EVIDENCE FOR THE CLINICAL AND COST EFFECTIVENESS OF CHIROPRACTIC SPINAL MANIPULATION:

A SYNOPSIS OF CURRENT LITERATURE

Compiled by:
Dr. Tim Bertelsman
Dr. Brandon Steele
May 2018

EVIDENCE FOR THE EFFECTIVENESS OF CHIROPRACTIC

Numerous studies throughout the world have shown that chiropractic treatment, including manipulative therapy and spinal adjustment, is both safe and effective. Many other studies have shown that chiropractic care can contain costs and get workers back on the job in less time than other treatments.

The following excerpts from a few of the more recent studies.

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SYNOPSIS OF CHIROPRACTIC CLINICAL EFFECTIVENESS RESEARCH

A. PEER REVIEWED EVIDENCE IN SUPPORT OF CHIROPRACTIC CARE FOR LOWER BACK PAIN

After a systematic review of literature on CLBP Haldeman et al. suggests that a reasonable approach to chronic LBP would include education strategies, exercise, simple analgesics, and a brief course of manual therapy in the form of manipulation, mobilization, or massage.

Haldeman S, Dagenais S. What we have learned about the evidence-informed management of chronic low back pain? The Spine Journal. 2008(8): 266-277

The American College of Physicians 2007 recommends: "For patients who do not improve with self-care options, clinicians should consider the addition of non-pharmacologic therapy with proven benefits—for acute low back pain: spinal manipulation." *–Annals of Internal Medicine*

Roger Chou, MD; Amir Qaseem, MD, PhD, MHA; Vincenza Snow, MD; Donald Casey, MD, MPH, MBA; J. Thomas Cross Jr., MD, MPH; Paul Shekelle, MD, PhD; and Douglas K. Owens, MD, MS, for the Clinical Efficacy Assessment Subcommittee of the American College of Physicians and the American College of Physicians/American Pain Society Low Back Pain Guidelines Panel. Diagnosis and Treatment of Low Back Pain: A Joint Clinical Practice Guideline from the American College of Physicians and the American Pain Society. Ann Intern Med. 2007;147:478-491.*

Patients who received HVLA manipulation "showed a faster and more distinct reduction" in disability and subjective estimation of pain, and reported a better quality of life following manipulation, compared with patients who received drug therapy.

von Heymann WJ, Schloemer P, Timm J, Muehlbauer B. Spinal high-velocity low amplitude manipulation in acute nonspecific low back pain: a double-blinded randomized controlled trial in comparison with diclofenac and placebo. Spine (Phila Pa 1976). 2013 Apr 1;38(7):540-8.

"Chiropractic Manipulative Therapy in conjunction with standard medical care offers a significant advantage for decreasing pain and improving physical functioning when compared with only standard care, for men and women between 18 and 35 years of age with acute low back pain."

Goertz CM, Long CR, Hondras MA, et al. Adding chiropractic to standard medical therapy for nonspecific low back pain. Spine (Phila Pa 1976). 2013;38:627–34.

"Patients with chronic low-back pain treated by chiropractors showed greater improvement and satisfaction at one month than patients treated by family physicians. Satisfaction scores were higher for chiropractic patients. A higher proportion of chiropractic patients (56 percent vs. 13 percent) reported that their low-back pain was better or much better, whereas nearly one-third of medical patients reported their low-back pain was worse or much worse."

Nyiendo, Joanne et al. Patient characteristics, practice activities, and one-month outcomes for chronic, recurrent low-back pain treated by chiropractors and family medicine physicians: A practice-based feasibility study Journal of Manipulative & Physiological Therapeutics , Volume 23 , Issue 4 , 239 - 245

Spinal manipulation provided better short and long-term functional improvement, and more pain relief in the follow-up than either back school or individual physiotherapy. Back school and individual physiotherapy scheduled 15, one hour sessions for 3 weeks. Back school included: group exercise, education/ ergonomics; individual physiotherapy: exercise, passive mobilization and soft-tissue treatment. Spinal manipulation, given according to Manual Medicine, scheduled 4 to 6 20'-sessions once-a-week. Spinal manipulation was associated with higher functional improvement and long-term pain relief than back school or individual physiotherapy, but received more further treatment at follow-ups ($P<0.001$); pain recurrences and drug intake were also reduced compared to back school ($P <0.05$) or individual physiotherapy ($P <0.001$).

Francesca Cecchi, Raffaello Molino-Lova , Massimiliano Chiti, Guido Pasquini, Anita Paperini, Andrea A Conti, Claudio Macchi Spinal manipulation compared with back school and with individually delivered physiotherapy for the treatment of chronic low back pain: a randomized trial with one-year follow-up. Clinical Rehabilitation, Vol. 24, No. 1, 26-36 (2010)

According to a 2004 article in The Spine Journal, spinal manipulative therapy for both chronic and acute lower back pain was more effective and provided more short term relief than many other types of care, including prescription drugs, physical therapy, and home exercise.

Bronfort G, Haas M, Evans R, Bouter L. Efficacy of Spinal Manipulation and Mobilization for Lower Back Pain and Neck Pain: A Systematic Review and Best Evidence Synthesis, The Spine Journal, 2004

Several RCTs have been conducted to assess the efficacy of SMT for acute LBP using various methods. Results from most studies suggest that 5 to 10 sessions of SMT administered over 2 to 4 weeks achieve equivalent or superior improvement in pain and function when compared with other commonly used interventions, such as physical modalities, medication, education, or exercise, for short, intermediate, and long-term follow-up. Spine care clinicians should discuss the role of SMT as a treatment option for patients with acute LBP who do not find adequate symptomatic relief with self-care and education alone.

Simon Dagenais, DC, PhDa,b,, Ralph E. Gay, DC, MDc, Andrea C. Tricco, PhDd, Michael D. Freeman, PhD, MPH, DCe, John M. Mayer, DC, PhDf. NASS Contemporary Concepts in Spine Care: Spinal manipulation therapy for acute low back pain. The Spine Journal 10 (2010) 918–940*

A 2010 systematic review found that most studies suggest spinal manipulation achieves equivalent or superior improvement in pain and function when compared with other commonly used interventions for short, intermediate, and long-term follow-up.

