Integrative Medical Strategies for Chronic Pain

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“It is much more important to know what sort of person has a disease, than what sort of disease a person has”

Sir William Osler
The DESTINATION is not nearly as important as the JOURNEY!
``When I see a patient with arthritis coming in the door, I leave by the back door``

Sir William Osler
Our best approach to chronic pain is to intelligently apply multiple therapeutics together, working on identified mechanisms and system’s in a layered fashion, chosen by a deep understanding of the patient’s unique story and current health challenges.
“There was strong evidence that intensive multidisciplinary biopsychosocial rehabilitation with functional restoration improves function…”

Systems biology and the future of medicine.

Loscalzo J¹, Barabasi AL.

Abstract
Contemporary views of human disease are based on simple correlation between clinical syndromes and pathological analysis dating from the late 19th century. Although this approach to disease diagnosis, prognosis, and treatment has served the medical establishment and society well for many years, it has serious shortcomings for the modern era of the genomic medicine that stem from its reliance on reductionist principles of experimentation and analysis. Quantitative, holistic systems biology applied to human disease offers a unique approach for diagnosing established disease, defining disease predilection, and developing individualized (personalized) treatment strategies that can take full advantage of modern molecular pathobiology and the comprehensive data sets that are rapidly becoming available for populations and individuals. In this way, systems pathobiology offers the promise of redefining our approach to disease and the field of medicine.
The Future of Medicine

“the network concept reveals a number of surprising connections amongst diseases, forcing us to rethink the way in which we classify and separate them.”
Learning Objectives

• The (Humbling) Complexity of Chronic Pain
• Pain Perception – a Personalized Experience
• Applying the Biopsychosocial Model
• Health Restoration through an Interdisciplinary Team Approach
  – Overview of our Integrative Model
  – Our Team’s Philosophy on Chronic Pain – the Need for a System’s Approach (pain is not simply one pathway gone awry)
• Natural Products (and the system’s they effect) for the treatment of Chronic Pain.
What is pain?

“An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.”

H. Merskey and N. Bogduk eds. IASP Task Force on Taxonomy, 1994
Intracerebral pain processing in a Yoga Master who claims not to feel pain during meditation

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Abstract

We recorded magnetoencephalography (MEG) and functional magnetic resonance imaging (fMRI) following noxious laser stimulation in a Yoga Master who claims not to feel pain when meditating. As for background MEG activity, the power of alpha frequency bands peaking at around 10 Hz was much increased during meditation over occipital, parietal and temporal regions, when compared with the non-meditative state, which might mean the subject was very relaxed, though he did not fall asleep, during meditation. Primary pain-related cortical activities recorded from primary (SI) and secondary somatosensory cortices (SII) by MEG were very weak or absent during meditation. As for fMRI recording, there were remarkable changes in levels of activity in the thalamus, SII-insula (mainly the insula) and cingulate cortex between meditation and non-meditation. Activities in all three regions were increased during non-meditation, similar to results in normal subjects. In contrast, activities in all three regions were weaker during meditation, and the level was lower than the baseline in the thalamus. Recent neuroimaging and electrophysiological studies have clarified that the emotional aspect of pain perception mainly involves the insula and cingulate cortex. Though we cannot clearly explain this unusual condition in the Yoga Master, a change of multiple regions relating to pain perception could be responsible, since pain is a complex sensory and emotional experience.

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Keywords: Yoga; MEG; fMRI; Pain; Meditation
Original Reports

The Perception of Pain in Others: How Gender, Race, and Age Influence Pain Expectations

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The Association Between Race and Neighborhood Socioeconomic Status in Younger Black and White Adults With Chronic Pain

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Sex Differences in Reported Pain Across 11,000 Patients Captured in Electronic Medical Records

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††Anesthesiology Service, Veterans Affairs Palo Alto Health Care System, Palo Alto, California.
Men reporting pain

- Men report substantially less pain during a painful experimental challenge if the experimenter is a good looking woman
Biopsychosocial approach

- Pain is not a simple reaction to a physical stimulus;
- What we feel as pain can be changed by mental, emotional and physical factors;
- This model emphasizes human disease and illness;
- This concept acknowledges and tries to explain the complexity of the person’s experience and observed behaviors, rather than ignoring or dismissing them.
This approach views a physical disorder as the result of an *intricate and dynamic interaction* among biological, psychological, and social factors that can often *antagonize the pain* condition. Individuals tend to express *variability in their pain* experiences due to the range and interaction of these factors that *modulate the interpretation* of symptoms.
From a clinical perspective, ...the psychosocial component in the gate control theory contributes a great deal in treating patients with pain. Negative states of mind—such as helplessness, hopelessness and anger—tend to amplify the intensity of the sensory input, while strategies focusing on coping and stress reduction help to “close” the gate. Also, behaviors found to facilitate keeping this gate “open” include poor eating habits, smoking, inadequate sleep, and lack of exercise. By promoting positive health behaviors, proactive choices can be factors in lessening the perception of pain.

