

Manual Medicine and Heart Disease

Karen Erickson, DC

Manual Medicine includes chiropractic, massage therapy, craniosacral therapy. Compared to surgery and medication, these therapies are safe and can be easily included as part of an integrative approach to heart disease and related cardiovascular conditions including high blood pressure and stress.

The heart is often referred to as the seat of the soul. Most people agree that human touch can soothe the soul and help heal the body. It is well documented that the human touch is a basic human need and is itself therapeutic. Babies who are not touched at birth and infancy fail to thrive. Throughout history humans have used hands to heal. Modern manual therapy techniques have combined scientific knowledge with the art of hands on healing to create effective therapies. Manual therapies have a therapeutic effect on blood and lymphatic circulation, the nervous system, immune system, endocrine system, as well as organ function.

Human touching releases endorphins, the natural hormones that reduce pain and induce a sense of well being. Candice Pert, PhD demonstrated in her revolutionary research that receptors for endorphins, the natural pain relieving substances produced by the body, are present in all tissues and can be stimulated in part, by touch. Imagine that even holding someone's hand could have a healing affect on them. Dr. Pert's work has changed the way we think about the mind, emotions and the body and introduced evidence for the body- mind connection.

Don't miss out on the benefits that chiropractic, massage and craniosacral therapy can bring to patients with heart disease. It is important to understand its role as part of a comprehensive integrated team of practitioners including a medical doctor and/or cardiologist, nutritionist, exercise specialist, and even psychological support.

Chiropractic and Heart Disease

Chiropractic is the largest health care service in the United States after medicine and dentistry. Chiropractic was developed over 100 years ago, and is now licensed in all 50 states and many countries around the world. It is a benefit of Medicare and many other insurance carriers.

There are different styles of chiropractic and most use a combination of techniques based on the needs of the patient. It is important to look until you find the right Doctor of Chiropractic for you and your condition. Most chiropractors do osseous adjustment to subluxations of the spine that can help restore motion and flexibility, modulate the nervous system, and help relax muscles. Some chiropractors include low force or non-force techniques that can realign the spine gently. Chiropractors often do myofascial release or muscle work, and can do it by hand or use physical therapies like ultrasound, cold laser, and electric muscle stimulation to relax muscles, improve circulation and decrease inflammation. Some chiropractors include exercise, nutrition, orthotics, and lifestyle modification in their recommendations. You can find a qualified and experienced chiropractor in your area by contacting the American Chiropractic Association or ACA at: <http://www.amerchiro.org> or call: 703 276 8800.

Chiropractic is concerned with the relationship between structure and function of the body. Chiropractic restores normal function to the spinal joints, and has a modulating effect on the spinal nerves and autonomic nervous system. It is thought that this modulating effect on the

nervous system is the mechanism that chiropractic has its effect on the heart and cardiovascular system. Most patients report feels profoundly relaxed and energized after receiving a chiropractic adjustment. Research shows chiropractic helps reduce stress by reducing the body's production of cortisol, (1). Chiropractic reduces pain, increase flexibility, and increase relaxation. Chiropractic can allow the patient to exercise more easefully, which may help reduce blood pressure and improve cardiac output.

Chiropractic and Blood Pressure/Hypertension

Research shows chiropractic may help lower blood pressure, at least temporarily. (2),(3), (4). There are several case studies in the chiropractic and osteopathic literature demonstrating a permanent reduction of blood pressure with ongoing chiropractic care, along with lifestyle changes, (5), (6), (7). The biggest changes in Pre and post adjustment BP was in people with values greater than 90mm hg Diastolic and 130mmHG systolic. Patients with normal blood pressure showed a statistically significant decrease in systolic and diastolic blood pressure in the group receiving chiropractic, but not in the control group, (8).

Some patients were able to decrease or slowly discontinue their medication under medical supervision while maintaining normal blood pressure. This can reduce the cost of care and reduce the risk of side effects of medication, (9). Since chiropractic can reduce blood pressure in some patients, it is important to monitor your blood pressure on a regular basis and work closely with your physician to manage your medication dosage.