Dagenais S, Gay RE, Tricco AC, Freeman MD, Mayer JM (October 2010). "NASS Contemporary Concepts in Spine Care: spinal manipulation therapy for acute low back pain". Spine J 10 (10): 918–40

For low back pain: "manual-thrust manipulation provides greater short-term reductions in self-reported disability and pain compared with usual medical care. 94% of the manual-thrust manipulation group achieved greater than 30% reduction in pain compared with 69% of usual medical care."

Schneider et al. Comparison of spinal manipulation methods and usual medical care for acute and subacute low back pain: a randomized clinical trial. Spine 2015 Feb 15;40(4):209-17.

A randomized controlled clinical trial compared medication, needle acupuncture and spinal manipulation for managing chronic spinal pain. The highest proportion of early recovery was found for manipulation (27.3%), followed by acupuncture (9.4%) and medication (5%). Manipulation achieved the best overall results. The conclusion states that "in patients with chronic spinal pain, manipulation results in greater short-term improvement than acupuncture or medication."

Giles L, Mueller R. A Randomized Clinical Trial Comparing Medication, Acupuncture, and Spinal Manipulation. Spine, Volume 28, Number 14, 2003, pp. 1490-1503

For patients with acute low back symptoms without radiculopathy, the scientific evidence suggests spinal manipulation is effective in reducing pain and perhaps speeding recovery within the first month of symptoms.

Bigos S, Bowyer O, et al. Acute Low Back Problems in Adults. Clinical Practice Guideline, Number 14, Rockville, Maryland: U.S. Department of Health and Human Services, Public Health Service, Agency for Health Care Policy and Research, AHCPR Pub. No. 95-0642, December 1994.

Medical authorities go on the record stating that spinal manipulation is appropriate for certain low-back pain conditions.

Shekelle PG, Adams A. et al. The Appropriateness of Spinal Manipulation for Low-Back Pain: Indications and Ratings by a Multidisciplinary Expert Panel. RAND Corporation, Santa Monica, California, 1991.

For patients with low-back pain in whom manipulation is not contraindicated, chiropractic almost certainly confers worthwhile, long-term benefit in comparison to standard hospital outpatient management.

Meade TW, Dyer S, et al. "Low Back Pain of Mechanical Origin: Randomized Comparison of Chiropractic and Hospital Outpatient Treatment." British Medical Journal, Volume 300, Number 6737, June 2, 1990, Pages 1431-1437.

At three years the results confirm the findings of an earlier report that when chiropractic or hospital therapists treat patients with low back pain as they would in day to day practice those treated by chiropractic derive more benefit and long term satisfaction than those treated by hospitals.

"...improvement in all patients at three years was about 29% more in those treated by chiropractors than in those treated by the hospitals. The beneficial effect of chiropractic on pain was particularly clear."

Meade TW, Dyer S, et al. "Randomised Comparison of Chiropractic and Hospital Outpatient Management for Low-Back Pain: Results from Extended Follow Up." British Medical Journal, Volume 311, Number 7001, August 5, 1995, Pages 349-351.

Manipulative therapy and physiotherapy are better than general practitioner and placebo treatment. Furthermore, manipulative therapy is slightly better than physiotherapy after 12 months.

Koes, BW, Bouter LM, et al. "Randomised Clinical Trial of Manipulative Therapy and Physiotherapy for Persistent Back and Neck Complaints: Results of One Year Follow Up." British Medical Journal, Volume 304, Number 6827, March 7, 1992, Pages 601-605.

"There is strong evidence that manipulation is more effective than usual care by the general practitioner, bed rest, analgesics, massage or a placebo for treatment of chronic low-back pain."

van Tulder and Bouter et al. "Conservative Treatment of Acute and Chronic Nonspecific Low-Back Pain." Spine, Vol. 22, Number 18, 1997, Pages 2128-2156.

In a subgroup of patients with acute non-specific LBP spinal manipulation was significantly better than NSAID Diclofenac and clinically superior to placebo. 93 subjects were analyzed comparing the two intervention groups. The manipulation group was significantly better than the Diclofenac group (Mann Whitney test: P = 0,0134). No adverse effects or harms were registered.

von Heymann, Wolfgang J. Dr. med.; Schloemer, Patrick Dipl. math.; Timm, Juergen Prof. Dr. rer. nat. PhD; Muehlbauer, Bernd Prof. Dr. med. Spinal HVLA-Manipulation in Acute Non-specific LBP: A Double Blinded Randomized Controlled Trial in Comparison With Diclofenac and Placebo. Spine. Publish Ahead of Print, POST ACCEPTANCE, 28 September 2012

Implementing chiropractic manipulation into the treatment of acute low back pain is part of evidence based clinical practice guidelines as defined on an international scale. Bishop et al. recruited 92 patients that compared usual primary care to chiropractic care for acute low back pain. Usual care included consultation, pain meds, muscle relaxants, and anti-inflammatory meds. Chiropractic care included manipulation with advice to avoid bed rest and medication. Results: Full clinical practice guideline treatment including chiropractic manipulation yielded significantly greater improvement in condition-specific functioning and pain at 8,16, and 24 weeks.

Bishop et al. The chiropractic hospital-based interventions research outcomes study: a randomized controlled trial on the effectiveness of clinical practice guidelines in the medical and chiropractic management of patients with acute mechanical low back pain. The Spine Journal 2010(10):1055-1064

The State of Oregon has issued Evidence Based Clinical Guidelines for the Evaluation and Management of LBP and recommends spinal manipulation as the only non drug intervention for the first four weeks of care. The agency for health care policy and research have determined that spinal manipulation both relieves pain and restores function, while pain medication (NSAID and Analgesics) relieve pain but do not restore function.

Saboe V. Oregon LBP Guidelines: Try Chiropractic First. Dynamic Chiropractic 2013(1);31: Issue 01

This randomized clinical trial compared outcomes for patients suffering from low back pain when managed in a hospital by either a regional pain clinic or chiropractor. This review found that for patients with chronic low back pain (>12 weeks), chiropractic care resulted in a substantially greater reduction in pain and disability when compared to outpatient pain management.

Wilkey, et al. A Comparison Between Chiropractic Management and Pain Clinic Management for Chronic Low Back Pain in a National Health Service Outpatient Clinic. Journal of Alternative & Complimentary Therapies: Volume 14, Number 5, 2008, pp.465-473.

Overall, the 2 treatment groups were similar based on primary or secondary outcome measure scores for the full treatment period (4 weeks, with up to 7 treatments). However, there were statistically significant and clinically meaningful differences in both disability and pain scores at week 2 (midpoint) with 4 treatments, suggesting that the protocol of care had a more rapid effect than usual care.

