Relational Medicine
Perception, Epigenetics, & the Vis – Part 2

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Part 1 of this article introduced relational medicine and discussed how both perception and attachment are powerful determinants of biopsychosocial wellness. In Part 2, we now examine the effects of our early-life relational experiences on our adult lives, and discuss how we can support the Vis through engaged and responsive patient care.

An Epigenetic View

Bruce Lipton, PhD, has long been a champion for a new understanding of biology (see, for example, his 2005 book, The Biology of Belief). As Dr Lipton discusses, our perceptions are fundamental in the way they affect our thoughts, feelings, relationships, and cellular selves. Mind and body are mutually determined through a way we can support the Vis through engaged and responsive patient care.

The Endocannabinoid System

The nervous system remains one of the great frontiers in modern science. Meanwhile, diseases of the nervous system create immense suffering, contributing extensively to hospitalization and to the long-term care of patients.

The endocannabinoid system (ECS) is involved throughout all body systems and hierarchical levels of biological organization. The ECS plays a key role in synaptic communication within the nervous system, influencing a large spectrum of functions. Cannabinoid receptors represent the most common G-protein-coupled receptor in the entire central nervous system (CNS), with their highest densities in the cerebellum, hippocampus, cerebral cortex, and amygdaloid nucleus. The ECS and its receptors are involved in mood and emotional responses, cognition, plasticity, motor function, growth and development, learning/memory, eating and food drive, reproduction, and pain signaling, including interpretation and processing of those signals.

A Brief Intro to the ECS

Cannabinoids – both endogenous and external – can act to coordinate intracellular biochemistry, intercellular communication, and all body systems. Endocannabinoids affect every biological oscillator or pacemaker cell investigated, including circadian rhythms, rhythmical variations in blood pressure, peristalsis slow waves, and both EKG and EEG rhythms.

The ECS consists of cannabinoid receptors, endogenous ligands known as endocannabinoids, and endocannabinoid-metabolizing enzymes. This system functions as a self-regulating harm-reduction system, profoundly influencing multiple physiologic processes in the human body and in almost all other animals. Due to its enormous nature, a full discussion of the ECS is beyond the scope of this paper.

Cannabinoid receptors in the CNS represent the most dense receptors of all receptor systems in the human brain. In the nervous system, these receptors are involved in synaptic transmission, short-term memory, mood and emotion, cognition, motor function, nociception and pain perception, feeding, reproduction, metabolism, neuronal protection, synaptic plasticity, cellular and molecular mechanisms necessary for proper brain development, proliferation of neural progenitor cells, axon growth signaling, and protective effects on neuronal death induced by ischemia and glutamate toxicity.

Endocannabinoid receptors and their ligands are expressed in every animal except insects. These receptors operate as a finely discerning detection system for internal and external factors that affect every biological oscillator or pacemaker cell investigated, including interpretation and processing of those signals.

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The ECS in Embryogenesis

The proper development of the human nervous system requires a precise web of molecular communication of information between nerve cells, their internal cellular structures, and the surrounding neuroprotective matrix of the extracellular matrix. Signaling from the ECS orchestrates molecular and cellular mechanisms necessary for proper brain development. The ECS continues to be poorly understood by modern science. In one pathway, CB receptors couple to GF (fibroblast growth factor). GF activates dicyglycinol (DAGL), thereby increasing 2-AG, which in turn primes axon guidance and growth, both of which are necessary for nerves to connect to their targets. This trait, combined with anti-inflammatory effects, offers the tantalizing hope of using ECS as a target for regenerative health benefits in patients suffering from nerve injury or stroke.

Endocannabinoids, via CB receptors, provide a developmental signal to neurons that regulate molecular machinery required for proper brain maturation. The receptor system provides feedback that guides the specific generation of the neural architecture; it also helps to enhance neural connectivity and brain development. These activities include neural progenitor proliferation and axon growth necessary for communication between neurons. Dysfunctional endocannabinoid signaling in the CNS may play a role in disorders of development, as well as epilepsy.

Retrograde Transmission

Unlike all other known receptor systems, biological information via the ECS flows backwards, or "upstream," in contrast to traditional neural pathways – a process known as retrograde transmission. This is one of the ways that the ECS protects the nervous system from hyperactivity during seizures.

A huge part of the nervous system is therefore actually involved in the reduction or limitation of neurotransmission. It has been suggested that 70% of the human brain exists to slow down the other 30%. Additionally, the ECS operates intracellularly in organelles such as mitochondria, facilitating energy and information flow in cytoplasm.

The primary cannabinoid (CB) receptors – CB1 and CB2 – are G-protein-coupled receptors. These 2 receptors differ in both tissue distribution and mechanisms of signaling. G-proteins represent the most common receptor signaling pathways, and, as mentioned above, CB receptors are the most abundant and dense receptors in the human nervous system. Interestingly, some other lipid metabolites that are chemically similar to the very early formation of endocannabinoids 2-AG (2-arachidonoylglycerol) and AEA (anandamide), may also function as endocannabinoids.1 Thus, unlike most other G-protein receptors, cannabinoid receptors appear to have more than 1 endogenous agonist. Tissue levels of 2-AG and AEA are regulated independently from each other, allowing them to exert different functions even within the same cell, tissue, or organ. There has been much speculation about why this occurs.

The ECS & Neuroprotection

Throughout the nervous system, the ECS supports energy balance by modulating mitochondrial and influencing inflammatory and immune responses. The ECS also plays a protective role against oxidative stress, excitotoxicity, and inflammation. Potential applications of cannabinoid therapeutics include various types of pain, including dependence, stroke, cancer, MS, ALS, Huntington’s disease, epilepsy, Parkinson’s disease, Alzheimer’s, metabolic syndrome and diabetes, anxiety, and depression.

On a molecular level, cannabinoids coordinate antioxidant activity, modulation of neural detoxification (including clearance of toxic byproducts of metabolism), and mitochondrial function. All types of cannabinoids protect neurons from insults that produce neuronal death after TBI, including free radical production, neuroinflammation, excitotoxicity, and calcium influx.8 In humans, ECS coordination is integral to both health promotion and disease prevention. As a stress reduction system, the ECS responds positively not only to cannabinoids, but also to diet, lifestyle, and physical medicine interventions.9 The variable nature of the ECS dictates a patient-centered dosing paradigm, and necessitates a time-intensive, education-based approach to care that is consistent with naturopathic principles. This include the use of low-tox compounds, diet and lifestyle treatments, mind-body dynamics, and more.
and disease outcomes as relationships that interact with other factors, rather than as singularly causative certainties due to faulty genes. For most people, the experience of wellness vs disease is largely determined by our subjective experience in life, and the way that experience directs organization through mind, brain, body, and genes. Our experience within our environment, governed largely by unconscious perceptual systems, is emerging as a primary determinant of health.

With a growing public interest in genetic testing and a robust scientific understanding of the ways that molecular DNA modification pathways function [for a simple but complete summary, see the fact sheet on Epigenomics at www.genome.gov], as well as the role of specific nutrients as epigenetic regulators, our profession is well equipped to support patients in an active design for health. Certainly, any efforts to reduce toxicity and sustain a wellness lifestyle will have positive physiologic as well as epigenetic effects. However, if we are truly seeking to promote the Vis and optimal expression of life force energy, then we must expand our focus to the primary determinant of our inner environment and step into the realm of perception.

Regulating the Inner Environment

It appears that the most pervasive epigenetic regulators have less to do with what our bodies are exposed to and more to do with what we as feeling/sensing creatures make of that experience. This is the power of perception, both that which we are aware of as well as those perceptual structures that are housed deep within our unconscious. When working to support the Vis and activate epigenetic protectors of health, we must acknowledge the power of perception, particularly with regards to its influence on blood chemistry and stress response systems.

We know that our direct perceptions of the world and our place in it are translated through our nervous system and blood chemistry and stress response systems, triggering activation through specific brain centers as well as the hypothalamic-pituitary-adrenal (HPA) axis. This will also heighten cognitive-emotional-social systems to attend to any data that is part of that perceptual system, either amplifying or relieving the activation. Our perceptual state also has a direct line of influence on the composition of our blood, by way of hormones, neurotransmitters, and other metabolic byproducts. If a perceptual state of alarm is activated, chemical messengers will flood into our bloodstream, interact with our cells, and organize a cellular response. In this way, perception determines blood chemistry determines our internal environment determines genetic activity. What’s interesting is that this happens whether or not our perceptions are aligned with the sensory data received by our brain.

All external and internal signals are relayed through the brain. However, these signals are not directly perceived; rather, they are translated through our lived experience, our “mind,” and we form a discrete perception that may or may not reflect the objective, data-based information that was originally relayed to the brain. The perception, then – and not the original data – is conveyed back through the brain and nervous system, affecting all systems of the body (psycho-neuro-endocrino-immuno-cardio-etc-oklogy).

In other words, external signals are taken in as sensory data and processed in the brain, but it is the interpretive analysis of that data at the level of the mind (eg, “perception”) that actually activates our nervous system and thereby influences cellular behavior and gene activity. What we perceive as “true” directs our experience through both mind and body, whether or not that perception is confirmed by external reality. For example, if you perceive a threat, you will experience the mental, emotional, and physiologic sensation of alarm. This is true whether or not a threat was actually present.

When perceptions that provoke alarm activate through the HPA axis, they alter physiology throughout the body and create a cascade that leads to disturbances in mind, body, and genome. As naturopathic physicians, we are familiar with the clinical impact of stress. However, we may have not considered perception as a root cause of a maladaptive stress response. From this perspective, we can consider perceptual organization to be 1 of 3 specific pathways where faulty signals disrupt biologic function, the other 2 being due to either physical trauma that changes the body’s ability to manage energy (eg, a spinal cord injury) or chemical toxicity (eg, nutritional deficiencies or molecular toxins that affect metabolic pathways). The presence or absence of wellness during our lives has much less to do with genetic inheritance and much more to do with the signals that are consistently transmitted throughout our lives, particularly with regards to our perceptual experience of safety.
The Perceptual Experience of Safety

As we know, an infant’s experience of safety is wired into the brain, the central nervous system, and developing cognitive/emotional systems. Without any conscious awareness of an experience, that experience will direct and organize perception for the rest of their life. This is a prototype for people whose basic perceptions register a lack of safety and who compensate by seeking others and trying to grasp an interpersonal lifeline that seems ephemeral and elusive. They are preoccupied by relationship – its status, its degree of connection, and its availability. Physiologically, their central nervous systems are wired so as to seek regulation from an outside source; they need the other.

These individuals’ perceptual bias tells them that they are not safe unless they are actively engaged with another, and so they may organize their perceptual response in any possible way. They have learned to cope with their experience of insecurity by developing a behavioral repertoire that either demands another’s attention to irritate them into the relationship so as to keep it available. This might lead to a pattern of relying on intense emotional expression as a primary route for communicating their need to significant others. Another possible pattern involves suppressing one’s own needs so as to please or fulfill the needs of others, thereby maintaining connection. Because the relationship feels essential to their survival, themes of rejection and abandonment are often prominent.

People tend to cope with the stress of this fear by focusing intently on the subtleties of their relationships, creating narratives that their fundamental experience of separation and disconnection, and diminish their sense of self. We might also see patterns that tend towards explicit dependency, codependency, and a desire to preserve a relationship at all costs. Generally, a person with this sort of perceptual bias is very other-focused. They are also going to have an unconscious perceptual activation of alarm whenever their relationship or their position within a relationship feels threatened, leading to an overactive and/ or dysregulated stress response system as well as negative emotional and psychological enactments.

To someone wired this way, an event as seemingly minor as a delay in an expected text or phone call from a loved one can even feel like a threat. Because their perceptual default is “I am not safe” or “I need another to make me safe,” they are primed to perceive data that confirms this, thereby activating a state of alarm with great regularity. A therapeutic shift for these patients will include integration of a mind-body awareness of a capable, worthy, and independent self. They must learn how to regulate themselves into an experience of inner calm, safety, and security. Trust in the self emerges, biochemical and hormonal pathways shift, and the Vis expands.