Spinal manipulation might lower blood pressure via an autonomic reflex action lowering the aldosterone level directly, or decreasing peripheral resistance, and lowering blood pressure. In one study C2, T9 and L5 were adjusted in hypertensive patients 10 times, 72 hours apart. Aldosterone was reduced as well as blood pressure. The reduction in blood pressure was not sustained, but aldosterone levels increased only slightly and did not return to pre-study levels, (10). As demonstrated by some case studies, longer term chiropractic care as part of an integrative approach may be necessary to help have the lower aldosterone decrease sodium levels, thereby reducing blood pressure.

Spinal Misalignment at Different Levels: Different Effects on the Cardiovascular System?

Adjusting is done at the spine level needed by the patient, and is not based on a predetermined prescription. Your chiropractor will examine you carefully and palpate and adjust the spinal misalignments detected at each visit. However, misalignment of certain vertebrae may be common in patients with certain health conditions.

For example, one study showed a strong correlation between misalignment/subluxation/segmental dysfunction of the C6, T2, and T6 vertebrae and grade 2 or higher hypertension, (13). Other studies looked at misalignments of the upper cervical, upper thoracic, particularly T2-3, and the lower thoracic, T11-12 areas and found they were often present in patients with hypertension(14). Adjusting T1-5 on 21 patients with elevated blood pressure significantly decreased systolic and diastolic blood pressure in the treatment group compared to a placebo group and a no treatment group, (15). It is unlikely that there is a direct cause or effect, but it points to the complex relationship between the spine or somatic system, the cardiovascular system, and the nervous system. Adjusting may help lower blood pressure by reducing sympathetic neuronal discharge due to subluxation in the vertebral unit.

Left Sided Thoracic dysfunction in the T1-T5 region detected by palpation alone was 92% sensitive in predicting coronary artery disease, likely explained by the somatic sympathetic reflex

found in this region, (11). A controlled blind study of patients who suffered myocardial infarction showed paravertebral soft tissue changes clearly detectable by the palpation of the left T1-T4 area in these patients but not in the control group (12). It may be possible to use palpation of left side thoracic dysfunction as a predictive for risk of future MI.

Autonomic disturbances created by spinal joint dysfunction may play a role in initiating terminal arrhythmia via the cardiac sympathetic or vagus nerve. One theory is that a burst of autonomic outflow created by spinal joint dysfunction or subluxation (misalignment) could cause an arrhythmia or coronary spasm leading to ventricular fibrillation. Adjusting the vertebral dysfunction may help restore stable neuronal input to the heart, helping to prevent sudden cardiac death.

Different physiological responses can be elicited by adjusting different levels of the spine. For example, one study showed that adjustment to C5/C6 caused an increase in respiratory rate, heart rate and diastolic/systolic blood pressure compared to control and placebo groups, (16). The authors propose that the C5/6 adjustment has this effect by stimulating the sympathetic, and might also explain why adjustment at this level can produce analgesia or pain relief.

Patients with stage 1 hypertension in one study were divided; the group doing diet and 10 sessions of chiropractic showed a decrease in blood pressure, but the group that did dietary change alone showed an even higher drop in blood pressure, (17). The authors concluded that more than 10 session of chiropractic may be necessary to show a significant long term drop of blood pressure. Weight loss, stress management exercise and nutritional supplements (Ca, Mg, K, fish oil) High alcohol and low potassium increase BP. Even 5-10% weight loss is effective in reducing blood pressure and should be included in an integrative approach to heart disease.

The heart is supplied by Sympathetic fibers from the superior cervical ganglion and the stellate ganglion. Parasympathetic fibers are branches from the vagus nerve originating in the cranial vault. Brainstem Compression at lateral or ventral-lateral medulla oblongata has been linked to patients with essential hypertension. MRI showed neurovascular compression of the medulla in 75% of the patients with essential hypertension, but this can be present in people with normal BP also. For some patients, pulsating compression of vertebral or inferior cerebellar artery may be a cause of essential hypertension. Surgical correction of 42 patients showed relief of hypertension in 32 pts, and 4 more had improvement. May affect the IX and X cranial nerves left root entry zone. We might query if subluxation, arthritis, disc degeneration or cervical sprain/strain which can cause the cervical spine to shorten, might cause the vertebral artery to loop and press on the ventrolateral medulla activating the sympathetic (fight or flight) nervous system.

