The Chiropractic Report

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Professional Notes

Chiropractic for LBP – UCLA Trial Confirms Safety and Effectiveness

Spine has now published the 18 month follow-up results from the University of California at Los Angeles (UCLA) low-back pain study by Eric Hurwitz, DC PhD, Hal Morgenstern, PhD et al.

These results – from a large, federally-funded trial of medical and chiropractic care, the first in which all care was given in a managed care environment – support the safety and effectiveness of chiropractic management, which produced better results with less medication than standard medical care for a population of mainly sub-acute and chronic patients.

The differences between the groups of patients was not large. One reason for this may well be the limited care given in the managed care setting – chiropractic patients had an average of 5.4 visits over 6 months. Medical patients who were referred to physical therapy also achieved better results than standard medical care.

Chiropractic scored particularly well in

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Why is Chiropractic Manipulation Successful?

New Study Demonstrates Reduction in Joint Inflammation

A. Introduction

CHIROPRACTIC RESEARCH IS flourishing which, as this article will demonstrate, is important for all chiropractors. Last year's International Conference on Chiropractic Research (ICCR), sponsored by the World Federation of Chiropractic and the Foundation for Chiropractic Education and Research, and held in Sydney, Australia June 16-18, 2005, attracted 183 original research submissions from 16 countries.

The greatest number of research projects from single institutions came from Macquarie University, Sydney, Australia, the Palmer College of Chiropractic, Davenport, Iowa, USA and the University Anhembi Morumbi, Sao Paulo, Brazil.

The profession's flagship journal, the *Journal of Manipulative and Physiological Therapeutics (JMPT),* now published by health sciences publishing giant Elsevier and now the official scientific journal of the American Chiropractic Association, has just published the three prize-winning papers from the ICCR in Sydney. First prize, the Scott Haldeman Award, went to Song, Gan et al.[1] a team of medical and chiropractic researchers from the Department of Neurobiology at the Parker College Research Institute in Dallas, Texas. This was for a sophisticated animal study with a long title that would not usually attract much attention from chiropractors in daily practice – the main audience for this newsletter. The title is *Spinal Manipulation Reduces Pain and Hyperalgesia after Lumbar Intervertebral Foramen Inflammation in the Rat*. However reasons why clinicians in the field may well be very interested include:

a) The study illustrates how the chiropractic profession is actively researching its hypotheses and principles in this generation in which it finally has the necessary depth of human, laboratory and financial resources.

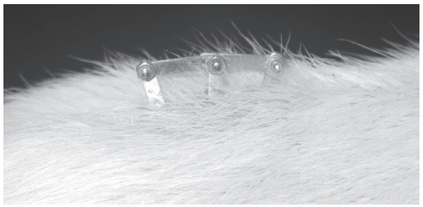
b) It demonstrates the sophistication of that research, here from an interdisciplinary team of medical and chiropractic scientists at Parker College of Chiropractic in Texas, privately funded by the profession and that college.

c) It provides an impressive result with strong clinical relevance. How often have you heard someone say that chiropractic adjustment is basically a placebo or soothing treatment without demonstrated objective benefits, and wanted to answer them convincingly? There are now many demonstrated effects of chiropractic manipulation. Some of these effects, necessarily because of the invasive nature of the research, are shown by means of animal studies. The Song, Gan et al. study, in which the principal chiropractic researcher was Ronald Rupert, DC MS, reports:

- When trial rats with experimentally-induced inflammation of the intervertebral foramen (IVF) at the fifth lumbar vertebra (L5) received a course of 10 adjustments over two weeks, there was a much faster recovery than for the comparison or control rats. This was both from pain (in 2-3, weeks rather than 4-5 weeks) and the pathological and neurological changes caused by the inflammation (e.g. pathological changes in the dorsal root ganglion were significantly reduced after 3-4 weeks in rats receiving manipulation, but not the others).
- The specific target of manipulation was important. Adjustment of L4 produced no benefit. Adjustment of L6 – the vertebrae at the level of joint inflammation – L5 and L6 (yes, the rat has six lumbar vertebrae) – did.

For these reasons this issue of *The Chiropractic Report* endeavors to summarize this prize-winning study with language and illustrations that cut through the rather complex terminology of sophisticated, modern, animal research.

Figure 1. White rat with tags attached to the spinous processes of L4, L5 and L6, and linked so that the vertebrae are fixed in flexion.



Courtesy of Henderson and Cramer

First, however, some background observations on the role of animal research.

