NATUROPATHIC DOCTOR NEWS & REVIEW

VOLUME 14 ISSUE 7 JULY 2018 | NEUROLOGY / PAIN MEDICINE

Vis Medicatrix Naturae

Relational Medicine

Perception, Epigenetics, & the Vis – Part 2

ALLISON CREECH, MED, ND

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*).[1] 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

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Vis Medicatrix Naturae

The Endocannabinoid System

Self-Regulating Harm Protection

JAKE F. FELICE, ND, LMP

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 the 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,[1] 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.[2] 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.[3] These receptors operate as a finely discerning detection

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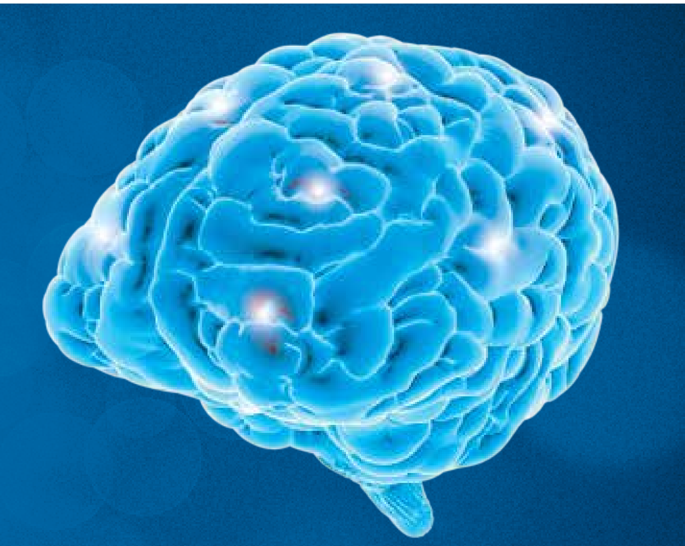

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apparatus, continually sensing biochemical fluctuations in the interstitial space surrounding all cells. Additionally, the ECS operates intracellularly in organelles such as mitochondria, facilitating energy and information flow in cytoplasm.

The primary cannabinoid (CB) receptors – CB_1 and CB_2 – are G-protein-coupled receptors. These 2 receptors differ in both tissue distribution and mechanisms of signaling. G-proteins represent the most common receptor system in vertebrates, and, as mentioned above, CB_1 receptors are the most abundant and dense receptors in the human nervous system. Interestingly, some other lipid metabolites that are chemically similar to the well-studied endocannabinoids, 2-AG (2-arachidonoylglycerol) and AEA (anandamide), may also function as endocannabinoids.[4] 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 as to why this occurs.

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 microenvironment of the extracellular matrix.[5] Signaling from the ECS orchestrates molecular and cellular mechanisms necessary for proper brain development. These ECS signals continue to be poorly understood by modern science. In one pathway, CB receptors couple to FGF (fibroblast growth factor). FGF activates diacylglycerol (DAGL), thereby increasing 2-AG, which in turn primes axon guidance and growth,[6] both of which are necessary for nerves to connect with their targets. This trait, combined with anti-inflammatory effects, offers the targeting of the ECS exciting potential for regenerative health benefits in patients suffering from nerve injury or stroke.[7]

Endocannabinoids, via CB receptors, provide developmental signals to neurons that regulate molecular machinery required for proper brain maturation.[5] 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.[8]

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.[9] This is one of the ways that the ECS protects the nervous system from hyperactivity during seizures.[10]

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%.[11] When such inhibitory mechanisms are impaired, "dis-inhibition disorders" can occur, such as hyperactivity, impulsive behaviors, anxiety, seizures, and pain exacerbation (including central sensitization syndrome).

During seizure activity, eg, neurons are overstimulated, resulting in an "electrical storm" that rages in the brain. Via retrograde transmission, the ECS allows cells on the receiving end of hyperactive events to call a "time-out" to other nerve cells by sending a signal upstream to quiet the overstimulated neural circuits.[12] Amazingly, when cannabinoids are given within 4 hours of traumatic brain injury (TBI), they appear to limit glutamate toxicity[13] and nerve damage.[14]

During adverse brain events such as TBI, ECS synthesis of 2-AG serves as a homeostatic regulator to limit brain damage.[15] One important role of the ECS in the nervous system thus involves the maintenance of homeostasis by preventing excess neuronal activity in seizure activity and hyper-nociceptive signaling.[15]

The ECS enables the postsynaptic neurons to reduce overstimulation and control their own input at the synapse, and is a key element to the homeostatic regulation of physiology by the ECS. In the nervous system, presynaptic CB_1 receptors on axon terminals become activated from post-synaptically discharged endocannabinoids, resulting in a reduction of presynaptic neurotransmitter release[16] – a negative feedback process called *retrograde inhibition*.

Retrograde inhibition works similarly in pain pathways. When a pain signal is extreme or overwhelming, retrograde inhibition uses endocannabinoids to slow or reduce the impulses coming from a site of injury, thereby reducing the nociceptive signals moving towards the cortex.[17]

The ECS & Neuroprotection

Throughout the nervous system, the ECS supports energy balance by modulating mitochondria and influencing inflammatory and immune responses. The main mechanisms include protection against oxidative stress, excitotoxicity, and inflammation. Potential applications of cannabinoid therapeutics include various types of pain, drug 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 multiple insults that produce neuronal death after TBI, including free radical production, neuroinflammation, excitotoxicity, and calcium influx.[18]

During conditions of nerve injury and axonal damage, CB receptor expression appears to be increased.[19] In glial cells following inflammation or injury, CB_2 receptor populations increase by as much as 100 times[20]; however, it is not clear whether this is due to increased expression on glial cells or is a result of peripheral immune-cell migration to the site of injury.

The ECS & TBI

In a rat model of experimental stroke, CBs provided protection, significantly reducing infarct volume and improving functional outcomes.[21] In a study of adult patients with TBI (n=446), a positive THC (tetrahydrocannabinol) screen is associated with decreased mortality.[22] Specifically, mortality in the THC-positive group (2.4% [n=2]) was significantly decreased compared with the THC-negative group (11.5% [n=42]; p=0.012). In a separate model of experimental stroke in animals (systematic review and meta-analysis of 34 publications), cannabinoids were found overall to improve functional outcomes and reduce infarct volumes.[21]

In a mouse study, cannabidiol (CBD) appeared to provide stronger neuroprotection than THC, and without inducing tolerance; this occurred via a CB_1-independent mechanism.[23] It is important to keep in mind, however, that THC has positive properties as well, as demonstrated by the TBI study just mentioned, and that the combination of different CBs and terpenes may encourage more positive entourage effects.[24]

Findings from a murine model of carotid artery occlusion suggest "a protective effect of CBD on neuronal death induced by ischemia and indicate that CBD might exert beneficial therapeutic effects in brain ischemia. The mechanisms that underlie the neuroprotective effects of CBD in … mice [with carotid artery occlusion] might involve the inhibition of reactive astrogliosis."[25]

The body's levels of endocannabinoids spontaneously elevate during stroke and head injury,[7] which initiates protective responses.[9] Immediately after TBI, local and transient accumulation of 2-AG occurs at the site of injury, peaking at 4 h and sustained up to at least 24 h. Neuroprotection by exogenous 2-AG suggests that 2-AG formation may serve as a molecular regulator of pathophysiological events, attenuating the brain damage.[15]

A recent study provides the first evidence for the involvement of ECS in the neuroprotective action on brain edema, axonal injury, neurological impairment, and activation of microglia.[26] In a gerbil model, THC, via CB_1 and opioid receptors, reduced nerve damage induced by carotid artery occlusion.[27]

After stroke or seizure events, excitotoxicity is limited via ECS-modulated protection against interleukin (IL)-1-induced inflammation[12] via the IL-1 antagonist, IL-1ra.[28] Interestingly, during pain and nerve injury, the ECS responds in a similar way by elevating CB receptors involved in the attenuation of neuropathic pain.

The ECS & Seizures

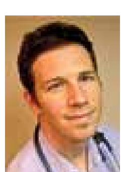
Cannabinoids seem to affect seizure activity in humans. In September 2016, a survey was conducted of parents of children with refractory epilepsy who had been using medicinal cannabis for different lengths of time.[29] Among 43 Mexican children who used CBD-rich cannabis, 51% experienced a moderate-to-significant decrease in seizure frequency, and an additional 16% were free from seizures. The number of antiepileptic drugs used was reduced in 9/43 (20.9%) cases. No serious adverse effects were reported.

CBD was shown to be effective in a rat model of status epilepticus.[30] CBD had anticonvulsant and neuroprotective effects, "reinforcing the potential role of CBD in the treatment of epileptic disorders."

Conclusion

The 600-million-year-old ECS emerged as a harm-reduction system, improving cells' ability to form bodies and survive the often hostile and changing environment of the early ocean. The ECS maintains a constantly adaptive receptor system that functions as a biological scanning system, detecting biochemical information in the extracellular matrix. The ECS is the most dense of all receptor systems in the CNS, performing myriad vital functions. All types of cannabinoids protect neurons from multiple insults that produce neuronal death after TBI, including free radical production, neuroinflammation, excitotoxicity, and calcium influx.[18] 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.[31] 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-toxicity compounds, diet and lifestyle interventions, mind-body dynamics, and more.

References available online at ndnr.com



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sophisticated system of information flow at the cellular level. In a 2017 presentation,[2] Dr Lipton describes how proteins and signals interact to elicit cellular behavior related to genetic expression. He notes that only a small percentage of disease is due to defective protein synthesis (eg, genetic birth defects, monogenic disorders, or random mutations). Rather, the vast majority of diseases are best described as "multifactorial inheritance disorders," meaning that variations in multiple genes interact with environmental factors to affect health and behavior.[3] The old story of nature vs nurture is evolving toward a more complex understanding of how nurture activates nature's potential. As genetic testing becomes more widespread and available to the general public, we will have greater professional opportunity to explore the correlations between genetic expression 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. Our perceptions direct 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-ology).

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 not have 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 manipulate energy (eg, a spinal cord injury) or chemical toxicity (eg, nutritional deficiencies or molecular toxins that affect metabolic pathways).[2] 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 the person's life, impacting cellular homeostasis, emotional processing, resilience to stress, and coping systems. When we work with patients at the level of perception, we have an opportunity to help change those set-points and thereby restore Vis energy though the body, mind, and genome. Perceptual recalibration promotes integration around an experience of safety, which in turn has profound implications for health.

When an infant experiences the biological stress of having an unmet need, cortisol systems activate through the adrenal glands and HPA axis. The infant experiences a state of biological alarm, a physiologic release of stress chemicals, and psychological distress. As the caregiver attends to the child to meet their needs, the child's neuroendocrine experience shifts to a state of biological calm and the child is soothed by interpersonal connection. As this cycle repeats itself, an infant develops an experience of trust (in their own body, in their needs, and in the response of significant others and the world itself, in terms of having those needs met). This is a fundamental template of perception that the infant will use to organize its experience in the world through the rest of its life: Am I safe? When the answer to that question is "yes," our mind-body-genes function in an integrated system that allows Vis energy to flow.

In terms of defining the experience of safety vs unsafety by way of attachment, researchers have consistently reported similar statistics when assessing attachment within the North American population: about 60% of people experience a securely attached primary relationship in early childhood, and about 40% do not. Said another way, about 60% of the population has a foundational perception of safety in their body and in the world, while 40% live from a perceptual reality of fear/alarm/uncertainty/lack of safety.[4]

Held out of conscious awareness, yet highly active at the interface of mind and body, this powerful perceptual foundation directs our experience throughout life. As Jack Shonkoff, MD, explains,

> *Our experience in relationships, our perceptual state around safety or lack thereof, and the actual formation of the brain will direct the ways that a person attempts to navigate life. Stress-induced changes in the architecture of different regions of the developing brain (e.g., amygdala, hippocampus, and PFC) can have potentially permanent effects on a range of important functions, such as regulating stress physiology, learning new skills, and developing the capacity to make healthy adaptations to future adversity.*
> (*Jack P. Shonkoff*)[5]

> Am I safe? When the answer to that question is "yes," our mind-body-genes function in an integrated system that allows Vis energy to flow.