Compensation via Isolation

Undoubtedly, all of us can also think of patients we have met who have wall off and shut down their emotional lives so as to live in a protected place of distance and disconnection. The perceptual bias of the prototype here is that others are not safe and will not meet my needs. So, I cannot trust others alone. Safety is achieved through isolation, and connection may seem threatening. To this end, relationships are generally resisted or kept at a superficial level, even with a long-term partner. Emotional intimacy does not feel safe, nor does emotional awareness.

Vulnerability of any kind is perceived as a major threat. To guard against this distress, we might see a denial of emotional needs and emotional suppression coupled with a heightened sense of independence or self-reliance. Anything or anyone that challenges this state of autonomy and emotional independence will be perceived as a threat and the patient will tend to cope with this stress via further disconnection. This can translate into an intense focus on work or some other performance-based measure of achievement, or into a tendency for abrupt psychological separation. In general, a person with this sort of perceptual bias is very self-focused.

Because this prototype has a perceptual default of “I am safe when I am alone” or “I am safe when I meet my own needs,” any indicator that they need another will provoke unconscious alarm. They may seek relationships, but at the same time feel fearful within them. The fear is related to their fundamental experience of relationship, which is essentially one of trauma. Whether it was intentional or not, their emotional needs were neglected and their infantile attempts to seek connection were met with distance and disengagement. Because the significant adults in the child’s life were not able to soothe the child’s distress, the child learned to cope by shutting down and denying the basic need to connect.

With regards to trauma, Peter Levine discusses this kind of supposition as follows: “According to the polyvagal theory, being in shutdown (immobility, freezing/collapse) or in sympathetic arousal (fight or flight) greatly impairs a person’s capacity to receive and incorporate support and empathy. The facility for safety and goodness is nowhere to be found. To the degree that traumatized people are dominated by shutdown, they are physiologically unavailable for face-to-face contact and the calming sharing of feelings and attachment.” Consequently, part of the work with this sort of patient may be to help them recalibrate their nervous system, allowing them to safely open to a state of connection where they are able to express their needs to others and/or allow others to meet those needs. They will also come to know greater safety in acknowledging and allowing emotional expression, while finding greater tolerance for vulnerability. This will allow greater connection and greater access to the pleasure that can come from connection. They learn that they are safe in their feelings, and that feelings can be a prototype for people whose basic perceptions register a lack of safety and who compensate by seeking others and trying to grasp an interpersonal lifeline that seems ephemeral and elusive.
be at least tolerated, if not welcomed. They learn that they can safely depend on reliable others, as well as safely observe their own emotional states, applying new coping skills to buffer indicators of distress. Construction releases, meridian pathways shift, and Vis energy is more fluid.

Integration through Relational Medicine

If we are true to our tenets of “treat the individual,” “seek the root cause,” and “support the healing power of nature,” we will recognize the fundamental power that comes with recognizing our basic perceptual patterns. In terms of supporting the Vis and recalibrating the epigenome to favor health, we want to be able to identify emotional and thought-based disturbances that provoke distress and to follow them to the hidden perceptions that we utilize to organize our experience. This is truly engaging at the interface of mind and body, as we follow the trail into a body-based level of subconscious experience. As we build trustful relationships with patients, connect with them in mutual empathy, and attend to the stories our patients share, we can begin to identify the subconscious structures that organize their perception and to examine their role in activating stress response systems in the body. And because our perceptual systems are so deeply embedded within our interpersonal experience, this is where the relational aspect of medicine becomes so important.

When we are skilled in the relational aspects of care, the relationship itself becomes therapeutic. While not providing professional psychotherapy services, we can create a relationship that provides an experience of trust and attentive care, as well as a safe environment for patients to observe and reflect on their inner experience. Our calm emotional presence and support will provide a buffer that can help patients learn to ground and stabilize their experience, thereby improving their adaptive response to stress. This means that they learn to connect in to their body and bring presence to their own experience, monitoring their own level of emotional arousal and noticing cues that suggest they are moving outside of their zone of regulation. We can support them in this process through many different techniques and modalities, ultimately helping them to achieve new capacity for self-soothing and regulation. We can also help patients learn to mentalize their experience in a new way, meaning that we offer an adaptive narrative for them to consider as they move through their experience.

Emotional intelligence and mindful awareness, both of our selves and our patients, are the keys to this kind of connection. With a deep and connected state of empathic care, we can help patients establish new perceptual pathways, new neurological associations, new emotional responses, and new physiologic set-points around stress. The experience of mutual responsiveness creates the environment necessary for positive neuropsycho and perceptual change to emerge. Over time, this allows patients to integrate new information and shift old perceptual habits that have obstructed health. As Gabor Mate, MD, describes, “Empathy, which is all about a relationship being in resonance, shows that when we focus on the subjective inner life of the other – whether it’s the child for a parent or a patient in a clinical case – it promotes health. So the first thing to say is your relationship really matters. It affects the physiology of the body.” As we hold this state of attunement and resonance, we help others move toward a more coherent experience of trust, resilience, and security. The more a patient is able to establish an inner template of safety, the more their experience will begin to shift to one that favors positive mind-body effects.

Shifting Patterns of Vis

As a large part of this work focuses on supporting patients to build and resource an inner template of safety, we need to develop a professional skill-set that will allow us maintain connection and remain sensitive to ourselves, as well as provide them with the patient’s emotional experience. We can help patients learn to recognize where and how perceptual cues set them into an alarm state, and what they can do to recalibrate in a responsive way. Mindfulness, homeopathy, and narrative work are the first tools I think of as being useful here, along with any naturopathic favorites for HPA and polyvagal regulation. However, we ultimately seek to return to the root, which is about shifting an experiential homeostasis of “I am not safe” to “I am safe.” This is true integration, and will register changes through mind, body, and the epigenome. With integration also comes the potential for emotional intelligence: empathy, impulse control, stress tolerance, flexibility, self-regulation, and emotional awareness. As Dr Dan Siegel writes, “When you begin to connect a patient to their own body, as to the chaotic rigidity that come from states of non-integration, … you allow the person to achieve… new and lasting states of integration, which… is the experience of harmony, flexibility, compassion, and [both] connection inside and connection to a larger world.” He explains further, saying “when you have reflection, and you have relationships that are caring and connection, you actually stimulate the growth of the integrative fibres of the brain, and these are the fibres that allow you to have resilience. The key to the whole thing is to support development of the frontal cortex by way of caring and connected relationships.” With mindful awareness of a new experience, new perceptions become available and over time they can correct the original perception that promotes distress. Relational medicine becomes part of a corrective experience that shifts perceptual organization, epigenetic markers, and patterns of Vis.

What I hope to have presented to you here is a better understanding how our perception as individuals – of ourselves, of others, of the world – is a basic determinant of health. Defined through the medium of relation, these filters are determinants of our experience that reside outside of conscious awareness yet influence our thoughts, feelings, behaviors, and biological systems. They exert epigenetic influences that impact DNA expression.

They organize cellular physiology. They set up our core belief systems, shape our cognitive and emotional patterns, and influence our relationships. They affect our brain, our core, our mind and our fundamental level.

Do I perceive myself as safe? Do I perceive myself as loved? Do I perceive myself as worthy? Do I perceive myself as capable?

Our perception defines our inner environment defines our experiences: body, mind, cells, genes, and energy systems. These perceptions influence the movement of Vis and provide templates for how patients experience and think about their health, on our entire lives. We cannot control what happens to us, but we can choose how we attend to ourselves in the present moment, how we perceive our experience, and how we create meaning from our experience. We can shift from a space of safety and well-being, we will see ripples of effect through the entire continuum of mind, body, and spirit.

At times our own light goes out and is rekindled by a spark from another person. Each of us has cause to think with deep gratitude of those who have lighted the flame within us. (Albert Schweitzer)

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Naturopathic Regenerative Orthopedics – Part 1

NOEL PETERSON, ND, DAAHP
SAMUEL G. OTITAN, ND

We hold this truth to be self-evident: true health is dependent on the Vis Medicatrix Naturaee. We embrace the term “regenerative orthopedics” because it specifically describes the mechanism of the care we provide. Naturopathic orthopedics enhances the Vis through the foundations of exercise, body mechanics, nutrition, botanicals, and mindfulness. In regenerative orthopedics, we coax the Vis to restore damaged tissue through the injection of proliferant substances and autologous biologic tissues and scaffolds. Part 1 of this article begins with naturopathic interventions, including dextrose prolotherapy, and will be followed by Part 2, which will focus on the use of autologous biologic tissues and scaffolds.

Regenerative Orthopedics & the Vis

We use the term “Orthopedic Medicine” (vs orthopedic surgery) to describe the scope and focus of this specialty because it most clearly describes how we practice in our clinic. Naturopathic influence is reflected in the American Association of Orthopedic Medicine (AAOM) definition of Orthopedic Medicine: “The non-surgical practice of using integrative diagnosis and comprehensive treatment methods to provide relief to acute and chronic musculo-skeletal pain. It demands the use of a multi-faceted approach to treatment, including prolotherapy (prolo = [pro-lot, rich plasma]), osteopathic manual medicine, therapeutic exercise and supportive nutraceutical, herbal, pharmaceutical and homeopathic-based treatments.”

We build our musculoskeletal therapies upon these principles:

Tolie Cusam

Evidence now supports the naturopathic tenet that osteoarthritis (OA) is a systemic, multifaceted condition dependent on aberrations of diet, nutrition, genetics, immunity, human microflora, obesity, body mechanics, and wear-and-tear.1 Yet the allopathic approach is largely limited to drugs and surgery. Regenerative orthopedic medicine’s emphasis on therapeutic exercise, diets, and supportive nutraceutical, hormonal, and botanical-based treatments addresses the cause of OA. Public demand is high for our evidence-based alternative medicine, hormone-stereoidal anti-inflammatory drugs (NSAIDs), opiates, and cortisone shots to treat OA.

Obesity stands as one of the major preventable causes of knee and hip osteoarthritis (KOA and HOA) and progression to joint replacement. After adjustments for age, occupation, and the presence of OA of the hand, the odds ratios (OR) of total knee replacement (TKR) were 1.7 for overweight men and 3.8 for obese men. For total hip replacement (THR), the OR was 1.7 for obese men. For women, the OR of TKR was 1.6 for overweight women and 4.0 for obese women.2 The Standard American diet (SAD), along with metabolic syndrome and obesity, drives systemic inflammation and accelerates the progression of OA and pain severity. Approximately 70% of all Baby Boomers are obese or overweight; an estimated 47.8 million Americans have some form of OA, and another 2010 that number is expected to rise to 72 million. In contrast to the SAD, a Mediterranean diet – rich in polyphenols, antioxidants, and PUFAs/PUFAs – has been shown to reduce both radiographic evidence and symptoms of KOA.3 This is likely due to its high content of fruits and vegetables, its inclusion of healthy fats, and its emphasis on herbs and spices with known anti-inflammatory effects. Low levels of sex steroids contribute to degenerative KOA and HOA in both men and women. Low levels of testosterone, estradiol, progesterone, and DHEA are associated with more-symptomatic OA and more severe joint abnormalities in both sexes.4 Barring individual contraindications, bioidentical hormone replacement therapy (HRT) is indicated in most Baby Boomers with OA.

Detection of heavy-metal burden is important, as mercury, cadmium, and lead upregulate matrix metalloproteinases (MMPs) that trigger collagen and cartilage degradation. Elevated MMPs can reduce collagen synthesis by up to 50%.5 Docere

As naturopathic physicians, we treat more than just our patient’s knees. We hold an integrative first consult that identifies dietary and other risk factors for cardiovascular and metabolic disease, and we provide a plan for evidence-based, whole-body treatment of any conditions identified. We educate our patients about the overuse, dangers, and limitations inherent in the prevailing approach to orthopedics that relies exclusively on pharmaceuticals and surgery. We counsel,coach, and integrate healthy eating, proper body mechanics, and therapeutic exercise with all our patients.