Pain Recovery and Health Restoration

- Personalized Food Selection and Nutrition
- Optimal Neurological System
  - Methylation
  - Oxidative Stress
- Abundant Energy Production
  - Mitochondria
- Balanced inflammatory Function
- Strong, Accurate Immunity
- Gastrointestinal Function
  - Emphasis on the barrier and microbiome
- Metabolic Detoxification
  - Biotransformation
- Healthy Stress Response
- Regulated Endocrine Control
Our Integrative Medical Philosophy

• Address the underlying cause(s) of Pain
• Biochemical individuality
• Physiological network
• Patient-centered medicine
• Implement evidence based practices
• Integrate CAM and conventional treatment
• Whole system - mind, body, spirit
Patient

Medical Doctor

Comprehensive Lab Testing & Imaging

Standard Medical Assessment

Injection Work Up

Additional Referral if warranted

Physio, Chiro. Osteo

Complete Assessment

Botox

Neural Block

Drug Therapy

PRP

Report

Confirm candidate for Injection Therapy

Initiate Tailored Manual Therapy

Order Specialized Labs

Infusion Therapy

Review Labs

Nutritional Status

Diet Diary

Environmental Screen

Suspected Relevant SNP’s

Generate Collaborative Report to Review by Team

Naturopathic Doctor

ACE Questionnaire

Psychology/Psychotherapy consult with HRV

Psychological & Emotional Therapy Initiated

Possible Mold, Metals, Solvents, etc

Environmental Consult Referral

Referral for Lifestyle Genomics

Personalized Approach Custom to Genetic needs

Implement Personalized Program

Referral to Dietician/Nutritionist
Comprehensive Laboratory Testing for Chronic Pain

- CBC
- Lytes, total protein, albumin, globulin,
- HbA1C, fasting glucose, fasting insulin
- Lipid Panel
- Ferritin, uric acid
- AM Cortisol, DHEA
- TSH, T4, T3, RT3
- Free testosterone, Progesterone, Estradiol, Estrone
- CK, AST

- ALT, GGT, ALP, total bilirubin
- Creatinine, BUN
- RBC Cholinesterase, serum mercury
- hs-CRP, ESR, Fibrinogen
- ANA
- B12, homocysteine, MMA,
- Zinc, copper, RBC Se, RBC Mg,
- 25-hydroxy vitamin D
- Amylase, lipase, urine Indican
- C3, C4, CD57, CD56, CD4/CD8 ratio
Because two patients with the same diagnosis differ in physical, social, and psychological compositions, “lumping” these patients into the same treatment program will not likely produce the best outcomes compared to a tailored treatment regimen.

The Need for a Personalized Medicine Approach

Genetic Influence on Pain CP

Emerging relevant SNPs related to pain perception
Epigenetics and Nutrigenomics

DNA Methylation: Essential for Normal Functioning of an Organism

1. Ingestion of nutrients
2. Nutrients metabolized
3. Nutrients absorbed by small intestine and transported via the blood stream to cells in the body
4. Dietary methionine, folate and choline enter the cells
5. Methyl group attaches to specific sites on the DNA strand
6. DNA methylation in promoter region down-regulates and silences gene expression. Cell division is suppressed
Genetic Uniqueness and Pain Perception

- Catechol-O-methyltransferase (COMT) is an important Phase II metabolism enzyme. Specifically, it is responsible for inactivating catechol neurotransmitters (such as dopamine, adrenaline and noradrenaline) via methylation.

- COMT an important enzyme in dopamine catabolism plays a key role in processes associated with...reward, pain, memory and learning.

PLoS ONE 6(3): e18035. doi:10.1371/journal.pone.0018035
PLoS ONE 7(10): e48135. doi:10.1371/journal.pone.0048135
Food Signals and Pain Modulation

“Appropriate nutritional interventions may be one of the most useful tools doctors have to improve overall health outcomes in their patients and specifically reduce inflammation.’


