Structural problems of the spine do not necessarily require intervention

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Introduction

This commentary focuses on the following non-severe structural problems of the spine typically encountered by the chiropractor: cervical kyphosis, degeneration of the vertebrae, disc problems (herniation and degeneration), head tilt, slight misalignment (less than a luxation), and scoliosis (20 degrees or less). The phrase "structural problems of the spine" or *SPOTS*, is used here to describe these non-severe structural conditions.

A number of health care professions address SPOTS. Sometimes SPOTS is severe enough to require intervention but often times it is moderate or slight and the indications for intervention may not be clear. The notion that SPOTS can be innocuous is not new. The founder of chiropractic, Dr. D.D. Palmer, wrote in 1910 that "hunchbacks are as free of disease, or more so and as frequently live to a ripe old age as the ordinary."[1]

Often times SPOTS requires attention if it is severe i.e., in the case of severe scoliosis[2,3] and severe disc problems, i.e., those which debilitate the patient and may require surgery.[4] This article does not pertain to conditions that are severe, but rather to the non-severe structural problems, that is, those typically not requiring medical care (i.e., a scoliosis angle of 20 degrees). The purpose of this article is to remind the chiropractor that a patient with non-severe structural problems of the spine (SPOTS) does not necessarily require intervention.

Some chiropractors may opine that non-severe structural problems of the spine *do* automatically cause some type of dysfunction in the patient, as suggested below:

> "It should be well understood to any first year chiropractic student, medical student, bricklayer, or aerospace engineer that structure dictates function. This is true regardless of the field of study. However, for some reason, in applying this knowledge in clinical healthcare for human beings, something is lost in the translation. Why is it so difficult to see that unless the structure of the spinal column and the nervous system inside is as close to biomechanical normal position as possible, the function of said human being *will* not be optimal?"[5] [emphasis added]

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SPOTS either always causes malfunction or it does not. If it does not, then it is not enough for a chiropractor palpating a high transverse process in the thoracic spine, for example, to automatically conclude that there is a consequential dysfunction due to SPOTS.

A limited search of the literature was conducted primarily via the following internet sites: Pubmed, Google, Index to Chiropractic Literature and the electronic library through Nova Southeastern University. The following keywords were used for the search: *spinal degeneration, spinal disc, head tilt, cervical lordosis, cervical kyphosis, misalignment*, and *scoliosis*. Articles, primarily from peer-reviewed sources, were included if they discussed one or more of the SPOTS conditions identified with an imaging procedure (i.e., x-ray, MRI) along with associated health problems or lack thereof. At a minimum, the four most recent available articles between 2000 and 2005 for each condition were used. In this review, *health problems* refers primarily to any of the following outcomes: pain, disability, perceived health problems (evidenced with a health survey), and neurological dysfunction. Although other types of health problems or dysfunctions may be caused by SPOTS, these outcomes were selected as *health problems* because they were typically the outcomes the literature discussed in relation to SPOTS. Under the *scoliosis* heading, *scoliosis-related symptoms and conditions* were added as health problems because of effects that severe scoliosis (i.e., curvature greater than 75 degrees) causes (i.e., on the heart and lungs). Older articles were included if they contributed in a substantial way, i.e. a study as Part 1 of 2, or a classic study. The following are the results, by conditions.

Degeneration

Borenstein[6] makes a strong correlation between the absence of back pain and the absence of osteoarthritis of the facets A similar notion is advanced by Gerbino and d'Hemecourt[7] while Gore[8] states that degenerative changes at C6–C7 are predictive for neck pain. Peterson et al.[9] found that there was a correlation between trauma and articular facet degeneration, but found no differences in pain and disability between trauma and non-trauma patients. Similarly, van der Donk, et al.[10] found that osteoarthritis of the facet joints was unrelated to neck pain but personality traits were. Jensen et al.[11] also raise doubt as to whether facet degeneration always causes back pain; they found that in a population of 98 asymptomatic people, 8% had degeneration. A prospective study of 148 veterans[12] found that depression was more of a factor for low back pain than degeneration of the spine. In addition, degeneration in the spine is thought to be a normal part of aging and is mostly an asymptomatic phenomenon.[13] Peterson, et al.[14] concluded that there is no difference in pain and disability in patients with versus without degeneration in the cervical spine and Luoma et al.[15] found that degeneration from a transitional vertebra is unrelated to low back pain.

