

Complementary and alternative medicine: Facts and figures - Part 2

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ABSTRACT

Background: The popularity of complementary and alternative medicine (CAM) is evident in both developed and less developed societies. It is perceived as being more natural and having fewer side effects than conventional medicine. Claims for efficacy are often unsubstantiated.

Objectives: In this second article, other forms of CAM will be described including herbalism, chiropractic, osteopathy, reflexology and iridology. Proposed mechanisms of action and evidence-based research about their efficacy will be presented, while issues related to safety and regulation will be discussed.

Method: Evidence for or against the efficacy of these forms of complementary and alternative medicine was obtained from studies, reviews and meta-analyses researched from various online publications.

Results: There is evidence for efficacy of osteopathy and chiropractic in low back pain, but little evidence for efficacy of herbal medicine. No evidence was demonstrated in iridology and reflexology.

Conclusion: CAM practices should be researched for efficacy and safety applying the same standards used in conventional medicine.

Key words: Complementary and alternative medicine, herbal medicine, chiropractic, osteopathy, reflexology, iridology, research, safety.

INTRODUCTION

Complementary and alternative medicine (CAM) is “a group of diverse medical and healthcare systems, practices and products that are not currently part of conventional medicine” (National Center for Complementary and Alternative Medicine, 2011a). Ancient traditional practices like acupuncture share this definition with newly conceived ones, like iridology. Common to most systems is a lack of scientific evidence for efficacy (Kopelman, 2004). As these practices become more widespread, conventional medical practitioners should update their knowledge about different types of

CAM and become aware of potential benefits or adverse effects associated with them. This knowledge will help them educate patients and guide them to make informed choices.

CAM practices can be classified as genuine, experimental or questionable (London, 2001). Genuine alternatives are supported by scientific evidence and exhibit a favourable risk-benefit ratio. Experimental practices are as yet unproven, but are being studied rigorously. Questionable alternative practices have no sound scientific basis and no evidence for efficacy.

Reasons why patients seek out alternative care include: recommendations by “word of mouth” (32%), fear of side effects associated with conventional therapies (21%), chronic medical problems (19%), dissatisfaction with conventional medicine (14%), and desire for more personalized attention (9%) (Eisenberg et al., 1993). CAM is commonly described as being holistic, caring for the patient in all his/her aspects; this more compassionate approach increases its attraction. Being holistic is not the sole provenance of CAM; conventional medicine is striving to become more holistic, especially in the field of family practice (Winnick, 2006).

An article on complementary medicine which has concentrated on acupuncture and homeopathy has already been published (Pace, 2012). This second article will deal with herbalism, chiropractic, osteopathy, reflexology and iridology. The vastness of the subject precludes discussion of all existing CAM practices.

HERBAL MEDICINE

This is defined as traditional medicinal practice based on the use of plants and plant extracts, also known as phytotherapy (ScienceDaily, 2011). The different chemical compounds that have been produced by plants during the course of evolution e.g. antioxidants, have often been found to have beneficial effects in humans. Like conventional medicines, plant compounds bind to receptor molecules with the same potential for effectiveness and harmful side effects (Tapsell et al., 2006).

It is estimated that 25% of modern pharmaceuticals are derived from plants. Some well-known examples include aspirin, digitalis and quinine. Eighty per cent of the 120 active compounds or phytochemicals widely used in modern medicine show a positive correlation between their current therapeutic use and the way in which they were used traditionally (Fabricant and Farnsworth, 2001).

Prevalence of Use

A 2002 survey carried out on adults in the United States showed that herbal medicine was the most popular CAM therapy (18.9%) excluding prayer (Barnes et al., 2004). Herbal remedies are widely used in Europe, especially in Germany and France (De Smet, 2005).

Evidence for Efficacy

The National Centre for Complementary and Alternative Medicine (NCCAM) in the United States has funded various trials on the efficacy of particular plants but the results have not been very promising (National Centre for Complementary and Alternative Medicine, 2011b). A study carried out to determine the effect of saw palmetto on benign prostatic hypertrophy, found its effect to be comparable to placebo (Barry et al., 2011). Similarly, other studies funded by NCCAM found that ginkgo biloba did not decrease the incidence of dementia or improve memory (DeKosky et al., 2008), and *echinacea* had no effect in preventing or treating viral colds (O'Neil et al., 2008). Garlic was found to have a modest effect on hypertension but negligible effect on cholesterol levels (Gardner et al., 2007). An independent review of food supplements glucosamine and chondroitin by the Agency for Healthcare Research and Quality was unsuccessful in proving efficacy in osteoarthritis of the knee (Agency for Healthcare Research and Quality, 2007) although trials funded by manufacturers obtained more positive results (Vlad et al., 2007).

In other NCCAM trials, St John's Wort demonstrated an effect comparable to placebo on mild depression (Rapaport et al., 2011) but was ineffective in moderate depressive illness (Hypericum Depression Trial Study Group, 2002). No proof was found during trials that Evening Primrose Oil is effective for premenstrual syndrome or menopausal symptoms (National Center for Complementary and Alternative Medicine, 2011). More research is needed to determine whether cranberry can help prevent urinary tract infections; it has not been proven effective in the treatment of established infection (Jepson and Craig, 2007).

Safety Issues

"Natural" does not imply "safe". The belief that herbals are generally safe is based mostly on tradition. Clinical trials of herbals may not have included laboratory monitoring to detect adverse effects, and manufacturers were not required to report severe adverse effects to the Food and Drug Administration (FDA) before December 2007 (U.S. Food and Drug Administration, 2011).

