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Letters to the Editor

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Network Spinal Analysis

Dear Editor:

There has been much debate about the objective basis of Network Spinal Analysis (NSA) and Network Spinal Analysis Care.[1–4] I and a number of my colleagues set out to study this. Our work during the last 10 years[5–10] has revealed some significant objective, repeatable, reliable, and measurable changes, which are the subject of a full paper being submitted for publication.* We believe that these findings have far-reaching implications for the future of health care development and for the development of Network Spinal Analysis Care as a discipline. For this reason, we believe it is important to alert the therapeutic and scientific community to our findings in this letter.

Our approach to Network Spinal Analysis has been to take an austere scientific and falsifiable view of the phenomena which arise in Network Spinal Analysis Care and in particular the emergence of the "NSA traveling and standing waves."[6,9,*] We sought, therefore, to measure and analyze surface electromyographic (sEMG) signals recorded during the NSA procedure. Over the past 10 years, we have taken the stand that sEMG signals recorded on the paraspinal muscles during the procedure provide a "window" through which we can view the central nervous system (CNS). The protocol—duly approved by the institutional review board of the University of Southern California, Los Angeles—consists of observing the cervical, thoracic, lumbar, and sacral sEMG signals when a subject is experiencing the NSA wave. This sensor deployment covers the cervical and sacral dural-vertebral attachments areas[11] that are sensitized during entrainment as well as additional areas that are interpolation points between the distal ends of the spine and that provide an insight into the overall motion of the spine. The specific features that we have observed on the sEMG signals recorded during NSA are: an improvement of the predictability of the sEMG signals as the subject goes from early to advanced levels of care[8]; an oscillation of the four signals in a standing-wave pattern[6,9,*]; and coherence among the various signals.[9,*] All of these phenomena point to some "organization" of the neuronal circuitry. What is closely related to the first feature is the fact that the mathematical models of the various signals, especially the cervical signal, are specific to the level of care in which they have been recorded.[9] More specifically, 12 baseline mathematical models are constructed and a switching logic based on least-squares prediction error consistently selects one, or two at the most, model(s), best fitting the data at a specific level of care and in a specific position of the subject (prone, supine, sitting). Probably the most important result is the dramatic improvement of the ability of the model selected by the switching logic to predict future outcomes[8] from early to advanced levels of care. This observation is corroborated by the increase of the mutual information between the past and the future of the bursts of sEMG activity from Level 1 to Level 3, as shown in Table 1.

In a few words, the "mutual information" (in bits per second) is a logarithmic measure of the amount of correlation between the past and the future[5]; evidently, should this correlation increase, the future will be more predictable from the past.

The objectively established fact that the signals become less random and more predictable can be interpreted to reveal a better "organization" of the neural circuitry at advanced levels of care. In the broader context, the coherent, standing-wave oscillation of the four signals reveals a better large-scale organization of the circuitry across the entire spine. The more complex wave pattern at Level 3 of care reveals a more-complex synaptic-strength pattern. It is an established mathematical fact that complex, yet predictable signals emanate from such nonlinear processes as attractors, which can be defined as stable, complex oscillatory patterns in dynamical systems.[12] The ability of the CNS to organize itself as an attractor, securing synchronization and coherence at a distance, has been shown to be ubiquitous in higher level cognitive processes.[13,14] Conversely, neurologic deficits are accompanied with lack of coherence/synchronization.[13] From this point of view, it is fair to assert that NSA provides some sort of "reorganization healing."

Table 1. Past/Future Mutual Information in sEMG Signals Recorded at Various points and at various Levels of Care[a]

Position along spine	*Level 1 subject*	*Level 2 subject*	*Level 3 subject*
Cervical	1.3465	2.1783	2.5804
Thoracic	1.0682	1.1324	2.2
Lumbar	0.9843	1.5855	1.5160
Sacral	1.7422	2.3117	4.3614

[a]Jonckheere E. Chaotic Modeling in Network Spinal Analysis. Mathematical classification of Levels 1,2,3 Patients. Online document at: http://exodus.usc/edu/CHAOS/nsa Accessed May 8, 2009.
sEMG, surface electromyographic.

*Jonckheere E, Lohsoonthorn P, Mahajan V, et al. On a standing wave Central Pattern Generator and the coherence problem. Biomed Signal Processing Control, submitted.

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Probiotic Use and Clindamycin-Induced Hypercholesterolemia

Dear Editor:

Antibiotics are routinely used prior to arthroscopy to reduce the risk of infection. In patients allergic to penicillin who can not tolerate a cephalosporin, clindamycin is often used. Clindamycin is capable of eliminating anaerobic gastrointestinal flora such as bacteroides[1] that break down ingested cholesterol to products such as coprostanol that are excreted in the feces.[2] This unintended sterilization could lead to increased serum cholesterol levels, which could be of clinical significance if this elevation persisted unnoticed over a prolonged period of time. We detail an account of such a finding.

The preoperative baseline and postoperative clinical course is characterized for the case of clindamycin use as prophylaxis against an infection prior to right knee arthroscopy in a patient allergic to penicillin. Total serum cholesterol and its components as well as triglyceride assessments were tabulated at baseline and then postoperatively prior to and following a 1-week course of probiotic use.

A 46-year-old male allergic to penicillin, on no medications, and with no significant past medical history, had a lipid panel drawn as part of his annual physical examination on December 20, 2007 (Table 1). The following day he underwent a right knee arthroscopy and received 600 mg of clindamycin intravenously to minimize the risk of postoperative infection. A 2 cm×2 cm erythematous area was noted on postoperative day 2 just lateral to an entry site of the scope and was believed to be consistent with a cellulitis. A 10-day course of clindamycin was prescribed at 300 mg four times daily by mouth and the rash resolved. On February 6, 2008, as part of a workup for an elevated mean corpuscular volume (MCV = 100.2), a lipid panel was ordered. The conclusion of the work up for the elevated MCV was that, given that it was long standing (14 years) and that the patient was never anemic, this was a benign hereditary pattern. However, the lipid panel obtained on February 6, 2008 was now abnormal, showing marked increases in the total cholesterol, high density lipoprotein (HDL), and low density lipoprotein (LDL) calculated, despite no change in diet and minimal change in activity level. Because laboratory error was suspected, the lipid panel was repeated on February 11, 12, and 19, but while levels were lower they remained markedly elevated compared to baseline. Given the suspicion that clindamycin may have changed the flora in the gastrointestinal tract,[1] a probiotic acidophilus was taken daily by mouth for 1 week. A repeat lipid panel on February 27 showed a return to baseline values.