Disc

Porchet et al.[16] found that approximately 90% of sciatic patients had a spinal disc problem while nearly 10% did not have a disc problem. Furthermore, these authors found that pain scale and physical function health surveys correlated positively with the severity of the disc disease. Similarly, disc space narrowing has been associated with low back pain.[17] Young and Young[18] state that degenerative disc disease is a common cause of low back pain (LBP) in young patients. Kjaer et al.[19] concluded, in regard to LBP that disc degeneration is common and is sometimes related to low back pain and that protrusion of the disc, changes in the endplate, and lumbar anterolisthesis is "strongly associated with seeking care for LBP." Iwamoto, et al.[20] also found that among high school and college football players, spondylolysis, disc space narrowing and spinal instability are significant factors related to low back pain. This finding is similar to the finding of Pye et al.[21] who link disc space narrowing with back pain. Ernst, et al.[22] however found that asymptomatic persons (n = 30) had focal protrusions of the disc and annular tears as discovered on MRI. Similarly, Jensen et al.[11] found that in a population of 98 asymptomatic people, 52% had at least one level where there was a disc bulge. In a study of 36 fast bowlers in the game of cricket,[23] there was a higher incidence of degenerative lumbar discs when compared to 17 controls. However, one of this study's conclusions is that the association of imaging findings and morbidity is not clear.

Hollingworth et al.[24] note that herniation of the disc and root compression are associated with low back pain yet they also report that "significant proportions of asymptomatic subjects have disc herniation and neural compromise." Peculiarly, these authors stated that "patients with radiological evidence of neural impingement reported *bet-*

ter (emphasis added) general health ($p < 0.01$)." The study by Jensen et al.[10] found that slightly more than half (52%) of 98 asymptomatic persons had a bulging disc according to MRI examinations. As well, Boos et al.[25] found that physical and mental aspects of a person's job are a stronger predictor of low back pain than MRI findings of disc aberrations. Boden et al.[26] found that one-third of 67 persons who never had sciatica, low back pain or neurogenic claudication had a "substantial abnormality" such as the herniated disc, for-aminal stenosis, bulging of disc, and degeneration of the disc. In a follow up study to Boden et al.[26], Borenstein, et al.[27] found that MRI was not predictive of LBP. In another study , low back pain was present in 42% who had at least one radiological abnormality but low back pain was also present on 44% who did *not* have a radiological abnormality.[28] Similarly, Remes et al.[29] found no correlation between the Oswestry Disability Index disability scores and abnormal lumbar findings on MRI. Luoma et al.[30] found that low back pain was significantly related to degeneration of the disc though they admit that "in most studies the temporal relationship between the radiologic findings and the symptoms is obscure."

In a study on neck pain, MRI findings were present in a group with and without neck pain.[32] Herniated disc however was found to significantly correlate with the neck pain in this study. Videman et al.[32] found that the sensitivity of MRI findings of annular tears and disc height narrowing are "poor" and that these types of findings by themselves are of limited value.

Misalignment

There is controversy as to whether slight misalignments of the spine automatically require treatment. There is literature that supports chiropractic subluxation[33–35] but affirmation was also found for the notion that slight vertebral misalignments, such as those that are *part* of a chiropractic subluxation,[36] do not always result in neurological dysfunction.[37–39] If there is only a misalignment present, without neurological dysfunction, then a chiropractic subluxation would not be present, and the misalignment should therefore be left alone.[40] Even if thoracic intervertebral foramina are encroached, neural involvement would still be unlikely.[35]

Scoliosis

There is controversy as to whether mild scoliosis of the spine such as the one shown in Figure 1[41] automatically requires treatment. In a study of 464 consecutive military recruits, half of whom had low back pain, Steinberg et al.[42] found that there was an increase frequency in those with low back pain in right-sided scoliosis, sacral lumbarization, lumbar lordosis, wedge vertebra, bilateral spondylolysis of L5 and/or a diameter of less than 12 mm in the sagittal plane. Health problems related to scoliosis (i.e., difficulty breathing) increase as the curvature increases. Curves less than 20 degrees, however, do not require intervention except for observing.[3,43–47]