Food pyramid for subjects with chronic pain: foods and dietary constituents as anti-inflammatory and anti-oxidant agents

• Emerging literature suggests that diet constituents may play a modulatory role in chronic pain (CP) through **management of inflammation/oxidative stress, resulting in attenuation of pain.**
• A narrative **review** was performed to evaluate the existing **evidence** regarding the **optimum diet** for the management of **CP**
• **172 eligible studies.**
• Comparable effects to drug management therapy
  – **low glycemic index** daily (three portions)
  – **fruits and vegetables** (five portions)
  – **yogurt** (125 ml)
  – **red wine** (125 ml)
  – **Olive oil**
  – **Weekly**
    • **legumes and fish** (four portions);
    • **white meat, eggs and fresh cheese** (two portions)
    • **red or processed meats** (once per week)
  – **sweets** can be consumed occasionally

• Top 5 alkali foods
  – Pumpkin seeds
  – Sweet Potato
  – Seaweed
  – Lime

• Top 5 anti-inflammatory foods
  – Ginger and Tumeric
  – Avocado
  – Blueberries
  – Hemp seeds
  – Brussel sprouts
  – Cold water fish

• Top 5 anti-oxidants
  – Goji berries
  – Kidney beans
  – Pecans
  – Artichokes
  – Dark chocolate (😊)

• Low Glycemic
  – Broccoli
  – Cinnamon
  – Apples
  – Lentils
  – Rolled oats
Oxidative Stress

Oxidative stress levels in patient’s with inflammatory and non-inflammatory back pain are higher than in controls, which suggests that oxidative stress may be involved...”
Oxidative Stress

• Targets
  – Cell Membranes
  – Receptors
  – Enzymes
  – DNA

• Causes
  – Low phytochemical rich diet (lack of fruits and vegetables)
  – Systemic inflammatory cytokines (inflammation)
  – Xenobiotic load (chemical toxins)

• Protective substances
  – Superoxide dismutase (requires zinc, copper and selenium)
  – Glutathione peroxidase
  – (selenium dependent & protein)
  – Catalase (Iron dependent)
  – Dietary input
    • Vitamin C
    • Vitamin E
    • CoQ10
    • Alpha lipoic acid
    • L-Carnitine
    • Glutathione
    • Quercetin
    • Rosemary

Diabetes Technol Therap 2;401-413. (2000)
Diabetic Care 2003;26:770-76
Expert Opin Ther Targets. 2013 Sep;17(9):1081-9
Brain Res Bull. 2009 Aug 14
Biofactors 1999:10:157-67
Pain. 2009 Sep;145(1-2):129-35.
Alpha Lipoic Acid

- Free radical scavenger and cytoprotectant
- Readily crosses the Blood-brain-barrier
- Upregulates glutathione synthesis (DHLA) and regenerate antioxidants such as Vitamin E and C
- Improves insulin-mediated glucose uptake
- Metal chelation capacity
- Inhibits NFkB
- Repair oxidatively damaged proteins (DHLA)
- Cofactor for mitochondrial bioenergetic enzymes

Clin Drug Investig 2008;28(8):495-500
Drugs R D 2014;14(1):1-7
J Med Food. 2017 Oct 4
General Pharmacology Vol. 29, No. 3 (1997): 315–331
Current Medicinal Chemistry Vol. 11, No. 9 (2004): 1135–1146
Alpha Lipoic Acid continued

- Diabetes (Type 1 and Type 2)
- Diabetic and Autonomic Neuropathy
- Insulin Resistance
- Metabolic Syndrome
- Liver disease
- Neurodegenerative disease
- Alzheimer’s Disease
- Hypertriglyceridemia

- increase in cAMP,
- reduce TNF-alpha and IL-6 (in obese patients primarily), NFKB, suppresses PL A2,
- protects against cerebral ischemia,
- neuroprotective effects.
- restores nitric oxide induction in endothelial dysfunction

Life Sci 12-14-2006;80(2):146-153
Proc Natl Acad Sci U.S.A 3-6-2007;104(10):4077-4082
PLoS.One. 2010;5(9)
Diabet Med. 2004;21(2):114-121
The ``Powerhouse`` of the Cell

“Protecting mitochondrial function would be a promising strategy to alleviate or prevent chronic pain states”
Metabolism: ATP Production

- Lipids, Carbs, and Protein following digestion are processed and transported into the mitochondria.
- Kreb’s cycle continues the breakdown to high energy electrons.
- Electron Transport Chain utilizes oxygen to produce ATP for cellular energy.
- All cell function and physiology depends on the functioning and efficiency of the mitochondria.
Mitochondrial (Dys)function