Gregory F. Parkin-Smith, MTech(Chiro), MSc, DrHC, Ian J. Norman, BSc, MSc, PhD, Emma Briggs, BSc, PhD, RN, Elizabeth Angier, BSc, MSc(Chiro), Timothy G. Wood, BSc, MTech(Chiro), James W. Brantingham, DC, PhD A Structured Protocol of Evidence-Based Conservative Care Compared With Usual Care for Acute Nonspecific Low Back Pain: A Randomized Clinical Trial Arch Phys Med Rehabil Vol 93, January 2012. In 2007 the American College of Physicians and the American

Pain Society recommended that clinicians consider the addition of spinal manipulation for patients who do not improve with self care options.

Chou R, Qaseem A, Snow V, et al. (October 2007). "Diagnosis and treatment of low back pain: a joint clinical practice guideline from the American College of Physicians and the American Pain Society". Ann. Intern. Med. 147 (7): 478–91.

"...patients suffering from back and/or neck complaints experience chiropractic care as an effective means of resolving or ameliorating pain and functional impairments, thus reinforcing previous results showing the benefits of chiropractic treatment for back and neck pain."

Verhoef et al. The Chiropractic Outcome Study: Pain, Functional Ability, and Satisfaction with Care. JMPT, Vol. 20, Number 4, May 1997, pp. 235-240.

A multicenter, randomized, controlled clinical trial with one year follow-up demonstrated that manual therapy showed significantly greater improvement as compared with exercise therapy in patients with chronic low back pain. These effects were reflected on all outcome measures, both on short and long-term follow-up.

O. Aure, Nilsen, Vasseljen. Manual Therapy and Exercise Therapy in Patients with chronic Low Back Pain. Spine, Vol 28, Number 6, 2003, pp. 525-532.

Oregon created a task force to review a large body of evidence about the "effectiveness of various treatments and the potential harms of certain therapies" for back conditions. Based on task force recommendations the state changed its coverage guidelines to endorse "chiropractic manipulation" to "help people manage their pain with less reliance on medication and fewer costly surgeries".

http://www.oregon.gov/oha/herc/FactSheet/Back-policy-changes-fact-sheet.pdf

The American College of Physicians publishes updated Clinical Practice Guideline recommending that for acute, subacute or chronic low back pain, physicians and patients initially utilize spinal manipulation and delay pharmacologic management.

Qaseem A, Wilt TJ, McLean RM, Forciea MA, for the Clinical Guidelines Committee of the American College of Physicians. Noninvasive Treatments for Acute, Subacute, and Chronic Low Back Pain: A Clinical Practice Guideline From the American College of Physicians. Ann Intern Med. [Epub ahead of print 14 February 2017]

The Journal of the American Medical Association (JAMA) published a systematic review of 26 randomized clinical trials in order to evaluate the safety and effectiveness of spinal manipulation for low back pain. The authors concluded:

"Among patients with acute low back pain, spinal manipulative therapy was associated with improvements in pain and function with only transient minor musculoskeletal harms."

Paige NM, Miake-Lye IM, Booth MS, et al. Association of Spinal Manipulative Therapy With Clinical Benefit and Harm for Acute Low Back Pain; Systematic Review and Meta-analysis. JAMA. 2017;317(14):1451-1460.

The European Spine Journal published guidelines for treating acute LBP and radiculopathy:

- Employ: Manual therapy, exercise, and patient education about prognosis, warning signs, and advice to remain active.
- Avoid: routine use of imaging, extra-foraminal steroid injections, acetaminophen, NSAIDs, and opioids.

Stochkendahl, M.J., Kjaer, P., Hartvigsen, J. et al. National Clinical Guidelines for non-surgical treatment of patients with recent onset low back pain or lumbar radiculopathy. Eur Spine J (2018) 27: 60.

A systematic review of 51 trials concluded: "manipulation and mobilization are likely to reduce pain and improve function for patients with chronic low back pain; manipulation appears to produce a larger effect than mobilization."

Coulter, Ian D. et al. Manipulation and mobilization for treating chronic low back pain: a systematic review and meta-analysis. The Spine Journal , Volume 18 , Issue 5 , 866 - 879

A consortium of 72 esteemed academic medical centers and health systems established new recommendations to help reduce the use of opioids. The experts endorsed manipulation, citing substantial research to support it's benefit for treating low back pain, neck pain, whiplash, neck-related headache, prevention of migraine, knee and hip arthritis, plantar fasciitis, common knee and shoulder disorders, tennis elbow, carpal tunnel syndrome, and TMJ disorders. The panel also noted that manipulation "Is more cost-effective than usual care".

Tick H, Nielsen A, et al. The Pain Task Force of the Academic Consortium for Integrative Medicine and Health. Evidence-based Nonpharmacologic Strategies for Comprehensive Pain Care. A Consortium Pain Task Force White Paper. www.nonpharmpaincare.org December 15, 2017

B. PEER REVIEWED EVIDENCE IN SUPPORT OF CHIROPRACTIC CARE FOR NECK PAIN

A 2008 review found evidence that suggests that manual therapy and exercise are more effective than alternative strategies for patients with neck pain.

> *Hurwitz EL, Carragee EJ, van der Velde G et al. (2008). "Treatment of neck pain: noninvasive interventions: results of the Bone and Joint Decade 2000–2010 Task Force on Neck Pain and Its Associated Disorders". Spine 33 (4 Suppl): S123–52.*

This randomized controlled clinical trial evaluated three different therapies for cervical spine pain. Manual therapy scored consistently better than the other two interventions on most outcome measures.

> *Hoving JL, Koes BW, de Vet HCW, et al. manual therapy, physical therapy, or continued care by a general practitioner for patients with neck pain. Annals of Internal Medicine, Volume 136, 2002, pp. 713-722.*

Conventional treatment of patients with whiplash symptoms is disappointing. Chiropractic is the only proven effective treatment for chronic whiplash cases.

> *Kahn S, Cook J, Gargan M, Bannister. A Symptomatic Classification of Whiplash Injury and the Implications for Treatment. The Journal of Orthopedic Medicine, Volume 21, Number 1, 1999, pp. 22-25.*

Chiropractic treatment benefited 26 of 28 patients suffering from chronic whiplash syndrome.