Allergic reactions can occur with commonly used plants like chamomile (National Institutes of Health, 2011). Many plants contain harmful toxins (datura, hemlock), while others can cause dangerous interactions with conventional drugs (e.g. St John's Wort with warfarin) (Medsafe, 2011). St John's Wort or garlic can interact with anti-HIV drugs to lower their efficacy (Ladenheim et al., 2008). Herbal medicines can be dangerously contaminated; adulteration by heavy metals and over-the-counter or prescription medications is common, especially in "all-natural" remedies for sexual dysfunction and weight loss (Smolinske, 2005).

Occasionally, serious outcomes have been linked to herb consumption; black cohosh has been implicated in a case of liver failure (Lynch, Folkers and Hutson, 2006). Another identified adverse effect is the nephrotoxicity and carcinogenicity of herbals containing extracts of *Aristolochia* plants. More than 100 women in Brussels developed nephropathy and consequent renal failure after consuming a herbal weight loss product containing *Aristolochia fangchi*; almost half developed carcinomas of the urothelial tract (Nortier et al., 2000; Vanherweghem et al., 2003).

In a 2010 survey of 1000 plants, 356 had clinical trials published evaluating their "pharmacological activities and therapeutic applications" while 12% of the plants, although available in the Western market, had "no substantial studies" of their properties (Cravotto et al., 2010). Another issue is lack of quality control of products. Standardization of purity and dosage is not required by law in the United States, as the FDA classifies herbal medicines as "dietary supplements" (Dietary Supplement Health and Education Act, 1994). In the EU, herbal medicines are regulated by the European Directive on Traditional Herbal Medicinal Products (European Commission, 2004).

Proper double-blind clinical trials are needed to determine the safety and efficacy of each plant before it can be recommended for medical use. Without establishing efficacy, useless remedies may be used instead of effective conventional medicines, to the detriment of patient outcomes (Ernst, 2007a).

MANIPULATIVE AND BODY BASED THERAPIES

This group of therapies incorporates chiropractic, osteopathy and massage therapy. The first two will be discussed.

CHIROPRACTIC

This alternative therapy was founded in 1895 by the American Daniel D. Palmer, a former grocer with a belief in vitalism, or “spark of life”. He hypothesized that vertebral “subluxation” interfered with the body’s “innate intelligence” (intrinsic ability to heal itself) and was the root of most diseases (Keating, 2005); this theory is not based on scientific principles. Subluxation in this context does not correspond to vertebral body displacement which can be visualized on X-rays. Manipulation of the spine, joints and soft tissues forms the basis of treatment, together with rehabilitative exercises, complementary procedures, health promotion and lifestyle counselling (Mootz and Shekelle, 1997).

There are two schools of thought in chiropractic: “straights” (minority) adhere to the original Palmer philosophy, while “mixers” (majority) incorporate conventional techniques like exercise and massage, use X-rays and are more open to mainstream views (Murphy et al, 2008; Tyler, 1990). Mixers also advocate use of nutritional supplements, acupuncture, homeopathy and herbal medicine. Chiropractic methods share common features with many other manual-therapy professions, such as massage therapy, osteopathy, physical therapy, and sports medicine.

Prevalence of Use

Chiropractic is very popular in developed countries such as the United States and Canada, where 6-12% of the population makes use of it, mostly sufferers from low back pain or those having neurological or musculoskeletal complaints (Barnes et al., 2004).

Evidence for Efficacy

Low back pain and radiculopathy

A review carried out in 2008 found strong evidence that spinal manipulation therapy (SMT) is similar in effect to medical care combined with exercise (Bronfort et al, 2008). A 2010 systematic review found that spinal manipulation can achieve equivalent or superior improvement in pain and function when compared with other interventions (Dagenais et al., 2010). In 2011, strong evidence was found that there is no clinically

significant difference between spinal manipulation and other treatments for reducing pain and improving function for chronic low back pain. Further controlled studies were suggested comparing with sham SMT (Rubinstein et al, 2011).

The use of SMT for the treatment of acute lumbar disc herniation with associated radiculopathy is supported by moderate quality evidence (Hahne, Ford and McMeeken, 2010). There is little evidence for chronic cervical and lumbar spine-related extremity symptoms and no evidence exists for the treatment of thoracic radiculopathy (Leininger et al., 2011).

Neck pain (including whiplash)

Only low level evidence for effectiveness of SMT in neck pain was found in reviews published in 2010 and 2011 (Gross et al., 2010; Cross et al., 2011). Mixed results were obtained for whiplash injury: a 2009 systematic review (Ernst, 2009f) produced no evidence, while low level evidence was found in a review published in 2010 (Shaw et al., 2010).

Headache

A 2004 Cochrane review found evidence that suggests spinal manipulation may be effective for migraine, tension headache and cervicogenic headache (Bronfort et al., 2004). Two systematic reviews published in 2011 are conflicting, one finding evidence that spinal manipulation might be as effective as propranolol or topiramate in the prevention of migraine headaches (Chaibi, Tuchin and Russell, 2011), the other concluding that evidence does not support the use of SMT (Posadzki and Ernst, 2011). Due to methodological shortcomings present in studies included in the first systematic review, more randomised controlled trials were suggested.

Other conditions

Very weak or no evidence has been found for a myriad other conditions, among them scoliosis, ADHD/ learning disabilities, gastrointestinal disorders and hypertension (Hawk et al., 2007), infant colic (Ernst, 2009a), fibromyalgia (Ernst, 2009b), asthma (Ernst, 2009d), dysmenorrhoea (Proctor et al., 2006) and back pain during pregnancy (Pennick and Young, 2007).