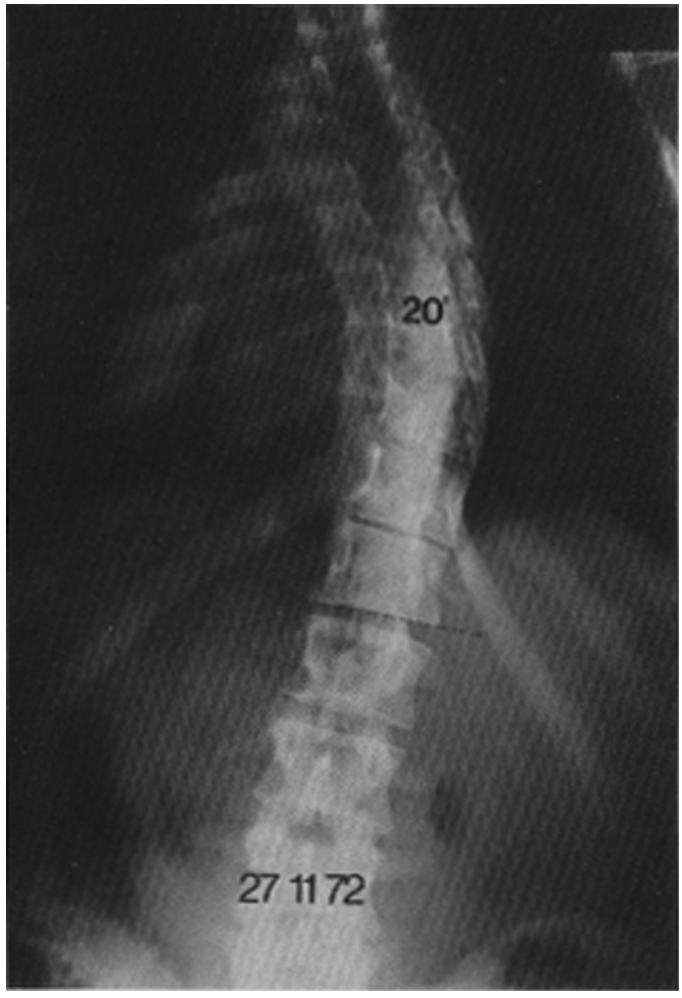

Figure 1 *Example of a 20 degree spinal curve*.[41]

Cervical Kyphosis and Head Tilt

It became apparent while searching with the use of the

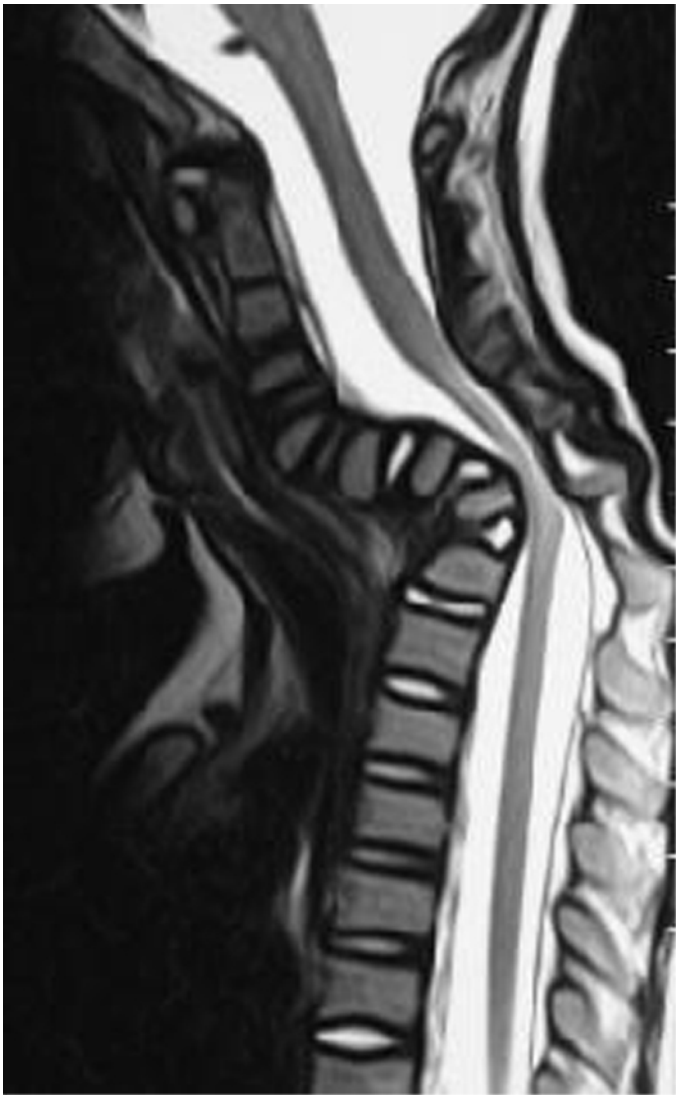

Figure 2 *Cervical kyphosis with cord compression.*[48]