> *Woodward MN, Cook JCH, Gargan MF, Bannister GC. Chiropractic Treatment of Chronic Whiplash Injuries. Injury, Volume 27, 1996, 643-645.*

"There have been more randomized controlled clinical trials of spinal manipulation than any other form of therapy for neck pain. Overall, these reviews have concluded that there seems to be some therapeutic advantage to manipulation versus several other comparative treatments."

> *Swenson R. "Therapeutic Modalities in the Management of Nonspecific Neck Pain. Physical Medicine and Rehabilitation Clinics of North America, Volume 14, 2003, pp. 605-627.*

Spinal manipulation is more effective and less costly for treating neck pain than physical therapy or care by a general practitioner.

> *Korthals-de Bos, Hoving, van Tulder, et al. Cost-effectiveness of Physiotherapy, Manual Therapy, and General Practitioner Care for Neck Pain: Economic evaluation alongside a randomized controlled trial. BMJ, Volume 326, April 26, 2003.*

“Mobilization, (cervical & thoracic) manipulation, and clinical massage are effective interventions for the management of neck pain."

Wong JJ, et al. Are manual therapies, passive physical modalities, or acupuncture effective for the management of patients with whiplash associated disorders or neck pain and associated disorders? An update of the Bone and Joint Decade Task Force on Neck Pain and Its Associated Disorders by the OPTIMa collaboration. Spine J. 2016 Dec;16(12):1598-1630

C. PEER REVIEWED EVIDENCE IN SUPPORT OF CHIROPRACTIC CARE FOR HEADACHES

A 2004 Cochrane review found evidence that suggests spinal manipulation may be effective for migraine, tension headache and cervicogenic headache.

> *Bronfort G, Nilsson N, Haas M, et al. (2004). "Non-invasive physical treatments for chronic/ recurrent headache". In Brønfort, Gert. Cochrane Database Syst Rev (3)*

"Cervical spine manipulation was associated with significant improvement in headache outcomes in trials involving patients with neck pain and/or neck dysfunction and headache."

> *McCrory DC, Penzien DB, Hasselblad V, Gray RN. Evidence Report: Behavioral and Physical Treatments for Tension-type and Cervicogenic Headache. Duke University Evidence-based Practice Center for Clinical Health Policy Research. - 2001*

The results of this study show that spinal manipulative therapy is an effective treatment for tension headaches. Amitriptyline therapy was slightly more effective in reducing pain at the end of the treatment period but was associated with more side-effects. Four weeks after the cessation of treatment, however, the patients who received spinal manipulative therapy experienced a sustained therapeutic benefit in all major outcomes in contrast with the patients that received amitriptyline therapy, who returned to baseline values.

> *Boline PD, Kassak K, et al. "Spinal Manipulation vs. Amitriptyline for the Treatment of Chronic Tension-type Headaches: A Randomized Clinical Trial." Journal of Manipulative and Physiological Therapeutics, Volume 18, Number 3, March/April 1995, Pages 148-154.*

Spinal manipulation seems to have a significant positive effect in reducing hours with headache and intensity of headache and analgesic consumption in cases of cervicogenic headache.

> *Nilsson N, Christensen HW, Hartvigsen J. "The Effect of Spinal Manipulation in the Treatment of Cervicogenic Headache." Journal of Manipulative and Physiological Therapeutics, Volume 20, Number 5, June 1998, Pages 326-330.*

D. PATIENT SUCCESS WITH CHIROPRACTIC PAIN RELIEF

Respondents of a survey by Consumer Reports tried five or six different treatments for acute low back pain. They rated the helpfulness of the treatments tried and their satisfaction with the health care professionals visited. Hands-on therapies were among the top-rated. Fifty-eight percent of those who tried chiropractic manipulation said "it helped a lot," and 59 percent were "completely" or "very" satisfied with their chiropractor. Massage and physical therapy were close runners-up. The percent of people highly (completely or very) satisfied with their back-pain treatments and advice varied by practitioner visited.

The most recent Consumer reports surveyed 45,000 people and found chiropractic care was perceived as the most effective treatment for neck and back pain.

Consumer Reports, Sept. 2011

"Chiropractic patients were found to be more satisfied with their back care providers after four weeks of treatment than were medical patients. Results from observational studies suggested that back pain patients are more satisfied with chiropractic care than with medical care. Additionally, studies conclude that patients are more satisfied with chiropractic care than they were with physical therapy after six weeks."

Ruth P. Hertzman-Miller, Hal Morgenstern, Eric L. Hurwitz, et al. Comparing the Satisfaction of Low Back Pain Patients Randomized to Receive Medical or Chiropractic Care: Results From the UCLA Low-Back Pain Study. American Journal of Public Health. October 2002, Vol 92, No. 10

"Chiropractic is the largest, most regulated, and best recognized of the complementary and alternative medicine (CAM) professions. CAM patient surveys show that chiropractors are used more often than any other alternative provider group and patient satisfaction with chiropractic care is very high. There is steadily increasing patient use of chiropractic in the United States, which has tripled in the past two decades."

Meeker WC, Haldeman S. Chiropractic: A Profession at the Crossroads of Mainstream and Alternative Medicine. Ann Intern Med. 2002;136(3):216-227

SAFETY OF MANIPULATION

Kosloff et al. extracted 3 years of commercial insurance and Medicare advantage plan data for approximately 39 million insured patients. This represents approximately 5% of the total US population. The study analyzed a potential correlation between chiropractic visits, PCP visits, and stroke.

The study found: "No significant association between VBA stroke and chiropractic visits. We conclude that manipulation is an unlikely cause of VBA stroke." The study did however find "a significant association between PCP visits and VBA stroke. The positive association between PCP visits and VBA stroke is most likely due to patient decisions to seek care for the symptoms (headache and neck pain) of arterial dissection."

This study suggests that chiropractic manipulation may not increase the risk of VBAI stroke, rather, impending VBAI stroke patients may have a higher likelihood to seek care from a variety of providers, including chiropractors.

Kosloff TM, Elto D, Tao J, Bannister WM. Chiropractic care and the risk of vertebrobasilar stroke: results of a case-control study in U.S. commercial and Medicare Advantage populations. Chiropractic & Manual Therapies (2015) 23:19

Stresses and strains on the vertebral artery during chiropractic spinal manipulation of the neck were always much smaller than those produced during passive range of motion testing and diagnostic procedures.