Safety Issues

Although chiropractic care is generally safe when employed skilfully and appropriately, adverse effects can occur. Absolute contraindications include rheumatoid

arthritis and conditions known to result in unstable joints; osteoporosis is a relative contraindication (World Health Organization (WHO), 2005). Mild temporary worsening of stiffness or pain can occur in up to two thirds of patients (Gouveia, Castanho and Ferreira, 2009). Rarely, spinal manipulation, especially in the cervical region, can result in permanent disability or death (Ernst, 2007b); it has been implicated in vertebrobasilar artery stroke in persons less than 45 years of age (Miley et al., 2008). A review carried out in 2010 concluded that there is a negative risk-benefit balance for cervical spinal manipulation (Ernst, 2010).

Some chiropractors habitually X-ray their patients several times a year, exposing them to unnecessary and harmful ionizing radiation (Singh and Ernst, 2008). There is also a propensity to oppose vaccination (Campbell, Busse and Injeyan, 2000) and water fluoridation (Conser, 2012), a view not shared by all practitioners.

OSTEOPATHY

Osteopathy was originally conceived in 1874 by Dr Andrew T. Still, from Missouri (University of Maryland Medical Centre, 2011). It is based on the interrelationship between structure and function of the body, with an emphasis on self-healing (American Association of Colleges of Osteopathic Medicine, 2011). Despite initial claims that many diseases including childhood infections, could be cured by manipulation (Barrett, 2003), osteopathy today tends to be more mainstream. However, certain practitioners still carry out osteopathic manipulative treatment (OMT) for asthma (Hondras, Linde and Jones, 2005), otitis media (Mills et al., 2003) and dysmenorrhea (Pirritano, 2004). More controversial are the practices of cranial osteopathy and chelation therapy. In the former, the skull is manipulated to “restore the rhythm of flow of cerebrospinal fluid” to help diagnose and correct diseases. Chelation therapy with ethylenediaminetetraacetic acid (EDTA) is claimed to be effective against various serious conditions including atherosclerosis (Barrett, 2003).

There are two different branches to this discipline: osteopathic medicine is practised by qualified doctors whose degree, Doctor of Osteopathy (D.O.), is equivalent to M.D., while osteopaths are non-physicians who carry out manipulative therapies. In the U.S. only the former are licensed to practise (AOA House of Delegates, 2010). Regulations for registration of osteopaths vary in different E.U. countries.

Evidence for Efficacy

A 2005 meta-analysis of six randomized controlled trials of OMT in low back pain, concluded that OMT was generally effective for at least three months and this efficacy could not be explained by placebo effects alone (Licciardone, Brimhall and King, 2005).

NCCAM states that most studies have shown that OMT can provide mild to moderate relief from low-back pain, appearing to be at least as effective as conventional medical treatments (Rubinstein et al., 2011). In 2007 guidelines, the American College of Physicians and the American Pain Society included OMT as a recommended treatment option to be considered when pain does not improve with self-care (Chou et al., 2007). Recent research into OMT for low-back pain is looking into different forms of manipulation, as well as treatment duration and frequency; spinal manipulation may provide relief from low-back pain for up to 1 year (NCCAM, 2011c).

Safety issues

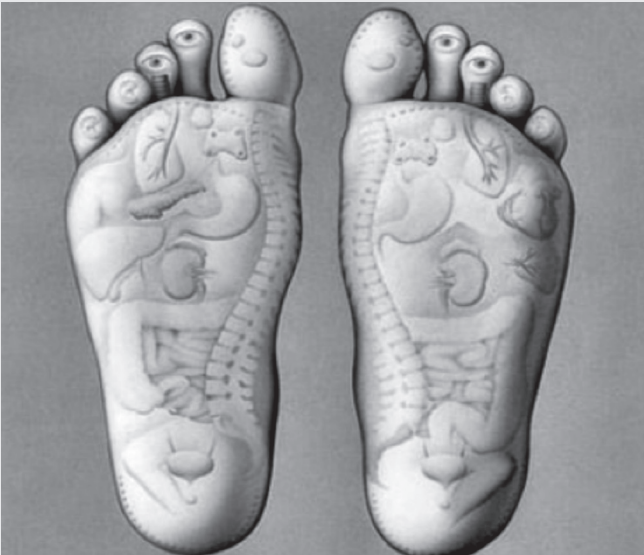
Osteopathy has the same contraindications and potential adverse effects as chiropractic. The commoner adverse effects (25-50% of all patients) are transient: mild pain or discomfort at the site of manipulation, slight headache, and fatigue. More serious potential consequences are rare; stroke and spinal cord injury after cervical manipulation occur in 1 in 20 000 patients to 1 per million procedures (Vickers and Zollman, 1999).

Controversial procedures such as cranial osteopathy and chelation therapies are only carried out by a minority of practitioners; unsubstantiated claims are made that diverse conditions can be cured including Meniere's, hypertension, angina and asthma (Barrett, 2003). As in all CAM practices, delaying diagnosis and treatment of medical conditions by replacing conventional medicine with unproven procedures (opportunity cost) can have serious consequences for patients.