B. Animal Models in Chiropractic Research

2. Clearly many invasive experiments are not possible with human beings and can only be done with the aid of laboratory animals. Rats have now been extensively used in such experiments to test chiropractic hypotheses. Examples are:

a) **Somatovisceral reflexes and effects following mechanical and chemical stimulation of the spine.** The longest-standing series of rat experiments involving chiropractic hypotheses and scientists, since 1983 in Tokyo, Japan, have been those by Akio Sato, MD PhD (recently deceased), Rand Swenson, DC MD PhD and Brian Budgell, DC PhD. These have shown that placing mechanical stress on spinal joints and other paraspinal tissues, or noxious chemical stimulation (e.g. injection of capsaicin into interspinous tissues), causes somatovisceral reflexes in the autonomic nervous system that alter many body functions in anesthetized rats – functions such as renal nerve activity, sciatic nerve blood flow, heart rate, blood pressure, adrenal function, bladder function and gastric function.

Significantly for chiropractic theory, in many cases these effects are segmentally related (i.e. responses are related to the spinal level stimulated), and continue after the mechanical and chemical stressors are gone. This work has been summarized by Sato and Budgell in the recent third edition of Haldeman's *Principles and Practice of Chiropractic*.[2]

(Note that new non-invasive technology is allowing measurement of some of these responses in humans – and the above chapter reports on Budgell's recent work demonstrating changes in autonomic output to the heart and decreases in heart rate in young adults in response to upper cervical manipulation – changes not seen in those receiving a sham manipulation).

b) **Joint degeneration and loss of function after fixation/subluxation, and reversal following treatment.** As described in this Report in May 2004, Palmer College in Davenport, Iowa and the National University of Health Sciences in Chicago have developed an animal subluxation model in which rats have metal tags attached to their L4, L5 and L6 spinal processes. These tags can then be linked for a period of days or weeks by metal cross links, inducing artificial subluxations or fixations that immobilize the joints in question. Depending upon the length of the cross links the joints can be fixated in flexion, neutral or extension. See Figure 1.

Gregory Cramer, DC PhD, Charles Henderson, DC PhD and their colleagues, have a generation of research planned using this rat model. Their first major goal was to demonstrate degenerative changes in lumbar facet joints – the ones that are gapped during chiropractic adjustment or manipulation – following fixation and loss of joint motion. They did this dramatically. First degenerative changes to the facet joints (zygapophysial or Z joints) were evident after one week, and these joints were completely fused after 12 weeks. This is illustrated in Figure 2. First results were published in 2004.[3] (This finding of early joint degeneration confirmed the work of Videman et al. in Finland using rabbits

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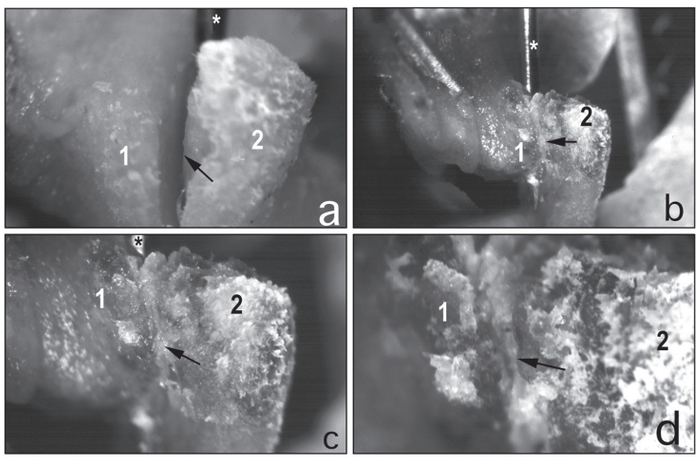
Figure 2. Figure 2a shows a control z-joint that, after the joint capsule was removed, was easily gapped by passing a small probe (*) approximately ¼ of the way into the joint. The black arrow points to the opened joint space. The numbers 1 and 2 mark the caudad and cephalad articular processes respectively.

Figure 2b, c and d presents progressively larger magnifications of a z-joint from a rat that had been experimentally fixed for 12-weeks. The joint did not gap despite the inserted probe (*) being passed completely through the joint (joint capsule was removed). The black arrow points to intra-articular adhesions preventing gapping of the joint. The numbers 1 and 2 mark the caudad and cephalad articular processes respectively.



