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## Complexity and Chiropractic: A scientific rationale for a Holistic Approach

Over the last two decades, the study of complex systems using models of real world phenomena running in the virtual world of the microchip have begun to uncover deep insights and possibly new laws underpinning many phenomena once thought of as too complex to investigate. The aim of this paper, by Dave Newell PhD, a lecturer at McTimoney Chiropractic College in the UK, was to outline the major developments in this area in an attempt to initiate some debate as to the applicability of this paradigm to chiropractic health care in particular and the much maligned and misused term, 'holistic health care' in general.

The author discusses how phenomena, including the weather, the stock market, flocking and shoaling behavior, traffic flow in cities, food webs, ant colonies, and human culture all display behavior that cannot be reduced to the elements of which the system is made.

What matters in these systems are the ways they are connected. As a result, concepts in complexity research have strong implications for positivist science, that is the view of science that assumes some measurable causative base for phenomena at the smallest level of the system. The author contends that, "...in cases where a system reaches a certain level of complexity, trying to reduce the behavior of the system to the characteristics of its individual parts is plainly futile."

After discussing the concepts of 'emergence', 'connectivity', and 'behavioral landscapes', the author proceeds by examining the applicability of these concepts to the human spine. The paper draws to a close with an exploration of the consequences of viewing the human spine as a network that adapts on a spinal behavioral landscape and the possible role of interventions such as manipulation within this model.

The author concludes, "The human spine as a system is highly connected and may fall within the descriptions of complex systems and display the universal behavior of known complex systems. Given this possibility, the paradigm articulated by complexity theory and its approach and language may be appropriate in describing both some characteristics in health and disease and interventions such as chiropractic in the treatment of spinal dysfunction."

Reference:

Newell D. Concepts in the study of complexity and their possible relation to chiropractic health care: a scientific rationale for a holistic approach. Clin Chiropr 2003;6:15-33.

## Somatosympathetic Reflexes from the Low Back in the Anesthetized Cat.

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In the appendicular skeleton substantial evidence demonstrates that somatosensory input from deep tissues including limb muscles and joints elicits somatosympathetic reflexes. Much less is known about the presence and organization of these reflexes from the axial skeleton.

The authors of this study attempted to determine if mechanical loading of the lumbar spine and lumbar paraspinal muscle irritation reflexively affects post-ganglionic sympathetic nerve discharge (SND) to the spleen and kidney.

In 27 alpha-chloralose-anesthetized cats the L2-4 multifidus muscles were injected with the inflammatory irritant mustard oil and a vertebral load (100% body weight) was applied dorsal-ventral at the level of the L3 spinous process.

Mustard oil injection alone without vertebral loading (n=7) increased mean splenic SND (60%), renal SND (30%), and heart rate (52 bpm). Mustard oil injection accompanied by the vertebral load (n=7) increased mean splenic SND (55%), renal SND (16%) and HR (27 bpm).

Blood pressure changes were biphasic and could not account for these changes.

When the vertebral load accompanied mustard oil the increases in splenic SND, renal SND, and heart rate remained elevated in a pattern significantly different from when the vertebral load was absent. Vehicle injection combined with the mechanical load (n=3) did not change any of the autonomic responses. Similarly mustard oil injection combined with a mechanical load did not change these responses when either the medial branches of the dorsal rami from T11 to L5 had been cut (n=4) nor when the spinal cord had been transected between the 2(nd) and 3(rd) cervical vertebrae (n=6).

The authors conclude that,

“The results indicate that inflammatory stimulation of multifidus muscle in the low back evokes a somatosympathetic reflex integrated supraspinally in the upper cervical spinal cord or higher. The reflex's afferent arm travels in the medial branch of the dorsal ramus

and its efferent arm can affect sympathetic outflow to the spleen and the kidney as well as HR and BP. A static mechanical load applied to the lumbar spine accompanying the inflammatory stimulus appears to sustain the inflammatory-induced reflex activity."

## Reference:

Kang YM, Kenney MJ, Spratt KF, Pickar JG. J Neurophysiol. 2003 Jun 11 [Epub ahead of print].

### Does chiropractic manipulation cause internal carotid artery dissection?

The objective of this review article was to determine the relationship between chiropractic manipulative therapy (CMT) and internal carotid artery dissection (ICAD). The authors performed a MEDLINE literature search (1966-2000) using the key terms internal carotid dissection. Literature that included information concerning causation of ICAD, as well as all case studies and series, was selected for review.

In reviewing the cases of internal carotid dissection seemingly related to CMT, the authors found many confounding factors, such as connective tissue aberrations, underlying arteriopathy, or coexistent infection, that potentially that they concede might obscure a cause-and-effect relationship.