Heart Rate and Cardiac Arrhythmia

Studies show a relationship between vertebral subluxation complex, autonomic tone and cardiac function and blood pressure. Heart Rate Variability (HRV) might be a tool to evaluate the balance between the sympathetic and parasympathetic balance, (18), (19), (20). .

One case study demonstrated adjustment of the upper neck at C2 was able to resolve a patient who had trigeminal arrhythmia with underlying brachycardia or slow heart rate. The adjustment resolved the trigeminal rhythm without affecting the brachycardia.

In healthy young adults, upper cervical adjustment has been shown to decrease heart rate by a few beats per minute, (21). Upper cervical adjusting seems to activate the parasympathetic nervous system, causing slower heart rate and relaxation in general, reversing the stress or fight or flight response. Heart rate variability is also decreased by Sacro-Occipital Technique and chiropractic

manipulative reflex technique, indicative of increased parasympathetic tone, (22). The balancing of the sympathetic and parasympathetic nervous system could have a beneficial effects on overall health and stress levels.

Non Cardiac Chest Pain

Chiropractic research demonstrates reduction of non cardiac chest pain or chest pain originating from the spine and rib cage. Stable angina pectoris or CTA can be present independently of coronary heart disease. Patients with angina pectoris and a diagnosis of CTA may benefit from chiropractic. 75% of the CTA pts reported significant reduction of pain after 4 weeks of chiropractic care, and 25% of non CTA patients who had true cardiac induced stable angina pectoris reported improvement as well, (23).

Bypass Surgery, Heart Transplant, CHF

There is no research on chiropractic for patients with open heart or other chest surgeries, congestive heart failure and other COPD, asthma and bronchitis, but there are many anecdotal reports of these patients benefiting from chiropractic care and other body work techniques. Patients, who have undergone open heart surgeries or other thoracic surgeries, might develop restrictions in the thoracic spine and rib cage including soft tissue adhesions. Conditions like post MI, COPD, CHF, asthma and bronchitis, force the body to use secondary muscles of respiration to breath. These muscles around the neck, throat, shoulders and shoulder blades, in-between the ribs and diaphragm become exhausted and less effective. Chiropractic mobilizes the rib cage and thoracic joints so full range of motion, rib cage expansion, and respiration is optimized.

Clinical Pearl

One patient had elevated blood pressure despite being on two kinds of blood pressure medication. She was under stress at work, and was not exercising because of a painful lower back. She began chiropractic care and within the first 2 weeks experienced a significant reduction of low back pain. Her blood pressure was monitored pre and post adjustment by the chiropractor. A check-up with her MD showed that her blood pressure was normal again with the same dosages of medication.

After a month of weekly chiropractic adjustments, she had more flexibility and began an exercise program of walking and stretching. Over the next year, she received chiropractic care 1-2 times a month. Her medical doctor lowered her blood pressure medication after 6 months, and after a year she was taken off one medication entirely and the other dose was lowered again. Her blood pressure has remained normal on just a fraction of the original medication she was taking, diminishing the risk of side effects. She has continued to receive chiropractic adjustments once or twice a month and keeps up with her exercise program.

Massage and Heart Disease

Massage is a safe and effective healing modality for patients with heart disease. Research shows that, as part of an integrative approach to heart disease, massage can promote relaxation, decrease stress and anxiety (1), reduce heart rate (2, 3) reduce blood pressure (4, 5), increase blood and lymphatic circulation and perfusion of tissues, as well as reduce the formation of scar tissue and adhesions. Case studies have shown massage can help

regulate cardiac rhythm (6). One study showed that ongoing regular massage, even 10 minutes, 3 times a week, lowered blood pressure (7).

