

# The Bioenergetic Model in Osteopathic Diagnosis and Treatment: An FAAO Thesis, Part 1

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## Abstract

The classic five-model concept of patient functioning, assessment and care is central to current osteopathic principles and practice. These primary models are biomechanical-structural, respiratory-circulatory, neurological, metabolic-nutritional and behavioral-biopsychosocial.

A separate sixth osteopathic bioenergetic model exists that emphasizes the concepts of life force or inherent energy flow within the body, energetic communication with the environment, and tissue biophysical and bioelectrical properties. This model has been minimized in the past, but actually may provide the basis for all others.

Although other healing arts disciplines (e.g., acupuncture, Reiki) utilize the bioenergetic model quite rigorously, the osteopathic profession historically has been resistant to discuss, research or embrace bioenergetics as a plausible explanation for the efficacy of osteopathic manipulative treatment (OMT), or as a contributing etiology of somatic and visceral dysfunction and health and disease.

This thesis will review the classic five models and osteopathic bioenergetic model; explore bioenergetic properties of living systems in an attempt to offer explanations behind the palpatory experiences and therapeutic results of OMT; discuss two bioenergetically-based OMT techniques; explore an expanded osteopathic bioenergetic model and discuss why the bioenergetic model should be utilized regularly in patient diagnosis and care; and offer suggestions for osteopathic research into possible bioenergetic contributions to the causes and maintenance of somatic and visceral dysfunctions.

## Literature Review

### The Five Osteopathic Models

In the early 1980s, the Educational Council on Osteopathic Principles (ECOP) developed five conceptual models related to patient assessment,

functioning, and care:<sup>1,2</sup> biomechanical-structural, respiratory-circulatory, neurological, metabolic-nutritional and behavioral-biopsychosocial. These models are supported by principles of anatomy, physiology, biochemistry and psychiatry/psychology. Each model provides a lens through which the patient can be viewed, diagnosed and treated. These models are not typically utilized in isolation but have various degrees of overlap with the others.

The neuromusculoskeletal system is considered the core interface among the models that helps to integrate and coordinate basic body functions, while playing a primary role in a patient's ability to adapt to multiple stressors (e.g., trauma, infection, nutritional, social) and maintain health.<sup>1</sup> (See Figure 1)

The *biomechanical-structural model* views the patient primarily from a structural perspective. It emphasizes the anatomy of the muscles, spine and extremities and resultant functions of posture and motion. Osteopathic manipulative treatment (OMT) is directed toward normalizing biomechanical somatic dysfunctions (joints, myofascia), thus restoring normal structural integrity, physiological functioning, adaptive potential and homeostasis.<sup>1</sup> Osteopathic manipulative techniques commonly utilized to normalize biomechanics include high-velocity low amplitude thrusting, muscle energy, counterstrain, ligamentous articular strain, myofascial release,<sup>2</sup> facilitated positional release<sup>3</sup> and Still technique.<sup>4</sup>

The *respiratory-circulatory model* emphasizes normalization of a patient's pulmonary and cardiovascular functions, and the circulation of fluids (blood, lymph, cerebrospinal fluid).<sup>2</sup> Horizontal diaphragms (tentorium cerebelli, respiratory, pelvic), thoracic inlet, thoracic cage, extracellular matrix, lymphatics<sup>1</sup> and viscera<sup>5</sup> (heart, lungs, kidneys) are important anatomical structures addressed. Osteopathy in the cranial field, cervical, thoracic and rib mobilization, lymphatic drainage, respiratory diaphragm myofascial release, and visceral osteopathic manipulative techniques are helpful in restoring health