They report that,

"To date there are only 13 reported cases of ICAD temporally related to CMT. Most ICADs seem to occur spontaneously and progress from local symptoms.....to cortical ischemic signs,"

and that,

"approximately one third of the reported cases were manipulated by practitioners other than chiropractors."

The authors conclude,

"The medical literature does not support a clear causal relationship between CMT and ICAD. Reported cases are exceedingly scarce, and none support clear cause and effect."

## Reference:

Haneline MT, Croft AC, Frishberg BM. Association of internal carotid artery dissection and chiropractic manipulation. *The Neurologist* 2003;9:35-44.

## Normal Pediatric Spinal Development

The ancient axiom within pediatrics is that "kids are not simply small adults."

The author of this paper, Randy J. Ference DC MD, contends that nowhere is that axiom truer than in the pediatric cervical spine where it's not until 8 years of age that the configuration begins to approach that of the adult.

The author makes the following important points:

- Atlas - Has 3 ossification centers  
The anterior ring remains unossified until 1 year of age  
The body of the atlas fuses with lateral masses by age 7 years  
Posterior arch is typically closed by age 3
- Axis - Has 4 ossification centers  
The dens fuses with the body of C2 by age 12
- C3-7 - Each has 3 ossification centers  
Posterior ring fuses by age 3 years  
Vertebral bodies fully ossify by 7-8 years
- The cervical facet joints are much more horizontal in infants than in adults.
- The ligaments are much more lax in infants than in adults.

# Focus on Research



## Reference:

Ferrance RJ. Normal and abnormal spinal development and the role of chiropractic management. Conference proceedings WFC's 7<sup>th</sup> Biennial Congress, Orlando, Florida, USA, May 1-3, 2003.

## A recent quote from the World Health Organization -

"Until recently the health professions have largely followed a medical model, which seeks to treat patients by focusing on medicines and surgery, and gives less importance to beliefs and to faith -- in healing, in the physician and in the doctor-patient relationship. **This reductionist or mechanistic view of patients is no longer satisfactory.** Patients and physicians have begun to realise the value of elements such as faith, hope, and compassion in the healing process."

## Is There a Scientific Basis for Vitalism?

Professor David Peters MB ChB DRCOG DMSMed MFHom FRCOM  
University of Westminster London, UK.

One of the medical doctors who presented at the recent WFC biennial congress in Florida this year was Professor David Peters. Professor Peters was asked to give a presentation in which he explores the possibility of a scientific basis for vitalism. The following are some of his comments made during that presentation.

“Many of us are scientists, and in the four centuries since its birth Science has undoubtedly failed to comprehend vital energy. Yet reports of vitalism’s death have been premature. Why do I say this? Mainly because the language of vitalism has become such a popular way of speaking about human experience: there is much talk about energy, vitality, and well-being. And of late those of us working to integrate non-conventional clinical approaches into the mainstream have found ourselves pushing on an open door.”

Professor Peters suggests that in order to maintain the integrated form and function of the body-mind, four aspects of self-regulation must work in harmony -

- Psychological homeostasis
- Biochemical homeostasis
- Structural homeostasis
- Whole organism homeostasis

(Note; Professor Peters suggests that whole organism homeostasis emerges out of the other 3).

He goes on to state,

“Several intelligent networks - neurological, endocrine and immune systems - must work as one seamless network to integrate the body’s self-regulation processes.”

Furthermore, the author proceeds by discussing the recent realization by scientists that living cells have the ability to sense mechanical signals and transduce them into biochemical messages -

“Lately the work of Donald Ingber now Professor of Pathology at Harvard, Boston Childrens Hospital has revealed that the cytoskeleton senses and transmits mechanical forces, and changes in the balance of intracellular forces influence cytoplasmic biochemistry and gene expression in the nucleus. Ingber maintains that the balance of mechanical forces in the cytoplasm is at least as important as biochemical signals in conveying critical regulatory information, for he has shown that living cells are literally hard-wired to filter the same set of chemical inputs to produce different functional outputs. These processes are largely controlled mechanically, through physical distortion of

# Focus on Research



trans-membrane adhesion receptors on the cell surface that preferentially transmit stresses to the internal cytoskeleton.”

Professor Peters goes on to discuss the work of a British biophysicist, named Mae-Wan Ho, who has carried out research suggesting that connective tissue can take on liquid crystalline properties. The implications of which include connective tissue being able to act as a noiseless excitable medium whose qualities let the structural continuum channel photons instantaneously.