Compensation via Connection

I am sure that all of us can think of patients we have encountered who describe waking up anxious, who suffer from unregulated emotional arousal, or who consistently doubt themselves and/or their relationships, thereby finding it difficult to come into a place of inner trust and stable connection. Their nervous systems may be tuned to great sensitivity, and they may seem to be overwhelmed by their life challenges while continually seeking an external compass to guide them. 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 be motivated to seek connection by any means possible. They have learned to cope with their experience of insecurity by developing a behavioral repertoire that either demands another's attention or ingratiates them within 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 needs 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 reinforce their basic perceptual bias 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. In general, 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 psychological and epigenetic correlations. 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 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 am better off 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 control will be perceived as a threat, and people 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 physical 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 in 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 suppression as follows: "According to the polyvagal theory, being in shutdown (immobility/freezing/or collapse) or in sympathetic arousal (fight or flight) greatly diminishes a person's capacity to receive and incorporate empathy and support. 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."[6] 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 experience, and 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

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Volume 14 Issue 7 | July 2018

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ISSN 2169-1614
Our printer utilizes wind-power

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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. Constriction 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 resonant 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 a 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 neuroplastic 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."[7] As we hold this state of attunement and resonance, we help others move towards a more coherent experience of trust, resilience, and security. The more a patent 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.

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 secure, ourselves, as we hold space for 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 3 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 support a patient to] move away from the chaos and 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."[8] He explains further, saying that "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."[9] With mindful awareness of a new experience, new perceptions become available and over time 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 relationship, 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 being on the most 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 experience: body, mind, cells, genes, and energy systems.

These perceptions influence the movement of Vis and provide templates for psycho-physiologic expression over 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 respond. When we create our lives 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)

Allison Creech, MEd, ND, is a naturopathic doctor who splits her time between seeing patients in private practice, teaching courses in Health Psychology at the Canadian College of Naturopathic Medicine (CCNM), and mothering her young son. She has a passion for mind-body medicine and deep consciousness work, where it is possible to engage and amplify the healing power of the Vis. She has a special interest in supporting women with pregnancy and also in helping people to activate their creative potential. Dr Creech graduated from CCNM in 2004 after pursuing graduate studies in clinical psychology. She can be reached online at www.alightalive.com or by email at dr.allison.nd@gmail.com.

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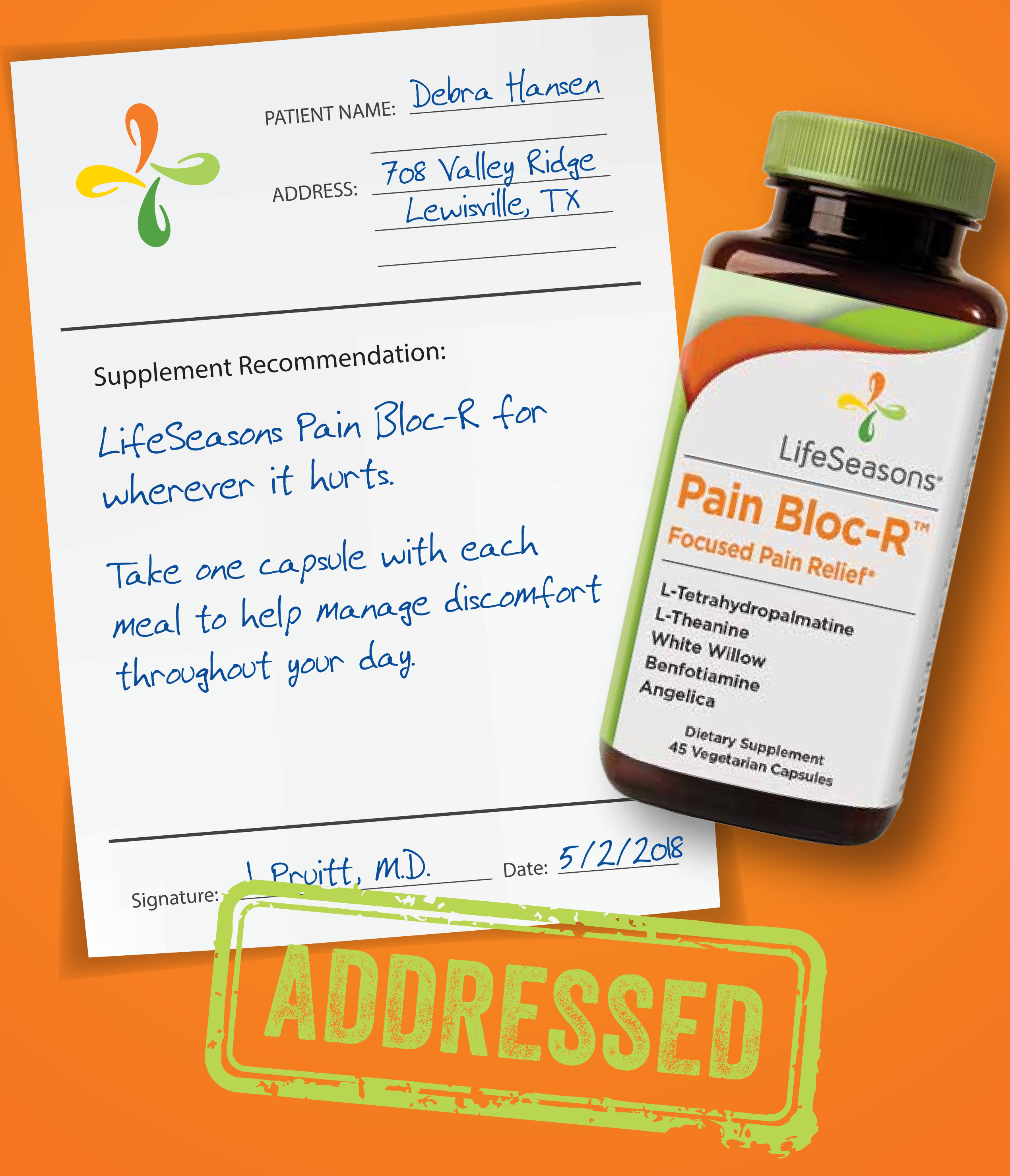

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Dextrose Prolotherapy

Naturopathic Regenerative Orthopedics – Part 1

NOEL PETERSON, ND, DAAPM
SAMUEL G. OLTMAN, ND

We hold this truth to be self-evident: true health is dependent on the *Vis Medicatrix Naturae*. 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 Orthopaedic Medicine (AAOM) definition of Orthopaedic 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 proliferant injections (prolotherapy, PRP [platelet-rich plasma]), osteopathic manual medicine, therapeutic exercise and supportive nutraceutical, herbal, pharmaceutical and homeopathic-based treatments."

We build our musculoskeletal therapies upon these principles:

Tolle Causam

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.[1,2] Yet the allopathic approach is largely limited to drugs and surgery. Regenerative orthopedic medicine's emphasis on therapeutic exercise, dietetics, and supportive nutraceutical, hormonal, and botanical-based treatments addresses the cause of OA. Public demand is high for our evidence-based alternatives to surgery, non-steroidal 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 5.3 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.[3]

The Standard American diet (SAD), along with metabolic syndrome and obesity, drives systemic inflammation and accelerates the progression of OA and pain severity. Approximately 10 000 Baby Boomers are turning 65 years of age every day. Almost 70% of all Baby Boomers are obese or overweight; an estimated 47.8 million Americans have some form of OA, and by 2030 that number is expected to rise to 67 million.[4] In contrast to the SAD, a Mediterranean diet – rich in polyphenols, antioxidants, and PUFAs/MUFAs – has been shown to reduce both radiographic evidence and symptoms of KOA.[5] 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 structural abnormalities in both sexes.[6-8] Barring individual contraindications, bioidentical hormone replacement therapy (HRT) is indicated in most Baby Boomers with OA.

Detection of heavy-metal burden is important, as silver, mercury, cadmium, and lead upregulate matrix metalloproteinases (MMPs) that trigger collagen and cartilage degradation. Elevated MMPs can reduce collagen synthesis by up to 50%.[9]

Many NSAIDs, including ibuprofen, inhibit GAG synthesis by as much as 80%.

Docere

As naturopathic physicians, we treat more than just our patient's joints. 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 benefit as well.[10-12] Even the most disabled 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.[13] 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%.[14] 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.[15]

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.[16] Unfortunately, in addition to the cardiac, gastrointestinal, and other morbidities, it is clear that many over-the-counter NSAIDS accelerate cartilage loss.[17] Cartilage cells compose less than 3% of cartilage volume, while the extracellular matrix (ECM) accounts for over 96% 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 unaware patients to TKR.[18] The routine use of NSAIDs in youth sports may be one reason why 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 boswellic acid has been shown to be effective in the treatment of OA-associated pain, and without any of the side effects of NSAIDs.[19] 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.[20,21] Adequate vitamin D is associated with knee pain reduction and increased quadriceps strength.[22] The evidence for glucosamine/chondroitin has weathered large-scale meta-analysis and shows a small benefit in slowing OA progression, which may indicate the importance of addressing the underlying inflammatory process as opposed to solely replacing collagen-building blocks.[23]

Hyaluronate 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 fast-track KOA to joint replacement.[24]

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 J. 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 in KOA.[25] Yet more than 600 000 arthroscopic surgeries for OA continue to be performed yearly in America. Meniscectomies have been shown to not only be ineffective, but also to result in a 3-fold increase in the progression to TKR.[26] 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.

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

800 000. The unfortunate fact is that less than half of those TKRs were medically indicated. Dr Daniel Riddel of Virginia Commonwealth University followed 4800 KOA patients for 5 years; in 2014 he reported that only 44% of TKRs performed on this group could be deemed appropriate and medically necessary, while 34% were completely unjustified, and 22% were questionable at best.[27] Yet, in spite of this evidence, over 800 000 TKRs were performed in 2017. And the TKR momentum continues: the DHHS projects that by 2030, over 3-million TKRs will be performed in the United States every year.

Dextrose Prolotherapy for OA

Naturopathic regenerative medicine has the potential to ease this staggering cost in human suffering and unnecessary knee replacement surgery. In the last 5 years alone, more than 4 Level-I evidence studies have been published demonstrating that regenerative injections are the most effective treatment identified for early 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.[28]

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.[31] 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.[31] 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.[29] 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.

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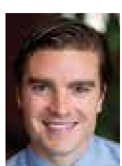
Noel Peterson, ND, DAAPM, has practiced in Lake Oswego, OR, since 1978, where he has provided decades of broad-based naturopathic medical care. Dr Peterson is the medical director of Oregon Regenerative Medicine, is certified in prolotherapy by the AAOM, and is a diplomat of the AAPM. He has extensive teaching experience in regenerative medicine, and serves as faculty for the American Association of Orthopaedic Medicine's prolotherapy. Oregon Regenerative Medicine (ORM) has served as a CNME-accredited residency training site as well as a site for multi-discipline physicians learning to perform platelet-rich plasma prolotherapy and stem cell therapy protocols developed at ORM.



Samuel G. Oltman, ND, is a naturopathic physician specializing in regenerative orthopedics at Oregon Regenerative Medicine in Lake Oswego, OR. After graduating in 2015, Dr Oltman completed a 2-year CNME-accredited residency in SE Portland, focused on family medicine. He has since received specialized training in regenerative injection therapies at ORM as well as musculoskeletal ultrasound training, and is working toward his RMSKUS certification. In addition to orthopedics, Dr Oltman specializes in TBI evaluation and treatment, offering unique regenerative medicine-based modalities for concussion recovery.