Exercise of nearly any type (except high-impact) increases collagen synthesis in the joint, helps regenerate cartilage, and prevents degeneration. Resistance training, in particular, has been shown to have a beneficial impact on OA symptoms and associated disability by improving functionality. Biking, swimming, yoga, and other low-impact activities all have benefits as well,8,9 and it is essential that all of our patients are able to implement some form of effective exercise. For example, in women, just 20 minutes of twice-weekly exercise will increase X-ray-measurable tibial cartilage volume.5 Pain and disability are strongly impacted by exercise. At Sweden’s Lund University, middle-aged men and women with a history of surgery for a degenerative meniscus tear participated in moderate physical activity of at least 3 times per week. Glycosaminoglycan (GAG) content increased significantly, and arthritis-related disability was reduced by 47%.10 Running and walking, although higher impact, have been shown to lower the rate of TKR and THR, but should be considered in light of the patient’s current level of fitness and history of physical activity.11

Primum Non-nocere

Regenerative orthopedics can reduce the use of harmful drugs and unnecessary surgery and is a clear example of do no harm. NSAIDs are the most commonly prescribed drug for OA, and Americans consume a staggering 30 billion doses per year! Well over half of rheumatologists and primary-care physicians use NSAIDs as a first-line treatment in symptomatic hip and knee OA.12 Unfortunately, in addition to the cardiac, gastrointestinal, and other morbidities, it is clear that many over-the-counter NSAIDs accelerate cartilage loss.12 Cartilage cells lose less than 3% of cartilage volume, while the extracellular matrix (ECM) accounts for over 90% of cartilage volume. GAGs compose the majority of the ECM, and many NSAIDs, including ibuprofen, inhibit GAG synthesis by as much as 80%. NSAIDs more than double the rate of radiographic deterioration of cartilage in knee joints, fast-tracking unwary patients to TKR.13 The routine use of NSAIDs in youth sports is increasingly unwise as younger Americans are getting large-joint OA. Younger patients are not good candidates for TKR or THR due to the insufficient durability of implants. Providing safe alternatives to NSAIDs can reverse the insidious effect of these drugs. The combination of curcumin and boswellia has been shown to be effective in the treatment of OA-associated pain, and without any of the side effects of NSAIDs.14 Quercetin alone has been shown to lower synovial inflammatory markers, and in combination with glucosamine and chondroitin, has Level 1 evidence for improving OA pain, mobility, and collagen synthesis.15 Adequate vitamin D is associated with knee pain reduction and increased quadriceps strength.16 The evidence for glucosamine/chondroitin has weathered large-scale meta-analysis and shows a small benefit in slowing OA progression, which may indicate the important role that addressing the underlying inflammatory process as opposed to solely replacing collagen-building blocks.17

Hyaluronic injections have been shown to be helpful in managing KOA pain; however, they do not modify the cartilage degenerative process at the heart of OA. Corticosteroid injections are the mainstay treatment in the orthopedic community despite their well-known destructive effect on cartilage and connective tissue. Corticosteroid injections are proven to be fast-track KOA to joint replacement.18

Surgery for OA

Surgery is the mainstay of conventional treatment for OA, but is often unnecessary and carries a high morbidity. Kirkley et al (2008) have provided Level 1 evidence suggesting that arthroscopic knee debridement surgery is no better than physical therapy and pharmaceuticals for the treatment of OA of the knee. Dr. Bruce Mosley reported in the New England Journal of Medicine, as early as 2002, that sham arthroscopic surgery was as effective as debridement, repair, and full arthroscopic surgery for KOA.19 Yet more than 600 000 arthroscopic surgeries for OA continue to be performed yearly in America. Meniscectomies have been shown to be ineffective, but also to result in a 3-fold increase in the progression to TKR.20 As a result, the American College of Sports Medicine recently recommended against meniscectomies, calling instead for physical therapy and time as the best practice for treatment of meniscus tears.21 The US Department of Health and Human Services (DHHS) reported that 300 000 TKRs were performed in 1991. By 2017 that number had nearly tripled to

Many NSAIDs, including ibuprofen, inhibit GAG synthesis by as much as 80%.
corticosteroid injection, exercise, and local connective tissue. Dextrose prolotherapy caused by ligament instability. Dextrose Many chronic pain conditions are collagen surfaces, tendons, and ligaments. and has been proven to stimulate repair of structures and/or intra-articular space, or procaine, into the supporting joint of 10-15% dextrose, mixed with lidocaine safe, effective, and well-proven intervention United States every year. performed in 2017. And the TKR momentum of this evidence, over 800,000 TKRs were 22% were questionable at best.27 Yet, in spite while 34% were completely unjustified, and of TKRs performed on this group could be 5 years; in 2014 he reported that only 44% half of those TKRs were medically indicated. osteoarthritis of the knee.28-30 Hypertonic dextrose prolotherapy is a safe, effective, and well-proven intervention in KOA. Classic dextrose prolotherapy relies on injecting a hypertonic solution of 10-15% dextrose, mixed with lidocaine or procaine, into the supporting joint structures and/or intra-articular space, and has been proven to stimulate repair of collagen surfaces, tendons, and ligaments. Many chronic pain conditions are caused by ligament instability. Dextrose prolotherapy directly treats ligament instability by strengthening ligaments and connective tissue. Dextrose prolotherapy is more effective than any combination of corticosteroid injection, exercise, and local anesthetic for OA pain.25

In 2016, Dr Gaston Topol et al demonstrated the ability of dextrose prolotherapy to regrow cartilage in patients with late-stage bone-on-bone knee OA who had been relegated to TKR. Using before-and-after fluorescent stains of cartilage tissue, arthroscopic mapping of bone-on-bone cartilage loss, biopsy, and subjective pain scores, 6 participants (1 female and 5 male) – median age of 71 years, WOMAC composite score of 57.5 points and a 9-year pain duration – received an average of 6 dextrose injections and follow-up arthroscopy at 7.75 months. Blinded reviewers agreed that cartilage regrowth occurred in 19 of 54 zone comparisons in areas of the knee that had been completely denuded of cartilage. All KOA patients experienced significant improvement in pain and disability scores after 7 monthly dextrose treatments.26 Six additional studies on the chondrogenic benefits of dextrose prolotherapy have been published within the last 4 years, most of which simply involved the injection of supporting knee structures in addition to intra-articular prolotherapy solution. Dextrose prolotherapy has also been demonstrated to be more effective than corticosteroid injections for OA of the first metacarpophalangeal (MCP) joint, improving pain and grip strength with only 3 injections.28 Dextrose prolotherapy has applications for virtually every joint in the body and has been shown to be safe and effective.

Conclusion

OA is a debilitating condition, the morbidity of which will only increase in coming years. Regenerative orthopedics and the associated injection therapies are effective, safe, and utilize the body’s own healing power to accomplish the restoration of natural function. Movement is a primary need for the human body and mind, and essential for optimal health. Therefore, reducing the pain and joint dysfunction and restoring movement should be a priority for every physician. Dextrose prolotherapy should be considered when evaluating patients for joint pain and musculoskeletal dysfunction. Naturopathic regenerative orthopedics is The Vis Medicatrix Naturae at work, and can help patients continue moving throughout their lives.

In Part 2 we will focus on the use of autologous biologic tissues and scaffolds.

References 7-31 available online at ndnr.com

REFERENCES


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Mistletoe
A Holistic, Patient-Centered Adjunctive Therapy

SUKRITI BHARDWAJ, BMSC, ND
MONIQUE AUCOIN, BMSC, ND

In 2017, approximately 206,200 new cancer cases and 80,000 cancer deaths occurred in Canada. Of these new cases, 50% will be prostate, breast, lung, or colorectal cancer. Alarmingly, an estimated 1 in 2 Canadians are at risk for the development of cancer within their lifetime, and 1 in 4 Canadians will succumb to the disease. The high incidence of cancer necessitates widespread implementation of supportive therapies that may enhance patients’ otherwise reduced quality of life as they navigate their diagnosis. For instance, chemotherapy produces toxicity-related side effects such as fatigue, nausea, and vomiting.1,2 The purpose of the present review is to evaluate the most relevant research to assess the efficacy of *Viscum album* (mistletoe) preparations in improving the quality of life of cancer patients with various solid-tumor malignancies.

**Treating Cancer**
**The Question of Origin**

The effort to control cancer and its consequent detrimental impact on patients’ quality of life has been largely impeded by the uncertainty regarding its origins.3 Cancer has long been regarded as a genetic disease. However, it is now postulated that chronic exposure to non-specific factors that compromise the mitochondria’s respiratory mechanisms result in upregulation of oncogenes such as Ras and BRAF,4 which may initiate malignant cancer. Examples of factors adversely affecting the mitochondria and potentially resulting in malignancy include carcinogen exposure, inflammation, viral infections, and advancing age.5 Elucidating the origin of a patient’s cancer is thus of vital importance so that the disease and its deleterious effects on the patient’s quality of life can be properly addressed.

**Conventional Treatment Goals**

Although research designed to elucidate the exact mechanisms underpinning the origin of cancer remains in progress, it is clear that cancer is rapidly becoming a significant public health concern. The primary goal of antineoplastic drug therapy such as chemotherapy is cure, defined as complete remission for 5 or more years. If cure is not possible, conventional care aims to control the disease by impeding cancer cell growth. Palliative care is provided when both cure and control are not achievable.6 Chemotherapy, however, is known to compromise quality of life during and after treatment, in addition to exerting toxicity-related side effects such as nausea, vomiting, pain, and fatigue. It is clear that cancer is rapidly becoming a significant public health concern. The primary goal of antineoplastic drug therapy such as chemotherapy is cure, defined as complete remission for 5 or more years. If cure is not possible, conventional care aims to control the disease by impeding cancer cell growth. Palliative care is provided when both cure and control are not achievable. Chemotherapy, however, is known to compromise quality of life during and after treatment, in addition to exerting toxicity-related side effects such as nausea, vomiting, pain, and fatigue. Therefore, the maintenance of quality of life during and after the completion of conventional therapies is paramount.

**Mistletoe Therapy – The Evidence**

Mistletoe therapy (using an aqueous extract of *Viscum album* from fir tree) is an adjunctive cancer treatment introduced at the beginning of the 20th century by Rudolf Steiner. Mistletoe is widely used in parts of Europe, such as Germany where it was prescribed more often than tamoxifen during the year 2002.6

In a methodologically strong study of 6 months’ duration, 95 breast cancer patients in the stages T1N0M0 and scheduled to be treated with 6 consecutive cycles of CAF (cyclophosphamide, adriamycin, and 5-fluorouracil [5-FU]) chemotherapy were adjunctively treated with mistletoe injections, using a dose-escalating protocol. The control group received chemotherapy alone. In 14 out of 15 comparisons (including various physical symptoms and parameters of function), the mistletoe group outperformed the control group, while 1 comparison (financial difficulties) favored the control group.7

Another trial studied the efficacy of mistletoe extract injections among digestive tract cancer patients undergoing surgery. The experimental group received treatment for 2 pre- and 2 post-operative weeks. Following 60 days from the beginning of hospitalization, a significant improvement was observed on the Karnofsky performance index (KPI) score and the Anxiety scale score (p < 0.01) in the mistletoe-treated patients. In contrast, a marked deterioration was observed in the control patients’ KPI (p < 0.05) and Anxiety scale score (p > 0.05).8

The effects of PS76A2, an aqueous mistletoe extract, were studied in 272 patients with operable stage I/II breast cancer eligible for CAF (cyclophosphamide, methotrexate, fluorouracil) chemotherapy.9 After 15 weeks of adjunctive treatment using the medium dose (15 mg mL, 0.5 mL), significant differences were demonstrated...
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Mistletoe: Mechanisms of Action
Structure & Apoptotic Properties

Viscum album extracts may be beneficial in this regard. Moreover, European mistletoe extract inhibits the PDK-1 (growth) pathway, which is essential in the proliferation and survival of myeloid leukemia K562 cells, thereby inducing apoptosis.10

Synergistic Action with Chemotherapeutic Agents

In vitro studies examining the effect of administering Viscum album concurrently with conventional chemotherapy drugs have also shown encouraging results. When chronic myelogenous leukemia K52 cell lines were co-treated with doxorubicin (Doxo) and Viscum album var. coloratum agglutinin (VCA) and Doxo,16 it is important to note that low-dose chemotherapy may result in a subset of tumor cells entering a state of senescence, meaning that while the cell cycle has been irreversibly arrested, the cells remain metabolically active and secrete factors that stimulate the growth of tumors.17 It was shown that simultaneous treatment of MCF-7 (human breast adenocarcinoma cells) with both Doxo and Viscum album var. coloratum agglutinin was able to halt the induction of cell cycle arrest at the G2/M phase, thereby activating an intrinsically apoptotic program in favor of senescence.18