REFLEXOLOGY

Reflexology, also called zone therapy, is described as a “natural healing art based on the belief that there are reflexes in the feet, hands and ears and their referral areas, which correspond to every part, gland and organ of the body. Through application of pressure... reflexology is claimed to relieve tension, improve circulation and help promote the natural function of the related areas of the body” (Reflexology Association of Canada, 2005) – see Figure 1. The principles of reflexology are shown in Table

Figure 1: Foot Reflexology Chart (reproduced by kind permission of Ted Pollard, Health 911, 2012. <http://www.health911.com/reflexology>)



1. Postulated mechanisms of action include obstruction of pain transmission through the dorsal horn of the spinal cord and crushing of lactic acid microcrystals by the application of pressure on the feet (CAM-Cancer, 2012). There is no scientific basis for these claims (Ernst, 2009c).

Reflexology was introduced into the United States in 1913 by William H. Fitzgerald, M.D. (1872-1942), an ear, nose, and throat specialist and modified some 20 years later by Eunice D. Ingham (1889–1974), a nurse and physiotherapist

Prevalence of Use

Reflexology is very popular in Northern Europe. A 2005 national survey in Denmark showed a 21.4% life-long use and a 6.1% 12 month use (Knowledge and Research Centre for Alternative Medicine, 2011). A Norwegian study done in 2007 showed that 5.6 % of the population had used reflexology within the previous 12 months (National Information Centre for

Complementary and Alternative Medicine, 2011).

Evidence for Efficacy

A 2009 systematic review of randomised controlled trials concludes that: “The best evidence available to date does not demonstrate convincingly that reflexology is an effective treatment for any medical condition” (Ernst, 2009c).

Safety Issues

Reflexology has not been demonstrated to affect the course of any illness. Done gently, reflexology may be considered as a form of relaxing foot massage (Stephenson, Weinrich and Tavakoli, 2000), with hardly any documented adverse effects (Ernst et al., 2007). Reflexologists are not qualified to make competent diagnoses (White et al., 2000), making opportunity cost a relevant issue.

IRIDOLOGY

Iridology (also known as iridodiagnosis) is an alternative practice whose proponents claim that examination of patterns, colours, and other characteristics of the iris can determine a patient’s state of health (LindlahrTake, 2010). Practitioners employ magnifying glasses, cameras or slit-lamps to determine the state of health of individuals by comparing their observations to iris charts: the iris is divided into 80 to 90 zones that are said to correspond to specific parts of the human body (Jensen, 1980) – see Figure 2.

The practice was initiated by Ignaz von Peczely, a 19th century Hungarian physician, who reportedly noted similar streaks in the eyes of a man he was treating for a broken leg and the eyes of an owl whose leg he had broken many years before. Iridology became better known in the United States in the 1950s, when Bernard Jensen, an American chiropractor, began giving classes in his own method (Barrett, 2008).

Table 1: The Principles of Reflexology (Wills, 1995)

The body is divided into 10 longitudinal zones—five on each side of the body.
Each organ or part of the body is represented on the hands and feet.
The practitioner can diagnose abnormalities by feeling the hands or feet.
Massaging or pressing each area can stimulate the flow of energy, blood, nutrients, and nerve impulses to the corresponding body zone and thereby relieve ailments in that zone.

Figure 2: Iridology chart (reproduced by kind permission of Sarah Burt N.D. http://www.sarahburtnd.co.uk/iridology_3.html)



Evidence for Efficacy

No clinical data exists to correlate illness with coinciding visible changes in the iris. The iris may only undergo some pigment changes in the first year of life, and thereafter remains unchanged. In fact, this stability is the foundation of biometric technology which uses specific iris morphology for identification purposes (Chellappa, Tistarelli and Li, 2009).

A study published in the Journal of the American Medical Association showed that three different iridologists were unable to correctly identify kidney disease in photographs of irises and even disagreed with one another. It was concluded that iridology was neither selective nor specific and that the odds of accurate diagnosis were statistically no better than chance (Simon, Worthen and Mitas, 1979).

The British Medical Journal also published a study where a group of five iridologists could not correctly identify which subjects had gall bladder problems and which were the healthy controls (Knipschild, 1988).

Safety Issues

Iridologists are usually not medical practitioners. Patients put their trust in them for diagnosis, management or prevention of diseases which may or may not be present. Delaying diagnosis or conventional treatment for actual illnesses would jeopardise the safety of patients.

DISCUSSION

If clients express high satisfaction rates when using CAM, why should its use matter to conventional medical

practitioners? With most CAM practices risks are small and costs can be modest. Is it important whether illness is cured by conventional methods or by placebo? Should we actually promote the use of placebo? There are no easy answers to these questions, especially if patients feel healthier and happier with their alternative choices (Ernst, 2009e). However, it should be kept in mind that an increase in patients' trust and reliance on CAM practices may adversely affect outcomes if conventional therapy is eventually partially or completely replaced (Kruglyakov, 2004). For their own safety, patients should also be made aware of what is scientifically sound and what isn't. Lack of public awareness of scientific methods makes many people unquestioningly accept untested herbal remedies, colonic cleansing and magnetic therapy, but worry about the safety of extensively tested conventional drugs.

Osteopathy and chiropractic have been proven effective in low back pain, beyond placebo effect, making them genuine CAM practices in this regard. Herbal medicine is still classified as experimental (London, 2001). Although phytochemicals with proven efficacy are routinely utilised in many conventional pharmaceuticals, research into many commonly used herbal medicines has mostly produced negative results.

Questionable practices described in this article include reflexology and iridology. These systems have shown no evidence of efficacy and have no scientific basis. Although practices like manipulative and body-based therapies do contain some elements based on scientific principles, they still retain elements of pseudoscience e.g. cranial osteopathy.