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Mistletoe

A Holistic, Patient-Centered Adjunctive Therapy

SUKRITI BHARDWAJ, BHSC
MONIQUE AUCOIN, BMSC, ND

In 2017, approximately 206 200 new cancer cases and 80 000 cancer deaths occurred in Canada.[1] 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.[1] 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.[2-4] 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.

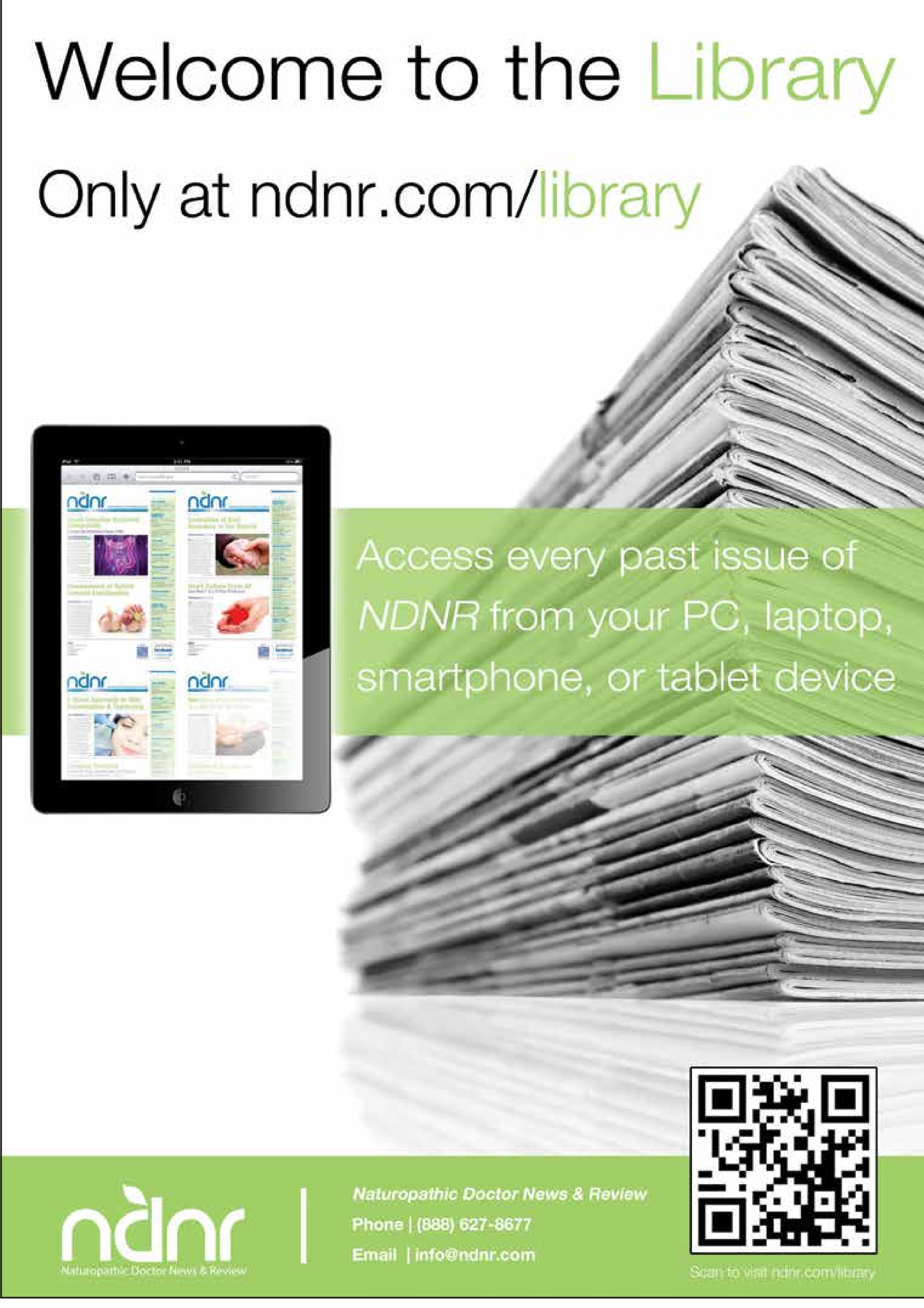
Treating Cancer

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.[5] 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,[6] 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.[7] When 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.[8,9] 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.[2-4] This fatigue may persist for months following the final course of chemotherapy.[4] 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.[10]

In a methodologically strong study of 6 months' duration, 95 breast cancer patients in the stages $T_{1\text{-}3}N_{0\text{-}2}M_0$ and scheduled to be treated with 6 consecutive cycles of CAF (cyclophoshamide, 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.[2]

Another trial studied the efficacy of mistletoe extract injections among digestive tract cancer patients undergoing surgery.[11] 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 ($p<0.01$).[11]

The effects of PS76A2, an aqueous mistletoe extract, were studied in 272 patients with operable stage II/III breast cancer eligible for CMF (cyclophosphamide, methotrexate, fluorouracil) chemotherapy.[12] After 15 weeks of adjunctive treatment using the medium dose (15 ng mL/0.5mL), significant differences were demonstrated

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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 demonstrated 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[2]), although this reaction was mild when using the low and medium doses.[12]

The same investigators conducted a follow-up study on 352 breast cancer patients receiving PS76A2 as an adjuvant treatment to CMF chemotherapy.[13] Patients were administered 30 ng 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."[13]

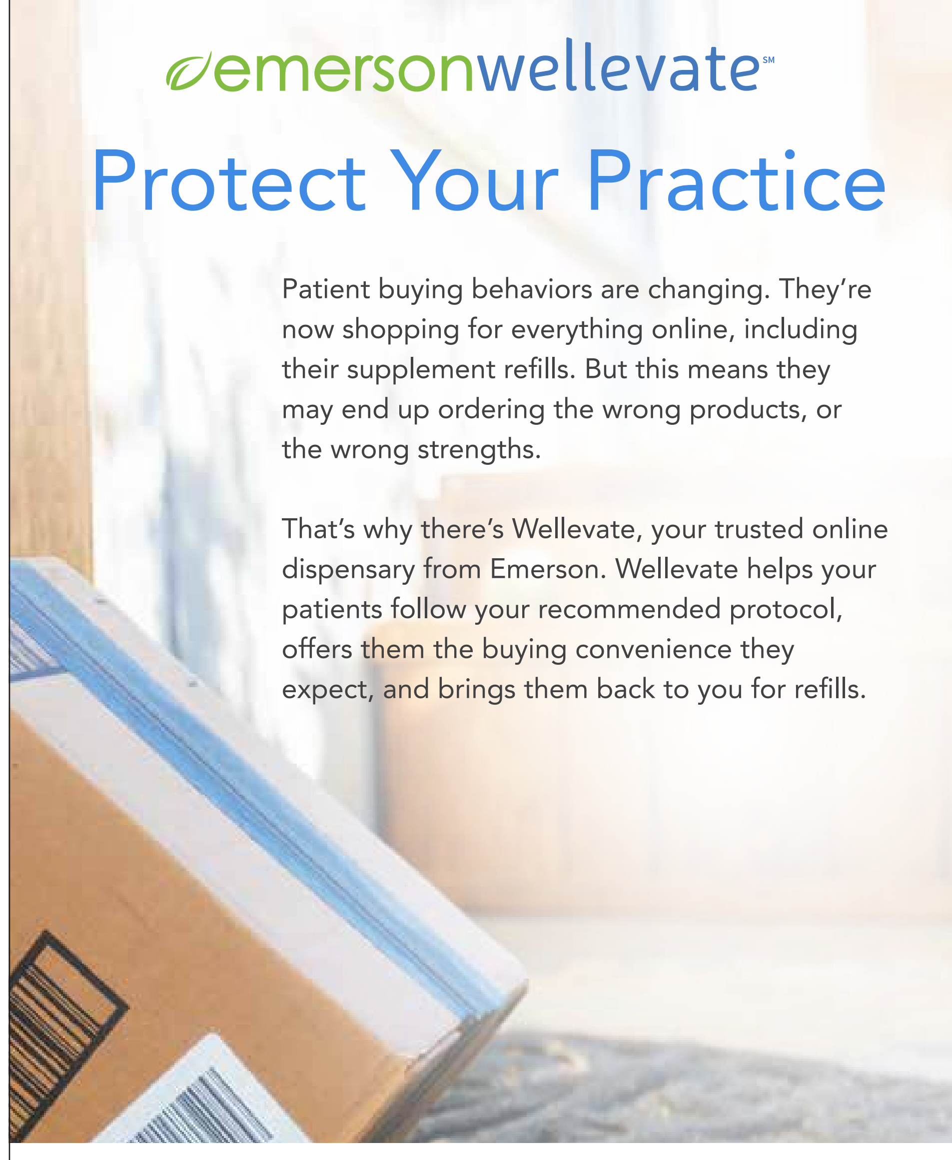
Another study evaluated 95 breast cancer patients with $T_{1-3}N_{0-2}M_0$ who were prescribed 6 consecutive cycles of CAF along with adjunctive injections of mistletoe (a proprietary fermented aqueous extract from apple tree) that were administered 3 times per week.[4] Compared to control patients who 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.[4]

Quality of life was also assessed in advanced pancreatic 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.[14] 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.[14]

Mistletoe: Mechanisms of Action

Structure & Apoptotic Properties

Metabolites of the European mistletoe plant include viscotoxins, amphipathic/basic polypeptides, and lectins, among other constituents. The primary metabolites 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-I, ML-II, and ML-III.[15] The B 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.[15,16] *V album* modulates mechanisms in the cancerous cell responsible for apoptosis. For example, *Viscum album* L coloratum, 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 PI3K-AKT (pAKT) pathway (which is essential in the proliferation and survival of myeloid leukemia K652 cells), thereby inducing apoptosis.[15]



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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 myelogenic leukemia K52 cells were co-treated with doxorubicin (Dox) and *Viscum album* extract (VAE) for 72 hours, VAE/Dox greatly reduced the amount of cancer cells in both the S (replicative) 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.[17] 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 Dox.[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.[18,19] It was shown that simultaneous treatment of MCF-7 (human breast adenocarcinoma cells) with *V album* and Dox was able to halt the induction of cell cycle arrest at the G2/M phase, thereby activating an intrinsic apoptotic program in favor of senescence.[18]

Immunomodulatory & 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 enhancing dendritic cell maturation and reduce the tumor-induced immunosuppression of dendritic cells.[20] A further effect on the immune system exerted by mistletoe, specifically lectin-rich extracts of the plant, is its ability to enhance natural killer (NK)-cell-mediated glioblastoma 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.[1] 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.[14] 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,[2,4,14] and fatigue,[2,14,23] among other outcomes that are important to patients. Mechanistically, mistletoe extracts exert pro-apoptotic[15] and immunomodulatory effects[21,22] that enhance host cell defenses against tumor cells. Its anti-inflammatory effect is postulated to be the potential mechanism by which it can alleviate cancer-related fatigue, thereby enhancing quality of life in this regard.[22,23] 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.

References available online at ndnr.com

Monique Aucoin, BMSc, ND, is a naturopathic doctor and research fellow at the Canadian College of Naturopathic Medicine. Dr Aucoin's clinical and research interests are focused on the role of diet in the treatment and prevention of mental illness. She has been involved in a range of systematic reviews and RCTs using natural health products, and she is passionate about supporting naturopathic doctors and students in engaging with evidence. For more info: www.MoniqueAucoinND.com

Sukriti Bhardwaj, BHSc, is a 4th-year student at the Canadian College of Naturopathic Medicine. Her research interests include the primary and secondary prevention of cancer through the use of integrative medicine, along with the impact of integrative therapies on quality of life and overall survival in cancer patients. She has also co-authored papers within the fields of psychiatry and digestive health. In her new role as a clinical intern at the Robert Schad Naturopathic Clinic, she is excited to be working with patients to help them achieve optimal health.