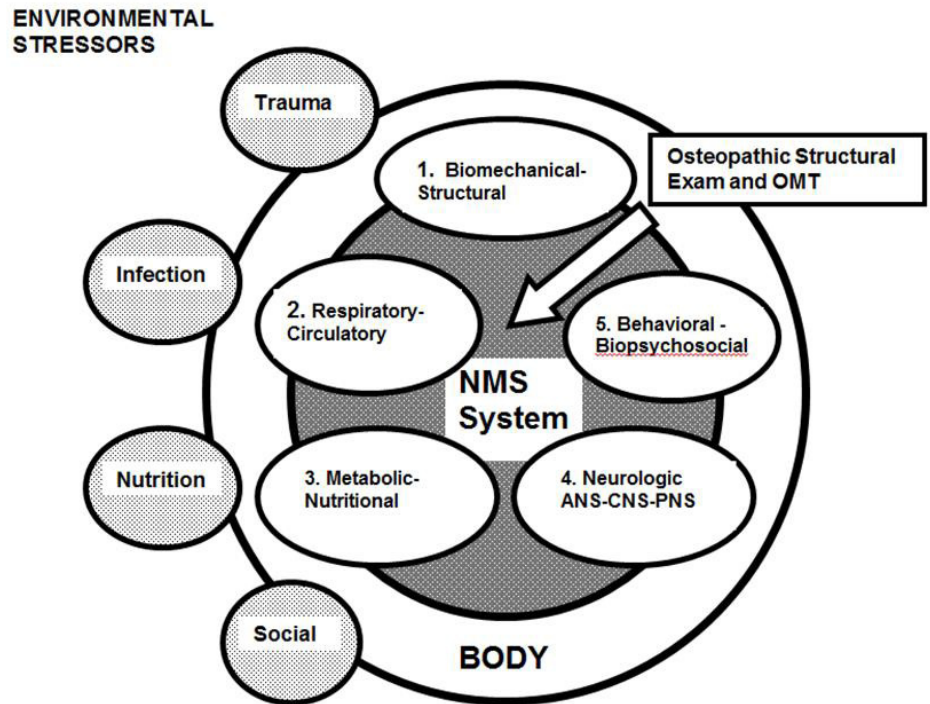
in combination with medications, surgery, intravenous fluids and even ventilation as appropriate.<sup>1</sup>

The *metabolic-nutritional model* encourages maximizing the efficiency of the patient's natural self-regulatory and self-healing mechanisms.<sup>1,2</sup> Homeostatic adaptive responses are orchestrated through positive and negative feedback systems to regulate various forms of energy exchange and conservation that occur through metabolic processes and organ functioning. The neuroendocrine-immune system and all internal organs are the focus. Lifestyle changes such as appropriate exercise, nutritional counseling and stress reduction are primary therapeutic modalities, as are appropriate use of medications. Osteopathic manipulative treatment includes lymphatic pump and visceral techniques.<sup>1,2</sup>

The *neurological model* addresses aberrations in the peripheral, autonomic and central nervous systems that may cause pain and dysfunction. These elements control, coordinate and integrate body functions.<sup>1</sup> Proprioceptive reflex and muscle strength imbalances,<sup>6</sup> spinal segmental facilitation,<sup>7,8</sup> nerve compression and entrapment disorders, autonomic reflexes and visceral dysfunctions,<sup>8</sup> nociceptive influences<sup>9</sup> and brain dysfunctions<sup>10</sup> are common problems. Manipulative treatment may include osteopathy in the cranial field,<sup>11</sup> Chapman reflexes, rib raising, counterstrain, muscle energy, neural release<sup>12</sup> and inhibition.<sup>9</sup> Exercise therapy, including proprioceptive balance training, stretching and strengthening,<sup>6</sup> as well as appropriate neurological evaluation, referral, surgery and medications may be appropriate in patient management.

