Living, and Modified Environment.*

4. The general goals are: to increase endogenous anti-inflammatories, such as opioids, which can both cause and be a result of feelings of well-being, and to consciously change health behaviors/Lifestyle to decrease the production of PIC's. The benefit is usually greatly improved quality of life and decreased pain.
5. Learning to *accurately observe and feel the choice* to modify one's own Lifestyle/health behaviors is *critical* to real and qualitative change.

Healing Happens

Eighty-two year old Ms. J was admitted ten days previously to an acute care hospital, with an exacerbation of Congestive Heart Failure. She was now on the Skilled Nursing Unit after seven days in the ICU>TCU>Med. Surg. She was average in height and weight and lying in bed on her side wearing a nasal canula giving her supplemental oxygen at the rate of 3 liters per minute. The nurse had a cup of pills and Helen J's chart said that she had generally been declining to participate in occupational and physical therapy. When she did, she went only to a bedside chair, needing 50-75% physical assistance and lots of encouragement. Prior to this hospital admission, Helen had been independent with activities of daily living, and used a walker only outdoors. She had not required supplemental oxygen.

Helen sounded short of breath as she said that she was "too tired for therapy." She appeared lethargic in movement and voice. Helen sounded sad and whiny. She said that her "back hurt, too." Helen apologized for her stance of non-participation, assuming that I would take it personally. I'd come to treat her in my role as an occupational therapist. I asked where she was born and what kind of work she had done. She was born in Minnesota, and currently lived with her sister who was two years younger, in San Francisco. "We've lived in the same house for over forty-five years." Helen had never married and had no children. She had been a pre-school teacher for the San Francisco Public Schools for several decades. I told her that I had also been a pre-school teacher for the San Francisco Public Schools, but for only a couple of years. She asked if I knew Marsha H, who had been the Pre-school Program Director when I worked there. Helen had trained Marsha in classroom teaching decades before. I let Helen know that I would be back at 2 PM to see if she would be willing to get out of bed to do some grooming and hygiene in a bedside chair.

At 2 PM Helen's chart said that she had also declined physical therapy (PT). I overheard the Social Worker and Physician agreeing that Helen would be "going to Long-term Care soon." Helen squeaked out a "hello." "Remember me," I said, "I'm the pre-school teacher." With encouragement she started to tell me about her lifetime of work with young children. As she talked about her early training her voice got louder and her facial muscles started to move. We shared our individual experiences with Marsha H. After 5-10 minutes of chatting Helen agreed to get out of bed. Moving very slowly, and not letting the chatting stop, I gave her 25% physical assistance to sit-up, then stand and transfer to the nearby chair using a front wheeled walker. Sitting on the edge of the bed I asked if she knew particular "cookie songs" that I had found 100% successful in keeping the children's interest. She knew one of them. I told her that what I missed most from my time as a pre-school teacher was "circle-time," and singing with the children. She moved with more and more pace while intermittently removing the oxygen canula from her nose. She performed an upper body sponge bath, changed her hospital gown, and brushed her very long hair without physical assist or needing rest breaks due to fatigue or shortness of breath. The chatting did not stop. She began to ask me about my personal history and how I'd gotten from "cookie songs to walkers." Hair combing was the last of these activities, and I could see her pausing to closely examine her hair in the mirror. She said that she missed her sister.

I encouraged her gently that her road back home to be with her sister included getting out-of-bed, transferring, and walking with the physical therapists. I went right back to the topics of what she missed about her

sister and had enjoyed about her career. She started to smile while talking about the children, I asked her to please sing the "Five Giant Cookie Song" with me. We did! I even remembered the hand-movements that went with the words. A nurse's aide stopped in the doorway to briefly listen. When I asked Helen to take the walk with me that she had missed with the PT in the morning she agreed. She required 25% physical assist to stand to the front-wheeled walker, and only 5-10% assist to walk with the walker and portable oxygen tank which I pushed, a total of 50 feet. She made it out into the hallway. There were no complaints of pain or fatigue, and no whining nor signs of shortness of breath. She talked and walked. Her oxygen saturation level with this activity was 94%. She asked when I would be coming back for more therapy.