Posttraumatic Stress

The Return to Wholeness – Part 2

DEBRA GIBSON, ND

In Part 1, current diagnostic criteria and symptom pictures of posttraumatic stress syndromes were outlined, with an overview of the neurobiology of posttraumatic stress – the so-called "fear circuitry" – and discussion of traditional treatment approaches.
Part 2 describes an emerging treatment paradigm for posttraumatic stress injury (PTSI) – individualized, holistic, patient-empowering, multidisciplinary, and aligned with core tenets of naturopathic philosophy – which affirms the place of naturopathic medicine in this constellation of care.

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) regaining safety, stabilizing unhealthy behaviors, and destigmatizing 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 multidisciplinary support over time. Despite the efforts of the Department of Veterans Affairs to establish an evidence-based, widely applicable PTSI treatment strategy, the healing of traumatized humans resists a "cookie cutter" approach.[3] Instead, a model of individualized, stage-appropriate combinations of modalities and practices that evolve over time, as healing progresses, has become a kind of non-standardized standard of care for more effective treatment of complex trauma.[4] Fundamentally non-cognitive modalities – such as EMDR (Eye Movement Desensitization and Reprocessing,),[5] Emotional Freedom Technique (EFT, or "tapping"), mindfulness practices, guided imagery,[6] 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.[7]

Diverse though they may be, as Belleruth Naparstek notes,[8] trauma-centered therapies share common therapeutic values: "1. They first and foremost find ways to re-regulate the nervous system. 2. They destigmatize and normalize the experience by explaining posttraumatic stress (PTS) as the somatic and neurophysiologic condition it is.
3. They offer simple, self-administer-able 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."[8]

Vis Medicatrix Naturae 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 assessments can inform treatment strategies, affirm to the patient that there really are physiologic underpinnings to their psychic distress, and sustain motivation for compliance with the care plan by tracking change over time. Multi-point cortisol assays and urinary neuropeptide panels; "conventional lab" screening for patterns of dysglycemia and dysinsulinemia, homocysteine elevation and inflammatory markers, thyroid and sex hormone 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 metabolism); 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 let 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 supply neurons 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.[9]

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.[10,11] 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 is usually 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 Herxheimer 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 pineal melatonin secretion for improved sleep, mood, immune function, and anxiety reduction.[12] A walk or a hike, 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."[13] 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.[14]

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) disruption, and glucocorticoid, catecholamine (particularly dopamine and norepinephrine), and serotonin dysregulation.[15,16] Naturopathic protocols for neuroendocrine repair – informed by 4-point cortisol, melatonin, urinary 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-latency insomnia) could include bedtime dosing of phosphatidylserine (200-300 mg), glycerophosphocholine (400 mg) and acetyl-S-carnitine (500 mg). Two observations of note: 1) some "adrenal support" formulae 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

The compound 4-amino-3-phenylbutyric acid (phenibut), an anxiolytic metabolite of gamma-aminobutyric acid (GABA) with primarily GABA-B receptor effects (similar to those of baclofen), originated as part of Russia's space program in the 1960s to temper stress in cosmonauts. Although there are reports in the literature associating excessive sedation and withdrawal syndromes with phenibut,[17] with reasonable dosing (250-500 mg daily), and in my own clinical experience over more than a decade of prescribing it as part of a proprietary formulation (phenibut with taurine and 5-hydroxytryptophan [5-HTP]), phenibut can provide dramatic and rapid improvement in problems with sleep onset, sleep interruption, and anxiousness. I have not observed side effects other than rare instances of morning-after grogginess.

Nutrient support for better sleep and reduced anxiety includes the B-vitamin, inositol, supplied in divided doses of as much as 16 grams per day, and magnesium supplementation of 200-500 mg or more per day (as "ionized" citrate powder or glycinate capsules; in divided doses; and subject to bowel tolerance), especially if supported by RBC levels of less than 5.4 mg/dL.

Many botanicals have anxiolytic qualities. Some that are receiving attention as part of treatment strategies for posttraumatic anxiety, insomnia, and depression include the adaptogenic herb *Rhodiola rosea*,[18] prescribed in higher-dose, high-percentage (15%) rosavin formulations to avoid the potential cortisol-stimulating effect of lower doses; *Withania somnifera* (ashwagandha),[19] prescribed traditionally in powder form as a 5-g bedtime dose[20] or in smaller doses as a 2:1 or 5:1 extract; and *Bacopa monnieri* (200-600 mg per day of a 20% bacoside formula). Mechanisms driving their effects – an increasing focus of research – include modulating effects on cortisol and catecholamines, and stimulation of the neuroplasticity-enhancing protein BDNF (brain-derived neurotrophic factor).[21]

Amino acids targeting neurotransmitter and catecholamine imbalance can have potent modulating effects on PTSI symptoms. They are also relatively inexpensive and, in easy-to-take powder or chewable form, can mitigate "supplement fatigue." Glycine, a norepinephrine antagonist (1/2-1 tsp [2-4 g] in powder form, up to 4 times per day); the GABA-A agonist taurine (1/4 tsp [about 1.5 g] as a powder, 2-3 times per day); L-theanine, a glutamate receptor antagonist derived from green tea (100-200 mg in capsule or chewable form twice daily and as needed for acute stress) may be prescribed singly, in combination, or in compound formulas with anxiolytic botanicals and nutrient cofactors. When indicated by results of neurotransmitter testing, 5-HTP (50-300 mg per day), the serotonin precursor (with its cofactor pyridoxine 5′-phosphate) may be supplied for mood enhancement and sleep-cycle normalization. (Of course, it's appropriate to adjust treatment strategy, dosing, and the frequency of follow-up testing in the context of concurrently prescribed pharmaceuticals such as SSRIs and NSRIs.)

Cannabidiol (CBD) oil, the primary non-psychotropic compound found in *Cannabis sativa*, is emerging in trauma treatment as an adjunct to psychotherapy. Available in a plenitude of vehicles for administration (oil for sublingual drops or vaping, spray, suppository, tincture, and soft-gel, to name a few), CBD is also taken in varying concentrations and an even greater variety of delivery methods when combined with the psychoactive cannabis compound delta(9)-tetrahydrocannabinol (THC). CBD's effects of reducing anxiety and pain, improving sleep and mood,[22] and modulating fear memory are attributed in part to indirect effects on the endocannabinoid system, increased serotonin transmission through stimulation of serotonin ($5\text{-}HT_{1A}$) receptors, and stimulation of opioid receptors.[23,24] Although clinical guidelines for use of CBD for PTSI are not yet available, "grey literature" resources and professional manufacturers may be useful resources.[25]

Holistic Trauma-Centered Care

It is a truism that change requires action. One of the greatest impediments to healing for people suffering from PTSI is their reluctance to seek treatment, and then to not stay in treatment long enough to feel results. This is tragic, given what may be life-or-death stakes (for them and for others). What is emerging in posttraumatic care is a holistic model in line with the holism that has always been central to naturopathic philosophy. Combining multiple modalities that engage with and support healing of mind, body, and spirit – for instance, EMDR with MBSR (Mindfulness-Based Stress Reduction), trauma-centered yoga, supportive psychotherapy, and adjunctive naturopathic care – eases the hard work of authentic healing, opens a way back to a livable present, and holds real promise for posttraumatic growth and thriving.[26]

> *Trauma is hell on earth. Trauma resolved is a gift from the gods.*
> (Peter A. Levine)

References available online at ndnr.com

Debra Gibson, ND, graduated from the National College of Naturopathic Medicine (now NUNM) in 1983, and has practiced for more than 30 years. The intersection of body, mind, and metaphysics is of particular interest in her work. She currently practices in Cos Cob, CT.

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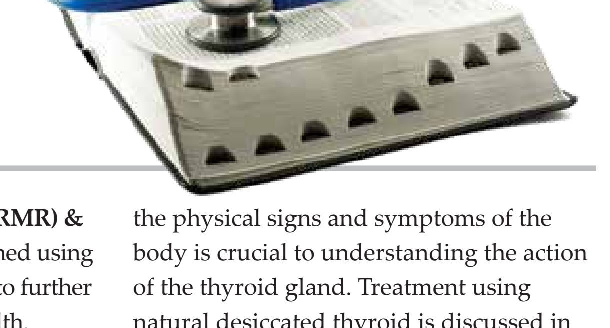

AMY TUNG, ND

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 hyperthyroidism 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 "ThryoZone® System." They explain in detail the interplay of the thyroid gland and the other hormones in the body, using a functional interpretation of thyroid laboratory values and a comprehensive view of metabolism and the body.

The book, *Thyrozone: Real Thyroid Solutions for Better Health & Better Living*, is divided into 2 parts: Section 1 reviews the thyroid gland and introduces the ThyroZone® System; and Section 2 discusses the diagnosis, treatment, and monitoring of patients used by Drs Robinson and Romero-Bosch in their clinic.

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- **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.
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- **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.

Just the FACTS

Title: *Thyrozone: Real Thyroid Solutions for Better Health and Better Living*
Author: John A. Robinson, NMD, & Christina Romero-Bosch, NMD
Publisher: Wheatmark
Available from: www.wheatmark.com
Pages: 128
Style: Soft Cover
Copyright: 2017
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		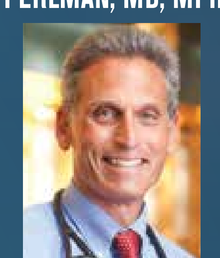		
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Clinical Use of Cannabis

ANUP MULAKALURI, ND, AWC

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 desperate for effective alternatives, cannabis has re-emerged 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.[1] 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.[2]

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. *Bhavaprakasha*, a 14th-century Ayurvedic text, describes cannabis as a medicine with warming and soothing qualities.[3] 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.[3] *Bhavaprakasha* 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 "Upavishad" herb. This means that it requires appropriate processing and purification to maximize its powerful clinical benefits 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

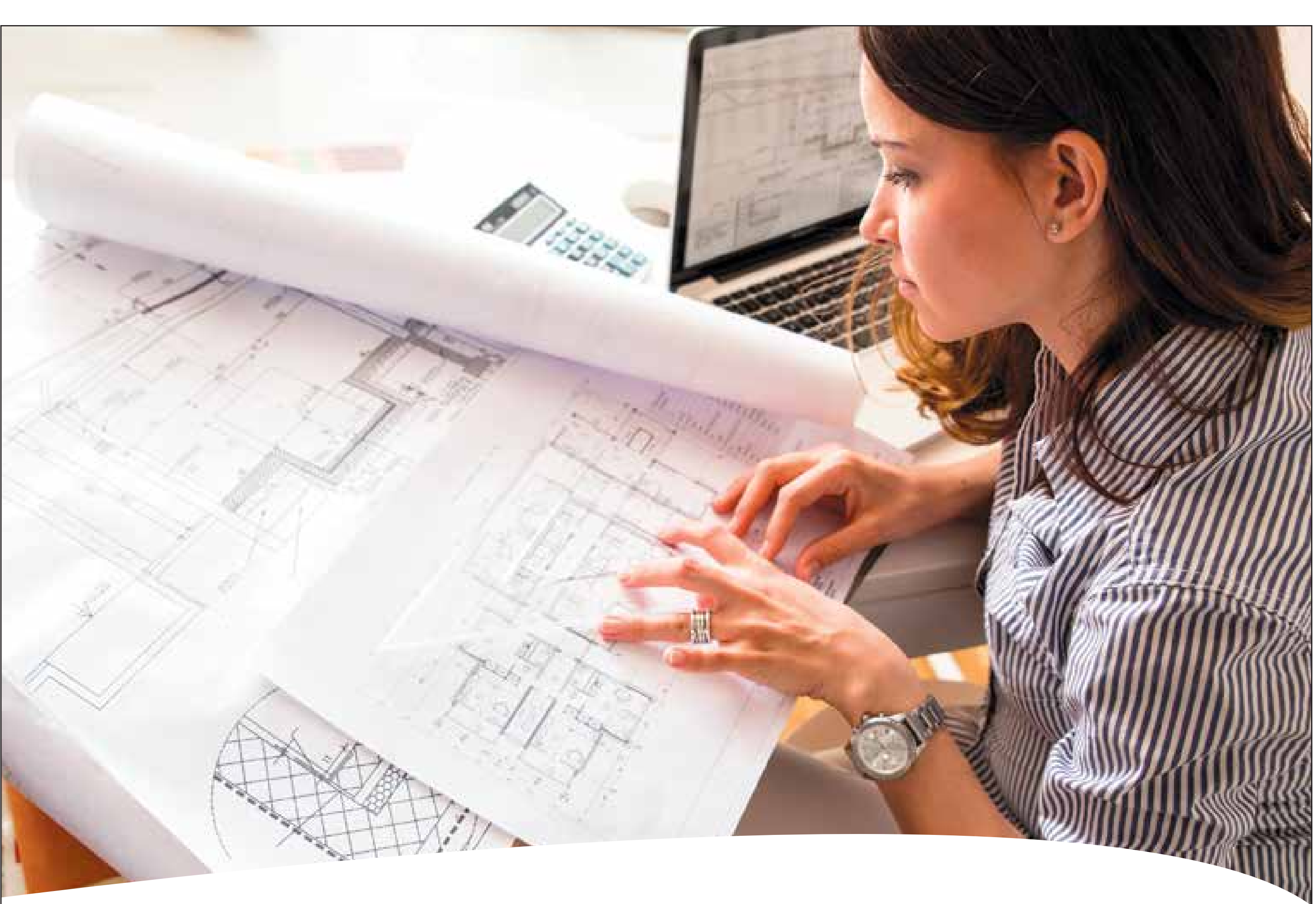
To begin, we must acknowledge that the cannabis plant contains up to 70 phytocannabinoids.[4] To put this in perspective, we are only now starting to grasp the breadth of the effects that just 3 of these compounds have in the body. These are tetrahydrocannabinol (THC), delta-9-tetrahydrocannabivarin (Δ^9THC), and cannabidiol (CBD).