Courtesy of Henderson and Cramer

with knee joints splintered and immobilized in an extended position).[4]

Their second major goal is to see whether timely and appropriate treatment can reverse these changes and restore joint mobility. The two treatment approaches being used, in trials funded by the US National Institutes of Health, are the dynamic thrust and low-velocity variable-amplitude motorized flexion/distraction on a rat-sized Cox Table. Henderson reports that data from the first trial, involving one treatment only, is complete and under analysis. A second trial involving eight weeks of treatment is now commencing.

3. These experiments illustrate why animal studies are necessary – one cannot inject noxious chemical into humans, or fix metal tags to their vertebrae or bury measuring instrumentation in their spines and central nervous systems. We return now to the new prize-winning study from Song, Gan et al.

C. Song Rat Model and Prize-Winning Study

4. The intervertebral foramen (IVF) is the passage or tunnel at each level of the spine, and at each side, through which the spinal nerves lead out from the spinal cord. Figure 3 illustrates IVFs in the human lumbar spine. In humans we know:

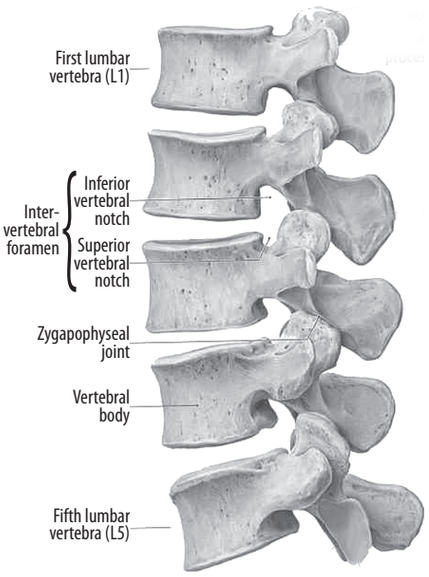
a) Spinal nerve roots and their dorsal root ganglia (DRG) may be compressed and trapped in the IVF passageway. The elegant work of Lynton Giles, DC PhD in Australia establishes that.[5] While the entrance to the IVF is quite spacious, there is minimal extra space within the interpedicular zone and the neural and associated vascular structures may well be compromised by abnormal joint mechanics.

b) Mechanical manipulation of the lumbar spinal vertebrae creates significant movement of the joints and the IVF, and produces neurophysiological responses.

Christopher Colloca, DC, Tony Keller, PhD and Robert Gunzberg, MD PhD, observed that directly in operative patients at the University of Vermont, in a study that won the Scott Haldeman Award in 2003.[6]

c) Inflammation in the IVF plays "a critical role" in the production of back pain.[1] After inflammation in the IVF and associated compression of and injury to nerves, various chemical factors or substances are released – such as cytokines, nerve growth factors and inflammatory mediators. These activate and change the function or properties of neurons in the DRG and dorsal horn of the spinal cord, which results in hyperalgesia (an abnormally increased sense of pain, of response to pain signals).

Figure 3. Lumbar spine viewed from left and showing intervertebral foramen



Courtesy of Atlas of Anatomy, Thieme, 2006.

It was "to further understand the mechanisms of low-back pain due to IVF inflammation", say Song et al., that they developed their animal model of IVF inflammation. This has involved precise injection of inflammatory mediators into the L5 IVF of live laboratory rats, and sophisticated measurements of pain response and the pathological and neurophysiological bases for that.

Armed with this model Song et al. have proceeded to their newly published study of the effects of manipulation on IVF inflammation and pain.

5. **Objective.** The objective of the study, which involved 148 adult male rats, was to assess and document the influence of spinal manipulative therapy on pain and hyperalgesia produced by IVF inflammation – using behavioral, electrophysiological and pathological outcome measures.

6. **Method of Inflammation.** For 100 rats an "inflammatory soup" containing bradykinin, 5-HT, histamine and prostaglandin was injected directly into the left IVF at L5 under anesthesia. This followed exposure of the L5 IVF by a midline incision from L4 to L6 and separation of the paraspinal muscles. After injection the muscle and skin layers were sutured. For 48 control rats there was an identical surgical procedure but no injection.

7. **Treatment Protocol.** Rats in the treatment group received spinal manipulation with a manually-assisted Activator adjusting instrument set at its lowest level. More specifically:

a) There was a series of 10 adjustments – the first given one day after surgery, then others daily for a week and then every second day.

b) Each treatment involved one adjustment, applied to the spinous process of the vertebra at a prescribed angle (40° to 50° to the vertebral horizontal line) as illustrated in Figure 4.

c) Different groups of rats received adjustment to L4, L5, L6, and L5 and L6 (this last group therefore actually had two adjustments per treatment session).