- Recent research has shown involvement in cellular activities including **signalling, proliferation, and apoptosis.** (not just ATP)
- Generate ATP in a complex multistep process involving electron transport chain complex (ETC) and oxidative phosphorylation (OXPHOS).
- Mitochondria consume nearly **90% of the total oxygen content in the cell** to enable oxidative phosphorylation and adenosine triphosphate (ATP) synthesis. **The brain uses 70% of ATP!**
- Cells contain ~ 1000 to 2500 mitochondria, with an average cell using 10 billion ATP molecules per day.
- **Nutrient deficiencies, environmental toxins, and oxidative damage** affect the normal functioning of mitochondria.
- The primary source of oxidative stress in cells is **leakage of oxygen and high-energy electrons** from the mitochondria.
- Mitochondrial DNA (mtDNA) is extremely **sensitive** to ROS.

- **Saturate** with nutrients to improve ATP production
- Stabilize mitochondrial membranes with appropriate type and amount of **fatty acids**
- Prevent **damage** to the mitochondrial membranes
- Promote **mitochondrial biogenesis**, maintain mitochondrial pH-buffering capacity, electron-transport chain activity, and ATP generation.
Energy Production

• Mg plays a key cofactor and structural role in ATP production

Cell

ATP (energy)

Mg$^{2+}$

Dr Paul Hrkal ND. 2017
Magnesium

- Involved in over 300 cellular reactions
- Common deficiency in NA
- **Orally** used for fibromyalgia and migraines
- **Intravenously** used in neuropathic pain, cluster headaches, postoperative pain (reduce need for opiates) and low back pain
- Reduces anxiety and depression
- **Antagonist at N-methyl-D-aspartate** (NMDA) receptors and depressant effects on nerves and smooth muscle.
- This mechanism is thought to explain the role in the above conditions as well as erythromelalgia, Raynaud's Phenomenon, and other vascular disorders and pain syndromes.
- Other potentially helpful mechanisms in CP include, **ATPase activity**, calcium channel antagonism, glucose utilization, decreases plasma cortisol levels, reduce CRP and involved in maintenance of nerve and muscle electrical potentials.

Mg$^{2+}$ Malate

- Malic Acid
  - Increases cellular energy production
  - Shown to reduce muscle pain in 2 clinical trials
- Fibromyalgia

*Malic acid is a precursor to ATP (energy) production*

Dr Paul Hrkal ND. 2017
Mg$^{2+}$ Glycinate

- Glycine
  - Acts as a central inhibitory neurotransmitter = “calming” effect
  - Promotes detoxification
Magnesium and Inflammation

- Anti-inflammatory; Recent review study, supplementation reduced (CRP), a marker of inflammation among individuals with elevated levels (greater than 3).

Curr Pharm Des. 2017 May 25
The Inflammatory Cascade

A Complex Array
Inflammation – A Unifying Law of Pain

- Determine
- inflammatory profile
- 2. Inhibit or suppress
- inflammatory
- mediators
- 3. Inhibit or suppress
- afferent and efferent
- motor transmission
- 4. Modulate neuronal
- Transmission
- All should be reclassified
- as variants of
- inflammation-induced
- pain
Understanding Inflammation

• It is a complex, highly orchestrated process that relies on signal transduction to activate an interconnected network of recursive, self-amplifying cascades.

• *Acute inflammation* is an adaptive phenomenon that primarily consists of defend and repair functions.

• *Chronic inflammation* is a destructive, maladaptive phenomenon responsible for a wide variety of seemingly disparate diseases.
A Natural Approach to Controlling The Inflammatory Cascade

Cytokines
- Interleukin 1
- Interleukin 6
- Tumor Necrosis Factor - Alpha

T Helper Cell Antigen

Immune cells identify antigen
Immune cells produce cytokines
Cytokines recruit immune cells
More cytokines produced, more inflammation

Nutrients That Calm the Immune/Inflammatory Response

I Kappa A
NF Kappa B

RIAA calms the kinase pathways

Omega-3 EFAs

COX-2

PGE1 & 3

COX-2
Curcumin and rosemary block COX-2

Adequate selenium and zinc calm the inflammatory response

Joints, tissues, etc.
Boswellia Serrata

- Promotes a healthy inflammatory and autoimmune response
- Anti-arthritis, anti-edema and analgesic properties
- Inhibits 5-lipoxygenase (leukotriene synthesis, not COX)
- Decreases the pro-inflammatory cytokines (IL-6 and TNFalpha)
- Neuroprotection (Post-concussive recovery)
- Reduces production of antibodies and cell-mediated immunity
- Improvement in cognitive function
- Disease modifying effect by decreasing cartilage degradation