These 3 compounds interact with and affect the body through cannabinoid receptors (CB_1 and CB_2). The stimulation of either of these receptors has an antinociceptive effect, which ultimately produces the therapeutic benefit of cannabis.[5] CB_1 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.[5] CB_2 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 modulate immune responses.[6] In summary, CB_1 activity is more concerned with the response of the central nervous system to perceived pain, inflammation, injury, etc, while CB_2 activity is more concerned with mitigating peripheral perception and immune responses to pain, inflammation, injury, and other triggers of nociception.

There is significant upregulation of CB_1 and CB_2 receptors in response to neuropathic pain, as well as with inflammatory conditions. THC and Δ^9THC bind strongly to CB_1 receptors and act as only partial agonists of CB_2 receptors. Thus, these compounds contribute to antinociceptive activities centrally and in the periphery primarily through CB_1 receptor binding.[4] Both have strong psycho-activity. By contrast, CBD binds relatively less effectively to CB_1 receptors and has no psycho-activity. CBD has high binding potency to CB_2 receptors. It binds strongly enough to have very beneficial health effects and contributes nociceptive activity similar to that of Δ^9THC.[4] In addition to pain management, CBD conducts immune modulation to reduce inflammation.[7]

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 CB_1 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.[8,9] This effect is especially useful for conditions such as multiple sclerosis and chronic regional pain syndrome (CRPS). In addition, because CB_2 receptors are upregulated in microglia and peripheral afferent nerves in response to



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[1]McGlade E, et all. The effect of Citicoline supplementation on motor speed and attention in adolescent males. J Atten Disord. 2015 Jul 15; 1087054715593633.

injury, inflammation, and pain, the activity of CB_2 receptors helps to control pain, inflammation, and associated edema.[6] CB_2 activity has also been found to mediate visceral pain through antinociceptive activity in visceral organs.

CBD use is favored in order to avoid the adverse effects associated with the psycho-activity of THC. In other words, CBD provides wide-ranging effects without the perceptual changes and sedative effects associated with THC activity. Furthermore, the benefits of CBD are associated with the following mechanisms of action[10]:

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 (Ca^{2+}), thus stabilizing immune cells like mast cells and preventing the inflammatory effects of compounds like histamine.
5. Ca^{2+} influx in smooth muscles and skeletal muscles in response to CBD binding of CB_2 receptors also helps mitigate spasticity and associated pain.

Clinical Applications

The aforementioned studies and others demonstrate the clinical indications for cannabis 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: Pharmacodynamic Study of Various Modes**[11,12]

Mode of Administration	Time of Onset	Length of Effect
Smoke/Vapor inhalation	A few seconds	30 minutes-2 hours
Oral ingestion	1-2 hours	4-6 hours
Transdermal	1.5 hours	6-8 hours

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, migraine, etc.
- Oral ingestion of oil-infused extracts of cannabis proves most beneficial in chronic pain conditions. Orally ingested, 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, local joint pain and swelling, etc.

CBD vs THC

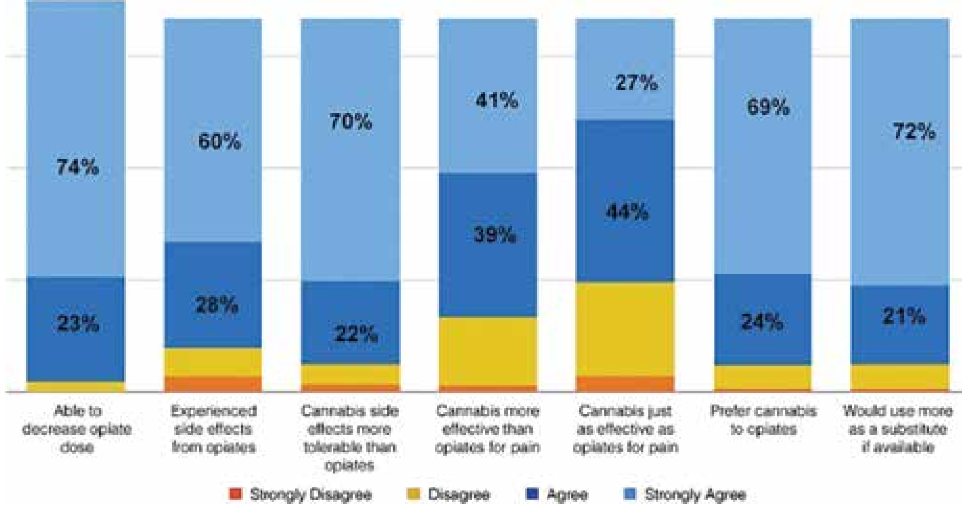
CBD is by far the most frequently recommended form of phytocannabinoid in my practice. CBD offers the benefit of activating both CB_1 and CB_2 receptors, and it provides an additive effect by promoting the efficacy and concentration of endocannabinoids.[4] Additionally, it is much more practical than cannabis for regular use, since in contrast to THC, CBD does not have psycho-activity. CBD is, by far, the preferred choice of everyone who values sobriety.

On the other hand, I have found that the psycho-activity 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

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



(Courtesy of Reiman A et al; 2017)

energy. By revitalizing them, their vital force becomes available for deeper healing. The subsequent introduction of herbs can then provide an additive and sustaining effect to the healing process.

- ***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 (rubor, calor, dolor, 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]
- ***Boswellia serrata***: Boswellic acid alkaloids from frankincense resin have powerful effects on controlling inflammation. In Ayurveda, it is a prescribed for Vata/Kapha-predominant conditions that feature degenerative changes to musculoskeletal tissue and bowels.[15] *Boswellia* has proven clinical benefits for conditions including Crohn's disease, collagenous colitis, osteoarthritis, rheumatoid arthritis, and more.[16]
- ***Withania somnifera***: In Ayurveda, ashwagandha is described as a Rasayana (rejuvenating) herb, indicating its benefit for restoring and stimulating the vital force. Chronic and severe pain have a physically and emotionally draining effect. When an individual is in pain and is still trying to be active, it can "feel like a battle every day," as one client described it. Adrenal adaptogens, in general, can be very supportive as an individual recovers his or her vitality. Ashwagandha has clinically-proven efficacy for managing stress. In a study of individuals with workplace stress, ashwagandha lowered the percentage of subjects with high serum cortisol levels (15.6-21.5 μg/dL), from 75% to just 15%.[18] This study also showed that the herb improved sleep quality, as well as subjective parameters such as irritability, depression, and motivation to work.

Conclusion

While our scientific understanding of the clinical application of cannabis is still nascent, there is a growing urgency to explore responsible clinical use of the herb. The great ingenuity of cannabis plant growers and processors contributes to the availability of CBD-rich plants and extracts, which can be prepared and used without fear of psycho-activity and impairment. A growing body of research supports the use of cannabis in inflammatory, painful, degenerative, and neurological conditions, and it can also play a significant role in alleviating psychological conditions associated with PTSD, anxiety, mania, schizophrenia, and more.

References available online at ndnr.com

Anup Mulakaluri, ND, AWC, is a naturopathic doctor specializing in Ayurvedic Medicine. Dr Anup's practice focuses on treating the whole person – body, mind, and spirit. He uses clinically proven natural remedies in treatment. This includes food and herbs, lifestyle and health-promoting daily routines, as well as Ayurvedic detoxification and body therapies. His passion is empowering individuals to transform their life and health. For individuals with chronic diseases, focus is placed on restoring healthy physiology and minimizing pharmaceutical dependence. Dr Anup is the founder and president of Natural Rhythms Integrative Medicine (www.nrimseattle.com), a community-centered, multi-care natural health clinic in the Wallingford/Fremont area of Seattle, WA.

Bowen Therapy

Reset Your Body and Mind

SANJA TAMBURIC, ND

My first experience with Bowen therapy was when I was a student at Boucher Institute of Naturopathic Medicine (BINM) and it was immediately clear 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 mental/emotional issues. Thus my love for Bowen was born.

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

According to Bowen authorities, Olafimihan and Hall, "Bowen is a complementary therapy that supports mind, body, and spirit through physical, mental, and psychological pathways."[1]

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 currently permeates 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 tears 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 patters of thinking and movement often contribute to chronic pain, especially pain that is not a result of an injury or condition such as fibromyalgia.

This is why all those treatments that focus solely on the body do not work. We also know that muscles hold memory of how the body is in a healthy state, and the brain has the blueprint for a return to health.

Bowen therapy helps erase bad memories and reset the brain, giving it a subtle stimulus that then has a domino effect on many systems via the autonomic nervous system (ANS). The ANS controls over 80% of bodily functions. There are 2 parts to the ANS: sympathetic and parasympathetic. Most of us spend 80% of the time in the sympathetic mode from overstimulation, and only 20% in the parasympathetic, relaxing mode, mainly when we sleep (assuming restful sleep). No wonder there is so much chronic pain and so many digestive issues. Healing and repair can only occur in the parasympathetic mode. Bowen technique enables that process. Shortly after the start of treatment, one will feel a patient's muscles letting go and hear gurgling in the stomach as digestive juices are released and prepare to digest. Both are signs of parasympathetic activation.

Mechanism/Physiology of Bowen Therapy

The postulated theory of the mechanism of Bowen work is that via a simple Bowen move, golgi and spindle cells in the belly of a muscle are stimulated, along with the surrounding tissue, fascia, and fluid, both intra- and extracellular.[2] The move initiates a cascade of reactions, including stimulation of the ANS throughout the body and the central nervous system to the brain.[1,3] These moves produce a domino effect in other areas of the body distant from the affected area (in physiology we call it segmental viscero-somatic spinal reflexes), comparable to the effect of acupuncture on moving energy along the meridians.

The postulated theory suggests that the energetic impulses stimulate healing pathways to restore the body to the original state of health prior to an insult or trauma, and reduce the stimulation of pain receptors.[4] The treatment reboots the body, reorganizes false patterns, and establishes new ones.