Massage techniques vary widely and are all effective. Explore which therapist and techniques are right for you and your condition. Massage can be relaxing, but at times tender or even painful as tight muscles are released. It is not uncommon to feel fatigued or sore the day following a massage as lactic acid is released from tight muscles. This is only a temporary discomfort and can be an indication of successful therapeutic massage. Drinking plenty of water before and the entire day after a massage will help minimize any fatigue or soreness. Guide your evaluation by how you feel during the session as well as how you feel hours and days later.

Swedish is a lighter full body massage done with massage lotion or oil. If you are allergic to nuts, make sure no nut oils are used. Myofascial release, Rolfing, sports massage, acupuncture, Shiatsu, and trigger point therapy use slightly firmer pressure. Reiki, therapeutic touch or energy healing may involve only light or no touching at all, and can be done with the patient fully dressed. For most people, foot reflexology is surprisingly relaxing even though it only involves working on the feet (8). It can be helpful for people who are recovering from surgery or in bed, or people who prefer to remain clothed. Many massage therapists combine several of these techniques to suit the needs of their patients. Essential oils can be used on the skin or as aromatherapy to enhance the massage. Be sure to use only organic essential oils, and work with someone experienced in their use.

Some diagnostic and treatment procedures for heart disease can be emotionally and physically distressing. Massage is one way to experience the body as a source of relaxation and well being (9). Massage can be helpful before or after a surgery or procedure (10), and can be helpful to patients that have become sedentary or bedridden. Whether it is a professional medical massage, a body work session, energy healing or a shoulder, scalp, foot or hand massage given by a friend or spouse, it can transform your physiology and help you regain a sense of well being.

Massage improves circulation and promotes relaxation. In particular, massage decreases cortisol levels and increases levels of serotonin and dopamine reflecting decrease stress and depression, and increase sense of well being. A 30% change in the hormone and neurotransmitters levels was seen following massage (11). Massage should be considered to combat the depression common after cardiac bypass surgery.

Deep tissue massage that involves a strong direct pressure or gliding over the skin may be contra-indicated for a period of time after surgery, or when blood thinners or other medication is being taken. However, some healing techniques are appropriate right after surgery including energy work, therapeutic touch and Reiki. These therapies involve light touch or no touch at all that can be a safe and relaxing option which can even be done in a recovery room or hospital room. One study showed use of acupuncture on a wrist meridian (continuous 24-h PC6) help stopped nausea and vomiting common after myocardial infarction (heart attack) with no side effects(12). Discuss the timing of

massage and body work with your physician. Ask your hospital staff what arrangements can be made.

Memet Oz, MD, a renowned heart surgeon at Columbia Presbyterian Hospital in New York has been a pioneer in having healers in the operating, recovery room and as part of an integrative cardiac treatment protocol. He has documented that patients receiving this integrative care recovered more quickly from anesthesia, needed less pain medication, had less post surgical complications and were released from the hospital more quickly (13).

A two year Danish study on 69 patients with angina pectoris, found the patients who received acupressure, Shiatsu and lifestyle adjustments had a significantly lower death and myocardial infarction rate (7%), compared with patients that choose surgical bypass procedures (21%) and angioplasty (15%). Patients who received the hands on therapy were able to postpone invasive procedures 61% of the time due to clinical improvement (14).

Massage can improve lymphatic flow and can relax secondary muscles of respiration which can be helpful with Congestive Heart Failure (CHF) patients to improve respiration and the labor of breathing. Although there is no research on massage and CHF, many licensed massage therapists find that working on the trapezius, levator scapulae, pectorals, rhomboids, diaphragm and anterior scalenes help patients with CHF or other respiratory conditions like asthma and bronchitis, breathe more easily. Increase oxygen intake positively impacts heart function.