The *behavioral-psycho-social model* addresses a patient's mental, emotional, social and, to some degree, spiritual dimensions in relationship to health and disease.<sup>1,2</sup> Mind-body interactions can have a huge influence on a patient's wellbeing and functioning in society. Depression, anxiety, stress, habits, addictions and numerous other conditions must be addressed appropriately, often in conjunction with medications, psychiatry or psychotherapies, stress reduction, meditation, and support groups. Osteopathic

**Figure 1.** Classic five models of physiological function coordinated and affected by the neuromusculoskeletal (NMS) system and adapting to external and internal environmental stressors. Osteopathic diagnosis and manipulative treatment is seen as a key modality to help restore homeostasis and facilitate health. (Adapted from *Foundations of Osteopathic Medicine*, 3rd edition<sup>1</sup>)



manipulative treatment also may be helpful in the form of somatoemotional release with guided imagery<sup>13</sup> and emotional release.<sup>14</sup>

### The Bioenergetic Model in Osteopathic Medicine

Healers in various cultures have utilized bioenergetic models of healing throughout the millennia. Oriental medicine, for example, which originated in China at least 5,000 years ago, describes the concept of qi (ch'i)—energy or life force. Qi is thought to maintain homeostasis and/or cause aberrations in health. In other words, abnormalities in qi (excesses, deficiencies or stagnation) are thought to be the root cause of illness.<sup>15</sup>

Throughout the history of the osteopathic profession, numerous manipulative techniques have been developed to treat a variety of patient ailments and assist in maintaining homeostasis. These techniques are primarily based upon biomechanical, neurophysiological or lymphatic/fluid models.<sup>1</sup> Not included in the five classic models above, and rarely discussed both in the medical literature and clinically, is the bioenergetic model. Bioenergetics is, perhaps, the all-encompassing model that underlies the classic five models, as well as life itself.

*Bioenergetics* is a unique field of research that falls under the category of biophysics, and is not emphasized, per se, as an important part of traditional biology or clinical medicine. It is the study of how endogenous and exogenous energy sources/forms influence and control living systems and their environment. Scientific study of bioenergetics of both plants and animals, including humans, has been prolific and ongoing for at least a century.<sup>16,17,18,19</sup>

Bioenergetic concepts actually have been a part of the language and practice of osteopathic medicine from the early beginnings. Andrew Taylor Still advertised and practiced as a magnetic healer prior to founding our profession.<sup>20,21</sup> In his book *The Philosophy and Mechanical Principles of Osteopathy*, he discussed the concept of “biogen”<sup>22</sup> as vital (energetic) force operating through protoplasm to produce living matter.<sup>23</sup> He acknowledged that electric and magnetic forces in the body are likely important in health.<sup>24</sup>

In 1902 J.M. Littlejohn, DO,<sup>25</sup> defined the *vital force* as a union of spirit and matter operating through its basic principle—the power of vibration. He noted that oscillatory rhythms exist in all living tissues in one form or another, and surmised that various levels of “vibratility” correlate with normal and abnormal functioning, i.e., health and disease. From his perspective, encouraging restoration of normal vibratory activity in the body was an important physiological principle behind osteopathic therapeutics.

In 1903 Hulett<sup>26</sup> presented a detailed osteopathic energy model. He conjectured, “a normal condition of health is dependent on a proper coordination of energies, and that disease represents a state of living matter such that incoordination results.”

Around this same time, W.G. Sutherland was just beginning his lifelong journey to develop the cranial concept, a model for osteopathic treatment in the cranial field. In order to explain rhythmic motions of the cranium, sacrum and other tissues that he was palpating, he eventually (1939) defined what he called the *primary respiratory mechanism* and *potency*.<sup>27</sup> The primary respiratory mechanism has five components, two of which may contribute the inherent driving forces behind the flexion-extension phases of movement. These are the inherent motility of the brain and spinal cord; and fluctuation of the cerebrospinal fluid.<sup>28</sup>

Magoun<sup>29</sup> stated that fluctuation of the cerebrospinal fluid exhibited two characteristics which affect the whole body: potency, an energetic force, acting through a hydrodynamic mechanism; and electrical potentials

acting in positive and negative phases. He suggested that electrical energy might be generated by the coiling and uncoiling of the neural tube. Additionally, he wrote, “In the cranial concept, human electrobiology is tremendously affected by its environment as it carries out a similar transmutation throughout the body.”