ImmunoModulator & Anti-Inflammatory Effects

The immunomodulatory effects of mistletoe lie in its interaction with dendritic cells. Normally, tumor cells are capable of diminishing dendritic cell activity, as a means of evading the normal immune response of the body, by releasing immunosuppressive substances. Various extracts of mistletoe are capable of diminishing immune maturation and reduce the tumor-induced immunosuppression of dendritic cells.19 A further effect on the immune system exerted by mistletoe, specifically lectin- mediated, is to enhance natural killer (NK)-mediated globlastoma cell lysis in vitro.21 Mistletoe also exerts a powerful anti-inflammatory effect via its ability to inhibit the expression of Cox protein, potentially accounting for its antitumor effect.22 Furthermore, non-specific sustained inflammatory response may precipitate and prolong cancer-related fatigue (CRF). Specifically, a correlation was found, in the serum of disease-free breast cancer survivors, between CRF and increased inflammatory molecules such as immunoglobulin G subunits, complement C1q and serum amyloid A. Thus, the anti-inflammatory properties of mistletoe extracts may be beneficial in this regard.23

Clinical Implications

Cancer is an increasingly common condition with a high incidence and mortality.24 Cancer survivors commonly suffer a wide range of detrimental effects on various dimensions of quality of life such as pain, fatigue, appetite loss, and insomnia.25 This compromise in quality of life can be attributed to the disease process itself as well as to side effects from conventional treatment. The maintenance of quality of life is paramount in cancer patients. Mistletoe therapy enhances quality of life on various dimensions such as pain, insomnia,26,27 and fatigue,28 among other outcomes that are important to patients. Mechanistically, mistletoe extracts exert pro-apoptotic29 and immunomodulatory effects30 that enhance host cell defenses against tumor cells. Its anti-inflammatory effect is postulated to be the potent mechanism by which it can alleviate cancer-related fatigue, thereby enhancing quality of life in this regard.31 In summary, the inclusion of mistletoe therapy as part of an integrative approach to provide mental, emotional, and physical support for the increasing number of patients facing a cancer diagnosis within their lifetime is warranted.32 References available online at ndnr.com

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Monique Aucoin, BMSc, ND is a naturopathic doctor and research fellow of the Canadian College of Naturopathic Medicine. Dr Aucoin’s clinical and research interests are focused on client well-being and prevention of mental illness. She has been involved in a range of systematic reviews and randomized controlled trials. In her practice, Dr Aucoin is passionate about supporting naturopathic doctors and students in engaging with evidence. For more info: www.MoniqueAucoinND.com

Sukriti Sharma, BHSc

Sukriti Sharma, BHSc, is a 4th-year student at the Canadian College of Naturopathic Medicine. Her research interests include the primary and secondary prevention of mental illness. During her time in medical school, Sukriti has explored the use of integrative medicine, along with the use of traditional medicine, within the realms of psychiatry and cognitive health. In her free time, Sukriti enjoys spending time with patients to help them achieve optimal health.

Student Scholarship – Research Review

Emerson Ecologics is the largest distributor of professional supplements, and has been supporting the practice of healthy living for over 35 years. For the dimensions of “tiredness” (p<0.05), “sexual interest or ability” (p<0.05), and “thought of actually having treatment” (p<0.01). Positive trends for the categories of appetite, feeling sick (nausea/vomiting), and sense of taste were also noted for the medium dose vs placebo. Some patients experienced a local inflammatory reaction at the site of injection (the most common adverse effect of mistletoe therapy), although this reaction was mild when using the low and medium doses.22 The same investigators conducted a follow-up study on 352 breast cancer patients receiving PS76A2 as an adjuvant treatment to CMF chemotherapy.23 Patients were administered 30 mg mistletoe lectin/ml twice weekly for 16-24 consecutive weeks before starting each chemotherapy regimen. After 15 weeks of treatment, scores on the 3 subscales of the FACT-G questionnaire (physical, emotional, and functional well-being) were significantly in favor of the treatment group (p<0.0001). Item analysis of the GLQ-5 showed that item 1 (feeling anxious or depressed), 5 (tiredness), 6 (appetite or sense of taste), 7 (sexual interest or ability), 8 (thought of actually having treatment) improved with PS76A2 treatment but worsened in the placebo group (p<0.0001). Two months following the last chemotherapy treatment, the patients’ quality of life was again evaluated. Significant differences for all physical and functional well-being items were observed except for the item labeled “having pain.” In addition, PS76A2 outperformed placebo for the following 3 items on the emotional well-being scale: “I feel sad,” “I feel nervous,” and “I worry that my condition will get worse.”24

Another study evaluated 95 breast cancer patients with T_N_M who were prescribed 6 consecutive cycles of CAF along with adjunctive injections of mistletoe (a proprietary fermented aqueous extract from apple tree) that were administered 3 times per week.25 Compared to control patients who received chemotherapy alone, the mistletoe treatment group showed improved quality of life, according to all 15 scores on the quality-of-life questionnaire, EORTC-QLQ-C30. Nine of the symptom scores on this questionnaire showed a clinically significant difference of at least 5 points for patients in the mistletoe group: emotional, social and role functioning, nausea and vomiting, pain, insomnia, appetite loss, diarrhea, and financial difficulties.26 Quality of life was also assessed in advanced pancreatic cancer patients receiving mistletoe extract; the treatment was administered in escalating doses via subcutaneous injection at a frequency of 3 times per week, for up to a year.27 The scales showing the greatest improvements in the mistletoe treatment group were those on which the patients’ baseline clinical condition was the worst: global quality of health, physical function, pain, fatigue, appetite loss, insomnia, and nausea/vomiting.28

Mistletoe: Mechanisms of Action
Structure & Apoptotic Properties

Metabolites of the European mistletoe plant include viscotoxins, amphiphatic basic polypeptides, and lectins, among other constituents. The primary toxic activities of V. album with known anticancer activity are type II ribosome-inactivating proteins composed of an A and B chain known as mistletoe lectins: ML-1, ML-2, and ML-3. The A chain facilitates the entry of the toxic subunit into cells through its binding to cell-surface glycoconjugates, and the A chain functions to inactivate the 60S ribosomal subunit in eukaryotic cells, thereby preventing protein synthesis.11,12 V. album modulates mechanisms in the cancerous cell responsible for apoptosis. For example, Viscum album L. colostratum, a type of Korean mistletoe, has been shown to target the MAPK pathway in cancer cells by increasing the expression of a component of this pathway, known as JNK1. Overexpression of JNK1 in hepatocarcinoma cells significantly increases the apoptotic rate of these cells. Moreover, European mistletoe extract inhibits the PDK-1 (growth) pathway, which is essential in the proliferation and survival of myeloid leukemia K562 cells, thereby inducing apoptosis.10

Synergistic Action with Chemotherapeutic Agents

In vitro studies examining the effect of administering Viscum album concurrently with conventional chemotherapy drugs have also shown encouraging results. When chronic myelogenous leukemia K52 cells were co-treated with doxorubicin (Doxo) and Viscum album var. coloratum extract (VAE) for 72 hours, VAE/Doxo greatly reduced the amount of cancer cells in both the S (reparative) and M (mitotic) phases of the cell cycle. At 72 hours, a significant loss of mitochondrial membrane potential was observed in addition to cleaved caspase-3 and bax gene expression, all of which indicate activation of mitochondrial apoptotic pathway.30 A similar increase in apoptosis was observed in estrogen receptor-positive and receptor-negative cell lines co-treated with Viscum album var coloratum agglutinin (VCA) and Doxo.16 It is important to note that low-dose chemotherapy may result in a subset of tumor cells entering a state of senescence, meaning that while the cell cycle has been irreversibly arrested, the cells remain metabolically active and secrete factors that stimulate the growth of tumors.17 It was shown that simultaneous treatment of MCF-7 (human breast adenocarcinoma cells) with V album and Doxo was able to halt the induction of cell cycle arrest at the G2/M phase, thereby activating an intrinsically apoptotic program in favor of senescence.31

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The Long & Winding Road to Authentic Recovery

There is general agreement in the field of trauma therapy that recovery occurs in stages. Although the number of stages varies between approaches, they are broadly organized around concepts of 1) training in stabilizing unhealthy behaviors, and desensitizing the posttraumatic experience by becoming educated about basic trauma physiology; 2) remembering and mourning; coming to terms with traumatic history; and 3) reconnecting to self and others.1,2

Movement between stages is non-linear, and authentic recovery is achieved by transcending the multilayered treatment strategies, the healing of traumatized brain and nervous system; the amplification of the treatment plan by blending cognitive and psychodynamic, Gestalt, and sensorimotor therapy, a newer, promising approach,7 Belleruth Naparstek notes,8 trauma-focused therapies share common cognitive modalities – such as EMDR (eye movement desensitization and reprocessing),9 Emotional Freedom Technique (EFT, or “tapping”), mindfulness practices, guided imagery, trauma-sensitive yoga, biofeedback (neurofeedback and cardiac coherence training) – detour around fear-damaged neural pathways to access places in mind and body where trauma is embedded. More cognitively-based approaches, such as trauma-centered cognitive behavioral therapy and psychodynamic therapy, may then be employed to enable gradual integration of traumatic memories.

Sensorimotor therapy, a newer, promising iteration of stage-cognizant trauma care, is described as a “mindfulness-based body-oriented therapy” that synthesizes cognitive, psychodynamic, Gestalt, and other psychotherapeutic models.10,11

Diverse though they may be, as Belleruth Naparstek notes,12 trauma-centered therapies share common therapeutic values: “1. They first and foremost find ways to re-negotiate the nervous system. 2. They desensitize and normalize the experience by explaining posttraumatic stress (PTS) as the somatic and neurophysiologic condition it is. 3. They offer simple, self-administerable tools that empower the end-user and confer a sense of mastery and control. 4. The interventions are cast as training in skill sets, not the healing of pathology.”12

Vis Medicatrix Natura in Trauma Care

For people on the continuum of PTSI recovery, naturopathic medicine can play an important and ongoing role in the multidisciplinary continuum of care: as an ongoing touchstone for compassionate presence, education, and informed provider referral; by offering expert guidance for self-care and healthy lifestyle practices; by providing functional testing and treatment to support healing of trauma-disrupted systems and pathways; and by “treating the whole person” using our extensive naturopathic armamentarium – from nutrition and botanicals, to homeopathic support, flower essences, acupuncture, and more – to remove obstacles and support healing. Laboratory assessment can guide treatment strategies, affirm to the patient that there really are physiologic underpinnings to their psychic distress, and sustain motivation for continued care within the care plan by tracking change over time. Multi-point cortisol assays and urinary neuropeptide panels; “conventional lab” screening for patterns of dysglycemia and dyslipidemia, homocysteine elevation, and inflammatory markers, thyroid and sex hormones, imbalance, vitamin D, magnesium, and zinc deficiency; comprehensive functional nutrient assay; digestive analysis; genomic assessment (particularly focused on genetic polymorphisms tied to inflammatory upregulation and methylation pathways, particularly those of catecholamine metabolites); and food intolerance panels to pinpoint proinflammatory foods; these are all tools with which to identify individual patterns of imbalance and more effectively “treat the cause.”