You can learn more about massage and find a licensed massage therapist by contacting American Massage Therapy Association
Phone: 1-877-905-2700
Website: <http://www.amtamassage.org>

Self Massage Techniques:

<http://www.nwhealth.edu/healthy/chillout/self.html>

<http://www.full-body-massage-online.com/selfmassage.html>

http://www.holistic-online.com/massage/mas_home.html

<http://www.mynaturalharmony.com/massage.htm>

Clinical Pearls

Massage Instead of Coronary Bypass Surgery

One patient was fully worked up by his cardiologist and was recommended for Quadruple Coronary Bypass Surgery. After weighing the risks and benefits, he decided to decline the surgery. His internist recommended significant lifestyle and dietary changes and referred him to a licensed massage therapist (LMT) for weekly sessions that included Swedish massage with essential oils, foot reflexology and energy work. The patient reports that these sessions significantly reduced episodes of angina pectoris or chest pain upon exertion and given him a “sublime” level of relaxation that he never

thought was possible without sleep. This relaxation helped him comply with the arduous lifestyle changes including dietary changes and exercise.

Massage therapy before and after Heart Transplant

The wait for a heart transplant can be long and massage therapy can help the body and mind cope with the physiological and psychological/emotional stress and fear of waiting. After transplant surgery, one patient found foot reflexology and energy work done in the recovery room enabled her to bounce back from anesthesia and reduced her need for pain medication dramatically. She continued massage therapy at home once a week or more, and found that she had less scarring and adhesions than her doctors expected. She feels the relaxation she experienced helped her avoid increases in anti-rejection medication and enable her to more quickly adjust to her new life (15).

1. Learn how to do self massage and reflexology.
2. Trade massage with a spouse or friend.

You can start with shoulder, feet, scalp or hand massages. You can do this!

Craniosacral Therapy and Heart Disease

Craniosacral therapy has evolved over the past 75 years from Osteopathic and Chiropractic traditions. Craniosacral therapy addresses the relationship between the cerebral spinal fluid in the brain and spinal cord, the meningeal or Dural membranes that cover the brain and spinal cord, other connective tissue in the body, and the boney structures that the meninges and connective tissue attach to (1). The craniosacral rhythm is between 6 and 12 cycles per minute. The nervous system is surrounded by the meninges, cranium and spine. Work on these structures help modulate neurological function, particularly the balance between the sympathetic and parasympathetic parts of the autonomic nervous system (2). The autonomic nervous system assists in regulation of cardiac function, blood pressure, digestion and stress/relaxation response. Craniosacral therapy stimulates relaxation as well as circulation of the cerebral spinal fluid, blood and lymphatic fluids.

Craniosacral therapy is a safe and effective as part of an integrative approach to heart disease. This technique uses a gentle, light touch to palpate, evaluate and restore normal craniosacral rhythm. Sessions are usually an hour and are done with the patient fully clothed, lying face up on a massage table. Sometimes a pillow is placed under the knees to ease low back tension. This therapy can also be done with a patient lying in bed, or sitting if necessary. There is little research published in peer review journals on craniosacral therapy. However, the value of craniosacral therapy for patients with heart related illnesses is elucidated in countless patient and therapist anecdotes.

Many patients report a decrease in frequency and intensity of angina pectoris with regular weekly craniosacral therapy sessions. Despite the presence of coronary artery blockages which craniosacral therapy does not directly address, the relaxation and increased perfusion facilitated by this technique might account for these patients's perceived reduction in symptoms.

After a heart attack or bypass surgery, craniosacral therapists can work on the cranium, sacrum, shoulders, diaphragm, hips, legs and feet. As a precaution, hands should not be placed directly on the area of the procedure until the sutures are completely healed. After wound healing has taken place, work on the thoracic cage can help restore mobility and reduce adhesions. This

technique can also be done on the TMJ, neck and throat area which can be affected by intubation during and after surgery. Craniosacral therapy can help patients who have developed back pain from being sedentary or bedridden for prolonged periods.

Craniosacral therapy has been an effective adjunctive therapy for patients with Congestive Heart Failure. By gently improving movement in the thoracic cage, relaxing the muscles of respiration, and stimulating blood and lymphatic circulation, cranial sacral may help reduce the burden on the heart. It should be considered as part of an integrative approach, and not the sole treatment..