8. **Measurements and Results – Behavioral Testing.** The primary measurements used were behavioral, and these were used on 80 of 100 injected rats, 40 of the 48 control rats. These rats were tested on the two days prior to surgery, 1, 3, 4, 5, 7, 10 and 14 days after surgery, and then once weekly for five weeks. The two behavioral measures were:

a) **Thermal hyperalgesia (sensitivity to heat).** This was measured by the time that elapsed before movement of a hind paw when the rat was placed on a smooth glass surface that was then subjected to a controlled heat stimulus (technically 'foot withdrawal latency' to heat stimulus).

A heat source was moved beneath each of the hind paws when they were flush against a glass floor to a box which was otherwise maintained at a fixed temperature (26.5°C). The heat stimulus, which was constant for all experiments, shut off automatically when the paw moved or after 20 seconds to avoid tissue damage. It was delivered four times to each hind paw at 5-6 minute intervals. Results were:

i) The injected animals demonstrated "significant thermal hyperalgesia",

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continued from page 1

the areas of safety and patient satisfaction. As to the former, there were no treatment-related adverse events during the 18 month period of the trial. Hurwitz, Morgenstern et al. explain that "complications following spinal manipulation of the lumbar spine are very rare" whereas "medications given the course of standard medical care are much more likely to be associated with adverse reactions than are comparator treatments, and may delay recovery".

Because this is the first randomized controlled trial (RCT) for back pain in a managed care setting, is of thorough scientific design and gives long-term follow-up and results – the sort of results of most interest to patients and payors – more detail is given as follows:

a) **Patients**. Patients were 681 adults with largely sub-acute and chronic mechanical low-back pain who were members of a health maintenance organization (HMO) in Southern California, and attended one of three primary care centers between 1995 and 1998.

b) **Comparison groups**. These patients were randomly assigned to one of:

• DC Group - manipulation/mobilization/adjustment, instruction in strengthening and flexibility exercises and advice on proper back care.

• DCPM Group – the above with addition of physical modalities (heat or cold therapy, ultrasound, electrical muscle stimulation).

• MD Group – medical care without physical therapy – at the discretion of the medical provider receiving one or more of instruction in proper back care and strengthening and flexibility exercises; prescriptions for analgesics, muscle relaxants or anti-inflammatories; and lifestyle recommendations.

• MDPT Group – medical care with physical therapy - addition of instruction in proper back care from a PT and, at the discretion of the PT, one or more of heat or cold therapy, ultrasound, EMS, soft-tissue and joint mobilization, traction, supervised therapeutic exercise, and strengthening and flexibility exercises. Supervised therapeutic exercise was used with a majority of patients (59.5%) and joint mobilization was used with 1 in 5 of patients (19.9%).

c) **Frequency of care.** No limitations on number of treatment visits are mentioned – though presumably the HMO had rules governing this. It is reported that 85% of treatments occurred within the first 6 months, with the chiropractic groups and the physical therapy group having on average almost twice as many visits during this 6 months as patients receiving medical care alone – 5.4 versus 2.9 visits. In other words, there was very limited care for patients who mostly had sub-acute and chronic pain. "Visit frequencies after six months did not appreciably differ between groups or providers".

d) **Outcome measures.** Primary outcome measures were disability (Roland Morris Low Back Disability Questionnaire), intensity of most severe and average LBP during the past week (11 point numerical rating scales) and complete remission/recovery. Secondary outcome measure was patient perception of improvement in low-back symptoms (questionnaire with options of a lot worse, a little worse, about the same, a little better or a lot better). All of these questionnaires, with others such as the SF-36 survey of general health status, were given at baseline and then at 2, 6, 52 and 78 weeks.

e) **Results.** Results included:

i) On the primary outcome measures of pain and disability, the DC Group, DCPM Group and MDPT Group did better in terms of less pain and disability and more total recoveries/remissions than the MD Group – but the advantage was not statistically significant.

ii) However, perceived improvement in low-back symptoms "was much more likely" in chiropractic and physical therapy patients than medical care only patients. This inconsistency with the primary outcome results is a little strange since all results flow from questions asked of patients – the researchers suggest that this inconsistency reflects higher patient satisfaction.

iii) Interestingly, adding modalities to chiropractic care not only produced no benefit – it was associated with slightly more perception of worsening.

iv) Note also that participants in the MD Group "were most likely to have pain most or all of the time (30%) and least likely to be pain-free (15%), and that patients in each of the MD Group and MDPT Group "were more likely to report prescription pain medication use" than those in the DC Group and DCPM Group – 32% vs 24% at 6 months; 29% vs 20% at 12 months; 27% vs 19% at 18 months. However "frequencies of disability days due to low-back pain did not appreciably vary by treatment group."