Cephalalgia 2012;32:719-22
Phytomendicine 2003;10:3-7
Arthritis Res Ther 2008;10:R85
Gastro-Intestinal Health and Chronic Pain

“A cholinergic anti-inflammatory pathway has been described through Vagus nerve fibers, which is able to dampen peripheral inflammation”
LOSS OF INTEGRITY

“Translocation of bacteria and toxins through leaky gut mucosa may amplify or perpetuate systemic inflammation’

Turk J Gastroenterol 2001;12(2)141-44.
The Influence of the Microbiome

• “If the GI system is populated with the wrong bacteria, there is an increase in pro-inflammatory cytokines and the development of visceral hyperalgesia.”

• Probiotic use has been reported to reduce anxiety and stress response, and improve mood...

• Consumption of a fermented milk product containing specific probiotics modulates brain activity affecting midbrain connectivity.

• The complexity of the superorganism helps us explain the variety of physical and emotional aspects of pain... this may lead to a “bottom-up” approach to treatment, paying attention to microbiome-related changes in behavior and pain.

Dr Donald C Manning MD, PhD
American Academy of Pain Management 2014 Annual Clinical Meeting
Toxicants and the Pain Process (Solvents, heavy metals, pesticides and other toxicants)

• Solvents – “There is strong evidence that some solvents may cause peripheral neuropathy.”

• Pesticides – “Neurologic symptoms are also common with chronic exposure. Peripheral neuropathy, manifested by paresthesia, pain, anesthesia, paresis and ataxia, may be a prominent feature.”

• Heavy metals
  – “…direct proportionality between the level of pain the increase of the concentration of heavy metals in all the examined group”
  – “Concentration of heavy metals in serum samples of RA patients and healthy control individuals differ significantly…”

npic.orst.edu/RMPP/rmpp_ch21.pdf
Occup Environ Med. 2006 Mar; 63(3): 221–226
Excessive toxin exposure can result in prolonged firing of peripheral pain receptors, resulting in central nervous system sensitization and exaggerated stimuli response.

87,000 new chemicals
CDC 2400 adults and childrens 200 synthetic chemical toxins

Baked goods and pre-packaged foods such as a pizza box, hygiene products such as underarm deodorant and after shave, cosmetics such as eyeliner and lipstick, furniture and carpets, clothes cleaned at the dry cleaner, pesticides, car exhaust, etc.

Genetic Variations

- There are numerous genetic variations in the activity of both phase 1 and phase 2 enzymes.
- This, along with nutritional status and total toxic load, may help explain why detoxification abilities for a particular substance may vary as much as 100-fold or more between different individuals.
Types of Reactions

Phase I: Activation
- Cytochrome P450 enzymes

Activated Intermediate

Phase II: Conjugation
- Glucuronosyltransferase
- Sulfation
- Amino Acid Conjugation
- Glutathione Conjugation
- N-Acetyltransferase

Parent Fat-Soluble Compound

Water-Soluble Compound
Phase II Liver Detoxification

Enzymes increased by:

• Sulphoraphane (in Broccoli seeds)
• Polyphenolics (in Green Tea)
• Curcumin (Tumeric)
• Selenium (activates Glutathione peroxidase)
• Glycine, Taurine, Glutamine, Arginine, Cysteine and Methionine
Sulforaphane Glucosinolate (SGS)

- Activates the transcription factor Keap1/Nrf2/ARE, modulate macrophage and NFKB activity
- Exhibits indirect antioxidant activity for at least 48 to 72 hours, a significantly longer period of time than direct antioxidants, such as vitamins C, E, and beta carotene.
- Supports the body’s ability to **protect cellular DNA** from damage.
- **Metabolic disposal** of xenobiotics, carcinogens and other electrophils through selective induction of phase II conjugation.
- Supports the body’s protective response against age related CNS inflammation. (microglial and macrophage activation)

Stress induced Dysfunction

“It is likely that sustained arousal may facilitate the development of sensitization in some or many neural circuits”

Pharm, bio and behaviour 2005
Pain 1999;83(2):313-19
Z Rheumatol 1998;57 (Suppl 2):67-71
BMC Res Notes, 2008 Dec 22:1:134
Archives of general psychiatry, vol 63, pg 1267
IMAJ 2001;3:755-60
What is Stress?