I returned to that hospital and Unit a few days later and found Helen walking down the hall with the physical therapist and walker, without supplemental oxygen. She was chatting and smiled while reaching out her hand to greet me. I told her how much it meant to me to sing the cookie song again. Helen was discharged to her home, at her previous-level-of-function about one week after we sang together.

Opioids and other peptides made by our body can have powerful anti-inflammatory affects, without the possibly negative effects of pharmaceuticals. Connecting with our self-esteem, our purpose, our connection to others, and our sense of love and joy can make opioids. ◉

"...the molecules of emotions run every system in our body.... this communication system is in effect a demonstration of the bodymind's intelligence, wise enough to seek wellness, and one that can potentially keep us healthy and disease-free without the modern high tech medical intervention we now rely on."

Pert, Candace B. *Molecules of Emotion*. P. 19 Touchstone

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Anatomy and Physiology in Psychoneuroimmunology: A Start

In 1984, Candace Pert and Michael Ruff gave the fledgling science, which that year chose to call itself "Psychoneuroimmunology" (PNI), a basis to understand critical aspects of intercellular communication. This communication did not primarily involve synapses or neurotransmitters. Pert refers to this as "chemical brain." Pert and Ruff met with the future PNI-people at a conference where they shared their historical work on endorphin and opiate receptors. They focused on peptides as the largest group of "information substances."

As presented earlier in this Newsletter, immune cells make peptides such as cytokines. Peptides are information substances whether they are made by brain tissue, macrophages, or in the gut. Other information substances are steroids and neurotransmitters. In 1985, in the preface to *Foundations of Psychoneuroimmunology*, Locke et al stated, "External stimuli and/or intrinsically generated signals processed by the brain can affect the immune response by changing the 'set point' of brain immuno-regulatory mechanisms resulting in immunosuppression or potentiation" (p. xiv). Some authors refer to "neuroendocrine-immune circuits."

In the December, 2002 issue of *Brain, Behavior, and Immunity* (p. 422-23) Paul Black wrote, "There is now incontrovertible evidence that the nervous and immune systems interact bi-directionally; that is, the central nervous system by means of neuropeptides, neurohormones, and neurotransmitters interacts with the immune system which, in turn, feeds back to the brain which then induces changes both in behavior (sickness response) and in the immune system as well."

The Feltens led the work in the 1980's finding sympathetic fibers having direct contact with critical immune structures. Margaret Kemeny has led controlled studies showing that actors can consciously affect immune function when they embrace various emotional states. Some researchers have referred to the hypothalamus as the "brain of the immune system," and the immune system as a "sensory organ." There is published scientific evidence dating back to the 1920's that immune responses can be classically conditioned.

A reader may want to interpret the above to mean that cellular communication and the relations among systems is hierarchical, linear, and controlled by tissue of the brain. Current research, as well as the work of pioneers such as Pert and Soloman would disagree. I believe that the best view is to see that any cell can start, as well as greatly influence communication and relations. This perspective also leaves an opening for the role of what are typically called "Spiritual" factors in physiology and health.

Many of the above sentences could be dramatic headlines for someone who is considering how chronic pain comes from chronic inflammation and behavior. The next issues of this Newsletter will have important sections on "anatomy and physiology in PNI." ●

General Scheme of Immune System Reaction

- (Autoimmune) Over-reaction to something produced by the body.
- (Cancer) An inadequate response to something produced by the body.
- (Infection) An inadequate reaction to something from the outside.
- (Allergy) An over-reaction to something from the outside.

	Overactive	Underactive
Inside	Autoimmune	Cancer
Outside	Allergy	Infection