Research in CAM is hampered by the fact that rigorous studies require consistent standards which CAM practices often lack. Another factor deterring research, particularly in herbal medicine, is lack of regulation and standardisation; an investigation of the composition of packaged herbal medicines revealed a significant variance in presence of plant extract (WHO, 2004). Many of these products are not patentable, and therefore industry does not invest in research for efficacy or safety levels since this would reduce profits.

Criticism is directed at NCCAM in America about research being carried out on complementary and alternative practices. Some scientists feel that a budget of \$123 million yearly, with hardly any positive results, makes it “politically correct to investigate nonsense” (Barker Bausell, 2007). They feel that this funding should be directed into more deserving projects.

Safety issues have already been highlighted. Besides the presence of opportunity cost where diagnosis and proper treatment are delayed, there is also the issue of safety in children. A study on paediatric vaccination carried out in 2010 found that sole use of CAM leads to lower immunization rates and an increased rate of infectious diseases (Downey et al., 2010). Another study carried out in 2010 presented adverse events in children linked to CAM practices: most were minor e.g. constipation, bleeding and allergies, although the latter 2 can be potentially life-threatening. More serious consequences occurred secondary to failure to use conventional medicines, changes in medication by CAM practitioners or due to dietary restrictions; seizures

and even fatalities were reported (Lim, Cranswick and South, 2010).

In these two articles, not all existing complementary and alternative therapy modalities have been dealt with, the subject being too vast. Other examples of CAM practices not described include massage, yoga, aromatherapy and dietary regimens like the Atkins diet and Blood Type diet.

CONCLUSION

Scientific research has in many cases failed to provide a strong evidence base for CAM therapies; the majority of claims for efficacy remain unfounded. The positive effects of chiropractic and osteopathic manoeuvres on chronic low back pain were a notable exception; other practices were either disproven or more research is warranted. Safety issues are also an important consideration when dealing with CAM practices.

This subject can create much controversy both in society and even within medical circles. For medical practitioners, the patient’s interest should always be a first priority. Keeping this in mind, conventional medical doctors should become knowledgeable about alternative therapeutic options so that they will be in a position to educate and safeguard their patients. This does not mean that doctors should impose their beliefs onto their patients; sensitivity should be exercised especially in the presence of chronic or debilitating illness. Greater awareness of all that CAM practices imply can help improve clinical skills and ameliorate patient outcomes.

References

- Agency for Healthcare Research and Quality, 2007. *Treatment of Primary and Secondary Osteoarthritis of the Knee*. Rockville, Md. AHRQ Publication No. 07-E012. [online] Available at: < <http://archive.ahrq.gov/downloads/pub/evidence/pdf/oaknee/oaknee.pdf> > [Accessed 25 October 2011].
- American Association of Colleges of Osteopathic Medicine (AACOM), 2011. Glossary of Osteopathic Terminology. [online] Available at: < <http://www.aacom.org/resources/bookstore/Documents/GOT2011ed.pdf> > [Accessed 25 November 2011].
- AOA House of Delegates, 2010. *Resolution 301, H229-A/05 ‘Osteopath & Osteopathy – Use of the Terms’*. Approved by the AOA House of Delegates, July 2010. [online] Available at: < http://www.do-online.org/TheDO/wp-content/uploads/2010/08/Resolution301_A2010_FinalVersion.pdf > [Accessed 20 November 2011].
- Babylonsearch images, 2011. [online] Available at: < http://www.shereflexology.co.uk/_assets/Reflexology_Foot_Chart.jpg > [Accessed 25 November 2011].
- Barnes, P.M. et al., 2004. *Complementary and Alternative Medicine Use Among Adults: United States, 2002*. Adv. Data Vital Health Stat. p. 343. [online] Available at: < <http://nccam.nih.gov/news/camsurvey.htm> > [Accessed 19 October 2011].
- Barrett, S., 2003. *Dubious Aspects of Osteopathy*. [online] Available at: < <http://www.quackwatch.org/04ConsumerEducation/QA/osteo.html> > [Accessed 22 October 2011].
- Barrett, S., 2008. *Iridology is Nonsense (Quackwatch)*. [online] Available at: < <http://www.quackwatch.com/01QuackeryRelatedTopics/iridology.html> > [Accessed 27 October 2011].
- Barry, M.J. et al., 2011. *Effect of increasing doses of saw palmetto extract on lower urinary tract symptoms: a randomized trial*. JAMA, 306(12), pp.1344–1351.
- Barker Bausell, R. 2007. *Snake Oil Science: The Truth about Complementary and Alternative Medicine*. USA: Oxford University Press.
- Bronfort, G. et al., 2004. *Non-invasive physical treatments for chronic/recurrent headache (Review)*, The Cochrane Library 2009. [online] Available at: < <http://dare2.ubvu.vu.nl/bitstream/handle/1871/27456/271236.pdf?sequence=2> > [Accessed 23 November 2011].
- Bronfort, G. et al., 2008. Evidence-informed management of chronic low back pain with spinal manipulation and mobilization. *Spine J.*, 8(1), pp.213–225.