Naturopathic TAU and PTSI

Many of the fundamentals of naturopathic care – our “treatment as usual” – align well with the developing trauma-centered treatment model. Because poor habits of self-care go hand-in-hand with the posttraumatic experience (ie, a tendency to skip meals; to overdo caffeine, alcohol, sweets and refined flours and give short shrift to nutrient-dense whole foods and water; to go of regular exercise and time spent outdoors), educating patients on the importance of attending to lifestyle fundamentals can be a first step in a turnaround for recovery. Additional macro- and micro-nutrient support in the form of a glycemic-balancing medical shake and/or supplement formula may ease the transition to healthier behaviors, reduce dysglycemic spiking of epinephrine and norepinephrine, and support nutrients with the steady stream of glucose required for stable function. Advocating an “anti-inflammatory lifestyle is common to many naturopathic treatment strategies – emphasizing a plant-focused, toxicant-minimizing diet (informed whenever possible by testing for proinflammatory food intolerances) and personal environment – but it takes on greater importance with increasing acknowledgment of inflammation’s impact on PTSD physiology.8

A simple supplement plan, including a high-quality multiple-vitamin/mineral formula and an activated B-complex can help to stabilize body-mind systems. Omega-3 fatty acids have been of interest in the treatment of psychiatric disorders, and more recently in the context of prevention and treatment of PTSI.13,14,15 Particularly in light of potential eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) depletion secondary to diet and lifestyle compromise in the PTSI population, supplementation with EPA (900-1500 mg) and DHA (400-1000 mg) is indicated and may even be conservative. Even more than usual is the case, complex protocols for the PTSI population have the potential to backfire due to overwhelm, and overly aggressive lifestyle change can amplify risk of “detox” or Jarisch-Herschel reactions, which can dramatically increase symptoms to demoralizing effect.

Exercise increases brain oxygen supply and production of serotonin and endorphins, modulates stress; supports glycemic balance; promotes reconnection of mind and body, and can be a source of social support. Sunlight augments antidepressant vitamin D levels and stimulates balanced, pinal melatonin secretion for improved sleep, mood, immune function, and anxiety reduction.2 A walk or a bike, absorbing the grounding energies of earth, water, sun, sky, trees, and wild things – puts us in touch with what the poet Mary Oliver has called our “place in the family of things.”16 Rhythmic movement, breath-work (pranayama, chanting, singing), yoga, qi gong, and martial arts; there are many ways to promote “bottom-up” regulation of body-mind imbalance.17,18

Restoring the HPA Axis

I’ve often thought of the adrenal glands as the interface of mind and body, and it’s not surprising that in PTSI-focused research there is increasing awareness of connections between HPA axis (hypothalamic/pituitary/adrenal axis) dysregulation, and glucocorticoid, catecholamine (particularly dopamine and norepinephrine), and serotonin dysregulation.18-20 Naturopathic protocols for neuroendocrine repair – informed by 4-point cortisol, melatonin, urinarv neurotransmitter, and genomic analysis – enhance restoration of neuroendocrine balance and symptom amelioration, with small risk of harm.

Basic nutrient support for restoring the HPA axis and improving cortisol balance (particularly nighttime output, to reduce sleep-lateny insomnia) could include bedtime dosing of phosphatidylserine (200-300 mg), glycerophosphocholine (400 mg) and acetyl-L-carnitine (300 mg). Two observations of note: 1) some “adrenal support” formulas contain ingredients that may stimulate cortisol output and may therefore be contraindicated, at least until sleep, mood lability, and other symptoms

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of neuroendocrine imbalance have been well-stabilized; and 2) because of the intensity of posttraumatic symptomatology and the variable and sometimes extended timeframes for improvement (in my experience, ranging from a few days to 2-3 months), additional short- to moderate-term strategies for improving sleep quality and reducing anxiousness are often in order.

Reducing Anxiousness, Improving Sleep

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Thyrozone®: Real Thyroid Solutions for Better Health & Better Living

According to the American Thyroid Association, nearly 20 million Americans suffer from hypothyroidism. This number, however, could be closer to 60 million depending on interpretation of TSH levels. The prevalence of hypothyroidism and Grave’s disease has been estimated at close to 3 to 4 million in the United States alone. The thyroid epidemic is only growing, and adequate knowledge and understanding of this important endocrine gland is vital for doctors and patients alike.

Dr John Robinson and Dr Cristina Romero-Bosch are a husband and wife team that have created a wonderful book that helps physician and patient better understand the growing thyroid epidemic; the book also details how they have successfully treated it with their “ThyroZone® System.” They explain in their clinic.

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• Step 1: Basic Thyroid Screening Questionnaire. This thorough clinical questionnaire is based on research-validated questions that can reveal symptoms related to hypothyroidism.

• Step 2: Determining Goiter. When goiter is present, it is graded through the World Health Organization (WHO) Classification of Goiter, on a scale of 0-2.

• Step 3: Confirming the Diagnosis Low or High Thyroid. Zulewski’s clinical score for hypothyroidism can be used to determine hypothyroidism (a score greater than 5) or euthyroid (a score between 0 and 2). In cases of suspected hyperthyroidism, Wayne’s hyperthyroid index would be utilized.

• Step 4: Functional Analysis of Blood Work. By looking specifically at optimal ranges (as opposed to simply standard laboratory ranges) of TSH, Total T3, Free T3, Total T4, Free T4, Reverse T3, Anti-TPO, and Anti-Tg, we can further confirm thyroid dysfunction including specific patterns.

• Step 5: Resting Metabolic Rate (RMR) & Reflex Testing. This is accomplished using additional physical exam testing to further confirm and monitor thyroid health.

• Step 6: Other Clinic Diagnostic Tools. Other testing, including thyroid ultrasound, thyroid biopsy, thyroid thermography, and electrocardiogram (ECG), are used to monitor the health of the patient throughout the treatment.

• Step 7: Common Diet Factors in Thyroid Disease. Dietary factors are considered, such as lectins, gluten, the importance of the traditional ancestral diet, the elimination of goitrogens, limiting soy intake, and the top nutraceuticals and herbs for thyroid health.

• Step 8: Common Thyroid Environmental Toxins and Endocrine Disruptors. This step involves identifying and eliminating any possible endocrine disruptor in foods or the environment.

• Step 9: Comprehensive Diagnosis: Bringing it Together. By gathering all the information discussed thus far, proper treatment and monitoring of a patient’s progress can be accomplished.

Only 18% of the thyroid hormones in the body are found in the blood, whereas 75% can be found in the muscles, skin, and brain tissues. This is why understanding the physical signs and symptoms of the body is crucial to understanding the action of the thyroid gland. Treatment using natural desiccated thyroid is discussed in depth, as well as other thyroid medication options. The authors also address underlying stress and adrenal issues, as well as imbalances in sex hormones, insulin, and growth hormone.

From a functional medicine and naturopathic medicine perspective, this book provides clear insight into how to properly identify, treat, and monitor your thyroid patients and give them a better quality of life. I highly recommend this book for any physician who treats thyroid patients in his or her practice. It has become an invaluable tool in my practice, and I refer to it often.

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Clinical Use of Cannabis

Cannabis has a documented history of clinical use that spans thousands of years in the traditional medicines of Asia and Europe. As the prevalence of the opioid epidemic has made the medical community re-emerge as one of the most effective alternatives for pain management.

A 2017 study surveying 2800 patients found that 93% preferred using cannabis over opioids for managing pain. Of those surveyed, 97% were able to decrease their dependence on opioids through the introduction of cannabis, and 80% described cannabis as being more effective than opioids (Figure 1). Similarly, a retrospective study conducted in 2016 found that the use of cannabis was associated with a 64% decrease in opioid use over a 2-year period. While these numbers are impressive, important questions still remain.

What makes cannabis so profoundly beloved among people using it for pain management? Is it as clinically effective as its adherents believe? What is the basis for its clinical effectiveness? How should it ideally be used, if psycho-activity can become an impediment to daily activity?

Ayurvedic Perspective on Cannabis Use

Because cannabis has been suppressed in both India and the United States due to its socially and culturally adverse reputation, I was surprised to learn about its significant use in traditional Ayurvedic formulas. Bhuraprakasha, a 14th-century Ayurvedic text, describes cannabis as a medicine with warming and soothing qualities. These qualities mitigate the effects of excess Vata, which presents with painful and spastic symptoms, and they alleviate the Kapha quality, which is associated with inflammatory fluid retention, lymphatic congestion, and appetite suppression. Bhuraprakasha indicates cannabis use for abdominal cramping, severe pain, severe dysentery, inflammatory conditions, excessive fatigue associated with overactivity, and for stimulating the appetite.

However, one of my honorable Ayurvedic mentors, Vaidya Jayarajan Kodikannath, cautions that Ayurveda considers cannabis to be an “Uparishvah” herb. This means that it requires appropriate processing and purification to maximize its powerful clinical benefit and minimize its adverse effects. The section below will explore what this concept means in modern scientific and clinical terms.

Bio-Physiological Activity of Cannabis

To begin, we must acknowledge that the cannabis plant contains up to 70 phytocannabinoids. To put this in perspective, we are only now starting to grasp the breadth of the effects that just 3 of these compounds have in the body. These are tetrahydrocannabinol (THC), delta-9-tetrahydrocannabinol (δ9-THC), and cannabidiol (CBD).

These 3 compounds interact with and affect the body through cannabinoid receptors (CB1 and CB2). The stimulation of either of these receptors has an antinociceptive effect, which ultimately produces the therapeutic benefit of cannabis. CB1 receptors are primarily located centrally in the nervous system, in locations such as the thalamus, amygdala, cerebellum, etc., as well as peripherally in the dorsal root ganglia of the spinal cord. CB2 receptors are located at the peripheral afferent nerves on the surface of the skin, in the digestive tract, etc., as well as in immune cells like macrophages and macroglia, which perform surveillance and regulate immune responses. In summary, CB1 activity is more concerned with the response of the central nervous system to perceived pain, inflammation, injury, etc., while CB2 activity is more concerned with mitigating peripheral perception and immune responses to pain, inflammation, injury, and other triggers of noceception.

There is significant upregulation of CB1 and CB2 receptors in response to neuropathic pain, as well as with inflammatory conditions. THC and δ9-THC bind strongly to CB1 receptors and act as only partial agonists of CB2 receptors. Both have strong psycho-activity. By contrast, CBD binds relatively less effectively to CB1 receptors and has no psycho-activity. CBD has high binding potency to CB2 receptors and acts as full agonists of CB2 receptors. It binds strongly enough to have very beneficial health effects and contributes to nociceptive activity similar to that of δ9-THC. In addition to pain management, CBD conducts immune modulation to reduce inflammation.

Clinical Indications

Indications for the clinical use of cannabis have become clearer with a growing body of research on the biochemical and physiological effects of cannabinoids. For example, the activation of CB1 receptors in the central nervous system modulate stress-induced responses of the nervous system. This activity is associated with lowering the propagation of pain patterns that are centrally generated. This effect is especially useful for conditions such as multiple sclerosis and chronic regional pain syndrome (CRPS). In addition, because CB2 receptors are upregulated in microglia and peripheral afferent nerves in response to...
injury, inflammation, and pain, the activity of CB2 receptors helps to control pain, inflammation, and associated edema. CB2 activity has also been found to mediate visceral pain through antinoceptive activity in visceral organs.

CBD use is favored in order to avoid the adverse effects associated with the psychoactivity of THC. In other words, CBD provides wide-ranging effects without associated with THC activity. Furthermore, the benefits of CBD are associated with the following mechanisms of action:

1. CBD generates an anti-inflammatory effect, as indicated by the reduction of interleukin (IL)-6, tumor necrosis factor (TNF)-α, cyclooxygenase (COX)-2, and inducible nitric oxide synthase (iNOS) expression.
2. CBD has an agonistic effect with adenosine A2A receptors, as it downregulates overactive immune cells and reduces collateral inflammatory damage.
3. CBD may help control inflammation in the brain by reducing microglial activation, thereby protecting against degenerative changes or the progression of disease.
4. CBD’s binding can promote the uptake of intracellular calcium (Ca2+), thus stabilizing immune cells like mast cells and preventing the inflammatory effects of compounds like histamine.
5. Curcumin is a polyphenol in the turmeric plant that possesses anti-inflammatory, anti-cancer, and anti-microbial properties.

Clinical Applications

The aforementioned studies and others demonstrate the clinical indications for cannabinoids in a wide range of painful conditions. Acute pain after surgery, injuries such as tears of ligaments, tendons, muscles, fractures, etc., as well as chronic pain associated with neuropathic, inflammatory, or degenerative conditions, are treatable with cannabis-based preparations.