keywords of the category, *cervical kyphosis*, that the literature showed severe cases of cervical kyphosis, such as that seen in Figure 2.[48] The severe kyphosis in Figure 2 is not typically seen in the chiropractor's office. Consequently, literature on *mild to moderate* cervical kyphosis, as typically seen in the chiropractor's office, is sparse, as is literature on head tilt. McAviney et al.[49] found a statistically significant relationship between a loss of cervical lordosis and neck pain. Gore[50] however, states that a loss of cervical lordosis is not predictive of neck pain. Head tilt in one case was thought to be the result of faulty eye muscles and the body's way of keeping the eyes horizontal.[51]

Discussion

Most of the literature cited here supports the notion that SPOTS does not automatically require intervention. The notion that all patients with SPOTS have or will have health problems is flawed because the literature cited here does not support such a notion.

Intervening in a condition that may not require intervention is to invite the possibility that the costs of the intervention might outweigh the benefits. That is, all interventions carry a risk but if the potential benefits outweigh the potential risks, then it may be reasonable to proceed with the intervention. On the other hand, if there are no known benefits of the intervention, e.g., no functional improvements by realigning a vertebra or correcting an "abnormal" spinal curvature, the scale weighs heavy on the potential risk side and intervention may be inadvisable.

If by *function* we are referring to symptoms and/or nerve dysfunction, then it seems the axiom, *structure dictates function* is not applicable to all cases. For the chiropractor focusing on symptoms, or for the one focusing on vertebral subluxation, it is not a foregone conclusion that SPOTS is related to the functional health outcome (of symptoms or nerve dysfunction). As Kaiser and Holland note, "the presence of an imaging study abnormality does not automatically imply causality."[52] Technologies and/or examination methods that provide information as to whether SPOTS and dysfunction are linked in a given patient would help the chiropractor correctly decide when and when not to intervene. For example, the chiropractor focusing on nerve function could use relevant technology (i.e., thermography, heart rate variability), while becoming cognizant, through research, about the likelihood that a given abnormal neurological finding is related to SPOTS in a given patient. Conversely, if such technology indicated *normal* nerve function, then no intervention would be indicated even if SPOTS (i.e., a high transverse process palpated in the thoracic spine) was present.

Summary

We as a profession need to have reliable and valid methods to determine when SPOTS requires intervention, and perhaps more importantly, when it does not. Information

that helps the chiropractor to correctly decide when *not* to intervene will help improve quality of patient care.