Most patients report a profound sense of relaxation during and after the session. Breathing usually deepens and relaxes and heart rate steadies and slows as tension in the body is eased. It is important to drink plenty of water, avoid alcohol and rest after sessions. Many patients have reported a reduction of blood pressure with ongoing sessions, perhaps because of craniosacral therapy's affect on the autonomic nervous system and relaxation response. One study showed that craniosacral therapy shortened the time it took for patients to fall asleep, by decreasing the sympathetic tone of the nervous system (which is also the part of the nervous system associated with stress) (3).

Craniosacral Therapy session sometimes reveal body-mind connections, assisting patients in somatoemotional recall and release of emotional or physical injuries stored in the body. Patients have reported remembering and releasing memories during a session that years of "talk therapy" had not uncovered.

Practitioners trained in craniosacral therapy are most commonly licensed massage therapists, chiropractors, physical therapists, and occupational therapists. Some practitioners combine cranial sacral therapy with other modalities like massage, chiropractic, visceral manipulation, lymph drainage, and somatoemotional release. Others do craniosacral therapy alone. The clinician's experience and skill is the most important factor (4), (5). The Upledger Institute and its HealthPlex Clinic in West Palm Beach Gardens, Florida is an excellent resource of therapists around the country and world. To get more information about craniosacral therapy or find a practitioner in your area, you can check their website at: <http://www.upledger.com/home.htm> or [phone 561-622-4334](tel:561-622-4334). They offer a cranial balancing device called a still point inducer that you place under your head while lying face up. It is the closest you can get to experiencing craniosacral therapy on your own, but it really doesn't compare to having a hands on session.

Clinical Pearl

Craniosacral therapy, hypertension and de-stressing a marriage

One patient had regular massage therapy sessions to help alleviate stress and get his blood pressure under control which was high despite medication. He reported that the once a week massage sessions got his blood pressure normal and stable within the first few months. The profound relaxation helped him approach his marriage differently. He rekindled his deep love and commitment and stopped an impending divorce.

Chiropractic References

1. Whelan TL, Dishman JD, Burke J, Levine S, Sciotti V. The effect of chiropractic manipulation on salivary cortisol levels. *Journal of Manipulative & Physiological Therapeutics*. 25(3):149-53, 2002 Mar-Apr.
2. Gregory Plaucher, Cynthia Long, Joel Alcantra, Alyssa Silveus, Herbert Wood, Kapildeo Lotun, Michael Menke, William Meeker, Stephen Rowe. Practice-Based Randomized Controlled- Comparison Clinical Trial of Chiropractic Adjustments and Brief Message Treatment at Sites of Subluxation in Subjects with Essential Hypertension: Pilot Study. *JMPT*. May 2002. p221-239,
3. Christine Goertz, Richard Grimm, Ken Svendsen, Greg Grandits. *Journal of Hypertension* 2002, 20:2063-2068
Celandier E. Effects of osteopathic manipulative therapy on autonomic tone as evidence by blood pressure change and activity of the fibrinolytic system. *J. Am Osteopath Assoc* 1968; 67:93-94.
4. Crawford, JP, Hickson GS, Wiles MR. the management of hypertensive disease: a review of spinal manipulation and the efficacy of conservative therapies. *JMPT*. 1986; 9:27-32.
5. Adam Spiegel, John Capobianco, Adam Kruger, Warren Spinner, Osteopathic Manipulative Medicine in the Treatment of Hypertension: An Alternative, Conventional Approach. *Heart Dis* 5(4); 272-278, 2003
6. Norris A. Study of the effect of manipulation on blood pressure. Carmel, CA; Academy of Applied Osteopathy (Yearbook) 1964; 184-188. Hood R. Blood pressure. *Dig Chiro Econ* 1974; May/June;36-38.
7. Christine Goertz, Richard Grimm, Ken Svendsen, Greg Grandits. Treatment of Hypertension with Alternative Therapies (THAT) Study: a randomized clinical trial. *Journal of Hypertension*. 2002, Vol 20, No 10. 138-143.
8. Michael McKnight and Kenneth DeBoer. Preliminary Study of Blood Pressure Changes in Normotensive Subjects Undergoing Chiropractic Care. *JMPT* 11(4) Sug 1988. 261-266.
9. Gregory Paugher and Trent Bachman. Chiropractic Management of a Hypertensive Patient. *JMPT*. 16(8) Oct 1993, 544-549.
10. Wagon RJ, Sandefur, RM Ratliff CR. Serum Aldosterone changes after specific chiropractic manipulation. *Am J. Chiro Med* 1988;1:66-70.
11. William Johnston, Albert Kelso. Changes in the Presence of a segmental dysfunction pattern associated with hypertension: Part 2. A long-term longitudinal study. *JAOA*. Vol 95(5)315-318.
12. Crawford, JP, Hickson GS, Wiles MR. the management of hypertensive disease: a review of spinal manipulation and the efficacy of conservative therapies. *JMPT*. 1986; 9:27-32.
13. Glenn Yates, Donna Lamping, Nancy Abram, Catherine Wright. Effects of Chiropractic Treatment on Blood Pressure and Anxiety: A Randomized Controlled Trial. *JMPT* 11(60 Dec 1988, 484-488.
14. Jarmel, M.J. Possible Role of Spinal Dysfunction in the Genesis of Sudden Cardiac Death. *Journal of Manipulative & Physiological Therapeutics*. 12(6);469-475, 1989 Dec, 1989).
15. Nicholas, AS, DeBias DA, Ehrenfeuchter W. A somatic component to myocardial infarction. *Br. Med. J.* 1985; 291: 13-17.
16. McGuiness J. Vicenzino B. Wright A. Institution: Department of Physiotherapy, University of Queensland, Queensland 4072, Australia. Title: Influence of a cervical mobilization technique on respiratory and cardiovascular function. *Manual Therapy*. 1997 Nov; 2(4): 216-20. (26 ref)
17. Gueyffier F, Fromet A, Gouton, M. New meta-analysis of treatment trials of hypertension: Improving the estimate of therapeutic benefit. *J. Hypertens*. 1996; 10:1-8.