Peters concludes,

What we can now see coming together are elements for a scientific model of the organism as a living matrix integrated and shaped by an incalculable traffic of regulatory information encoded in many different ways, some slow some extremely fast. Such a flow of organizing information resembles what the vitalists imagined as vital energy, except rather than involving a single, distinct and subtle life force, this information is modulated by the forces that science knows about:

# Focus on Research



- The organism's electromagnetic flux
- It's clouds of neuro-receptor traffic
- It's rhythmic impulses of sound, heat, gravity, elasticity and pressure.

Science is now in a position to explore how such a flow of vibrant information might b in this living matrix.

During the course of his presentation Professor Peters stated,

“Science now offers new ways of imagining how life flows through us and between us. In the light of these ideas the notion of innate intelligence appears to have been ahead of its time.”

Reference:

Peters D. Is there a scientific basis for vitalism? Conference proceedings WFC's 7<sup>th</sup> Biennial Congress, Orlando, Florida, USA, May 1-3, 2003.

## CVA Risks in Perspective

The following is a table reproduced, with the authors permission, from a presentation made by Anthony Rosner PhD, at the May 2003 ECU conference in Heidelberg, Germany.

### RISKS IN PERSPECTIVE: COMPARISON OF DEATH RATES ATTRIBUTED TO VARIOUS CAUSES

<u>RISK</u>	<u>FREQUENCY [PER MILLION]</u>
Neuro complications d/t Cervical Manipulation	0.3
Spinal Surgery	700
Total Hip Replacement	4900-15300
Appendectomies	13500
Nuclear Bone Scan	333

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Venipuncture	40
GI Bleeding d/t NSAID use	400
Smoking 20 cigarettes/day	5000
Drinking: 1 bottle of wine/day	75
Canoeing	10
Motorcycling	20000
Car driving (UK)	169
Soccer, football	39

In relation to the data in the above table, Rosner states,

“The risk estimates attributed to cervical manipulation are significantly less [by orders of magnitude] than those associated with various medical procedures and lifestyle activities.”

## Content validity of manual spinal palpatory exams - A systematic review

### Background

Many health care professionals use spinal palpatory exams as a primary and well-accepted part of the evaluation of spinal pathology. However, few studies have explored the validity of spinal palpatory exams. To evaluate the status of the current scientific evidence, the present authors conducted a systematic review to assess the content validity of spinal palpatory tests used to identify spinal neuro-musculoskeletal dysfunction.

# Focus on Research



## Methods

The authors undertook a review of eleven databases and a hand search of peer-reviewed literature published between 1965 and 2002. Two blinded reviewers abstracted pertinent data from the retrieved papers, using a specially developed quality-scoring instrument. Five papers met the inclusion/exclusion criteria.

## Results

Three of the five papers included in the review explored the content validity of motion tests. Two of these papers focused on identifying the level of fixation (decreased mobility) and one focused on range of motion. All three studies used a mechanical model as a reference standard. Two of the five papers included in the review explored the validity of pain assessment using the visual analogue scale or the subjects' own report as reference standards. Overall the sensitivity of studies looking at range of motion tests and pain varied greatly. Poor sensitivity was reported for range of motion studies regardless of the examiner's experience. A slightly better sensitivity (82%) was reported in one study that examined cervical pain.

## Conclusions

The lack of acceptable reference standards may have contributed to the weak sensitivity findings. Given the importance of spinal palpatory tests as part of the spinal evaluation and treatment plan, effort is required by all involved disciplines to create well-designed and implemented studies in this area.

## Reference:

Najm WI, Seffinger MA, Mishra SI, Dickerson VM, Adams A, Reinsch S, et al. BMC Complementary and Alternative Medicine 2003;3:1

## Use of complementary and alternative medicine among the ethnic elderly.

The objective of this survey, from researchers at the Department of Family Medicine, University of California, USA, was to explore whether the elderly are high users of complementary and alternative medicine (CAM), and to determine which modalities they use.

A population of 525 community-residing elderly completed personal interviews.

Two hundred and fifty-one respondents (47.8%) reported using CAM over the past year. Dietary supplements (47.4%), **chiropractic (16.3%)**, home remedies (15.9%), acupuncture (15.1%), and Oriental medicine (12.8%), were the most frequently used.

# Focus on Research



The majority of CAM users (62.4%) did not inform their physicians that they were using it, but 58% consulted their physician for the same problem for which they used CAM.

Family and friends were most relied upon for making the choice of therapy.

Among the 3 ethnic groups studied, Asians were higher users of acupuncture (28%) and Oriental medicine (31%), while white non-Hispanics were higher users of chiropractic (42%), massage (20%), vitamins (20%), diet (17%), and psychospiritual (15%) modalities.