References

1 Palmer DD. The Chiropractor's Adjuster. Portland, OR: Portland Printing House; 1910.
2 Greiner KA. Adolescent idiopathic scoliosis: radiologic decision-making. *Am Fam Physician* 2002, 65:1817–22.
3 How serious is scoliosis? Retrieved 12–5-05 from University of Maryland: http://www.umm.edu/patiented/articles/how_serious_scoliosis_000068_4.htm
4 Bertagnoli R, Yue JJ, Shah RV, Nanieva R, Pfeiffer F, Fenk-Mayer A, Kershaw T, Husted DS. The treatment of disabling single-level lumbar discogenic low back pain with total disc arthroplasty utilizing the Prodisc prosthesis: a prospective study with 2-year minimum follow-up. Spine 2005; 30:2230–2236.
5 Haas J. Clinical Biomechanics of Posture and Rehabilitation Protocols. Retrieved October 21, 2005 from American Journal of Clinical Chiropractic [Electronic Version] http://www.idealspine.com/pages/AJCC/AJCC_new/July2002/hassCBP_protocols.html
6 Borenstein DG. Does osteoarthritis of the lumbar spine cause chronic low back pain? Curr Pain Headache Rep 2004; 8:512–517.
7 Gerbino PG, d'Hemecourt PA. Does football cause an increase in degenerative disease of the lumbar spine? Curr Sports Med Rep 2002; 1:47–51.
8 Gore D. Roentgenographic findings in the cervical spine in asymptomatic persons. Spine 2001; 26:2463–2466.
9 Peterson CK, Bolton JE, Wood AR. A cross-sectional study correlating lumbar spine degeneration with disability and pain. Spine 2000; 25(2):218–23.
10 van der Donk J, Schouten JS, Passchier J, van Romunde LK, Valkenburg HA. The associations of neck pain with radiological abnormalities of the cervical spine and personality traits in a general population. J Rheumatol 1991; 18:1884–9.
11 Jensen MC, Brant-Zawadzki MN, Obuchowski N, Modic MT, Malkasian D, Ross JS. Magnetic resonance imaging of the lumbar spine in people without back pain. N Engl J Med 1994; 331:69–73.
12 Jarvik JG, Hollingworth W, Heagerty PJ, Haynor DR, Boyko EJ, Deyo RA. Three-year incidence of low back pain in an initially asymptomatic cohort: clinical and imaging risk factors. Spine 2005; 30(13):1541–8.
13 Roh JS, Teng AL, Yoo JU, Davis J, Furey C, Bohlman H. Degenerative disorders of the lumbar and cervical spine. Orthop Clin North Am 2005; 36:255–62.
14 Peterson C, Bolton J, Wood AR., & Humphreys BK. A cross-sectional study correlating degeneration of the cervical spine with disability and pain in United Kingdom patients. Spine 2003; 28(2):129–133.
15 Luoma K, Vehmas T, Raininko R, Luukkonen R, Riihimäki H. Lumbosacral transitional vertebra: relation to disc degeneration and low back pain. Spine 2004; 29(2):200–205.
16 Porchet F, Wietlisbach V, Burnand B, Daeppen K, Villemure JG, Vader JP. Relationship between severity of lumbar disc disease and disability scores in sciatica patients. Neurosurgery 2002; 50:1253–9.
17 Hassett G, Hart DJ, Manek NJ, Doyle DV, Spector TD.Risk factors for progression of lumbar spine disc degeneration: the Chingford Study. Arthritis Rheum 2003; 48(11):3112–7.
18 Young JP, Young PH. Degenerative disc disease in childhood and adolescence. Mo Med 2005; 102(1):70–2.
19 Kjaer P, Leboeuf-Yde C, Sorensen JS, Bendix T. An epidemiologic study of MRI and low back pain in 13-year-old children. Spine 2005; 30(7):798–806.
20 Iwamoto J, Abe H, Tsukimura Y, Wakano K. Relationship between radiographic abnormalities of lumbar spine and incidence of low back pain in high school and college football players: a prospective study. Am J Sports Med 2004; 32(3):781–6.
21 Pye SR, Reid DM, Smith R, Adams JE, Nelson K, Silman AJ, O'Neill TW.Radiographic features of lumbar disc degeneration and self-reported back pain. J Rheumatol 2004; 31(4):753–8.
22 Ernst CW, Stadnik TW, Peeters E, Breucq C, Osteaux MJ. Prevalence of annular tears and disc herniations on MR images of the cervical spine in symptom free volunteers. Eur J Radiol 2005; 55:409–14.
23 Ranson CA, Kerslake RW, Burnett AF, Batt ME, Abdi S. Magnetic resonance imaging of the lumbar spine in asymptomatic professional fast bowlers in cricket. J Bone Joint Surg (Br) 2005; 87(8):1111–1116.
24 Hollingworth W, Dixon AK, Todd CJ, Bell MI, Antoun NM, Arafat Q, Girling S, Karia KR, Laing RJ. Self reported health status and magnetic resonance imaging findings in patients with low back pain. Eur Spine J 1998; 7:369–75.
25 Boos N, Semmer N, Elfering A, Schade V, Gal I, Zanetti M, Kissling R, Buchegger N, Hodler J, Main CJ. Natural history of individuals with asymptomatic disc abnormalities in magnetic resonance imaging: predictors of low back pain-related medical consultation and work incapacity. Spine 2000; 25(12):1484–92.
26 Boden SD, Davis DO, Dina TS, Patronas NJ, Wiesel SW. Abnormal magnetic-resonance scans of the lumbar spine in asymptomatic subjects. A prospective investigation. J Bone Joint Surg (Am) 1990; 72:403–408.