Less is More

Breaks between the moves are a difficult concept to grasp for many practitioners, let alone patients experiencing the treatment. However, these breaks are a fundamental part of Bowen therapy success. In my practice, I have commonly failed to achieve results when breaks were skipped or when there was a verbal interaction between patient and a doctor during the treatment. It is during this time that the 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 button 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 or digestive problems, menstrual irregularities, and circulation problems. It is well suited to clients who cannot tolerate deep-tissue bodywork, eg, fragile or 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 fetal 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 these patients can gain immediate relief and improved quality of life for weeks and months after Bowen treatment.[5]

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 the subject, 53% showed that Bowen was effective for reducing pain, and 33% showed improvement in mobility.[4] In

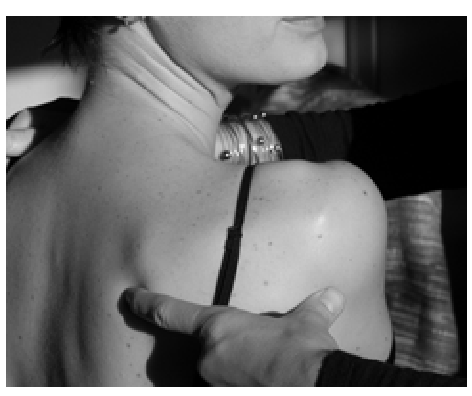


Table 1. **Conditions Responsive to Bowen**

Category	Conditions
Musculoskeletal Pain	Back pain: chronic and acute Frozen shoulder and pain Tennis elbow Carpal tunnel syndrome Arthritic pain Sporting injuries Inflexibility Hamstrings Headaches TMJ syndrome Scoliosis Migraine Postural problems Gait disorders Leg length discrepancies Plantar fasciitis Shin splints Fibromyalgia Polymyalgia rheumatica Foot and ankle problems Hammer toes Heel pain Bunions Hernia Knee and hip restrictions Pelvic problems Repetitive strain injury / Occupational overuse syndrome Sciatica
Respiratory Problems	Asthma Bronchitis Hay fever Sinusitis Allergies
Digestive Disorders	Constipation Colic Crohn's disease Indigestion Bowel problems
Gynecological Problems	Infertility Mastitis Premenstrual syndrome Breast lumps
Chronic & Acute Issues	Chronic fatigue syndrome Balance problems Tinnitus Bed wetting in children Prostatic problems Hemorrhoids Earache and ear infections

addition, 5 studies showed Bowen to effectively relieve symptoms commonly associated with chronic illnesses such as multiple sclerosis.[4]

Here is a sampling of the research on Bowen:

- **Lymphedema in breast cancer survivors**: In a pilot study of 21 breast cancer survivors, Bowen work was shown to effectively reduce lymphedema associated with breast cancer treatment, as reflected in reduced arm circumference and improved range of motion. Bowen also improved mental health, quality of life, and daily functioning.[6]
- **Frozen shoulder**: This study was designed to evaluate clients' experience of Bowen Technique in the treatment of frozen shoulder, in terms of their pain, functional ability, and well-being. All participants experienced improvements in shoulder mobility and associated function, including those with longstanding frozen shoulder. With treatment, the median "worst pain" pre-therapy score reduced from 7 (mean 7, range 1-10) to a median "worst pain" score of 1 (mean 1.45, range 0-5). Participants also experienced improvement in their activities of daily living.[7]
- **Hamstring flexibility**: An assessor-blinded, prospective, randomized controlled trial was performed on 116 asymptomatic volunteers who were randomly assigned to a Bowen treatment group or a control group. Using 3 hamstring flexibility measurements, flexibility levels were observed to increase in the Bowen group after only 1 treatment session – an improvement that persisted 1 week later.[8]
- **Stress reduction**: Over 6 weeks, 31 hospital and community health services staff were treated in a group setting with a Bowen technique designed to improve physical health and reduce stress. Quantitative and qualitative assessments revealed that Bowen successfully reduced stress and improved energy, well-being, and sleep in the participants; it also reduced pain and improved mobility.[9]

Patient Cases

Migraine

A 52-year-old woman presented to me with severe migraine headache with aura. The migraines made her nauseated, sensitive to light, and unable to work at her flower shop. Someone suggested to her that she try Bowen. After the first treatment, her migraine pain was reduced by about 50%. After the second session, all of the concomitant symptoms were resolved, and she had some residual pain that was bearable. After the third session, she was free of migraines.

Sciatica

A 70-year-old overweight woman presented who suffered from sciatica and right-sided buttock pain that radiated down the leg and into the foot, though sometimes only to the knee. She had a previous history of low back pain and sciatica, and had been to many practitioners of physical medicine, with no relief. Because of the sciatica, she had experienced months of limping, difficulty walking and living in pain, and not being able to sit properly or sleep. After 2 Bowen treatments, she became pain-free.

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 then 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

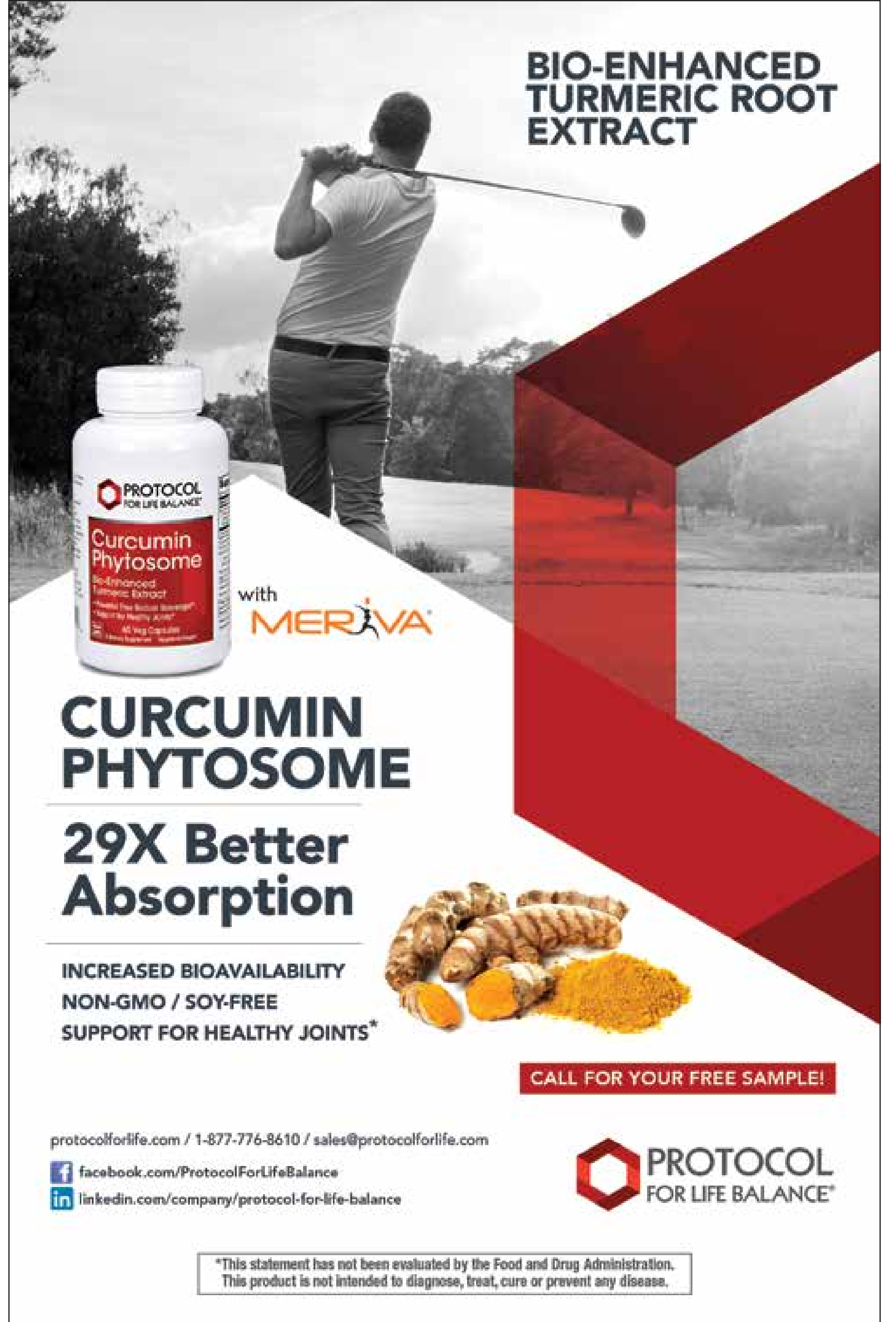
Bowen is not only physical therapy; it also integrates mind and body, leaving a patient pain-free and deeply relaxed such that the body can heal. Despite limited scientific research, its benefits are short of being miraculous.

Successful results opens 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

Sanja Tamburic ND, is a licensed naturopathic physician in BC, Canada. She is a graduate of BINM, 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 solving chronic autoimmune diseases, especially MS, using Dr Coimbra's protocol and various mind/body modalities, including Bowen, homeopathy and total body modification (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.



Surfing The Microbiome

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, which I 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, prebiotic and probiotics, 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 like to say 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 a 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 take-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 probiotic supplements 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.[1]

Figure 1. **Sprague's 10-Day Microbial Diversity**

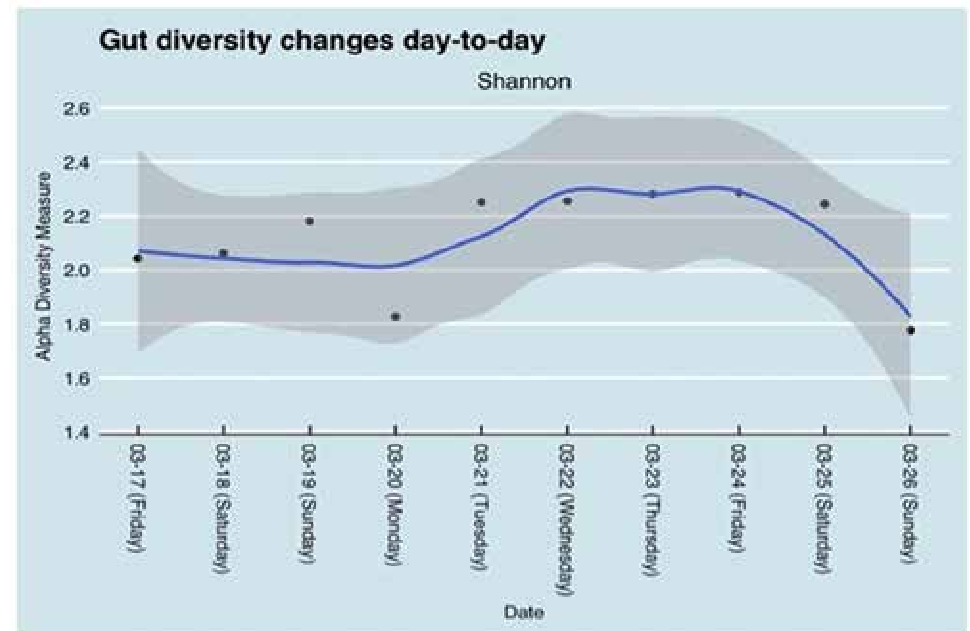
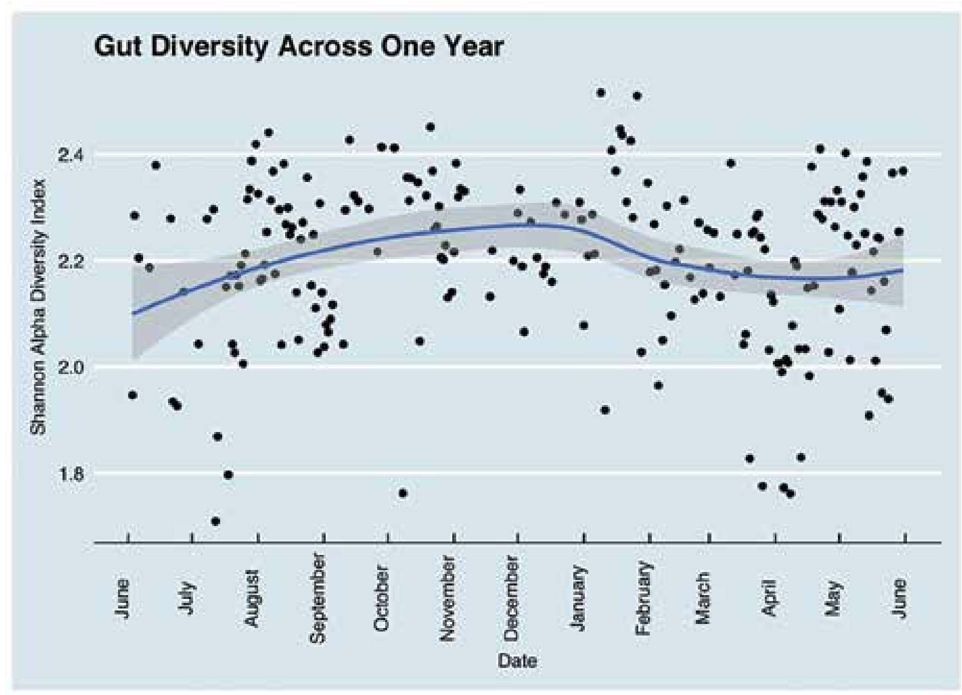


Figure 2. **Sprague's 12-Month Microbial Diversity**



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.