- CAM-Cancer (complementary and alternative medicine for cancer), 2012. *Reflexology*. [online] Available at: <<http://www.cam-cancer.org/CAM-Summaries/Manipulative-body-based/Reflexology/What-is-it>> [Accessed 12 April 2012].
- Campbell, J.B., Busse, J.W. and Injean, H.S., 2000. Chiropractors and vaccination: a historical perspective. *Pediatrics* 105 (4), e43. doi:10.1542/peds.105.4.e43. PMID 10742364.
- Chaibi, A., Tsuchi, P.J. and Russell, M.B., 2011. *Manual therapies for migraine: a systematic review*. *J. Headache Pain*, 12(2), pp.127–133.
- Chellappa, R., Tistarelli, M. and Li, S.Z. eds, 2009. *Handbook of remote biometrics: for surveillance and security*. New York: Springer, p.27.
- Chou, R., et al., 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), pp.478–491.
- Conser, H., 2012. Why I'm Against Fluoridation of Bozeman's Water. [online] Available at: <<http://bozemanchiropractic.com/bozeman-chiropractor/index.php/detoxification/fluoride/water-fluoridation-bozeman>> [Accessed on 12 September 2012].
- Cravotto, G. et al., 2010. Phytotherapeutics: an evaluation of the potential of 1000 plants. *J. Clin. Pharm. Ther.*, 35(1), pp.11–48.
- Cross, K.M. et al., 2011. Thoracic spine thrust manipulation improves pain, range of motion, and self-reported function in patients with mechanical neck pain: a systematic review. *J. Orthop. Sports Phys. Ther.*, 41(9), pp.633–642.
- Dagenais, S. et al., 2010. NASS Contemporary Concepts in Spine Care: Spinal manipulation therapy for acute low back pain. *Spine J.*, 10(10), pp.918–940.
- De Smet, P., 2005. Herbal Medicine in Europe — Relaxing Regulatory Standards. *N. Engl. J. Med.*, 352, pp.1176–1178.
- DeKosky, S.T. et al., 2008. *Ginkgo biloba for prevention of dementia: a randomized controlled trial*. *Journal of the American Medical Association*, 300(19), pp.2253–2262.
- Dietary Supplement Health and Education Act of 1994. Public Law 103-417, 25 (DSHEA), October 1994. Codified at 42 USC 287C-11
- Downey, L. et al., 2010. Pediatric Vaccination and Vaccine-Preventable Disease Acquisition: Discussion. *Maternal and Child Health Journal*, 14(6), pp.922–930.
- Eisenberg, D.M. et al., 1993. Unconventional medicine in the United States. Prevalence, costs, and patterns of use. *N. Engl. J. Med.*, 328(4), pp.246–252.
- Ernst, E., 2007a. Herbal medicines: balancing benefits and risks. *Novartis Found. Symp.*, 282: 154–67; discussion 167–172, 212–218.
- Ernst, E., 2007b. *Adverse effects of spinal manipulation: a systematic review*. *J. R. Soc. Med.*, 100(7), pp.330–338.
- Ernst, E., 2009a. Chiropractic spinal manipulation for infant colic: a systematic review of randomised clinical trials. *Int. J. Clin. Pract.*, 63(9), pp.1351–1353.
- Ernst, E., 2009b. Chiropractic treatment for fibromyalgia: a systematic review. *Clin. Rheumatol.*, 28(10), pp.1175–1178.
- Ernst, E., 2009c. Is reflexology an effective intervention? A systematic review of randomised controlled trials. *Med. J. Aust.*, 191(5), pp.263–266.
- Ernst, E., 2009d. Spinal manipulation for asthma: a systematic review of randomised clinical trials. *Respir. Med.*, 103(12), pp.1791–1795.
- Ernst, E., 2009e. Why would anyone use an unproven or disproven therapy? A personal view. *J. R. Soc. Med.*, 102, pp.452–453.
- Ernst, E., 2009f. *Chiropractic spinal manipulation for whiplash injury? A systematic review of controlled clinical trials*. *Focus Altern. Complement. Ther.*, 14, pp.85–86.
- Ernst, E., 2010. Deaths after chiropractic: a review of published cases. *Int. J. Clinical Practice*, 64(8), pp.1162–1165.
- Ernst, E. et al., 2008. *Oxford Handbook of Complementary Medicine*. Oxford: Oxford University Press.
- European Commission, Public Health, 2004. Herbal Medicinal Products. [online] Available at: <http://ec.europa.eu/health/human-use/herbal-medicines/index_en.htm> [Accessed 22 November 2011].
- Fabricant, D.S. and Farnsworth, N.R., 2001. *The value of plants used in traditional medicine for drug discovery*. *Environ. Health Perspect.*, 109 Suppl 1, pp.69–75.
- Gardner, C.D. et al., 2007. *Effect of raw garlic vs. commercial garlic supplements on plasma lipid concentrations in adults with moderate hypercholesterolemia: a randomized clinical trial*. *Archives of Internal Medicine*, 167(4), pp.346–353.
- Gouveia, L.O., Castanho, P., Ferreira, J.J., 2009. Safety of chiropractic interventions: a systematic review. *Spine*, 34(11), E405–413.