Pain was a higher indicator of CAM use among Asians, gastrointestinal problems and diabetes among Hispanics, and stress/fatigue and cardiovascular problems among white non-Hispanics.

The authors conclude,

**“Findings indicated a high use of CAM among the elderly and emphasize the likelihood that elderly immigrants use those therapies with which they are familiar.”**

Reference:

Najm W, Reinsch S, Hoehler F, Tobis J. Use of complementary and alternative medicine among the ethnic elderly. *Altern Ther Health Med.* 2003;9:50-7.

## Efficacy of cervical endplay assessment as an indicator for spinal manipulation.

The objective of this double-blind, randomized, placebo-controlled trial was to evaluate the effect of manual endplay assessment on neck pain and stiffness outcomes in neck pain patients receiving spinal manipulation.

# Focus on Research



The authors contend that, to date, there have been no studies on the efficacy of palpation used as an indicator for manipulation in the management of back and neck pain.

Neck pain patients (n = 104) were randomly assigned to one of two groups.

The study group received manipulation targeted to individual cervical vertebrae according to endplay restriction noted by the examining clinician. The control group received manipulation determined by sham, computer-generated examination findings.

Treatment was rendered on a single occasion by a chiropractor. Outcomes were neck pain and stiffness assessed before and after manipulation and at least 5 hours following treatment.

The study and control groups showed clinically important improvement in neck pain and stiffness. **However, there were no clinically important or statistically significant differences between the study and control groups in terms of pain or stiffness outcomes.** Findings were robust across patient, complaint, and treatment characteristics.

The authors conclude,

**“Endplay assessment in and of itself did not contribute to the same-day pain and stiffness relief observed in neck pain patients receiving spinal manipulation. The data suggest that pain modulation may not be limited to mechanisms associated with manipulation of putative motion restrictions.”**

The impact of a longer course of treatment and longer/broader outcome assessment remains to be investigated.

## Reference:

Haas M, Group E, Panzer D, Partna L, Lumsden S, Aickin M. Efficacy of cervical endplay assessment as an indicator for spinal manipulation. *Spine* 2003;28:1091-6.

# Focus on Research



## The Intelligent Body

Conventional medicine regards the body as a machine, like a jumbo jet or a computer. It assumes that the body becomes diseased in much the same way a machine breaks down—when a specific part goes wrong.

CAM has a very different philosophy: the idea that the healthy body is a system in balance, and that disease can be created by a fault that is distributed over the whole body. Because this idea is so obviously at odds with convention, CAM has always appeared unscientific.

However, Michael E. Hyland, a Professor of Health Psychology at the University of Plymouth suggests that CAM's might not be as unscientific as they first appear if we think of the body as a series of networks. Networks are systems that can do lots of things simultaneously, and the brain is one. Many of the intelligent features of the brain, such as perception, learning and problem solving, can be explained as emergent properties of the network. Other parts of the body, such as our hormones and immune system, are also networks.

Professor Hyland recently published a brief synopsis of his ideas in the journal *New Scientist*.

Professor Hyland states,

“Network pathologies arise when the body self-organises in response to some disturbance, but becomes confused and ends up worse at self-regulation than before. Some diseases, such as irritable bowel syndrome and chronic fatigue syndrome, are not associated with any consistent, measurable physiological abnormality. They are primarily network pathologies. There is clearly a failure of self-regulation.....”

Furthermore, the author observes that,

“Many chronic diseases, including asthma, have proved hard to treat with conventional drugs.....The drugs merely suppress the disease symptoms. On the other hand, treatment by a CAM practitioner can—for whatever reason—create much longer-term changes.....CAM treatments don't "make" a cure. Instead they disturb the system, giving it the opportunity to settle down in a new position. Where it settles down depends on other contextual factors inputting to the network.”

The author goes on to suggest that,

“Rather than distinguishing CAM from conventional medicine, it may be more helpful to distinguish between robust treatments that treat specific pathology and subtle treatments that treat network pathology. Robust treatments correct the broken parts of the machine. Subtle treatments teach the intelligent body, or at least help it to relearn so that it self-regulates more effectively. On the whole, CAM treatments are the subtle ones that nudge the body back into balance. Both types of treatment are needed.”

# Focus on Research



The author concludes,

“...we need to know more about interactions between different inputs, such as psychosocial and nutritional influences, lifestyle and genetics. In the main, research in conventional medicine does not look for these interactions. Just as physicists needed a new mindset to test quantum theory a century ago, so medical researchers may need to think again if the study of CAM is to develop as a true science.”

Reference:

Hyland ME. The intelligent body. New Scientist 2001;170:32.