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."[2]

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 on 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.

Dr Swanson Comment:

I take about 5 g per day. Interestingly, a recent study showed that diets high in resistant starch increase plasma levels of trimethylamine-N-oxide (TMAO), a gut microbiome metabolite associated with CVD risk.[3]

Have you tried different dietary regimes, eg, ketogenic diet, gluten-free, Paleolithic, low-fat, etc, to document their effects on bacterial populations and microbiome diversity?

I've not done the kind of systematic dietary change that would pass muster in a serious scientific trial, but I do notice obvious differences when drinking kefir, for example. Many people have sent me their own microbiome data before/after a dietary change, and I do see obvious shifts, though it's not clear if the changes are individual-specific. For example, it could be that a ketogenic diet lowers the Firmicutes in one individual but makes it higher in another. 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 far 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 naturopathic 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 doubt I'm saying 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).[4] 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.[5]

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 some 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.

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

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.[6] 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.[7-9] 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.[10] This would move the wellness goal-posts 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

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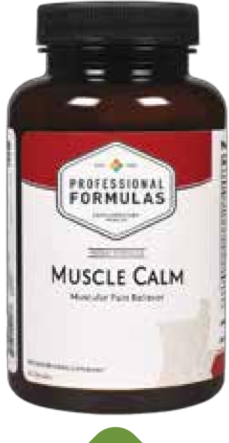
NO TWO PAINS ARE THE SAME



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Pregnancy, Childbirth & Hydrotherapy

SUSSANNA CZERANKO, ND, BBE

There is no period of life at which it is of so much consequence to observe moderation and simplicity of diet, and avoid the use of heating food and stimulants, as during pregnancy.
Hester Pendleton, 1851, p.168

The truly remarkable effects of water treatment in enabling our patients to recover so soon from the effects of childbirth, meets with great opposition on the part of some of the medical fraternity.
Joel Shew, 1851, vol. VII, p.117

I have never known the slightest ill effect from the use of water in childbirth in the practice of any water cure physician, not even when the patient seemed imprudent in sitting up and walking directly after the birth.
Dr Nichols, 1856, p.310

For some time now, I have wanted to explore hydrotherapies historically used during pregnancy and childbirth. The literature from the Benedict Lust publications certainly included women's health issues, and there were many articles published by both men and women on this topic. However, let us delve more deeply into the era prior to Benedict Lust and the advent of Naturopathy to get some perspective on this remarkable modality and its value to women and babies.

Hydrotherapy in that time period is particularly reflected by a group of doctors who had studied with Vincent Priessnitz. They wrote prolifically on the subject of women's health almost 2 centuries ago. As noted in the last issue of *NDNR*, women in America currently have the worst mortality rates among the developed nations despite the world's most expensive medical system. So, let's see if there are tools and lessons that we can learn from the earlier literature on hydrotherapy. After all, we know that pregnancy and childbirth are decidedly not diseases; on the contrary, they are natural life processes. How did the early Hydrotherapists help women safely through their pregnancies?

The literature reaches further back to the mid-19th century, benefitting from a different collection of works, published as a 7-volume series, of various authors predicated on the work of Vincent Priessnitz. This body of work is called *The Water-Cure Library*, published in 1851 by Fowlers and Wells Publishers in New York City. In 167 years of scientific advances, one would assume that pregnancy and childbirth would be a very safe and no-risk affair. To recapitulate, let's peek into the numbers and uncover what are actually false notions of safety in our time.

American women's maternal mortality rate (MMR) is the highest among of all of the industrialized, developed countries. Having the highest MMR is not simply having the biggest number with the others in the pack following closely behind. No, the gap between United States and Canada, for example, is definitely wide despite their close proximity. The gap between the US MMR of 26.4 and Canada's MMR of 7.3, for instance – notwithstanding its frequently misunderstood and unfortunately demonized socialized (translation: single payer system) health care – is incredibly wide, with Canada's MMR being only 27% of its American counterpart. In fact, most Asian and European countries – such as Finland, Germany, France, Sweden, Belarus, Japan, Singapore, Australia, and Kuwait, to name but a few from across the world – have single-digit MMR statistics. The question is hardly rhetorical as to why contemporary women in the world's most economically progressive and technologically advanced society should not benefit from mitigated risk factors in pregnancy and childbirth, achieving at least the low levels experienced by Finland, for example [MMR of 2.3]. (Kressebaum et al, 2016)

To unravel the reasons for these variations of data from different countries and cultures is beyond the scope of this article; however, we may well find valuable a look at the practices and interventions used almost 200 years ago for women moving through pregnancy and childbirth. Certainly, the number of deaths due to childbirth has dropped significantly over time; however, the contemporary data, tabulating deaths per thousand or per 100 000, continue to be worrying, and even alarming.

Dr Hester Pendleton

Hester Pendleton, a woman who wrote broadly on the topic of childbirth, contributed several chapters to *The Water-Cure Library*. Women of her era were largely in the dark in terms of information and guidance regarding pregnancy. Pendleton's writings reveal the opinions and views of her medical contemporaries and shed light on how hydrotherapy and pregnancy were indeed very compatible. Pregnancy was fraught with pain and suffering and too often resulted in death of mother or child, or even both. In Pendleton's view, pregnancy was a natural process that did not need to be painful. She writes, "The functions of gestation and parturition are as natural as digestion; and were mankind brought into a natural and healthy state, we have reason to believe that these functions would be attended with little if any pain." (Pendleton, 1851, p.154)

She addresses the question of diet during pregnancy and the prevailing points of view in the 1850s. Diet restrictions were adopted to reduce birthing complications by essentially reducing the weight of the fetus. Pendleton cites a diet created by a "Mr. Rowbotham" that influenced the bone development 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 substances, especially refined wheat, legumes, dairy products and caffeinated drinks, alcohol, and even water.

> While taking her sitz bath one morning, labor began, and in 20 minutes a healthy baby was born. In about 10 minutes, the afterbirth came with no complications.

Another point of view is presented by Dr Eberle, who writes, "There is no period of life at which it is of so much consequence to observe moderation and simplicity of diet, and avoid the use of heating food and stimulants, as during pregnancy." (Pendleton, 1851, p.168) He was opposed to unrestrained eating and to undesirable and unhealthy foods. He advocated for strict dieting during pregnancy to reduce the size of the baby.

Dr Eberle also counseled against the use of corsets. He writes, "The custom of wearing tightly-laced corsets during gestation cannot be too severely censured. … By this unnatural practice, the circulation of the blood throughout the abdomen is impeded—a circumstance which, together with the mechanical compression 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 saw that insufficient diet created feeble and unhealthy children. She writes, "It is naturally the children of the poor who will [be affected] most from the inadequate nourishment of the parent during pregnancy; but those of the higher classes also suffer, though in a different way. The system is duly nourished only when the proper food is also properly digested; if the digestion be imperfect, no food, however nutritious, will afford a healthy sustenance." (Pendleton, 1851, p.167)

Writings in *The Water-Cure Library* addressed the importance of exercise, fresh air, 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.

Baths, Diet and Exercise

Pendleton presents a remarkable case which was typical of pregnancies when the woman adopted hydrotherapies, dietary changes, and exercise. The woman was healthy and 17 years old. Her regime throughout the entire pregnancy included the following:

> *She took regularly a shower bath every morning, exercised every day, [rain or shine] in the open air, and when the amount of exercise was considerably less than common, a quick bath was taken before dinner, and regularly a sponge or rubbing bath was used before going to rest. Sitz baths were taken daily and the body bandage [trunk compress around the body] worn much of the time. (Pendleton, 1851, p.186)*

It is important to note that when Pendleton refers to baths, she is referring to cold-water baths. No warm or hot water would have been used. The body bandage was a signature therapy used by Priessnitz, held by him in high esteem, since it was the very therapy that changed his destiny from being an invalid to a healthy adult.

Further therapies included enemas, using cold water to keep the bowels free. The 17-year-old patient ate a very plain diet consisting of vegetables, fruits, and farinaceous foods. In the last trimester, "the supper was always omitted so that only two light meals were taken daily and no food between times." (Pendleton, 1851, p.187) She drank mineral water, which was "a powerful means to reduce the inordinate craving appetite with which so many are afflicted." (Pendleton, 1851, p.187)

While taking her sitz bath one morning, labor began, and in 20 minutes a healthy baby was born. In about 10 minutes, the afterbirth came with no complications. After the delivery of baby, the mother rested a short time, and her body was sponged and dried quickly. Wet cloths were placed on the breast and the abdomen and the young mother was wrapped in blankets. She fell asleep soundly. Three days after the birth, she resumed her exercises in the open air. (Pendleton, 1851, p.187)

Dr Joel Shew

Joel Shew had spent several months studying with Priessnitz and had become one of his most assiduous followers, leaving behind a colossal body of literature. Shew lived a mere 39 years, and the depth of knowledge found in his writings is impressive. He wrote often on gynecology and on hydrotherapy. He brought a scientific rigor unsurpassed in his day, and his writings are a valuable stepping stone for those who want to develop and master the art of hydrotherapy. He recorded cases of childbirth that he attended, and he left a wealth of clinical pearls to guide future generations of doctors.

For example, Shew's advice for preparation for childbirth began in pregnancy with cold water ablutions and sitz baths, and included wearing cold, wet wraps or bandages around the abdomen, dietary recommendations, and lots of exercise in the outdoors. These preparatory measures not only ensured a rapid and relatively painless birth, but also a quick after-birth delivery of the placenta.

As another example of the advice he produced for colleagues, Shew recounted a case that he saw in 1846 of a woman who 2 years prior had given birth to her first child. 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 92°F/27° to 33°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 65°F/13° to 18°C] (Kellogg, 1903, p.100), the daily bathing was increased to 2 ablutions 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 by Priessnitz were waters of 60° to 70°F/16° to 21°C. (Shew, 1851, vol. VII, p.35)

Hip Bath

In the morning, upon rising, the patient took a cold shower and also benefitted from a daily hip bath. (Shew, 1856, p.155) The hip bath was taken in a sitz tub or similar vessel – large enough to accommodate movement during the bath. Directions given by Shew: "The [tub] should be large enough to admit the motion of the arms in rubbing 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 organs, it should only be administered after a meal has long been digested. Shew prescribed the hip bath often during pregnancy because of its tonic effects on the pelvic organs.

For dietary recommendations, Shew advised the woman to replace drinking coffee and tea with drinking cold water. She was to discontinue the use of butter and oily foods and eat coarse bread and fruit. Without any aid of enemas, her bowel habits normalized, and her complexion improved as well.