Walter Herzog, PhD The biomechanics of spinal manipulation. Journal of Bodywork & Movement Therapies(2010) 14, 280-286

VBA stroke is a very rare event in the population. The increased risks of VBA stroke associated with chiropractic and PCP visits is likely due to patients with headache and neck pain from VBA dissection seeking care before their stroke. **We found no evidence of excess risk of VBA stroke associated chiropractic care compared to primary care.**

J. David Cassidy, DC, PhD, DrMedSc, Eleanor Boyle, PhD, Pierre Coˆte´, DC, PhD, Yaohua He, MD, PhD, Sheilah Hogg-Johnson, PhD,Frank L. Silver, MD, FRCPC, and Susan J. Bondy, PhD. Risk of Vertebrobasilar Stroke and Chiropractic Care Results of a Population-Based Case-Control and Case-Crossover Study. SPINE Volume 33, Number 4S, pp S176–S183*

Most randomized controlled clinical trials on neck pain favored the group treated with manipulation. The complications of cervical spine manipulation are rare. Conclusion: "A multidisciplinary expert panel agreed that cervical spine manipulation is an appropriate therapy for patients with neck pain and headache."

Shekelle PG, Coulter I. Cervical Spine Manipulation: Summary Report of a Systematic Review of the Literature and a Multidisciplinary Expert Panel. Journal of Spinal Disorders, Volume 10, Number 3, pp. 223-228

"The possible indication of the prodrome to a stroke may lie in the case history rather than the examination findings and provocative testing."

Annabel L. Kier, DC, and Peter W. McCarthy, PhD. CEREBROVASCULAR ACCIDENT WITHOUT CHIROPRACTIC MANIPULATION: A CASE REPORT J Manipulative Physiol Ther 2006;29:330-335)

"It is unlikely that chiropractic care is a significant cause of injury in older adults. In fact, among Medicare beneficiaries aged 66 to 99 years, risk of injury to the head, neck, or trunk within 7 days was 76% lower among subjects with a chiropractic office visit than those who saw a primary care physician."

Whedon JM, Mackenzie TA, Phillips RB, Lurie JD. Risk of Traumatic Injury Associated With Chiropractic Spinal Manipulation in Medicare Part B Beneficiaries Aged 66 to 99 Years. Spine 2015;40:264–270

Despite the fact that adverse events following treatment are common, and in some cases severe in intensity, this study shows that the benefits of chiropractic care for neck pain seem to outweigh the potential risks.

Sidney M. Rubinstein, DC, MSc, Charlotte Leboeuf-Yde, DC, MPH, PhD, Dirk L. Knol, PhD, Tammy E. de Koekkoek, DC, Chalres E. Pfeifle, DC, and Maurits W. van Tulder, PhD
THE BENEFITS OUTWEIGH THE RISKS FOR PATIENTS UNDERGOING CHIROPRACTIC CARE FOR NECK PAIN: A PROSPECTIVE, MULTICENTER, COHERT STUDY. J Manipulative Physiol Ther 2007;30:408Q418

A Systematic Review and Meta-analysis of data concerning spinal manipulation and VBAI and concluded: "**There is no convincing evidence to support a causal link between chiropractic manipulation and Cervical Artery Dissection.**"

Church E W, Sieg E P, Zalatimo O, et al. (February 16, 2016) Systematic Review and Meta-analysis of Chiropractic Care and Cervical Artery Dissection: No Evidence for Causation. Cureus 8(2): e498. doi:10.7759/cu reus.498

Researchers reviewed more than 15,000 carotid artery stroke cases admitted to Ontario, Canada hospitals over a 9-year period. They compared the incidence of stroke following a visit to a chiropractor vs. a medical provider and concluded: "no excess risk of carotid artery stroke after chiropractic care". Researchers concluded that the equally increased incidence of stroke following either type of care was: "likely due to patients with early dissection-related symptoms seeking care prior to developing their strokes".

Cassidy JD, Boyle E, Côté P, Hogg-Johnson S, Bondy SJ, Haldeman S. Risk of Carotid Stroke after Chiropractic Care: A Population-Based Case-Crossover Study. J Stroke Cerebrovasc Dis. 2017 Apr;26(4):842-850.

"Among patients with acute low back pain, spinal manipulative therapy was associated with improvements in pain and function with only transient minor musculoskeletal harms."

Paige NM, Miake-Lye IM, Booth MS, et al. Association of Spinal Manipulative Therapy With Clinical Benefit and Harm for Acute Low Back Pain; Systematic Review and Meta-analysis. JAMA. 2017;317(14):1451-1460.

SYNOPSIS OF RESEARCH ON THE COST EFFECTIVENESS OF CHIROPRACTIC

A prospective study of 1885 workers in Washington state found that following work-related low back injury, patients who visited a chiropractor were nearly 30 times less likely to require surgery as compared to those who chose a surgeon as their first provider (42.7% vs 1.5%). Choice of provider shows "excellent ability to discriminate between workers who would versus would not have surgery."

Benjamin J. Keeney , PhD, Deborah Fulton-Kehoe, PhD, MPH, Judith A. Turner, PhD, Thomas M. Wickizer, PhD, Kwun Chuen Gary Chan, PhD, and Gary M. Franklin, MD, MPH. Early Predictors of Lumbar Spine Surgery After Occupational Back Injury. SPINE Volume 38, Number 11, pp 953–964

Analysis of a clinical and cost utilization data from the years 2003 to 2005 by an integrative medicine independent physician association (IPA) which looked the chiropractic services utilization found that the clinical and cost utilization of chiropractic services based on 70,274 member-months over a 7-year period decreased patient costs associate with the following use of services by 60.2% for in-hospital admissions, 59.0% for hospital days, 62.0% for outpatient surgeries and procedures, and 85% for pharmaceutical costs when compared with conventional medicine (visit to a medical doctor primary care provider) IPA performance for the same health maintenance organization product in the same geography and time frame.

Sarnat, Richard L.; Winterstein, James; Cambron, Jerrilyn (May 2007). "Clinical Utilization and Cost Outcomes From an Integrative Medicine Independent Physician Association: An Additional 3-Year Update". Journal of Manipulative and Physiological Therapeutics 30 (4): 263–269

This study demonstrates the ways in which individuals in Ontario are deterred from the use of chiropractic care because it is not covered under OHIP. Greater chiropractic coverage under OHIP would result in a greater number of individuals visiting chiropractors and going more often. The study shows that despite increased visits to DCs, this would result in net savings in both direct and indirect costs. It is very costly to manage neuromusculoskeletal disorders using traditional medicine. If individuals were able to visit chiropractors under OHIP a great amount of money would be saved by the government. Direct savings for Ontario's healthcare system could be as much as $770 million and at the very least $380 million.