One of the greatest champions for the bioenergetic model was Robert Fulford, DO. Throughout much of his career, he relied on his understanding of bioenergy to explain his hands-on techniques and use of the percussion hammer.<sup>30,31,32</sup> He continually questioned and sought answers to the true nature and greater scope of healing and osteopathic principles. He had a wide-ranging interest in research and therapies related to the energetic life force, including polarity therapy.<sup>33</sup>

*Polarity therapy* is an energetically-based system of health, diagnosis and treatment founded upon Eastern traditions (yogic/Ayurvedic and Chinese medicine).<sup>34</sup> Developed by Randolph Stone, DO, DC, it addresses mind-body-spirit issues by therapeutically touching the body to (theoretically) affect electromagnetic wave and polarity imbalances.<sup>35,36</sup>

During the 1960s, Rollin Becker, DO, sought to define, explain and teach about various palpable energies that he experienced while treating patients with osteopathy in the cranial field. In a series of four articles (1964-65)<sup>37,38,39,40</sup> he described and discussed *bioenergy fields*, *biodynamic* and *biokinetic intrinsic energies* and *forces* and their relationships to potency, fulcrums, diagnostic and therapeutic touch, health, disease and trauma. *Biodynamic intrinsic forces/potencies* were defined as the “physiological energy found in the health within the patient.” *Biokinetic intrinsic forces/potencies* were defined as the “pathological-physiological energies... found in disease and traumatic states within the patient.”<sup>41</sup> In 1969, he abandoned these terms and concepts when he perceived they were not being appreciated and understood by colleagues.<sup>42</sup>

In 1987 Stephen M. Davidson, DO, developed an osteopathic diagnosis and treatment model which he called *neurofascial release*.<sup>43</sup> Based on a paradigm of standing waveforms and interference vibratory patterns in tissues, this technique can be applied to musculoskeletal, visceral, cranial and even emotional dysfunctions. Neurofascial release will be discussed in more detail later in this paper.

A similar model of abnormal interference tissue wave patterns is thought to explain the “energy cyst” concept originating with Elmer Green, PhD, and described by MacDonald<sup>44</sup> and Upledger.<sup>45</sup> *Energy cysts* are defined as energetically encapsulated areas of the body which

contain increased energy entropy or disorganization within the cysts. Theoretically, these result from physical, mental, emotional or spiritual trauma, and are similar to the concept of stagnant or blocked qi in the acupuncture meridian system. They can be detected by a number of methods and treated by myofascial unwinding of the cyst area with subsequent mobilization of related facilitated spinal segments and the dural tube.<sup>44</sup>

In the late 1980s and early 1990s, Carlisle Holland, DO, pondered the human body from a biophysics standpoint. With a unique educational background in aerospace engineering, molecular biology and osteopathic medicine, he began discussing the colloidal nature of tissues and their propensity to move between solid or gel states. Sol-gel interconversion in colloids occurs when certain energetic or physical stresses are applied. Thus, changes in viscoelastic and viscoplastic properties of the dura (and tissues in general) occur as a result of trauma/dysfunction, and can normalize by appropriate treatment with osteopathy in the cranial field and other techniques.<sup>46</sup> Holland went on to expand these concepts with dynamical systems theory, chaos theory, and fractal principles.<sup>47</sup> His contribution to the osteopathic bioenergetics model also will be discussed subsequently.