### Table 1: Routes of Administration

<table>
<thead>
<tr>
<th>Mode of Administration</th>
<th>Time of Onset</th>
<th>Length of Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoke/Vapor</td>
<td>A few seconds</td>
<td>0-2 hours</td>
</tr>
<tr>
<td>Oral ingestion</td>
<td>1-2 hours</td>
<td>2-6 hours</td>
</tr>
<tr>
<td>Transdermal</td>
<td>1-5 hours</td>
<td>6-8 hours</td>
</tr>
</tbody>
</table>

Ideal routes of administration can change depending on the symptoms and conditions being treated with cannabis. For pain, some simple rules can be applied, based on the effect being sought:

- **Smoke/vapor inhalation** is most useful when the individual is seeking immediate relief from the acute or sudden onset of painful aggravations and muscular spasms. This mode is also effective for individuals seeking antiemetic effects for symptoms associated with conditions such as hepatitis C, migraines, etc.
- **Oral ingestion** is oil-infused extracts of cannabis provokes most beneficial in chronic pain conditions. Oral ingestion, oil-infused preparations have a slower onset but provide longer-term relief from symptoms. Oil infusion also allows cannabinoids to be more easily absorbed across fatty membranes and retained longer. Because of this longer retention, oil-infused preparations only need to be taken 2-3 times per day to treat and control pain.
- **Transdermal applications** are most helpful for superficial pains and injuries of musculoskeletal tissue, joint pain and swelling, etc.

### CBD vs THC

CBD is by far the most frequently recommended form of phytoconstituents in my practice. CBD offers the benefit of activating both CB1 and CB2 receptors, and it provides an additional effect by promoting the efficacy and concentration of endocannabinoids. Additionally, it is much more practical than cannabis for regular use, since in contrast to THC, CBD does not have psychoactivity. CBD is, by far, the preferred choice of anyone who values sobriety.

On the other hand, I have found that the psychoactivity associated with THC can be useful in the management of severe, debilitating pain that cannot be completely controlled by CBD. THC is effective in conditions where sedation and distraction are important methods of helping to control pain. Relevant conditions might include cases of late-stage cancer, kidney failure, traumatic brain injury, hepatitis, etc.

### Combining Cannabis with Other Herbs

While CBD is profoundly effective in helping to control and manage symptoms of chronic pain, it also allows the body to come out of the persistent shock of these symptoms. It brings about welcome changes in clients’ emotional experience and physical

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**Figure 1. Survey: Cannabis with or without Opioid Pain Meds**

![Survey Image](https://via.placeholder.com/150)

> *Curcuma longa*: Curcumin (or turmeric) serves as an effective inflammation modulator by controlling inflammatory pain and swelling. Ayurvedic medicine indicates its use for Kapha-Pitta aggravation, which is demonstrated by the hallmarks of inflammation (tumor, color, odor, and tumor). Curcumin is also indicated for ulcers and diseases of the skin.13 A proven medicine for its efficacy in controlling inflammation propagated by COX-2 and TNF-α, curcumin serves as an excellent supportive treatment for conditions including ulcerative colitis, rheumatoid arthritis, pancreatitis, cancer, and more.14

**References available online at ndnr.com**
**Bowen Therapy**

**Reset Your Body and Mind**

**SANJA TAMBUROC, ND**

My first experience with Bowen therapy was when I was a student at Boucher Institute of Naturopathic Medicine (BCIM) and it is important to note to me that this was a powerful tool to add to my naturopathic toolbox. Not only did it have the potential to repair the physiology associated with acute and chronic pain, it also had the ability to reset and harmonize the nervous system. It thus had effects far beyond pain relief.

In my early years of clinical practice, I quickly became aware of how much demand there was for a modality that would help my patients not only with pain management but also with mental and emotional issues. These patients often initially presented with physical pain but revealed very quickly that the main problem actually resided in the mental/emotional realm. Hence, I needed something that would address both. I started to use Bowen therapy on these patients and immediately realized I possessed a tool that not only could quickly resolve the physical pain for my patients, but also had the ability to go deeper into shifting the emotional/psychological issues. This thus for me Bowen was born.

At present, I use Bowen in my daily practice. It is quick, cost-effective, efficient, and very easy to learn. I can rely on it to shift my patient’s pain, whether acute or chronic, and in a very short span of time. In addition, my patients consistently report that they have become more relaxed, their sleep is better, and energy levels improved, and their brain fog has lifted; they have also noticed a significant shift in their ability to concentrate and that their emotional well-being has started to shift in a positive way.

For almost 10 years, I have been seeing the amazing results of Bowen therapy, Olafimihan and Hall, “Bowen is a complementary therapy that supports mental, and psychological pathways.”

**Mind-Body Connection & Pain**

Most patients and doctors look at the body as a sum of parts, where they aim to fix a particular part, just like a car engine. This mechanistic view that body and mind are separate could be counterproductive to our medical system. Nowadays, pain is the common denominator, and living pain-free is the ultimate goal.

When we are in pain on the mental, emotional, or energetic level, it tends to show itself as physical pain. An ancient proverb states: “the body bears what eyes refuse to shed.” No doubt, there is purely physical pain, eg, from an injured ankle while playing sports, a broken bone, cuts, etc, but most of the pain these days is chronic pain. What causes chronic pain? Our emotional response to pain may be the most important determinant. Learned patterns of thinking and movement often contribute to chronic pain. It is during this time that our body is processing the information and doing the work, as it shifts from a beta-wave to an alpha-wave state. If you think of a body as a “bio-computer” and Bowen as a system-check that turns on the program repair, the program will run through a set of precise moves/steps and take breaks at times, before finishing. You know to not touch the mouse or the buttons on the keyboard before it finishes with scanning and resetting of the “bio-computer.” Doing so will interrupt the process by introducing too much additional information, and confuse the bio-computer. As a defense mechanism, the “bio-computer” will lock up. Once you reset your “bio-computer” with new patterns, it will typically run for 5-10 days unless interrupted.

Factors that can interrupt this reset include: adding more information too soon; trying to speed up the process; hot water; magnets or other energetic therapies used to treat the same kind of pain (ie, acupuncture, osteopathy, chiropractic); or resuming the activity that led to an injury in the first place.

When we play by these rules, the results are stunning.

**Who Can Benefit from Bowen?**

Since Bowen directly affects the nervous system, many internal health conditions in organs innervated by the parasympathetic nervous system can benefit, such as headaches, breathing defective problems, menstrual irregularities, and circulation problems. It is well suited to clients who cannot tolerate deep-tissue bodywork, eg, elderly people, babies, and children, or patients with chronic pain such as fibromyalgia.

Bowen is an amazing therapy during pregnancy, as it can minimize some of its discomforts, promote optimal foetal positioning, and prepare the mother for birth. Likewise, for newborns, Bowen can help with breastfeeding (one particular breast move can change everything), relieve colic, and help settle babies into healthy sleeping patterns.

Those of us who have required frequent chiropractic adjustments that did not hold, often find that corrections hold for longer periods of time after Bowen treatment.

Another great example are fibromyalgia patients. They do not have any physical signs of tissue damage in the areas of pain, and no signs of inflammation; however, they are in chronic pain and the symptoms of depression, sleep disturbance, and myriad other symptoms affect their everyday life. This type of patient responds very well to Bowen. By measuring ANS activity via heart rate variability (HRV) studies, Dr Whitetaker’s study showed that those patients can gain immediate relief and improved quality of life for weeks and months after Bowen treatment.

The list of conditions responsive to Bowen is endless, considering the fact that the treatment targets the nervous system, hence is affecting organs and functions innervated by that system. Bowen affects pain (both acute and chronic), structure (via posture, nerve, fascia, muscle, tendon, nerve, and joint), energy (via mood, and vitality), and function (respiratory, neurological, lymphatics, digestion, hormonal, and cardiovascular).

**Research on Bowen**

Although published scientific research on Bowen technique is limited, there is a growing compilation of studies demonstrating the ability of Bowen work to alleviate acute and chronic symptoms associated with altered states of health. In a systematic review of 15 studies on Bowen technique is limited, there was effective for reducing pain, and 33% showed improvement in mobility. In

**Table 1. Conditions Responsive to Bowen**

<table>
<thead>
<tr>
<th>Category</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Musculoskeletal Pain</td>
<td>Back pain: chronic and acute, Frozen shoulder and pain</td>
</tr>
<tr>
<td>Respiratory Problems</td>
<td>Asthma, Bronchitis, Hay fever, Sinusitis, Allergies</td>
</tr>
<tr>
<td>Digestive Disorders</td>
<td>Constipation, Colic, Crohn’s disease, Indigestion, Bowel problems</td>
</tr>
<tr>
<td>Gynecological Problems</td>
<td>Infertility, Mastitis, Premenstrual syndrome, Breast lumps</td>
</tr>
<tr>
<td>Chronic &amp; Acute Issues</td>
<td>Chronic fatigue syndrome, Balance problems, Tinnitus</td>
</tr>
<tr>
<td>Prosthetic Problems</td>
<td>Bed-wetting in children, Prostate problems</td>
</tr>
<tr>
<td>Immune System</td>
<td>Hepatitis, Earache and ear infections</td>
</tr>
</tbody>
</table>
Tolle Causam

associated with chronic illnesses such as addiction, 5 studies showed Bowen to...

Hamstring flexibility measurements, asymptomatic volunteers who were...

Frozen Shoulder
A 52-year-old nurse came in to my office complaining of a right frozen shoulder.

Babies with Colic
Two newborn twins, 40 days old, were vomiting/regurgitating and crying loudly, often after feeding, and experiencing irritability and disturbed sleep. Both babies showed signs of bloating, gas, stiff stomach, and flexed knees. After 3 Bowen treatments, including a simple release of the diaphragm and a TMJ procedure, their vomiting and colic were resolved.

Frozen Shoulder
A 52-year-old nurse came in to my office complaining of a right frozen shoulder. She was unable to perform any daily activities with the affected arm. Her arm was fully flexed and adducted due to restricted range of motion (ROM) and pain on any movement. ROM in her right arm was less than 20%. At this point, I was her last chance.

I did basic Bowen moves in the first visit, not even focusing on the shoulder. On her second visit, the shoulder pain was significantly reduced and ROM was increased by at least 20%. On this visit I started the frozen shoulder protocol. On her third visit, the pain had significantly lessened and she was able to move her arm and abduct to about 50 degrees. I worked on balancing the rest of the body; as it is inappropriate to touch the treated part during resting phase. She was still improving, experiencing less pain, more ROM, and increased ability to use her limb.

After a month, it was time for another shoulder move. I was not fully satisfied at this point, even though the patient was thrilled with the results. I decided to let her go for a month and have her return for one more, perhaps final, treatment. At this last visit, she surprised me with full ROM in her right arm and a fully-resolved frozen shoulder.

Conclusion
Bowen is not only physical therapy; it also integrates mind and body, leaving a patient pain-free and deeply relaxed such that the body can heal. Despite limited scientific research, its benefits are short of being miraculous.

Successful results open the door to further conversations about a patient’s health. Bowen occupies at least 40% of my practice. This is a very valuable and reliable technique in my toolbox, and I hope this will inspire many of you to learn it or to use it more if you already know it.

Note: Every condition listed here I have treated successfully in my practice.

References available online at ndnr.com

Sandra Tamburri, ND is a licensed naturopathic physician in BC, Canada. She is a graduate of BNVNA, where she currently teaches a Nature Cure class. With a background in both conventional and naturopathic medicine, her goal is to bridge the gap between the 2 worlds. Her current focus is on treating chronic autoimmune diseases, especially MS, using Dr Combier’s protocol and various mind/body modalities, including Bowen, homeopathy and total body modifi- cation (TBM). Working at Vancouver Naturopathic Clinic in beautiful BC satisfies her thirst to help her fellow Vancouverites as well as other patients from all over the world suffering from autoimmune diseases.

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NATUROPATHIC DOCTOR NEWS & REVIEW

JULY 2018

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Interview with Richard Sprague

MARK SWANSON, ND

Let me introduce Richard Sprague to the readers of The Expert Report. He is an amazing citizen scientist. I’ll start with one of his quotes regarding our topic, the gut microbiome:

Why microbiome testing is important is that unlike genomics and genetics and your human DNA, you can’t find very fascinating, there’s not a whole lot you can do to change it. Despite the fact that there are a lot of genes that are involved, there’s not a whole lot you can do if you find out that you’ve got the gene for this or that. Whereas with the microbiome you’ve got way more genes and you can change them. And I think those two things are part of the reason that I’m very excited about the microbiome.