"The overwhelming body of evidence" shows that chiropractic management of low-back pain is more cost-effective than medical management, and that "many medical therapies are of questionable validity or are clearly inadequate."

Manga, Pran. "Enhanced chiropractic coverage under OHIP (Ontario Health Insurance Plan) as a means for reducing health care costs, attaining better health outcomes and achieving equitable access to health services." Report to the Ontario Ministry of Health, 1998.

This study demonstrates that an increase in use of chiropractic care to manage low back pain would save an enormous amount of money. The study reveals that if management of low back pain was taken from physicians and given to chiropractors there could be a potential savings of millions of dollars every year. The study also revealed that spinal manipulation is both safe and more effective than drugs, bed rest, analgesics, and general practice medical care for managing low back pain.

There is an overwhelming body of evidence indicating that chiropractic management of low back pain is more cost-effective than medical management ... The lack of any convincing argument or evidence to the contrary must be noted and is significant to us in forming our conclusions and recommendations. The evidence includes studies showing lower chiropractic costs for the same diagnosis and episodic need for care.

In this study the cost of health care for back or neck pain for individuals belonging to an HMO who used chiropractic care or other methods of treatment were evaluated. In this study the cost of surgery, use of diagnostic imaging, and the satisfaction of patients were evaluated. Claims that were paid from October 1, 1994 through October 1, 1995 were evaluated and analyzed. The cost of healthcare for back and neck pain was much lower for patients using chiropractic care than those using other treatments. Surgical costs and the satisfaction of patients was nearly the same for those who used chiropractic care and those who did not. The conclusion of the study is that chiropractic care yields similar outcomes to other forms of care at a much lower cost.

Mosley, Carrie; Cohen, Ilava; Arnold Roy. "Cost-effectiveness of chiropractic care in a managed care setting." The American Journal of Managed Care 1996; 2: 280-282.

This study is an assessment of the difference in cost of treatment between chiropractors and other practitioners in dealing with individuals who have similar back-related problems. This study analyzed individuals who had medical visits in 1980 and had a combination of eleven health problems including arthritis, disc disorders, bursitis, low back pain, spinal related sprains, strains, and dislocations. Chiropractic care had a lower cost option for many back ailments.

Dean, David; Schmidt, Robert. "A comparison of the cost of chiropractors versus Alternative Medical Practitioners." Richmond, VA: Virginia Chiropractic Association, 1992.

This study is an analysis of worker's compensation claims in Florida from June through December of 1987. All of the claims analyzed were related to back injuries. The greater purpose of this study was to compare the cost of osteopathic, medical and chiropractic doctors. The cost of drugs were not included in the analysis. The results of the study lead to the finding that individuals who had compensable injuries and were treated by chiropractors often times were not forced to be hospitalized. It was also revealed that chiropractic care is a "relatively cost-effective approach to the management of work-related injuries."

Wolk, Steve. "An Analysis of Florida Workers' Compensation Medical Claims for Back-Related Injuries." Journal of the American Chiropractic Association 1988; 27(7): 50-59.

In this study the cost of health care for back or neck pain for individuals belonging to an HMO who used chiropractic care or other methods of treatment were evaluated. In this study the cost of surgery, use of diagnostic imaging, and the satisfaction of patients were evaluated. Claims that were paid from October 1, 1994 through October 1, 1995 were evaluated and analyzed. The cost of healthcare for back and neck pain was much lower for patients using chiropractic care than those using other treatments. Surgical costs and the satisfaction of patients was nearly the same for those who used chiropractic care and those who did not. The conclusion of the study is that chiropractic care yields similar outcomes to other forms of care at a much lower cost.

Mosley, Carrie; Cohen, Ilava; Arnold Roy. "Cost-effectiveness of chiropractic care in a managed care setting." The American Journal of Managed Care 1996; 2: 280-282.

Older patients who use Chiropractic Manipulative Treatment (CMT) either alone or in combination with conventional medical care during their chronic LBP episodes have lower overall costs of care, shorter episodes, and lower cost of care per episode day than patients using standard medical care. These findings support initial CMT use in the treatment of, and possibly broader chiropractic management of, older chronic LBP patients.

Weeks, William B et al. The Association Between Use of Chiropractic Care and Costs of Care Among Older Medicare Patients With Chronic Low Back Pain and Multiple Comorbidities. Journal of Manipulative & Physiological Therapeutics , Volume 39 , Issue 2 , 63 - 75.e2

A comprehensive systematic review that compared health care costs for spine pain patients who received chiropractic care vs. care from other health care providers concluded: "Overall, cost comparison studies from private health plans and WC plans reported that health care costs were lower with chiropractic care."

Dagenais S, Brady O, Manga P. A systematic review comparing the costs of chiropractic care to other interventions for spine pain in the United States. BMC Health Serv Res. 2015 Oct 19;15:474.

"Reduced odds of surgery were observed for...those whose first provider was a chiropractor. 42.7% of workers [with back injuries] who first saw a surgeon had surgery, in contrast to only 1.5% of those who saw a chiropractor."

Keeney BJ, Fulton-Kehoe D, Turner JA, et al. Early predictors of lumbar spine surgery after occupational back injury: results from a prospective study of workers in Washington state. Spine, Dec. 12, 2012

In older adults with chronic neck pain, incorporating spinal manipulation decreases overall societal costs 5% and results in greater improvements in pain and disability when compared to a home exercise program alone. Furthermore, adding spinal manipulation to a home exercise program resulted in 47% lower costs compared to supervised rehabilitation.

Leininger B, et al. Cost-effectiveness of spinal manipulative therapy, supervised exercise, and home exercise for older adults with chronic neck pain. Spine J. 2016 Nov;16(11):1292-1304.

"For Medicare patients with back and/or neck pain, availability of chiropractic care reduces the number of primary care physician visits, resulting in an annual savings of $83.5 million."

Davis MA, et al. Regional Supply of Chiropractic Care and Visits to Primary Care Physicians for Back and Neck Pain. Journal of the American Board of Family Medicine: JABFM. 2015;28(4):481-490.