Also during the 1990s, O'Connell researched and applied bioenergetics and biophysics principles to the treatment of fascia.<sup>48</sup> She developed the bioelectric fascial activation energy and holographic models for an osteopathic manipulative technique she termed *bioelectric fascial activation and release* (BFAR).<sup>49</sup> This bioenergetic paradigm supports homeostasis through the synthesis of fascial bioresponsive electrical potentials, continuity and interface with the ECF, compensatory pattern and environmental communication. Treatment is accomplished through holographic palpation and energetic fascial activation.<sup>48</sup>

Over the past decade or so, the interest in bioenergetics in osteopathic medicine appears to have increased. In 2003 Comeaux described a method of diagnosis and treatment he termed *facilitated oscillatory release* (FOR).<sup>50</sup> The theoretical basis of which is the mechanical facilitation of coherent vibrations in the tissues resulting in normalization of function. He characterizes the technique as a merger of principles from Fulford's percussor model, fascial release and muscle energy.<sup>50</sup>

Other physicians also providing more recent insight and experience to the bioenergetic model include Lee (Spirit/extracellular matrix biophysics),<sup>51,52</sup> Chikly (trauma vector release),<sup>10</sup> and Hendryx<sup>53</sup> and O'Brien

(dynamic strain-vector release).<sup>54</sup> The contributions of these authors will be discussed in more detail later.

In 1939 C.P. McConnell, DO, wrote, "keep in mind that osteopathic pathogenesis is pre-eminently (essentially fundamental) a field of beginning pathology firmly grounded on biophysics. Herein arises the soundness and comprehensiveness of osteopathic science."<sup>55</sup>

### **Energy Medicine and the Scientific Basis of the Bioenergetic Model**

*Energy* is defined scientifically as the ability to do work.<sup>56</sup> The first law of thermodynamics maintains that energy can be neither created nor destroyed. It can only be converted to other forms of energy.<sup>57</sup>

Some familiar forms of energy include kinetic (motion), potential (stored), chemical, electromagnetic, heat, elastic, gravity and sound. Any form of energy can be absorbed by and affect living systems. Living systems also produce energy and interact with each other and the environment through energy exchange.<sup>58</sup>

*Energy medicine* can be defined simply as the use of energetic principles and phenomena to diagnose and treat patients. Oschman has made the argument, "all medicine is energy medicine and that the energetic perspective holds the key to the future of the entire medical enterprise."<sup>59</sup> He has thoroughly reviewed the historical background, measurements, biophysics and therapeutic uses of energetic phenomena in medicine (including osteopathic) and human performance.<sup>58,60</sup> Holland,<sup>47</sup> Lee,<sup>16,52</sup> O'Connell,<sup>61</sup> Comeaux,<sup>30,50</sup> Davidson,<sup>43</sup> Hendryx and O'Brien<sup>54</sup> and Handoll<sup>62</sup> have expanded and integrated these concepts to explain palpatory findings of inherent body motions, somatic dysfunction and manipulative therapeutics in the osteopathic healing model.

Biophysics and bioenergetic principles are utilized every day in medicine for diagnosis and treatment. Diagnostic instrumentation that employ energetic measurements include X-rays, computerized tomography (CT), magnetic resonance imaging (MRI), positron emission tomography (PET), electrocardiography (ECG), electroencephalography (EEG), electromyography (EMG), evoked potentials, infrared thermographic imaging, magnetoencephalography (MEG), magnetocardiography (MCG), ultrasound (US), superconducting quantum interference device (SQUID) magnetometry (biomagnetometry), pulse oximetry and skin surface potential measuring devices.

"Conventional" treatment modalities that utilize various forms of energy include ultrasound, electrical stimulation, electric/magnetic bone stimulation,

diathermy, X-irradiation, gamma-irradiation, light therapy (full spectrum, ultraviolet, laser, infrared), electrocautery, pacemaker, defibrillator, neurofeedback and music therapy. Osteopathic manipulative treatments of various types utilize mechanical energy, at the least.

The National Center for Complementary and Alternative Medicine (NCCAM/NIH) has designated and is supporting research into eight categories of complementary and alternative medicine:<sup>63</sup>

1. Alternative systems
2. Botanicals/herbal medicines
3. Biofield therapies (energy medicine/bioelectromagnetics)
4. Manipulative/manual/therapeutic bodywork
5. Movement therapies
6. Mind-body interactions
7. Pharmacologic/biologic
8. Diet/nutrition/lifestyle changes

Categories three and four obviously apply to the central theme of this thesis. At this point, it is important to define various terms related to the bioenergetic model as these terms do not appear in conventional osteopathic resource literature.