(Richard Sprague)

With that said, Sprague has become a renowned expert that is making a noteworthy contribution to the exploration and understanding of the gut microbiome via his personal testing and raw-data-tracking of influences by diet, foods, probiotics and prebiotics, etc., as well as examining just how accurate and actionable microbiome testing is regarding health and wellness. What you will find here is his unique perspectives, with insights not found anywhere else. I found myself completely intrigued and wanting to continue reading, listening, and data diving, and to learn more about his personal microbiome journey.

What is your education and current position?

I’m not a scientist or a healthcare expert! I likened that up front to emphasize that I believe science should be open to all curious people. My undergraduate degree is in computational linguistics (Stanford), and I received an MBA and MA from University of Pennsylvania, which led to a career in the consumer software industry (Apple, Microsoft, startups). I think of myself as a software engineer who turned into a high-tech executive. I’m currently CEO for Airdoc US, an AI Healthcare company.

Is it true you collected your own poop samples every day for over a year for microbiome testing? How many tests have been done so far? Are you still testing?

Yes! I’ve collected more than 600 samples since 2014. Most of that time I also carefully tracked my diet, exercise, sleep, and other variables, to study how my own microbiome changes. I don’t test daily anymore, but I still try to test at least once a month, or whenever I try something new (like a new diet).

That’s amazing! This is about as close as one gets to surfing the microbiome in real time! Let’s dive in.

Ok, ask away!

How have you compiled all these microbiome results, and why do it? What’s the single poop sample home message?

I did this because, in an environment full of so much hype about the microbiome, I wanted to see for myself what was true and what wasn’t. I’m still amazed that most people who talk about the microbiome – even doctors and other “experts” – have never actually tested themselves. Much of the research is just wrong, yet even some of the experts continue to repeat information that isn’t true. Doctors are supposed to treat the patient, not the disease. But with the microbiome they seem to forget that, just offering probiotics or dietary advice based on generic information, rather than a hard look at quantifiable test results.

Can diversity be accurately measured by a single test?

My experience is that science doesn’t know enough about how to measure diversity. Our current methods are so variable that it might simply be a matter of how or when they took the test. You can’t trust a single test, nor should you compare 2 tests taken under different circumstances. It’s more complicated than simply looking at the diversity number given by the test provider. Here’s a great day-to-day example from my own results (Figure 1).

Did your microbiome have a significant day-to-day variability in diversity?

Yes, the microbiome changes significantly every time I test, even when I’m not undergoing a specific experiment. Because the gut microbiome test requires, um, a sample, I’m not able to study how I change throughout the day; but I’m convinced there are significant changes happening every hour, all day long.

Since the microbiome is highly variable day to day, a single test is a poor indicator of a person’s microbial health. You’d know that if you tested yourself or followed a patient’s results carefully. On the other hand, I’ve learned that the overall microbiome is pretty stable and that it’s hard to change once it’s locked into a particular pattern.

For example, here’s a plot graph of how my microbiome looks over a full year (Figure 2). Note how, although there are daily ups and downs, there is an overall pattern and it’s unique to me.

In general, would a goal of higher diversity suffice for achieving good health and wellness, vs a lower diversity?

I don’t really know what people mean when they say “diversity.” Intuitively, it seems like having a rich variety of microbes would be better than having a monoculture, but it totally depends on the microbes. I’d rather have a small number of healthy or benign microbes than a rich variety of pathogens. That said, healthy eating isn’t that complicated; we all know that some kinds of foods are better than others. You don’t need a microbiome test to tell you to eat more fruits and vegetables – your grandma could have told you that.

Do microbiome communities of the skin, nose, mouth, and small and large intestines communicate?

This is something I’d like to explore in my own data! The longitudinal study that inspired my own daily testing says no, they couldn’t find any patterns, but I’ve got to believe there is some communication going on, and we just need to look for it more carefully.

We hear a lot about the Firmicutes/Bacteroidetes ratio and the obesity, metabolic syndrome relationship. What is its current significance?

It’s not relevant. The most recent, well-respected review says, flat-out: “the ratio changes between normal and obese individuals are not statistically significant overall and therefore should not be considered a general feature distinguishing normal and obese human gut microbiota across populations.”

Here’s a Firmicutes/Bacteroidetes ratio chart example from my own experiments (Figure 3). Which day’s ratio should I pick?

What foods have had the greatest impact on your microbiome?

I tried taking a 10-day course of a probiotic supplement in late October, the results of which are shown on the chart in Figure 4. The manufacturer claims that the pill contained Bifidobacterium and Lactobacillus, but as you can see, it didn’t produce any measurable effect on my microbiome (the red lines in the chart). But what you might notice is the same chart are the high levels of Bifidobacterium I saw in a different period, during August and September; when I was visiting family in New Orleans and eating lots of red beans and rice. Conclusion: food matters far more than a supplement.

Have you observed similar effects with potato starch?

Yes. I saw a large increase in Bifidobacterium after taking potato starch, but it seems to be extremely sensitive to dosage – too much and it’s counterproductive. I’m still trying to find the sweet spot. Also, I’ve found it may not work in people who have no Bifidobacterium to start with.

I did this because, in an environment full of so much hype about the microbiome, I wanted to see for myself what was true and what wasn’t.
Dr Swanson’s Closing Comments

Thank you for this enlightening interview! That was way cool! Your personal microbiome tracking on a daily basis has revealed a level of clarity and understanding that may not yet be known by many. It was very interesting to learn just how fast the gut microbiome and diversity shifts around and changes on an almost daily basis. This has also been reported by others in similar observations. The microbiome behavior is strongly dependent on the 24-hour circadian rhythms. Every cell in the body and every bacterium in the microbiome has a clock that communicates with a central circadian clock. It’s what makes life tick.

The commercialization of microbiome testing is growing rapidly. It is also bringing in a plethora of new, personalized wellness plans, diets, special foods, probiotics, prebiotics, and targeted supplements. Will it be the game changer? More open access, disclosures, and validation will tell. In the near future it’s plausible that personalized wellness recommendations may emerge from new research validation that is designed to sync the microbiome with the body’s circadian clocks through chronosynergy.1

This would move the wellness goal-post even closer to achieving a Life in Rhythm and Health In Sync. Richard Sprague’s microbiome exploration “in real time” is contributing by being one of best validating research projects to help achieve this and much more.

References and additional figures available online at ndnr.com

I don’t trust probiotics. I’ve not seen them make a measurable difference in me.

Dr Swanson

I take about 5 g per day. Interestingly, a Dr Swanson Comment:

The Expert Report

informative as sampling daily. That statistically you’re not going to find this far longer and in more depth than I perspective of “alien microbial system. microbes in the current environment get an external digestive system, where the

might make a difference in terms of which microbes (some of which are more sensitive) show up.

3. Bioinformatics pipeline: Labs use different reference databases to decide which microbes are which, and they may use different ways of filtering out irrelevant microbes or contamination.

Microbiome testing laboratories have gone direct-to-consumer in a big way. Is the science of testing and data interpretation advanced enough to accurately predict a person’s optimal diet and single food choices based on their microbiome patterns?

I think we’re getting there with pretty robust science. I was surprised that one lab could tell that I am lactose tolerant, for example. That said, I’m learning there is a lot of variability in the food itself. For example, there’s a big difference between “broccoli” that was grown from heirloom varieties in your back yard versus something harvested and processed weeks ago from some industrial farm. I’m optimistic that all these problems will be solved, though, and eventually we’ll know – at least at the high level – that some “good” foods are better for some people than for others. I say “good” because I’m assuming that healthcare providers are in general agreement on what constitutes healthy food. No informed person thinks a hot dog or French fries is healthy; for example, yet it’s surprising how many people need to be told that explicitly.

Is there a single most important validation benchmark to look for when laboratories extend the testing results to include optimal foods and dietary recommendations?

My general rule of thumb is to look for the raw data. If a laboratory report is telling you to make unusual dietary changes or take certain supplements and probiotics, etc, without offering the raw data that led to the recommendation, then I question how valid it might be. Beyond the data itself, much of the published research is wrong or incomplete. I’ll likely gain more trust in the recommendations knowing the real life experiences of people who’ve tried them, and also recognize that the scientific literature isn’t the whole story – at least not yet – when it comes to the microbiome.

Let’s conclude our interview at a place not yet explored... The gut microbiome is the body’s second brain. If the microbiome could speak, what would it sound like? Here’s what mine sounds like: https://soundcloud.com/sprague-1-sounds-of-my-microbiome. This is 2 years of my microbiome activity, compressed into 30 seconds!

What are your online links for more microbiome information?

http://personalscience.com: This is where I keep all my data. Your readers are welcome to upload their own data here as well and compare it to others.

http://richardsprague.com/microbiome/: View a summary of all my microbiome-related work at my personal blog.

http://twitter.com/sprague: This is where I regularly post more up-to-date microbiome information.

Microbiome activity, compressed into 30 seconds. This is 2 years of my own microbiome data before/after a dietary change. It would depend on what else is in the gut before starting the change.

Which would you choose: prebiotics or probiotics to have on hand when traveling abroad? Why?

I don’t trust probiotics; I’ve not seen them make a measurable difference in me. I know there are people who swear by them, especially expert naturopaths and others with more clinical experience than me, but I just haven’t seen the proof in myself or others. When I travel, I’ll make it a point to eat extra fermented foods upon arrival – something like fresh yogurt if possible. I think fermented food is important because – and I’m just speculating – it’s like having an external digestive system, where the microbes in the current environment get buffered a little before they enter your own alien microbial system.

That makes total sense in the nutritherapeutic perspective of “let foods be thy medicine.” Yes! Naturopaths have been thinking about this far longer and in more depth than I have, so I don’t say anything truly original!

What is influencing the microbiome daily fluctuations besides food?

Microbes have their own diurnal rhythms, so it probably matters when and how often you sample. I take daily samples under consistent conditions, and I find that that statistically you’re not going to find too much more by sampling every day. Sampling every third day is probably as informative as sampling daily.

Let’s move the conversation to the different sequencing testing methods: 16S (DNA), metagenomic (DNA), and transcriptomic (RNA). Is one particularly better than another?

I’ve compared all of them. I still think that 16S is better, at present, just because the lower cost lets you do more testing. Given the variability I mentioned, you’re better off testing several times and then taking an average. Metagenomic or transcriptomic would be better, of course, and if you could do multiple tests, that would be even better, but most people can’t afford sequencing testing at that frequency.1

Why are test results often different between labs?

1. Sampling differences: Some labs take a swab, some take a scoop. Gut microbes are not evenly distributed, so this makes a big difference.

2. Sample handling: There are no standards for even so many of the basic steps. For example, some labs are careful to “lyse” the cells thoroughly before shipping, whereas others not so much. Some labs amplify the DNA a different number of times than others, and that will make a difference in terms of which microbes (some of which are more sensitive) show up.

3. Bioinformatics pipeline: Labs use different reference databases to decide which microbes are which, and they may use different ways of filtering out irrelevant microbes or contamination.

Microbiome testing laboratories have gone direct-to-consumer in a big way. Is the science of testing and data interpretation advanced enough to accurately predict a person’s optimal diet and single food choices based on their microbiome patterns?

I think we’re getting there with pretty robust science. I was surprised that one lab could tell that I am lactose tolerant, for example. That said, I’m learning there is a lot of variability in the food itself. For example, there’s a big difference between “broccoli” that was grown from heirloom varieties in your back yard versus something harvested and processed weeks ago from some industrial farm. I’m optimistic that all these problems will be solved, though, and eventually we’ll know – at least at the high level – that some “good” foods are better for some people than for others. I say “good” because I’m assuming that healthcare providers are in general agreement on what constitutes healthy food. No informed person thinks a hot dog or French fries is healthy; for example, yet it’s surprising how many people need to be told that explicitly.

Is there a single most important validation benchmark to look for when laboratories extend the testing results to include optimal foods and dietary recommendations?

My general rule of thumb is to look for the raw data. If a laboratory report is telling you to make unusual dietary changes or take certain supplements and probiotics, etc, without offering the raw data that led to the recommendation, then I question how valid it might be. Beyond the data itself, much of the published research is wrong or incomplete. I’ll likely gain more trust in the recommendations knowing the real life experiences of people who’ve tried them, and also recognize that the scientific literature isn’t the whole story – at least not yet – when it comes to the microbiome.