Overall this RCT and its results support the now conventional wisdom that more frequent care and monitoring than found in usual medical practice, and the active interventions of manual care and exercise, produce higher satisfaction and better results than traditional medical advice and medication.

The trial also confirms that, whatever the treatment, a large proportion of persons with LBP do not become pain and disability free – in this trial only about 20% of patients had no symptoms after 12 and 18 months, "and more than 25% reported having pain most or all of the time." Given the natural history of persistent and recurring pain for many patients with LBP there is a need, say Hurwitz et al., to focus on more than the low-back for long-term relief. In other words there needs to be a biopsychosocial approach promoting behavior change, and for example more exercise and leisure time physical activity, as an inexpensive and effective way to reduce LBP and associated disability and work loss days.

(Hurwitz, EL, Morgenstern H et al (2006) *A Randomized Trial of Chiropractic and Medical Care for Patients with Low Back Pain: Eighteen-Month Follow-up Outcomes from the UCLA Low Back Pain Study,* Spine, 31(6):611-621).

Other Research Notes.

1. **Denmark – New Evidence of Much LBP in Childhood/ Adolescence.** *Spine* has just published an important study from chiropractic and medical researchers in Denmark, led by Lise Hestbaek, DC PhD and Charlotte Leboeuf-Yde, DC MPH PhD, which "clearly demonstrates correlations between LBP in childhood/adolescence and LBP in adulthood". The researchers report that "this should lead to a change in focus from the adult to the young population in relation to research, prevention and treatment." Key points are:

a) The study is based on surveys of members of a Danish Twin Register born between 1972 and 1982. The surveys were performed in 1994 and then 2002. This means that respondents were aged 12-22 at the time of the earlier survey, and aged 20-30 at the time of the second survey.

The survey group is strong for several reasons – firstly it is large (9,569 individuals in 1994, 71% of these in 2002); secondly it covers the transition from childhood into adulthood well; and thirdly it is known that these twins are representative of the general population since they have previously been shown to have the same mortality rate and the same prevalence of various diseases. (It is not important for this study that they happen to be twins).

b) Key results of the survey are that among those with persistent LBP at baseline there is a disproportionately large number with persistent LBP in 2002 (26% vs 9% for those who had no or non-persistent LBP at baseline), and, likewise but looking at it from the other side, a relatively small proportion of those with persistent LBP at baseline were pain-free in 2002 (33% vs 63% for those with non-persistent LBP at baseline).

c) Results leave no doubt that LBP, and especially persistent LBP, at an early age is a strong predictor of persistent LBP later in life with odds ratios as high as 4 (i.e. 4 times the risk or likelihood).

(Hestbaek L, Leboeuf-Yde C et al (2006) *The Course of Low Back Pain from Adolescence to Adulthood: Eight-Year follow-up of 9600 Twins*, Spine, 31:468-472).

2. **Australia – Link Between Incontinence/Breathing Disorders and Back Pain.** A new study from physiotherapists at the University of Queensland in Australia reports a much stronger relationship between disorders of breathing and continence and back pain in woman aged 18–75 years than the association between obesity and physical activity and back pain.

It is noted that the control of the trunk is dependent upon the activity of various muscles that play an essential role in respiration and continence - for example the diaphragm, the transversus abdominis and the pelvic floor muscles. Individuals with dysfunctions in these muscle groups and disorders in respiration or continence are likely to be less active and more obese. It may be, the researchers suggest given the results of this study, that breathing dysfunction and incontinence have a more fundamental association with back pain than obesity and physical inactivity. Points are:

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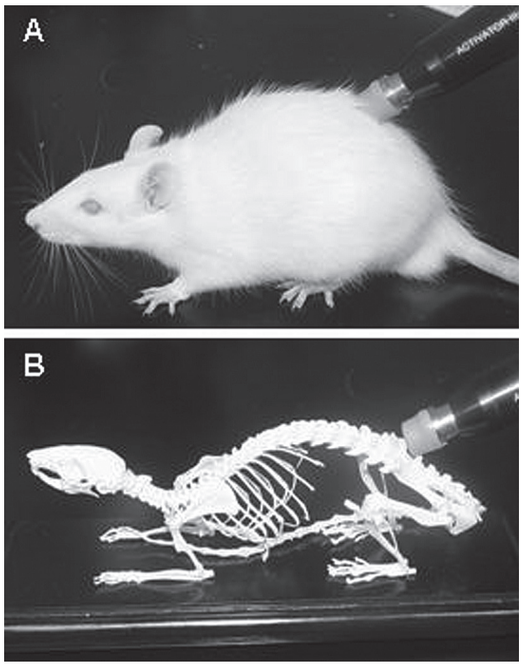
Figure 4. Treatment Protocol

Method of the Activator-assisted spinal manipulative therapy applied to the lumbar spinous process in the rat. The location and direction of the thrust to the spinous process are shown in an experimental rat (A) and an artificial rat skeleton (B).



Courtesy of Song et al. and JMPT, 2006.

whereas the other control rats did not. The left hind paw on the same side as the IVF inflammation became significantly more sensitive to thermal stimulus, the right hind paw did not, which is what one would expect if the injection, inflammation and hyperalgesia were all related.

ii) Both the severity and duration of hyperalgesia were significantly reduced for those rats which received the course of adjustments to L5, L6 or L5 and L6. Severity was significantly reduced after three adjustments, and recovery time or duration was shortened to 2 to 3 weeks instead of 4 to 5 weeks.

This, of course, strongly confirms that the good results in the rats adjusted at L5, L6, and L5 and L6 did result from the treatment.

iii) The rats adjusted at L4 showed no benefits and, like those given no treatment, had hyperalgesia for 4 to 5 weeks.

b) **Mechanical Allodynia.** The second behavioral measure, performed on the same schedule of days as the first, was mechanical allodynia, which is pain as a result of a normally non-noxious or non-painful stimulus to skin. A graduated set of filaments, capable of exerting forces of 10, 20, 40, 60, 80 and 120 milli-Newtons (mN) but with the same tip diameter were applied to 10 selected points on the plantar surface (sole) of the paw.

This was done from underneath while the rats were in a cage with a wire mesh floor – with the filaments inserted through 1 × 1 cm opening in the mesh. Each filament was applied to each point on each paw in ascending or increasing order of force. Contact time was one second, with 10-20 seconds between each contact or stimulus.

"Foot withdrawal threshold", and therefore degree of mechanical allodynia, was a calculation based on these measures and allowing for pre-existing differences. The method of calculation is fully described in the published paper. Results were:

i) As with thermal hyperalgesia, there was a significant reduction in severity and duration of mechanical allodynia in the injected animals that received manipulative treatment. With respect to duration, they recovered in 10-14 days instead of 3-4 weeks.

ii) Again, adjustments to L4 produced no benefit. Additionally, there was not significant benefit in mechanical allodynia in the sub-group adjusted at L5 – statistically significant benefits were shown only by those adjusted at L6 or L5 and L6.

8. **Measurements and Results – Electrophysiological Recordings.** Electrophysiological recordings were taken from L5 dorsal root ganglia (DRG) neurons surgically removed from three groups of 6 rats – one group with induced IVF inflammation, a second with induced IVF inflammation plus manipulation, and a third without IVF inflammation – the surgical control rats. The methods of identifying, removing, mounting and hydrating the DRG neurons with artificial cerebrospinal fluid are described.

Individual DRG neurons (i.e. conducting cells) were inspected by microscope to identity each of:

- Small nociceptive cells from unmyelinated C-fibers that transmit pain information into the spinal cord.
- Medium-sized cells from A-delta fibers that mainly convey fast and sharp pain information.
- Large cells from A-beta fibers that primarily transmit non-nociceptive information – such as touch and light pressure.

For each class of cell/neuron, there was evaluation of the readiness to respond to stimulus (excitability) by examination of several factors (e.g. resting membrane potential, the action potential (AP) current threshold, repetitive discharge evoked by depolarizing current) as described. Results were:

a) L5 IVF inflammation did cause increased and excessive excitability (hyperexcitability) of the L5 DRF neurons on the tests performed (e.g. AP current threshold decreased significantly in all sizes of DRG neuron).

b) This hyperexcitability was significantly reduced in the manipulation group. Two to 4 weeks later there was significantly reduced excitability in neurons from treated rats, but not in neurons from untreated rats.