Beverly Rubik, PhD, has defined the *biofield* as “the complex, extremely weak electromagnetic field of the organism hypothesized to involve electromagnetic bioinformation for regulating homeodynamics.”<sup>64</sup> The

biofield has been measured by a number of devices<sup>58</sup> and is concentrated within and immediately surrounds the physical body, although its boundaries are limitless. All cells, organs, organ systems and the extracellular matrix contribute energy to the biofield, with the heart and brain producing the two largest effects, respectively.<sup>58,60</sup> *Biofield therapy* can be defined as any therapeutic modality which interacts and changes the biofield and its manifestations.<sup>64</sup>

*Bioenergy* is energy produced endogenously by living systems.<sup>58,60</sup> The nature and sources of bioenergy are known in some instances, unknown in others. Much of it appears to manifest in the electromagnetic spectrum from extra low frequency fields (ELF) (<100 Hz) through 10<sup>15</sup> Hz (visible light).<sup>58</sup> Bioenergy is created and transmitted by a number of bioelectromagnetic and physiological activities inside living tissues and cells. Sources of bioenergy include biochemical reactions, ion influx/efflux through membranes (gating mechanisms), piezoelectric phenomena, mechanotransduction, electrical conduction through the neuromusculoskeletal system, blood circulation and electromechanical activity of the heart.<sup>58,60</sup> Some unknown sources and types of bioenergy have to do with inherent motion of the craniosacral system (cranial rhythmic impulse) and primary respiratory mechanism, acupuncture meridian systems, qi, healing biofields, and subtle energy.<sup>60,65</sup> Biofield energies may be directed and controlled through consciousness and intention.<sup>60,66</sup>

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*Bioelectromagnetics* is the study of the interaction between electromagnetic fields and biological living systems. *Bioelectromagnetism* describes the inherent ability of living cells, tissues and organisms to produce and emit electrical and magnetic fields, and the response of cells to electromagnetic fields.<sup>60</sup>

Oschman considers the human body to be a tissue-tensegrity piezoelectric matrix or liquid crystal under tension.<sup>60</sup> From a biophysics standpoint, this characteristic allows the body to react to and create various frequencies and fields of energy. The human body also creates other forms of energy including heat, sonic, photic (light/photons), chemical and mechanical.<sup>60</sup>

### The Bioenergetic Nature of Somatic Dysfunction

To an osteopathic physician, thorough evaluation of the neuromusculoskeletal system is key in accurately diagnosing and appropriately treating a patient. Intelligent palpation of changes in the position, motion, texture, tension and temperature of tissues gives important clues as to the status of a patient and response to treatment. Abnormal tissue texture changes, asymmetry and restriction of motion, and tenderness (i.e., T.A.R.T.) are the hallmarks of somatic dysfunction. *Somatic dysfunction* is classically defined as “impaired or altered function of related components of the somatic (body framework) system; skeletal, arthrodiagonal and myofascial structures, and the related vascular, lymphatic and neural elements.”<sup>67</sup> Commonly considered underlying etiologies of somatic dysfunction include poor body mechanics and posture, muscle imbalances, abnormal neurological reflexes, facilitation, emotional stressors, compensation from other areas of body or visceral dysfunctions, leg length discrepancies, localized strains and sprains, response to trauma and pain and others.<sup>68</sup> Abnormal tissue texture changes palpated in tissues are generally assumed to be maintained by various reflexes in the neuromusculoskeletal system and also by biotensegrity abnormalities.<sup>68,69</sup>

Because of the energetic nature of living systems, several important questions arise. Can energetic dysfunctions in the body or biofield cause or contribute to somatic dysfunction and other health issues? If so, how might these manifest? Can bioenergetic osteopathic manipulative techniques be utilized to actually treat somatic, visceral or psychological dysfunctions? What are the energetic mechanisms behind these techniques?