Let’s conclude our interview at a place not yet explored... The gut microbiome is the body’s second brain. If the microbiome could speak, what would it sound like? Here’s what mine sounds like: https://soundcloud.com/sprague-1-sounds-of-my-microbiome. This is 2 years of my microbiome activity, compressed into 30 seconds!

What are your online links for more microbiome information?

http://personalscience.com: This is where I keep all my data. Your readers are welcome to upload their own data here as well and compare it to others.

http://richardsprague.com/microbiome/: View a summary of all my microbiome-related work at my personal blog.

http://twitter.com/sprague: This is where I regularly post more up-to-date microbiome information.

Dr Swanson’s Closing Comments

Thank you for this enlightening interview! That was way cool! Your personal microbiome tracking on a daily basis has revealed a level of clarity and understanding that may not yet be known by many. It was very interesting to learn just how fast the gut microbiome and diversity shifts around and changes on an almost daily basis. This has also been reported by others in similar observations. The microbiome behavior is strongly dependent on the 24-hour circadian rhythms. Every cell in the body and every bacterium in the microbiome has a clock that communicates with a central circadian clock. It’s what makes life tick.

The commercialization of microbiome testing is growing rapidly. It is also bringing in a plethora of new, personalized wellness plans, diets, special foods, probiotics, prebiotics, and targeted supplements. Will it be the game changer? More open access, disclosures, and validation will tell. In the near future it’s plausible that personalized wellness recommendations may emerge from new research validation that is designed to sync the microbiome with the body’s circadian clocks through chronosynergy.1

This would move the wellness goal-post even closer to achieving a Life in Rhythm and Health In Sync. Richard Sprague’s microbiome exploration “in real time” is contributing by being one of best validating research projects to help achieve this and much more.

References and additional figures available online at ndnr.com
pregnancy; but those of the higher classes were placed on the breast and the abdomen sponged and dried quickly. Wet cloths were used during gestation cannot be too severely compressed of the abdominal organs, is peculiarly calculated to give rise to functional disorder of the stomach and liver, as well as to hemorrhoids; uterine hemorrhage and abortion.” (Pendleton, 1851, p.172)

Dr Pendleton presents a remarkable case of the fetus. Many women perished and suffered greatly during childbirth, and his own wife was no exception. Her first 2 pregnancies were accompanied by severe pain. To reduce his wife's suffering, he reduced any food items responsible for bone growth; his rationale was to decrease the hardness of the infant passing through the birth canal. He prescribed to his wife during her third pregnancy, a diet consisting of fruits, vegetable, and even animal food, excluding all farinaceous foods. In the last trimester, a diet consisting of fruits, vegetable, and even animal food, excluding all farinaceous foods. In the last trimester, she drank mineral water, which was soothing, and soothing thoughts, as well as the avoidance of evil influences during pregnancy. But the key question that may pique our curiosity is how hydrotherapy during pregnancy was used. The literature that I am referencing in this article comes from the followers of Vincent Priessnitz. This fact has special significance because of the dire and ominous circumstances that women faced.
As another example of the advice he produced for colleagues, Shew recounted a case that he became involved in when a 2-year-old child was born. The child was premature and the birth was difficult and the child was premature. He states, “Although her health had been generally good, she was now troubled with severe constipation, and difficulty of breathing, indigestion.” (Shew, 1856, p.155) The prescription for the woman was to begin with tepid [80° to 102°F (27° to 39°C)] (Kellogg, 1903, p.100) bathing daily, and to gradually lower the temperature of the water. When she was able to tolerate the cold water [55° to 68°F (13° to 18°C)] (Kellogg, 1903, p.100), the bathing daily progressed to urinary ablations per day. “Baths by affusions are very excellent to be used in pregnancy.” (Shew, 1851, vol. VII, p.29) Affusions were generally not taken using very cold water. Moderate or tepid temperatures described for Priessnitz were waters of 60° to 70°F (16° to 21°C). (Shew, 1851, vol. VII, p.35)

**Nature Cure Clinical Pearls**

In the morning, upon rising, the patient took a cold shower and also benefitted from a daily hip bath. (Shew, 1856, p.135) The hip bath was taken in a sitz tube, as the word indicate – large enough to accommodate movement during the bath. Directions given by Shew: “The[tub] should be large enough to admit the whole body of the person, from the abdomen, sides, and hips, first with one hand and then the other.” (Shew, 1851, vol. VII, p.38) He continues, “The more movement and friction, while in the bath, the better.” (Shew, 1851, vol. VII, p.38)

One of the chief considerations in the hip bath is that, because it affects the digestive system, it should only be administered after a meal has long been digested. Shew prescribed the hip bath to “all patients in pregnancy because of its tonic effects on the pelvic organs.”

For dietary recommendations; Shew advised the woman to replace drinking coffee with tea, and while dripping, one or more boiled potatoes. She also exercised daily in the open air. (Shew, 1856, p.155) The exercises, advocated by the Hydrotherapists during pregnancy, often entailed walking outside in the open air. Today we are inclined to think that walking a few blocks is adequate exercise. The women in the mid-19th century thought nothing of walking several miles every day.

Her labor was very short and without the terrible suffering experienced in her previous pregnancy. Slight labor symptoms began shortly after midnight and by 4:00 AM the pains commenced. One hour later, she gave birth to a healthy boy. After the birth, wet compresses were applied locally and her husband was given instructions on how to administer a bath to his wife. On the first day she took 2 cold baths and slept. On days 2 to 4 she continued bathing, exercising in her room, and eating a simple diet. Both the mother and child did remarkably well. (Shew, 1856, p.156)

NATURE CURE CLINICAL PEARLS

Suzanna Cerrano, ND, SBE is a naturopathic doctor in Oregon. Suzanna has developed an extensive armamentarium of traditional nature-cure tools for her patients. A frequent presenter, she is especially interested in balneotherapy, botanical medicine, breathing and nutrition. As Curator of the Rare Books Collection at NISM, she has compiled Hydrotherapy in Naturopathic Medicine, the tenth book of the 12-book series in the Hevert Water-Cure Library, from the archives of our Hydrotherapy used to prepare and deliver healthy babies safely.

In next month’s issue, I will continue on the topic of pregnancy and further how pregnancy and its many-faced symptoms were managed using hydrotherapy, from the archives of our beloved Professor Shew.
Entangling Poetry and Medicine

The Rise of the Medical Humanities

DAVID J. SCHLEICH, PHD

There are observers who conclude that what is at work these days in medicine, when we see ‘medical humanities’ curriculum popping up as part of allopathic medicine’s recent efforts to be less mechanistic, is a type of disruption. This new interest may be less about disruption than about the assimilation of new knowledge potentially incubating a change in philosophy. I fear, however, that this process may be at the risk of diluting the nature and purpose of the thing being assimilated. In this connection and from my perspective, being a lover of literature (a mainstay of the humanities), poetry and medicine may have something in common. But first, let’s consider the habit of allopathic medicine means by “prevention” and what naturopathic medicine means and has meant for a long time by the same term. The former usually means more tests sooner. The latter means more commitment of healthy lifestyle over the long term, undertaken well before a disease presentation. It means less reliance on an external directive about the responsibility one has for his or her own health.

Overcoming the Rift

There is a similar philosophical (and thus linguistic) gulf between the science of medicine and the art of medicine, manifesting these days as a rift between medicine and the humanities in terms of their value as cooperating disciplines. In this regard, C.P. Snow was spot-on back in 1959 in his famous “Two Cultures” Rede Lecture, when he described the “mutual lack of sympathy and appreciation” that existed between “literary intellectuals” and “natural scientists,” for example. In the field of medicine, that clef shows up as an important tension among medicine, the social sciences, and the humanities. We keep talking about that rift, but broadly in medicine there is a new accord emerging, all about how to approach treatment. It emerges within the interprofessional conversation about social determinants, mind-body medicine, holism, and integration. Having a closer look at the ensuing entanglement of medical science with humanities requires patience, though. It also demands that we not begin with the assumption that biomedical science, rooted epistemologically in the discipline of biology, can define and predict health more accurately than we have been doing for decades. After all, we have included psychosocial variables in our understanding of disease susceptibility from the beginning. This impression of increasingly effective tools such as cybernetics, systems theory, biosemiotics, information theory, and complexity sciences, and the future isn’t what it used to be.

When those of us in the naturopathic medical education field attempt to situate those social determinants – or, more precisely, the political, cultural, economic, and social determinants of health – inside broader, longer cultural parameters, we get it that biomedicine professionals are already well aware of the limitations of reductionism. Orthodox biomedicine practitioners are less than comfortable with where they are located on the wellness continuum. They know that rational medicine (some say, arising from Laennec’s stethoscopes and the emergence of the “objective physician” and accelerating quickly into an era of pathway detection whose tools and techniques sprinted forward with chemical analysis, antibiotics, ECGs, MRIs, CTs, and so on) can no longer depend on what Foss, back in 2002, explained as the “interconnectedness of things” or the “holism” of things. (Foss, 2002, p.8)

Emergentism & Reductionism

Foss also went on to point out, “The explanations of these disciplines tend to be loop-structured and recursive, amplifying upward and downward mutual causal (emergentism), rather than upward causal alone (reductionism).” (p.8) What has shifted, ironically, is due in part to the abundant, new information available through the increasingly reliable and more precise instrumentation of systematic heuristic scientific inquiry. So, where you have it – something the naturopathic doctor has known all along, and which was stated so presciently by Foss as interest in “complementary and alternative medicine,” accelerated in the early years of the first decade of our new century: “In the prevailing medical model mind and body are essentially separated. Considered scientifically, the patient has no self. The subject of treatment and care is the diseased body – medical science. The subject of compassion and care is the ill person – medical art – care for the unavoidable human accompaniments of disease, such as anxiety, pain, and discomfort. (Foss, 2002, p.9)

In this regard, there is a remarkable group in the United Kingdom called the “Medical Humanities” (Foss, 2002, p.9) that really understands this dilemma. Their “Arts in Health” publications and data banks are refreshing, current, and invitational. Have a look at Mike White and Mary Robson’s “Common Knowledge” repertoire, focused on developing research-guided arts in health projects in healthcare settings, schools, and communities. Also emerging from this center of thinking and action about the humanities and the arts in medicine is The Edinburgh Companion to the Critical Medical Humanities (Whitehead & Woods, 2016). The 36 chapter collection is all about the field of so-called “medical humanities,” dialoging into ethics, education, experience, and empathy (better known as the “vis” of the medical humanities). And, at the University of Oxford, we discover a significant forum for medical humanities already in place. Half a decade back, St Anne’s College partnered with the Wellcome Trust (the UK’s largest non-governmental source of funds for biomedical research) to launch its Centre for Personalized Medicine, focusing on medicine, genomics, law, economics, and ethics. A related publication, Medical Humanities, featured in its first half-dozen issues pieces on medicine and the arts, medicine as an art and a science, the existential focus of clinical medicine, and, interestingly (but not surprisingly), giving the momentum of this interest among healthcare professionals, the extent of chaos theory’s relevance to the humanities. The literature of “medical humanities” is already rich.

Belinda Jack, discussing Medical Humanities (the publication), points out a “cultural studies” feature, as a case in point, “drawing on fine art, literature, history and philosophy to discuss a range of conditions and topics such as anorexia nervosa, ageing, body image and distinguishing patients and feature self.” (Jack, 2015) Instead of this kind of work being subservient to mainstream medicine, a valuable entanglement is occurring. As this academic and professional conversation evolves, I have benefitted from some recent workshops, in which some of the participants blustered antagonistically, dismissing “the lore” (of humanities, arts, and social-science factors in diagnosis, prognosis, and eventual treatment) as “near science” and “lacking scientific validation.” In this important dialogue, such labels were being tossed out in order to challenge those of us who welcome – and deem possible – the emerging, collaborative relationships. Within such “ambiguous and risky intellectual space” (Whitehead & Woods, 2016, p.38), though, the pivots are quite
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References


Some may contend that this new

Ethics, and law). The notion of “physician

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