• A physiologic response to a demand for change
• “Fight or Flight” response
• General Adaptation Syndrome
• Sympathetic Nervous System Dominance
Chronic Stress Response and the Pain Process

- Based on the original work put forth by Selye, stress serves as a mechanism of adaptation, such that the body will respond to challenging or dangerous situations in an attempt to lessen any problematic consequences. (SAS and HPA)

- However, hyperactivity of the HPA system can be seen to intensify the pain condition. When dealing with chronic pain, individuals experiencing elevated levels of stress may actually exacerbate the pain experience.
Stress...Not Just An Adrenal Problem

Stress triggers psycho-neuroendocrine-immune imbalance
Addressing the Psychology of Pain

• While nociception and pain provide methods of communication to the central nervous system, suffering and pain behavior, on the other hand, are described as reactions to those signals that can be influenced by both previous experiences and anticipation of potential consequences.
Rhodiola Rosea

- Powerful herbal adaptogen (increase resistance to stressors)
- Neuro, cardio and hepatoprotective effects
- Downregulates neuro-excitatory over stimulation, anti-nociceptive effects, immunotrophic, antiviral, anti-inflammatory, anti-oxidant, nootropic, and antibacterial properties
- Regulates catecholamines and can activate central and peripheral opioid receptors
- Relieve stress related symptoms such as fatigue (mental and physical)
- Enhances mental focus, stamina and cognitive function
- Benefits sleep and mood including anxiety and depression through modulation of biogenic amines

Nord J Psychiatry 2007;61:343-8
Hormones and Chronic Pain

• “A correlation between hormone changes or treatments and pain intensity, threshold or symptoms... the findings suggest that changes in hormonal levels may well play a role in modulating the severity of CP.”
• “There is now evidence increasing evidence that estrogens influence the activity of joint tissues through complex molecular pathways that act at multiple levels.”
• ERT had a moderate,..., protective effect against worsening of radiographic knee OA...”
• “Women receiving ERT had significantly lower rates of arthroplasty”
• “Testosterone may suppress the expression of pro-inflammatory cytokines and potentiate the expression of anti-inflammatory (signals).”

Pain. 2014 Dec;155(12):2448-60
J Clin Endocrinol Metab. 2004 Jul;89(7):3313-8
Endocrine Reviews, Volume 28: 521-574, 2007
Journal of the American College of Cardiology, Volume 41: 1358-1363, 2003
Foundational Natural Therapeutics for Chronic Pain
Chronic Pain Foundational Natural Health Products

- Alpha Lipoic Acid
- Boswellia Serrata
- Rhodiola Rosea
- Sulforaphane Glucosinolate
- Magnesium
- L-Tryptophan (5-HTP)
- Ascorbate (buffered)
- Bioactive B Complex
- Essential Fatty Acids
- Cholecalciferol
- Scutellaria
Thank you for your time and attention

www.advancedmedicine.ca
www.beyouthfulco.com
http://www.drkoprp.com
Natural Standards

• NHPs for Neuropathic Pain
  – 0.075% Capsaicin (active in Capsicum)
    • topically 4x/d for 8 weeks led to significant pain reduction
  – Acetyl-L-Carnitine
    • 3 g for 6 to 12 months
  – ALA
    • 600 to 1800 oral and IV (often combined with GLA, SOD and B12) over 4 weeks
  – CoQ10
    • 400 mg for 12 weeks
  – Post-ca (neuropathic)
    • IV Mg, up to 1 g
Natural Standards

• NHPs for Fibromyalgia
  – Malate (alpha hydroxy acids)
  – CoQ10, 300 mg for 40 days (combined with Ginkgo in 1 trial)
  – Mg, 300 mg for 8 weeks
• NHPs for Headaches
  – Butterbur, 75 mg, bid, prevention only
  – Capsicum, intranasal 0.025% capsaicin
  – Feverfew
  – Mg
  – Peppermint 10% topically
  – B2, 400 mg as effective as beta-blockers
Natural Standards

• NHP for LBP
  – Capsicum
  – Comfrey, 35%, 4 g, tid, for 5 days
  – Devil’s Claw, 30-100 mg, equal to NSAIDs
  – Willow bark, 240 mg (salicin), relief in 1 week, equivalent to Vioxx
  – CRPS
    • DMSO 50% (+NAC) cream
    • Ascorbate 1500 mg