Energetic phenomena in the body that can be palpated and used in treatment of somatic or visceral

dysfunctions and psychosomatic conditions have been previously described and reviewed in depth.<sup>54</sup> These include palpation of inherent motions (nervous system, cranial rhythmic impulse/primary respiratory mechanism, visceral, myofascial), still points, therapeutic pulses, thermal projections, vibratory fields, biodynamic and biokinetic energy fields, “energy cysts,” “listening,” fascial interference patterns, pathological strain-vectors<sup>54</sup> and head trauma vectors.<sup>10</sup> Osteopathic manipulative techniques that employ primarily a bioenergetic model in treatment include, but are not limited to, Fulford percussor treatment,<sup>32</sup> myofascial release,<sup>61</sup> bioelectric fascial activation and release,<sup>49</sup> neurofascial release,<sup>43</sup> dynamic strain-vector release,<sup>54</sup> lymphofascial release<sup>70</sup> and head trauma vector release.<sup>10</sup>

Holland<sup>71</sup> makes a compelling argument for a biophysics and mathematically based system of integrative medicine which he terms “Dynamical Medicine.” Dynamical medicine follows a mathematical model and is named for its origin in dynamical systems theory, a branch of science concerned with chaos and fractals. Dynamical systems theory applies to all living systems in all dimensions and describes biological shapes and processes mathematically.

Physiological functioning in a dynamic living system is complex, and various parameters (blood pressure, blood chemistries and cell counts, heart and respiratory rates, body temperature, etc.), tend to hover within certain “normal ranges,” but never remain fixed. The domains of fluctuating parameter values were given the name of “strange attractors” by Lorenz.<sup>71</sup>

Through the lens of dynamical medicine, the human being is seen as an energetic vibrating system exhibiting fractal geometry in all dimensions. *Fractals* are mathematical processes that exhibit repeating patterns (waveforms) and occur in all of nature.<sup>71,72</sup> In humans, fractals may be seen in the branching patterns of nerves, blood vessels, lymphatics, fascia, muscles, ligaments, bones and in the tissue organization of all organs in the body. In normal tissue, energy flows unhindered through the fractal system, and normal function ensues (i.e., strange attraction). In dysfunctional systems, energy flow through fractals is blocked. Blockage occurs at what is known as a “catastrophic bifurcation” of the fractal where the waveform collapses.<sup>71</sup>

The point where this catastrophic bifurcation emerges is mathematically known as a “point attractor.” Point attractors may be “trivial” or “non-trivial.” Trivial point attractors are reversible in their stressor effects on a system. The living system can revert back to normal

functioning with full fractal expression once the trivial point attractor is removed.<sup>71</sup> Holland has described somatic dysfunction as a “matted fractal” where the energy flow is interrupted.<sup>47</sup> Thus, reversible somatic dysfunction is an example of a trivial point attractor in the dynamical medicine model.<sup>71</sup>

Non-trivial point attractors result in irreversible changes in the system. These produce permanent blocks in the energy flow and communication in the system and, if severe enough, will cause total collapse of the energy flow and fractal geometry of the system and death. Examples might include a cerebrovascular accident, fatal cardiac arrhythmia, liver or kidney failure.<sup>71</sup>

Sol-gel interconversions have been postulated to underlie palpatory findings of abnormal tissue texture changes associated with somatic dysfunction.<sup>54,73,74</sup> Holland emphasizes that all tissues, including the myofascia and extracellular matrix, are colloidal (a non-precipitating suspension) in nature and, as such, must follow colloidal physics principles.<sup>71</sup> Colloids have physical properties of both liquids (sol) and solids (gel), and are able to absorb and store energy through their intermolecular bonds. Physical energy in the form of trauma and even electromagnetic energy and fields (i.e., point attractors) can cause sol-gel interconversions.<sup>54</sup>

*Part two of Dr. Hendryx’s thesis will appear in the next issue of the American Academy of Osteopathy Journal.*

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