- Gross, A. et al., 2010. Manipulation or mobilisation for neck pain: a Cochrane Review. *Manual Therapy*, 15(4), pp.315–333.
- Hahne, A.J., Ford, J.J. and McMeeken, J., 2010. Conservative management of lumbar disc herniation with associated radiculopathy: a systematic review. *Spine*, 35(11), E488–504.
- Hawk, C. et al., 2007. Chiropractic care for nonmusculoskeletal conditions: a systematic review with implications for whole systems research. *J. Altern. Complement. Med.*, 13(5), pp.491–512.
- Hondras, M.A., Linde, K. and Jones A.P., 2005. Manual therapy for asthma. *Cochrane Database of Systematic Reviews*, 2. Art No. CD001002.
- Hypericum Depression Trial Study Group, 2002. *Effect of Hypericum perforatum (St John's wort) in major depressive disorder: a randomized controlled trial*. *Journal of the American Medical Association*, 287(14), pp.1807–1814.
- Jensen, B., 1980. *Iridology Simplified*, 2nd ed. Escondido: Iridologists International.
- Jepson, R.G. and Craig, J.C., 2007. A systematic review of the evidence for cranberries and blueberries in UTI prevention. *Molecular Nutrition & Food Research*, 51(6), pp.738–745.
- Keating, J.C., 2005. A brief history of the chiropractic profession. In: S. Haldeman, S. Dagenais, B. Budgell et al., (eds.). 2005. *Principles and Practice of Chiropractic*, 3rd ed. McGraw-Hill, pp.23–64.
- Knipschild, P., 1988. *Looking for gall bladder disease in the patient's iris*. *BMJ*, 297(6663), pp.1578–1581.
- Knowledge and Research Centre for Alternative Medicine ViFAB, 2011. *Reflexology in Denmark*. [online] Available at: <<http://www.vifab.dk/uk/alternative+medicine/reflexology>> [Accessed 25 October 2011].
- Kopelman Lorretta, M., 2004. The role of science in assessing conventional, complementary, and alternative medicines. In: D. Callahan, ed. 2004. *The Role of Complementary and Alternative Medicine: Accommodating Pluralism*. Washington: Georgetown University Press, pp.36–53.
- Kruglyakov, E., 2004. What threat does pseudoscience pose to society? *Social Sciences*, 3, pp. 74–88.
- Ladenheim, D. et al., 2008. Potential Health Risks of Complementary Alternative Medicines in HIV Patients. *HIV Medicine*, 8(9), pp.653–659.
- Leininger, B. et al., 2011. Spinal manipulation or mobilization for radiculopathy: a systematic review. *Phys. Med. Rehabil. Clin. N. Am.*, 22(1), pp.105–125.
- Licciardone, J. C., Brimhall, A.K. and King, L.N., 2005. *Osteopathic manipulative treatment for low back pain: A systematic review and meta-analysis of randomized controlled trials*. *BMC Musculoskeletal Disorders*, 6, p.43.
- Lim, A., Cranswick, N. and South, M., 2010. Adverse events associated with the use of complementary and alternative medicine in children. *Arch. Dis. Child*. doi:10.1136/adc.2010.183152.
- Lindlahr, H., 2010 [1919]. *Iridagnosis and other diagnostic methods*. Whitefish, Montana: Kessinger.
- London, W.M., 2001. Statement to the White House Commission on Complementary and Alternative Medicine Policy. [online] Available at: <<http://www.ncahf.org/papers/whccamp.html>> [Accessed 29 November 2011].
- Lynch, C.R., Folkers, M.E. and Hutson, W.R., 2006. Fulminant hepatic failure associated with the use of black cohosh: a case report. *Liver Transpl.*, 12(6), pp.989–992.
- Medsafe, Information for Health Professionals, 2011. Interactions with St John's Wort (Hypericum perforatum) Preparations. [online] Available at: <www.medsafe.govt.nz/profs/PU/articles/sjw.htm> [Accessed 21 November 2011].
- Miley, M.L. et al., 2008. Does cervical manipulative therapy cause vertebral artery dissection and stroke? *Neurologist*, 14(1), pp.66–73.
- Mills, M. et al., 2003. The use of osteopathic manipulative treatment as adjuvant therapy in children with recurrent acute otitis media. *Arch. Pediatr. Adolesc. Med.*, 157(9), pp.861–866.
- Mootz, R.D. and Shekelle, P.G., 1997. *Content of practice*. In D.C. Cherkin and R.D. Mootz, eds. 1997. *Chiropractic in the United States: Training, Practice, and Research*. Rockville: Agency for Health Care Policy and Research, pp. 9–16, 67–91.
- Murphy, D.R. et al., 2008. *How can chiropractic become a respected mainstream profession? The example of podiatry*. *Chiropr. Osteopat.*, 16(10).
- National Center for Complementary and Alternative Medicine, 2011a. *What is Complementary and Alternative Medicine (CAM)?* [online] Available