9. **Measurements and Results – Pathological Studies.** For these studies L5 dorsal root ganglia (DRG) were taken from rats over a period of one day to 4 weeks after initial surgery and injection of the inflammatory soup. In 18 rats ganglia destined for physiological recordings were first examined under light (× 4) and higher (× 40) magnification. In 10 animals (4 IVF inflammation, 4 IVF inflammation with manipulation, 2 control) both L5 DRGs (left and right sides) were removed then fixed, frozen, stained and sectioned for microscopic analysis of the glia cells – the cells which provide the supporting structure for the nerve cells or neurons and which multiply in number following inflammation. Results were:

a) Under light dissecting microscope, the DRGs from inflamed IVF rats showed clear pathological changes – including forma-

tion of a layer of connective tissue and increased vascular formation on the surface of the ganglia.

b) Stained sections from the DRG neurons from rats with IVF inflammation showed "clear inflammatory signs . . . the DRG neurons were surrounded by significantly increased numbers of glia cells".

Satellitosis, a condition in which there is an accumulation of glia cells around the neurons, and which is often a prelude to phagocytosis of nerve cells and finally cell death, was observed in most of the slices or sections.

c) Song, Gan et al. produce photos demonstrating that such accumulation of glia cells and expression of inflammation was significantly reduced after 3-4 weeks in those IVF inflammation animals that received manipulation, but not in those that were untreated.

d) There was no obvious or apparent pathological change in the ganglia from the IVF at L5 on the right side – opposite or contralateral to the side of inflammation.

Once again, this absence of change on the opposite side provides confirmation of the causative link between the injected inflammatory soup, the inflammation and the early reduction of inflammation brought about by the manipulation treatment.

10. **Summary of Results.** Summarizing the results of their study, Song, Gan et al. note:

a) Their injection of inflammatory mediators into the left L5 IVF in this study produced "acute inflammation to the constituents within the IVF, that is, the DRG (*dorsal root ganglion*), nerve root and blood and lymph vessels."

b) The study shows that the form of manipulation given "can significantly alleviate symptoms and shorten the duration of pain and hyperalgesia caused by the IVF inflammation. Furthermore by means of electrophysiological and pathological assessments our studies showed that the fast relief of pain and hyperalgesia after ASMT (*manipulation*) may result from the faster recovery of hyperexcitability of the sensory neurons and elimination of the DRG inflammation."

In other words the reduced pain and sensitivity to pain stimulus subjectively shown by the treated rats in their behavior, was backed up by solid objective evidence of pathological changes (improvements) and neurological changes (reduced abnormal excitability).

D. Conclusion

10. For the past decade it has been established that skilled manipulation is at least as effective as any other treatment for patients with mechanical or common low-back pain. That broad scientific consensus is reflected in national and regional evidence-based clinical guidelines in Europe,[7,8,9] and North America,[10]. But how does chiropractic manipulation, which emphasizes fast, specific techniques as in the Song, Gan et al. trial, cause relief? What are the exact mechanisms involved?

A certain amount can be learned from human studies. For example Mierau, Cassidy, et al. have used imaging to show that it takes approximately 20 minutes for joint surfaces to resume their former position after manipulation, a period of extra freedom which allows for a number of mechanical and neurological responses.[11] However animal experiments are required for more invasive studies – it is not possible to inject toxic and inflammatory substances into humans and then cut out and examine their dorsal root ganglia.

Therefore, on one hand the Song, Gan et al. study can be said to be only an animal study, reporting nothing directly about human health. On the other hand it demonstrates clearly, in a way that only an animal experiment can, that a short course of specific manipulations of vertebrae either side of an inflamed joint (here L5 and L6 in a laboratory rat) produces joint movement, reduced inflammation (proven by both pathological and neurological studies) and faster recovery from pain. It is logical and scientifically valid to assume similar mechanisms in human patients.

11. You could have heard Dr. Song, and 35 other researchers like him, present 8 minute overviews of their work at the International Conference on Chiropractic Research (ICCR) in Sydney last year. The next ICCR is in Portugal May 17-19, 2007 – see the notice in this Report on that meeting, and be there to keep abreast of the best chiropractic research being done around the world. TCR

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9 Research Directorate General, European Commission (2004), *European Guidelines for the Management of Acute and Chronic Non-Specific Low Back Pain in Primary Care,* available at www.backpainEurope.org.

10 Bigos S, Bowyer O, Braen G et al. (1994) Acute Low-Back Problems in Adults. Clinical Practice Guideline No.14. AHCPR Publication No. 95-0642. Rockville, MD; Agency for Health Care Policy and Research, Public Health Service, U.S. Department of Health and Human Services.