"The rate of opioid use was lower for recipients of chiropractic services (19%) as compared to non-recipients (35%). The likelihood of filling a prescription for opioids was 55% lower in the chiropractic recipient cohort. Average annual per-person charges for opioid prescription fills were 78% lower for recipients of chiropractic services as compared to non-recipients. Average per person charges for clinical services for low back pain were also significantly lower for recipients of chiropractic services. (Avg. $1513 for chiropractic management vs. $6766 for medical management)"

Whedon J. Association between Utilization of Chiropractic Services and Use of Prescription Opioids among Patients with Low Back Pain. Presented ahead of print at the National Press Club in Washington DC on March 14, 2017. Accessed online at: http://c.ymcdn.com/sites/www.cocsa.org/resource/resmgr/docs/NH_Opioids_Whedon.pdf

Comparison of costs of care for common lumbar and low back conditions when a chiropractor is the first provider and when an MD is the first provider. Total payments for inpatient procedures were higher for MD episodes and especially episodes that lasted longer than a single day. Outpatient payments were much higher for MD initiated treatments as well.

Stano, Miron. "The Economic Role of Chiropractic Further Analysis of Relative Insurance Costs for Low Back Care." Journal of the Neuromusculoskeletal System 1995; 3(3): 139-144.

Comparison of health insurance payments and patient utilization patterns for common lumbar and low back pain for patients who receive treatment from MDs and DCs. The results found that there were lower costs for episodes in which DCs were the first providers. The mean total payment when DC's were the first providers was $518 whereas the mean payment for cases in which a MD was the first provider was $1020.

"First contact chiropractic care for common low back conditions costs substantially less than traditional medical treatment and "deserves careful consideration" by managed care executives concerned with controlling health care spending."

Stano, Miron; Smith, Monica. "Chiropractic and Medical Costs of Low Back Care." Medical Care 34(3): 191-204.

Comparison of health insurance payments and patient utilization patterns for individuals suffering from recurring lumbar and low back pain visiting DCs vs. MDs. Insurance payments were higher for medically initiated episodes. Those who visited chiropractors paid a lower cost and were also satisfied with the care given. Because of this the study suggests that chiropractic care should be given careful attention by employers when using gate-keeper strategies.

Smith, Monica; Stano, Miron. "Costs and Recurrences of Chiropractic and Medical Episodes of Low Back Care." Journal of Manipulative and Physiological Therapeutics 1997: 20(1): 5-12.

Study examines cost, utilization and effects of chiropractic services on Medicare costs. The study compared program payments and service utilization for Medicare beneficiaries who visited DCs and those who visited other types of physicians. The results indicated that chiropractic care could reduce Medicare costs. Medicare beneficiaries who had chiropractic care had an average Medicare payment of $4426 for all Medicare services. Those who had other types of care had an average of $8103 Medicare payment for all Medicare services. The per claim average payment was also lower with chiropractic patients having an average of $133 per claim and individuals who did not have chiropractic care had an average of $210 per claim.

"Utilization, Cost, and Effects of Chiropractic Care on Medicare Program Costs" Muse and Associates. American Chiropractic Association 2001.

A comparison of chiropractic patients and medical/osteopathic patients in insurance plans that do not restrict chiropractic or medical benefits showed substantial savings for patients receiving chiropractic care. This retrospective study found that the total adjusted cost difference ranges from $291 to $1,722 over a two-year 69L74:D

Stano M. "Further Analysis of Health Care Costs for Chiropractic and Medical Patients." Journal of Manipulative and Physiological Therapeutics, Volume 17, Number 7, September 1994, Pages 442-446.

Comparison demonstrates that (i) a significant reduction was seen in the number of claimants requiring compensation days when chiropractic care was chosen, (ii) fewer compensation days were taken by claimants who chose chiropractic care, (iii) more patients progressed to chronic status when medical care was chosen, and (iv) the average payment per claim was great with medical management.

The financial and social savings inherent in the chiropractic approach could be maximized by: (i) an increased participation rage by chiropractors in the Work Care systems, and (ii) increased early referral of claimants with MLBP [mechanical low-back pain] by medical practitioners to chiropractors.

Ebrall PS. "Mechanical Low-Back Pain: A Comparison of Medical and Chiropractic Management within the Victorian WorkCare Scheme," Chiropractic Journal of Australia, Volume 22, Number 2, June 1992, Pages 47-53.

The low cost impact of chiropractic is due not to its low rate of use, but to its apparently offsetting impacts on costs in the face of high rates of utilization. Chiropractic is a growing component of the health care sector, and it is widely used by the population. Formal studies of the cost, effectiveness, or both of chiropractic, usually measured against other forms of treatment, show it to compare favorably with them. By every test of cost and effectiveness, the general weight of evidence shows chiropractic to provide important therapeutic benefits, at economical costs. Additionally, these benefits are achieved with apparently minimal, even negligible impacts on the costs of health insurance. The conclusion of this analysis is that chiropractic mandates help make available health care that is widely used by the American public and has proven to be cost-effective.

Schifrin LG. Mandated Health Insurance Coverage for Chiropractic Treatment: An Economic Assessment, with Implications for the Commonwealth of Virginia. The College of William and Mary, Williamsburg, Virginia, and The Medical College of Virginia, Richmond, Virginia, January 1992.

This study looked at 1.7 million health plan members with nearly identical benefits. The only exception was that 700,000 of the members had access to chiropractic care, the remainder did not.

Participants who utilized chiropractic care were shown to have between a 12% and 28% reduction in health care costs verses traditional medical care. The results suggested that systemic access to chiropractic care may prove to be not only clinically beneficial, but can reduce key cost factors that drive up employer health costs in traditional care settings.

Legorreta AP, Metz, RD, et al. Comparative Analysis of Individuals With and Without Chiropractic Coverage. Patient Characteristics, Utilization, and Costs. Archives of Internal Medicine, Oct, 11, 2004.

Low back pain initiated with a doctor of chiropractic (DC) saves 40 percent on health care costs when compared with care initiated through a medical doctor (MD), according to a study that analyzed data from 85,000 Blue Cross Blue Shield (BCBS) beneficiaries in Tennessee over a two-year span. The study population had open access to MDs and DCs through self-referral, and there were no limits applied to the number of MD/DC visits allowed and no differences in co-pays. Researchers estimated that allowing DC-initiated episodes of care would have led to an annual cost savings of $2.3 million for BCBS of Tennessee. They also concluded that insurance companies that restrict access to chiropractic care for low back pain treatment may inadvertently pay more for care than they would if they removed such restrictions.