27 Borenstein DG, O'Mara JW Jr, Boden SD, Lauerman WC, Jacobson A, Platenberg C, Schellinger D, Wiesel SW. The value of magnetic resonance imaging of the lumbar spine to predict low-back pain in asymptomatic subjects: a seven-year follow-up study. J Bone Joint Surg (Am) 2001; 83-A: 1306–11.
28 Iwamoto J, Abe H, Tsukimura Y, Wakano K. Relationship between radiographic abnormalities of lumbar spine and incidence of low back pain in high school rugby players: a prospective study. Scand J Med Sci Sports 2005; 15(3):163–8.
29 Remes VM, Lamberg TS, Tervahartiala PO, Helenius IJ, Osterman K, Schlenzka D, Yrjonen T, Seitsalo S, Poussa MS. No correlation between patient outcome and abnormal lumbar MRI findings 21 years after posterior or posterolateral fusion for isthmic spondylolisthesis in children and adolescents. Eur Spine J 2005; 14(9):833–42.
30 Luoma K, Riihimäki H, Luukkonen R, Raininko R, Viikari-Juntura E, Lamminen A. Low back pain in relation to lumbar disc degeneration. Spine 2000; 25(4):487–492.
31 Siivola SM, Sinikka L, Osmo T, Eero I, Heikki V, Sirkka K. MRI changes of cervical spine in asymptomatic and symptomatic young adults. Euro Spine J 2002; 11(4):358–363.
32 Videman T, Battié M, Gibbons L, Maravilla K, Manninen H, Kaprio J. Associations between back pain history and lumbar MRI findings. Spine 2003; 28(6):582–588.
33 Dishman R. Review of the literature supporting a scientific basis for the chiropractic subluxation complex. J Manipulative Physiol Ther 1985; 8(3):163–174).
34 Gatterman. M. Foundations of Chiropractic: Subluxation. St. Louis: Mosby; 2005.
35 Leach R. The Chiropractic Theories. Hagerstown, MD: Lippincott Williams & Wilkins; 2003.
36 The Subluxation. Retrieved 11–16–05 from Association of Chiropractic Colleges: http://www.chirocolleges.org/paradigm_scopet.html
37 Hart JF. Persistence of vertebral misalignments detected on radiographs of the cervical spine during chiropractic care: a case study. J Vertebral Subluxation Research 1997; 1(4):49–53.
38 Hart JF, Boone WR. Pattern analysis of paraspinal temperatures: a descriptive report. J Vertebral Subluxation Research 1999–2000; 3(4):1–8.
39 Erikson K, Owens EF. Upper cervical post x-ray reduction and its relationship to symptomatic improvement and spinal stability. Chiro Res J 1997; 4(1):10–17.
40 Palmer BJ. Chiropractic Clinical Controlled Research. Hammond, IN: W. B. Conkey Company; 1951.
41 James JP. Scoliosis. New York: Churchill-Livingstone, p. 289, 1976.
42 Steinberg EL, Luger E, Arbel R, Menachem A, Dekel S.A comparative roentgenographic analysis of the lumbar spine in male army recruits with and without lower back pain. Clin Radiol 2003; 58(12):985–9.
43 What are the general guidelines for treating scoliosis? Retrieved 12-5-05 from University of Maryland: http://www.umm.edu/patiented/articles/what_general_guidelines_treatin g_scoliosis_000068_7.htm
44 Questions and Answers about Scoliosis in Children and Adolescents. Retrieved 12–5-05 from National Institutes of Health: http://www.niams.nih.gov/hi/topics/scoliosis/scochild.htm
45 Screening for Adolescent Idiopathic Scoliosis. Retrieved 12–5-05 from Columbia University: http://cpmcnet.columbia.edu/texts/gcps/gcps0057.html
46 Scoliosis. Retrieved 12-5-05 from University of Michigan: http://www.med.umich.edu/11ibr/sma/sma_scolio_hhg.htm
47 Management and treatment. Retrieved 12-5-05 from University of Washington: http://www.orthop.washington.edu/uw/scoliosis/tabID_3347/ItemID_264/PageID_7/Articles/Default.aspx
48 Katz D, Hall J, Emans JB. Cervical kyphosis associated with anteroposterior dissociation and quadriparesis in Larsen's Syndrome. J Pediatr Orthop 2005; 25(4):429–433.
49 McAviney J, Schulz D, Bock R, Harrison DE, Holland B.Determining the relationship between cervical lordosis and neck complaints. J Manipulative Physiol Ther. 2005; 28(3):187–93.
50 Gore D. Letters. Spine 2002; 27(11):1249–1250.
51 Cooeperstein R. Normal, ideal, and optimal spines. Dyn Chiro 2005, 23(24). [Electronic version]. Retrieved 4-30-06 at: http://www.chiroweb.com/archives/23/24/05.html
52 Kaiser JA, Holland BA. Imaging of the cervical spine. Spine 1998; 23:2701–12.