18. Alex Eingorn and George Muhs, Rationale for Assessing the Effects of Manipulative Therapy on autonomic Tone by Analysis of Heart Rate Variability. *JMPT* 22(3) March/April, 1999, 161-165.
19. Response of Arrhythmia to Spinal Manipulation: Monitoring by ECG with Analysis of Heart Rate Variability. *Journal of the Neuromusculoskeletal System* 9(3) Copyright ©2001 by the American Chiropractic Association. 97-102.
20. Brian Budgell, Kyoto University and Yoshiki Igarashi, RMIT University, Tokyo, Japan. Blum CL, Globe G, Angina visceral mimicry syndrome: A proposed collaborative integrative treatment model, *Journal of Chiropractic Education*, Spr 2006;20(1): 51-2.
21. Brian Budgell and Fumie Hirano. Innocuous mechanical stimulation of the neck and alternations in heart rate variability in healthy young adults, *Autonomic Neuroscience: Basic and Clinical* 91(2001) 96-99.
22. Senior Research Project, Logan College of Chiropractic, Continues Proceedings of the Logan College Student Research Symposium. No. 37 of the December 2003 Class
23. Christensen HW. Vach W. Gichangi A. Manniche C. Haghfelt T. Hoilund-Carlsen PF. *Journal of Manipulative & Physiological Therapeutics*. 28(9):654-61, 2005 Nov-Dec.