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 true 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 the child thrived remarkably well. (Shew, 1856, p.156)

Shew cites several such cases, and there is a common theme among them. In almost every case, regardless of economic status, the women had experienced tormenting pains during their previous pregnancies. Significantly, after following the recommendations that Shew provided, such as water applications, diet, and exercise, their recovery after delivery was astounding. What differed in the various cases were the symptoms experienced during their pregnancies. For example, in the case of another woman who had previously given birth twice and had suffered for a few years because of complications during the previous pregnancies and deliveries, the protocol was that she was "confined to her bed for eight to ten weeks after each accouchement. Before her third pregnancy, she concluded to throw away drugs and try the water cure." (Shew, 1856, p.157)

Wet Girdle

This same patient, whom Shew discusses, began a daily routine of bathing twice a day, wearing the wet girdle, having a hip bath, and eating a simple diet twice a day. Her chronic debility was resolved by the hydrotherapies. The wet girdle or abdominal bandage was often used, sometimes in every pregnancy case. The linen used for the wet girdle was about 3 yards long and wide enough to cover above the hips and the lower abdomen. The wet girdle was worn wet and must be re-wetted should it should become dry. Shew relied upon the wet girdle during pregnancy to keep up "the general health and procure good sleep." (Shew, 1851, vol. VII, p.49) For women who found the numerous layers too heavy and bulky, shorter pieces of cloth could be used instead.

Shew adds, "She walked often in the open air, and several miles a day up to the time when confinement was daily expected." (Shew, 1856, p.157) Her labor lasted 2 hours before delivering a healthy baby. "After the birth, she slept two hours and then had a bath." (Shew, 1856, p.157) After 3 days, she traveled home in a carriage and resumed her duties in the management of her household. In another case, a pregnant woman suffering from headaches was relieved by the daily baths. When the headaches become worse, "as many as three showers or plunge baths were taken in a day." (Shew, 1856, p.158)

Rubbing Wet Sheet

One of Priessnitz's water applications was the "rubbing wet sheet," which Shew described as "being one of the mildest of all the water processes, as well as one of the most convenient, [and] … particularly applicable in pregnancy." (Shew, 1851, p.28) Shew provides details for its administration:

> *A large linen sheet, of coarse material, is wrung out in cold water, and while dripping, one or more assistants immediately aid in rubbing over the whole surface. Rub over the sheet; not with it. This is continued briskly, three, five or more minutes, until the skin becomes reddened, and the surface in a glow. (Shew, 1851, vol. VII, p.25)*

The purpose of the rubbing wet sheet was to restore an equilibrium in the blood circulation. It was ideal for patients who were bedridden. The rubbing wet sheet was administered to a part of the body. When the part was rubbed with the wet cloth, the part was dried and covered with a blanket before continuing with the rest of the body. For those who were mobile and able to walk, cold water was preferred. Cold water temperatures were adjusted to the strength of the patient. Shew writes that those persons exhausted from mental efforts "are greatly benefited by the rubbing wet sheet." (Shew, 1851, vol. VII, p.27)

Enemas

Enemas became very important to administer at the beginning of labor. Shew considered the enema as "quick and harmless in its action and always aids the natural pains in accouchement." (Shew, 1851, p.53)

Afterbirth

In 1845, Shew's wife followed the prescribed guidelines during her pregnancy and delivered a healthy baby. Colleagues were concerned that her pelvis was not large enough to allow delivery of a baby, but Mrs Shew was determined to have a natural birth. Dr Shew writes of his wife's labor: "The labor pains went, becoming exceedingly severe, and continued until 3:00 in the morning, at which time she gave birth to a large, healthy and well-formed female child." (Shew, 1851, vol. VI, p.246) His wife's family history revealed a strong tendency to hemorrhages, which she herself suffered after the birth of daughter. Shew resolved to place her in a cold sitz bath to stop the bleeding. He notes, "The water covered from near the knees over the whole abdomen, and no sooner had these parts come in contact with the water, than it seemed, as if by magic, the flooding ceased." (Shew, 1851, vol. IV, p.247) Chilled by the cold bath, Mrs Shew was placed in bed, and her feet and chilled parts were rubbed until warm while falling asleep.

When the after-pains began, Mrs Shew was again placed in a cold sitz tub and friction to the abdomen helped to alleviate them. Twenty-six hours after the birth of their child, Mrs Shew was up and about. Three days later, the Shews had moved into a new home with 3 flights of stairs, with Mrs Shew completely overseeing the move. She continued with the daily cold baths and was eating a plain diet twice a day.

Dr Nichols, another Hydrotherapist and a woman who attended childbirths, used vaginal douches after the childbirth, using cold water. She writes,

> *This causes the uterus to contract immediately, and saves the patient from after-pains, which are caused by the efforts of the uterus to contract, and assume its normal state. … I then wash the patient with a sponge in cold water, and put a long, cold wet bandage closely around the abdomen. She then is dressed, goes into a clean bed and generally sleeps five or six hours. When she wakes, she goes into a cold sitz bath for 15 minutes and is sponged over the whole [body]; a fresh wet bandage is then applied, and she is allowed to sit up for a short time as she wishes. (Nichols, 1856, p.310)*

Nichols also reports that this treatment of a sitz bath, cold wet bandage around the abdomen, and a vaginal douche continued for a month. Women who followed this regimen were able to resume their previous life habits within a week of their labor.

When Dr Shew conversed with a medical colleague of his wife and his patients' births, that colleague indicated that "he could not conceive it possible for a woman to get up and go about safely, in 24 or even 48 hours after childbirth." (Shew, 1851, vol. VI, p.250)

Mastitis

A common complaint after delivery is mastitis. Dr Joel Shew advised his patients prior to delivery to apply wet bandages to the breast using cloths at temperatures that felt comfortable, and to use them as frequently and as necessary to keep any inflammation from advancing. Shew "always and in every case directed these bandages to be applied immediately after labor, whether there is any undue inflammation or not." (Pendleton, 1851, p.191) These wet bandages were covered with dry flannel to prevent evaporation. Another added benefit of these breast bandages was that they helped induce a healthy secretion of milk.

For cracked and painful nipples, "Dr. Shew recommends that wet bandages be worn frequently and especially at night." (Pendleton, 1851, p.192)

Conclusion

Hydrotherapy used to prepare and support women through the difficulties of childbirth had positive benefits for the women who often suffered under their allopathic providers. Drs Pendleton and Shew's impact upon the lives of women was a godsend at a time when childbirth was fraught with pain and, too often, death. Simple measures, such as cold water ablutions, cold hip baths, simple dietary recommendations, and walking for miles in the open air, allowed even dainty and compromised women to give birth to healthy babies safely.

In next month's issue, I will continue on the topic of pregnancy, examining further how pregnancy and its many-faceted symptoms were managed using hydrotherapy, from the archives of our beloved Priessnitz.

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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 assimilating every good thing in its path.

Even though there is very little that biomedicine could teach naturopathic medicine about prevention and holism, the recent attention in the allopathic sector to developing a more inter-professional and co-operative "integrative medicine" approach might, after all, be more about incorporating what is out here and chunking that back into their market share.

Roszak described beautifully this worrisome process of assimilation way back in 1968 in *The Making of a Counterculture.* That book's theme zeroed in on European and North American youth counterculture at the time. Roszak described how, as the larger society's response and strategy to such robust rejection of the mainstream culture, large corporations and political entities routinely appropriated and reframed the most persistent of the changes in play, removing competition and counterpoint. So it goes, alas, with the new lingo of "integrative medicine." The new words (eg, holistic, integrative, natural) are easy to mouth, but the gulf is nevertheless wide between what 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 cleft shows up as an important tension among medicine, the social sciences, and the humanities.

We keep hearing 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. Factor in 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 problematics 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 and less comfortable with where they are located on the wellness continuum. They know that rational medicine (some say, arising from Laennec's stethoscope and the emergence of the "objective physician" and accelerating quickly into an era of pathology 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 feature self-amplifying upward and downward mutual causation (emergentism), rather than upward causation 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 instrumentality of systematic heuristic, scientific inquiry. So, there 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 cure 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 "Centre for Medical Humanities" 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). This impressive 36-chapter collection is all about the field of so-called "medical humanities," dialing into ethics, education, experience, and empathy (better known as the 4 "e's" 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, given the momentum of this interest among healthcare professionals), the extent of chaos theory's relevance to medicine. 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 as persons." (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 lot" (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

beautiful. They remind me of so many dozens of such conversations which have been the norm in naturopathic education for as long as I have been a part of this community. Naturopathic doctors were savvy about social determinants in their practices long before that became part of the mainstream menu. In any case, topics abound where "medical humanists" gather: "mind, imagination, affect," "health, care, citizens," "the body and the senses."

Fostering Interdisciplinary Research

On the other side of the world, at the University of Hong Kong, in the Li Ka Shing Faculty of Medicine, the Centre for the Humanities and Medicine has been active for almost a decade in fostering interdisciplinary research and teaching focused on: "the challenges posed by the translation of biomedical technologies into society; the relationship among disease, health, culture and society; and the humanization of our understanding and practice of medicine." (Centre for the Humanities and Medicine) The Li Ka Shing Faculty of Medicine has exemplary practices in cross-listing humanities modules into the clinical curriculum (such as history, literature, philosophy, sociology, visual arts, religious studies, ethics, and law). The notion of "physician heal thyself" is sensitized into the work assignments and expected outcomes of the faculty, systematized in human resource practices and accountabilities, and underscores the importance of human and humane aspects of medical practice. (Centre for the Humanities and Medicine; Medical Humanities)

Meanwhile, back here in America, the Mayo Clinic, the Yale School of Medicine, UNC-Chapel Hill (where one can earn a degree in "literature, medicine and culture"), and many other mainstream, more conventional university and research and healthcare institutions are paying attention to this powerful equation in the preparation of medical professionals.

Some may contend that this new interest in the idea that medicine is an art too, and that the therapeutic value of the humanities in health and healing, are perhaps not so new. After all, Hippocrates taught us a few millennia ago that "wherever the art of medicine is loved, there is also a love of humanity."

The richness of the humanities (philosophy, literature, religion, art, music, history, language) is daunting, and even more overwhelming in prospect is the challenge of using the humanities therapeutically. Generally understood to be the study of how people process and document human experience, there is growing awareness that the humanities use methods that, although primarily critical or speculative, have a persistent personal and community historical dimension. This compares with the generally empirical approach of the natural sciences and the biology-based medical sciences. The key question of the humanities disciplines is: what does it mean to be human?

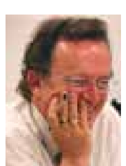
David Behling (2012) puts the continuum this way: "the windows on the human experience opened by the humanities reveal many different kinds of people and ways of thinking about life, the universe and everything. I think they teach us how to be humane — how to be good people — wherever we live and whatever we do."

No matter what corner of the abundant pathways, corners, and vistas of the humanities, Belinda Jack observes that whatever content or form in the humanities we gravitate toward as part of an overall healing strategy (say, reading great poetry, for example, whose succinctness and metaphorical power make for engagement), there are elements of the humanities which act like medicine in the end. (Jack, 2015)

It's not surprising, then, that the National Association for Poetry Therapy self-describes as "a community of healers and lovers of words." Depicting "poetry therapy" as a "holistic approach," the Association explains that poetry therapy "respects the various links of wellness, with its attentiveness to body, mind and spirit" (National Poetry Association)

In this regard, Jack writes:

> *Reading the poem we are no longer alone, rather we are in touch with the poet's humanity. And the space the loss has left has been filled – by the poem. The act of recognition of truth fills the space, in some small but fundamentally important way. Faced with some of life's most painful moments poetry can reassure us that we are not alone – others have suffered too. But a great poem also allows us to make sense of feelings that might otherwise be a searing amorphous mass somewhere deep inside us. Great poetry makes us understand the only half-understood; in that understanding comes relief, and it can feel very physical. This is art acting as a medicine.*
>
> (Jack, 2015)



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