- at: <nccam.nih.gov/health/whatiscom> [Accessed 15 October 2011].
- National Center for Complementary and Alternative Medicine, National Institute of Health, 2011b. *Herbal Medicine*. [online] Available at: <http://nccam.nih.gov/> [Accessed 10 October 2011].
- National Center for Complementary and Alternative Medicine, 2011c. *Low-Back Pain and CAM: What the Science Says*. [online] Available at: <http://nccam.nih.gov/health/providers/digest/lowback-science.htm> [Accessed 27 November 2011].
- National Information Centre for Complementary and Alternative Medicine NIFAB, 2011. About NIFAB. [online] Available at: <http://www.nifab.no/om_nifab/information_in_english> [Accessed 25 October 2011].
- National Institutes of Health (Medline Plus), 2011. *Roman chamomile*. [online] Available at: <http://www.nlm.nih.gov/medlineplus/druginfo/natural/752.html> [Accessed 20 November 2011].
- Nortier, J.L. et al., 2000. Urothelial carcinoma associated with the use of a Chinese herb (Aristolochia fangchi). *N. Engl. J. Med.*, 342, pp.1686-1692.
- O'Neil, J. et al., 2008. *Effects of echinacea on the frequency of upper respiratory tract symptoms: a randomized, double-blind, placebo-controlled trial*. *Annals of Allergy, Asthma, and Immunology*, 100(4), pp.384-388.
- Pace, O., 2012. Complementary and Alternative Medicine – Facts and Figures (1). *JMCFD*, 1(1), pp.8-23.
- Pennick, V.E. and Young, G., 2007. Interventions for preventing and treating pelvic and back pain in pregnancy. *Cochrane Database Syst Rev*. 2007 Apr 18;(2):CD001139.
- Pirritano, R., 2004. *Osteopathic treatment to patients with primary dysmenorrhea*. Master thesis, Victoria University. [online] Available at: <http://vuir.vu.edu.au/864/> [Accessed 10 November 2011].
- Posadzki, P. and Ernst, E., 2011. Spinal manipulations for the treatment of migraine: A systematic review of randomized clinical trials. *Cephalalgia*, 31(8), pp.964-970. doi:10.1177/0333102411405226. PMID 21511952.
- Proctor, M.L. et al., 2006. Spinal manipulation for primary and secondary dysmenorrhoea. *Cochrane Database Syst. Rev.* 3(3): CD002119.
- Rapaport, M.H. et al., 2011. *The treatment of minor depression with St John's wort or citalopram: Failure to show benefit over placebo*. *Journal of Psychiatric Research*, 45, pp.931-941.
- Reflexology Association of Canada, 2005. *Standards of Practice, Code of Ethics & Code of Conduct*. [online] Available at: <http://www.racbc-reflexology.com/PDF%20documents/Standards_Ethics_Conduct.pdf> [Accessed 25 October 2011].
- Rubinstein, S.M. et al., 2011. Spinal manipulative therapy for chronic low-back pain. *Cochrane Database Syst. Rev.* 2: CD008112.
- Science Daily, n/d. Herbalism. [online] Available at: <http://www.sciencedaily.com/articles/d/digitalis.htm> [Accessed 20 October 2011].
- Shaw, L. et al., 2010. A systematic review of chiropractic management of adults with Whiplash Associated Disorders: recommendations for advancing evidence based practice and research. *Work (A Journal of Prevention, Assessment and Rehabilitation)*, 35(3), pp.369-394.
- Simon, A., Worthen, D.M. and Mitas, J.A., 1979. An evaluation of iridology. *JAMA*, 242(13), pp.1385-1389.
- Singh, S. and Ernst, E., 2008. *The truth about chiropractic therapy. Trick or Treatment: The Undeniable Facts about Alternative Medicine*. New York: W.W. Norton, pp.145-190.
- Smolinske, S.C., 2005. Herbal product contamination and toxicity. *J. Pharm. Pract.*, 18, pp.189-208.
- Stephenson, N.L., Weinrich, S.P. and Tavakoli, A.S., 2000. *The effects of foot reflexology on anxiety and pain in patients with breast and lung cancer*. *Oncology Nursing Forum*, 27(1), pp.67-72.
- Tapsell, L.C. et al., 2006. Health benefits of herbs and spices: the past, the present, the future. *Med. J. Aust.*, 185(4 Suppl), S4-24.
- Tyler, R., 1990. *Speaking in Strange Tongues*. *Dynamic Chiropractic*, 8(16). [online] Available at: <http://www.dynamicchiropractic.com/pdf_out/DynamicChiropractic.com-Speaking-in-Strange-Tongues-1355164077.pdf> [Accessed 20 November 2011].
- U.S. Food and Drug Administration, 2011. *Dietary Supplements: What You Need to Know*. [online] Available at: <http://www.fda.gov/Food/ResourcesForYou/Consumers/ucm109760.htm> [Accessed 20 November 2011].
- University of Maryland Medical Centre, 2011. *Osteopathy*. [online] Available at: <http://www.umm.edu/altmed/articles/osteopathy-000358.htm> [Accessed 22 October 2011].
- Vanherweghem, J.L. et al., 2003. Aristolochic acid nephropathy after Chinese herbal remedies. In: M.E. De Broe, G.A., Porter, W.B., Bennett and G.A. Verpoeten, eds. *Clinical Nephrotoxins*, 2nd ed., Netherlands: Kluwer Academic Publishers, pp. 579-586.
- Vickers, A. and Zollman, C., 1999. ABC of Complementary Medicine: The manipulative therapies: osteopathy and chiropractic. *BMJ*, 319, pp.1176-1179.
- Vlad, V.C. et al., 2007. Glucosamine for pain in osteoarthritis. Why do trial results differ? *Arth. Rheum.*, 56, pp.2267-2277.
- White, A.R. et al., 2000. *A blinded investigation into the accuracy of reflexology charts*. *Complement. Ther. Med.*, 8(3), pp.166-172.
- WHO, 2004. *Guidelines on safety monitoring of herbal medicines in pharmacovigilance systems*. [online] Available at: <http://apps.who.int/medicinedocs/index/assoc/s7148e/s7148e.pdf> [Accessed 11 November 2011].
- WHO, 2005. *WHO guidelines on basic training and safety in chiropractic*. [online] Available at: <http://whqlibdoc.who.int/publications/2006/9241593717_eng.pdf> [Accessed 21 October 2011].
- Wills, P., 1995. *The Reflexology Manual*. Toronto: Healing Arts Press.
- Winnick, T.A., 2006. Medical doctors and complementary and alternative medicine: the context of holistic practice. *Health (London)*, 10(2), pp.149-173.

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