Massage Therapy References

1. Keegan L. Therapies to reduce stress and anxiety. *Critical Care Nursing Clinics of North America*. 2003 Sep; 15(3): 321-7. (32 ref)
2. Delaney JPA. Leong KS. Watkins A. Brodie D. *Journal of Advanced Nursing*. 2002 Feb; 37(4): 364-71. (53 ref) The short-term effects of myofascial trigger point massage therapy on cardiac autonomic tone in healthy subjects Lecturer in Behavioural Sciences, Wirral Metropolitan College, Liverpool, UK.
3. Diego MA. Field T. Sanders C. Hernandez-Reif M. Massage therapy of moderate and light pressure and vibrator effects on EEG and heart rate. *International Journal of Neuroscience*. 114(1):31-44, 2004 Jan.
4. Aourell M. Skoog M. Effects of Swedish massage on blood pressure. Carleson J. School of Physiotherapy, Karolinska Institutet, Novum, S-171 76 Stockholm, Sweden. *Complementary Therapies in Clinical Practice*. 11(4):242-6, 2005 Nov.
5. Cambron JA. Dexheimer J. Coe P., Changes in blood pressure after various forms of therapeutic massage: a preliminary study. *Journal of Alternative & Complementary Medicine*. 12(1):65-70, 2006 Jan-Feb.
6. Curtis M. The use of massage in restoring cardiac rhythm. *Nursing Times*. 1994 Sep 21-27; 90(38): 36-7. (8 ref)
7. Olney CM. The effect of therapeutic back massage in hypertensive persons: a preliminary study. *Biological Research for Nursing*. 7(2):98-105, 2005 Oct.
8. Frankel BSM. The effect of reflexology on baroreceptor reflex sensitivity, blood pressure and sinus arrhythmia. *Complementary Therapies in Medicine*. 1997 Jun; 5(2): 80-4. (18 ref)
9. Hanley J. Stirling P. Brown C. Randomised controlled trial of therapeutic massage in the management of stress. *British Journal of General Practice*. 53(486):20-5, 2003 Jan.

10. McNamara ME. Burnham DC. Smith C. Carroll DL. The effects of back massage before diagnostic cardiac catheterization. *Alternative Therapies in Health and Medicine*. 2003 Jan-Feb; 9(1): 50-7. (32 ref)
11. Field T. Hernandez-Reif M. Diego M. Schanberg S. Kuhn C. Cortisol decreases and serotonin and dopamine increase following massage therapy. *International Journal of Neuroscience*. 115(10):1397-413, 2005 Oct.
12. Dent HE. Dewhurst NG. Mills SY. Willoughby M. Continuous PC6 wristband acupressure for relief of nausea and vomiting associated with acute myocardial infarction: a partially randomised, placebo-controlled trial. *Complementary Therapies in Medicine*. 2003 Jun; 11(2): 72-7. (24 ref)
13. *Healing from the Heart: A Leading Surgeon Combines Eastern and Western Traditions to Create the Medicine of the Future*, Memet Oz, MD, and Dean Ornish, MD (forward) Plume (Penguin), New York, 1999
14. Ballegaard S. Norrelund S. Smith DF. Cost-benefit of combined use of acupuncture, Shiatsu and lifestyle adjustment for treatment of patients with severe angina pectoris. *Acupuncture & Electro-Therapeutics Research*. 21(3-4):187-97, 1996 Jul-Dec.
15. (Laura's New Heart: A Healer's Spiritual Journey through Heart Transplant. Laura Fine. Copywrite Laura L. Fine, 2004, 1st Book Library, A Quantum Reach Publishing, a-quantum-reach.com) available through Amazon.com

Craniosacral References

- (1) John E. Upledger, D.O., and Jon D. Vredevoogd, M. F.A. *Craniosacral Therapy*, Eastland Press, Seattle, Washington, USA, 1983.
- (2) John-Pierre Barral and Pierre Mercier. *Visceral Manipulation*. Eastland Press, Seattle, Washington, USA., 1988.
- (3) Cutler MJ. Holland BS. Stupski BA. Gamber RG. Smith ML. Cranial manipulation can alter sleep latency and sympathetic nerve activity in humans: a pilot study. *Journal of Alternative and Complementary Medicine*. 2005 Feb; 11(1): 103-8. (17 ref)
- (4) Moran RW, Gibbons P. Intraexaminer and interexaminer reliability for palpation of the cranial rhythmic impulse at the head and sacrum. *J Manipulative Physiol Ther*. 2001 Mar-Apr;24(3):183-90.
- (5) Rogers JS, Witt PL, Gross MT, Hacke JD, Genova PA. Simultaneous palpation of the craniosacral rate at the head and feet: intrarater and interrater reliability and rate comparisons. *Phys Ther*. 1998;78:1175-1185.