Liliedahl RL, Finch MD, Axene DV, Goertz CM. Cost of care for common back pain conditions initiated with chiropractic doctor vs medical doctor/doctor of osteopathy as first line physician: experience of one Tennessee-based general health insurer. J Manipulative Physiol Ther. 2010;33:640–643.

"Chiropractic care appeared relatively cost-effective for the treatment of chronic low-back pain. Chiropractic and medical care performed comparably for acute patients. Practice-based clinical outcomes were consistent with systematic reviews of spinal manipulative efficacy: manipulation-based therapy is at least as good as and, in some cases, better than other therapies."

Haas, Mitchell et al. Cost-Effectiveness of Medical and Chiropractic Care for Acute and Chronic Low Back Pain. Journal of Manipulative & Physiological Therapeutics , Volume 28 , Issue 8 , 555 - 563

Findings from a Medicaid pilot project in Rhode Island involving recipients who were referred for CAM co-management (including chiropractic, massage, and acupuncture) demonstrated:

- Prescriptions declined from 70% pre-referral to 26% post-referral; in particular opioid use declined from 8% pre-referral to 1% post-referral.
- Emergency-room visits declined from 7.57 visits pre-referral to 2.98 visits post-referral.
- Average pre-referral claims costs were $19,456.59 per enrollee; post-referral claims costs declined to $14,150.7.
- Ninety two percent "agree or strongly agree their CAM provider reduced their pain level"; 82% "believe their quality of life has improved by participating"; and 96% "would recommend the program to friends or family suffering from chronic pain or fatigue."

Advanced Medicine Integration Group, L.P. Presentation to Rhode Island Department of Health, November 2016.

"Healthcare plans that formally incorporate chiropractic typically realize a 2:1 return for every dollar spent."

FeldmanV. Return on investment analysis of Optum offerings — assumes Network/UM/Claims services; Optum Book of Business Analytics 2013. Analysis as of 12/8/2014.

"Low back pain care initiated with a doctor of chiropractic (DC) saves 40 percent on health care costs when compared with care initiated through a medical doctor (MD)."

Liliedahl RL, Finch MD, Axene DV, Goertz CM. Cost of care for common back pain conditions initiated with a chiropractic doctor vs medical doctor/ doctor of osteopathy as first line physician: experience of one Tennessee-based general health insurer. J Manipulative Physiol Ther. 2010;33:640–643.

CHIROPRACTIC AS A COMPONENT OF MEDICAL MANAGEMENT

The Ontario Ministry of Health has funded a study to determine the value of MD/DC collaboration in the management of lower back pain. Study participants were evaluated by their primary care physician and also by a chiropractor, in the same office. Physicians and chiropractors partnered to discuss decision making for; appropriateness of advanced imaging, specialist referral, patient education/ self-management and care plans.

- High patient satisfaction (94 percent of patients said they were "very satisfied" or "satisfied") with care.
- High provider satisfaction. All physicians made reference to the value in referring LBP patients to the consulting DC assessment.
- The majority of physicians perceived the consulting chiropractor's assessment and management of LBP as being of higher quality than physicians.
- Increased patient confidence in diagnosis and treatment options.
- Decrease in referrals for imaging and specialists (71 percent of physicians reporting).

Endicott, A. Working with MD's to Treat Back Pain, Dynamic Chiropractic, Vol. 30:20, September 2012.

There is a growing amount of interest in Chiropractic care within the allopathic model of healthcare. Branson reports 74% of respondents favored the addition of complementary medicine into a Minnesota hospital system.

Branson RA, Hospital-based chiropractic integration within a large private hospital system in Minnesota: a 10-year example. J Manipulative Physiol Ther. 2009 Nov-Dec;32(9):740-8. doi: 10.1016/j.jmpt.2009.10.014.

"...for the management of low-back pain, chiropractic care is the most effective treatment, and it should be fully integrated into the government's health care system."

Manga P, Angus D, et al. The Effectiveness and Cost-Effectiveness of Chiropractic Management of Low-Back Pain. The Ontario Ministry of Health, Ottawa, Ontario, Canada, August 1993.

The American Medical Association goes on record endorsing chiropractic care in a patient information synopsis: "Many treatments are available for low back pain… people benefit from chiropractic therapy."

Denise M. Goodman, Alison E. Burke, Edward H. Livingston. Low Back Pain. JAMA. 2013;309(16):1738.

Chiropractic co-management of DOD recipients shows significant improvement and high patient satisfaction.

Green BN, et al. Integration of Chiropractic Services in Military and Veteran Health Care Facilities: A Systematic Review of the Literature. Journal of Evidence-Based Complementary & Alternative Medicine. 2016 Apr;21(2):115-30.

A report from the FDA regarding the management of chronic pain concluded: "Non-pharmacologic therapies, including chiropractic, should be used"

> *FDA Education Blueprint for Health Care Providers Involved in the Management or Support of Patients with Pain. May 2017. Accessed on May 12, 2017*

Regarding the management of chronic pain, a prescribing guideline from the CDC concluded: “Nonpharmacologic therapy and nonopioid pharmacologic therapy are preferred"

> *Dowell D, Haegerich TM, Chou R. CDC Guideline for Prescribing Opioids for Chronic Pain- United States, 2016. MMWR Recomm Rep 2016;65(No. RR-1):1–49.*

The 2018 Joint Commission Guideline enhanced the pain assessment and management requirement for hospitals to include “nonpharmacologic pain treatment modalities” that were defined in 2015 to include “chiropractic therapy”.

> *The Official Newsletter of The Joint Commission. Joint Commission Enhances Pain Assessment and Management Requirements for Accredited Hospitals. July 2017 Volume 37 Number 7. Ahead of print in 2018 Comprehensive Accreditation Manual for Hospitals.*

> *Joint Commission Online. Revision to Pain Management Standards. http://www.jointcommission.org/assets/1/23/jconline_november_12_14.pdf*

In a measure to help control opioid use disorders, 37 state Attorney’s General suggested that PCP’s prescribe non-opioid alternatives including chiropractic.

> *Attorney General Janet Mills Joins 37 States, Territories in Fight against Opioid Incentives. Accessed 9/19/17 from http://www. maine.gov/ag/news/article. shtml?id=766715*