11 Mierau D, Cassidy JD et al. (1988) *Manipulation and Mobilization of the Third Metacarpophalangeal Joint: A Quantitative Radiographic and Range of Motion Study,* Manual Medicine, 3:135-140.

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a) This was a sub-study from a large survey, of 38,050 women from specific age groups randomly recruited from Australia's National Medicare Health Insurance database. They were sub-divided into the age categories young (age 18-23), mid-age (age 45-50) and older (age 70-75). Participants completed a comprehensive, mailed survey measuring physical and mental wellbeing, health behaviors, self-reported diagnoses and symptoms and social factors.

b) For this sub-study the researchers looked at frequency of self-reported back pain during the past 12 months (never, rarely, sometimes or often), and the postulated risk factors of incontinence, breathing difficulty, asthma, allergy, overweight or obese body mass index (BMI), and none/very low or low physical activity.

c) An association between low physical activity and back pain was only significant among older women, and then only amongst those with the most frequent category of back pain. This represented a small sub-population of 9.2% of women with back pain. The association between obese BMI and back pain was only statistically significant among the mid-age and older women.

"However, in contrast to BMI and activity level, after multivariate analysis the data showed consistency in relationship between back pain and disorders of continence and respiration across (all) age cohorts."

Dr. Vladimir Janda and his school from the Czech Republic have been pioneers in the field of manual methods of restoring muscle balance and stability to prevent and manage back pain. Janda's students have included Paul Hodges, PT, one of the researchers here, and chiropractic rehabilitation specialists such as Dr. Craig Liebenson and Dr. Craig Morris of Los Angeles. This study adds to the evidence that chiropractors, as spine care specialists, must increasingly look to the software as well as the hardware – managing muscle dysfunctions as fully as joint dysfunction.

(Smith M, Russell A, Hodges, P (2006) *Disorders Of Breathing and Continence Have a Stronger Association with Back Pain than Obesity and Physical Activity*, Aust J Physiotherapy 52:11-16).

3. **United Kingdom – Ernst Rides Again.** For the past 10 years Professor Edzard Ernst of the University of Exeter has done some damage to the chiropractic profession, but greater damage to his own reputation, by riding herd on the chiropractic profession – criticizing all things chiropractic in a stream of articles with obvious bias that have been easy to rebut. His latest article, just published in the April 2006 issue of the *Journal of the Royal Society of Medicine*, has generated some media interest in Europe. Titled *A Systematic Review of Systematic Reviews of Spinal Manipulation* it provides his own personal take on the scientific literature and concludes with the rather remarkable finding that overall there is no evidence to demonstrate "that spinal manipulation is an effective intervention for any condition."

No one should lose too much sleep over this. All serious researchers disagree with him. It is helpful to know, however, that a detailed analysis of Ernst's errors and omissions and scientific shortcomings has been published. It was prepared by Joseph Morley, DC PhD, Anthony Rosner, PhD and Daniel Redwood, DC, is titled *A Case Study of Misrepresentation of the Scientific Literature: Recent Reviews of Chiropractic*, and was published in the *Journal of Alternative and Complementary Medicine* in 2001. (J Alt & Comp Med, 7(1):65-78).

We are much indebted to Morley, Rosner and Redwood for this thorough work which concludes that "Ernst et al.'s publication on chiropractic includes repeated misuse of references, misleading statements, highly selective use of certain published papers, failure to refer to relevant literature, inaccurate reporting of the contents of published work, and errors in citation . . . The misrepresentation that (*is*) evident deserves full debate and raises serious questions about the integrity of the peer-review process and the nature of academic misconduct."

Morley et al. pick apart Ernst's misconduct reference by reference. Here we simply include one example – the first given by them. In a 1998 paper titled *Chiropractors' Use of X-rays* in the *British Journal of Radiology* Ernst asserts that "there is little or no evidence for efficacy" for the various conditions treated by chiropractors. To support this sweeping statement he supplies one reference – a paper published by Niels Nilsson, DC MD PhD in the field of cervicogenic headache.

First, Nilsson's paper only deals with cervicogenic headache – not other conditions. Second, it does not support the claim that "there is little or no evidence for efficacy" for cervicogenic headache. Third, at the time of Ernst's paper Nilsson et al. had completed and published a subsequent randomized controlled trial demonstrating convincingly that chiropractic manipulation was effective for patients with cervicogenic headache. Oh dear! It is time for the man to dismount.