

# 2.22 Complementary and alternative medicine 201

## 2.22 Complementary and alternative medicine 201

**ESSENTIALS** Complementary and alternative medicine can be defined as diagnosis, treatment, and/or prevention which complements mainstream medicine by contributing to a common whole, by satisfying a demand not met by orthodoxy, or by diversifying the conceptual frameworks of medicine. It is popular; hence doctors should know about it. Why is complementary and alternative medicine popular? The following motivations may be important: (1) to leave no therapeutic option untried; (2) to take control over one's own health; (3) to accord one's healthcare with one's global outlook; (4) to benefit from natural and, by implication, safe treatments; (5) to be given time, understanding, and empathy by a practitioner; (6) disenchantment with conventional medicine/science.

**Types of complementary and alternative medicine** The term covers a vast array of treatments and diagnostic techniques which have little in common except that they are not part of mainstream medicine. The most important modalities are (1) acupuncture—probably effective for some painful conditions and for nausea/vomiting; rarely causes severe adverse events. (2) Phytotherapy—treatment with herbal extracts; can be evaluated by assessing each of the many remedies separately; some phytomedicines are supported by sound evidence. (3) Homeopathy—based on irrational concepts of 'like cures like' and 'potentizing' (shaking and stepwise dilution of drugs); trial data fail to show efficacy for any condition. (4) Spinal manipulation—may be mildly effective for back pain as practised by chiropractors, osteopaths, physiotherapists, and other healthcare professionals; claims that it also works for many other conditions are not supported by sound evidence; can cause significant side effects (e.g. manipulation of the cervical spine causes transient adverse events in about half of all patients and has been associated with serious complications such as dissection of the vertebral artery).

**Definition** Most healthcare professionals feel they know intuitively what is meant by complementary and alternative medicine (CAM), yet an adequate definition is hard to find. Often CAM is described by characteristics that exclude it from mainstream medicine, for example: • not taught in medical school • not scientifically proven • not based on a scientific rationale • not used in routine healthcare CAM can be positively defined as 'diagnosis, treatment, and/or prevention which complements mainstream medicine by contributing to a common whole, by satisfying a demand not met by orthodoxy or by diversifying the conceptual frameworks of medicine'. CAM

encompasses a large variety of techniques which have little in common except that they are not part of mainstream medicine, claim to offer help for most conditions, and pride themselves on a holistic approach to patient care (Table 2.22.1). Some relate to therapeutic modalities (e.g. herbalism), some to diagnostic techniques (e.g. iridology), and some include both diagnostic and therapeutic modalities (e.g. acupuncture). There are considerable local differences in what are regarded as CAM or mainstream medicine. In Germany, for instance, massage therapy and herbalism are orthodox, whereas in English-speaking countries they are usually regarded as CAM. Acupuncture is CAM in the West, while in China it is a widespread, traditional, and generally accepted form of treatment. Since most CAM therapies are used as adjuncts to conventional treatments, 'complementary' is a more appropriate term than 'alternative'. When used as a true alternative to mainstream medicine, CAM can become a hazard to patients even if the treatment itself is without risks. In many countries, including the United Kingdom, CAM is practised mostly by healthcare professionals who are not medically trained, often in the absence of stringent regulation, leading many to be concerned that vulnerable patients may be exploited. Prevalence The 1-year prevalence of CAM usage by the general population ranges from 10% in the United Kingdom to 62% in Germany. In patient populations, these figures can be considerably higher.

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202 section 2 Background to medicine For instance, most cancer patients try one form of CAM or another. The annual expenditure for CAM exceeds (US) \$20 billion in the United States of America and £1.6 billion in the United Kingdom. In industrialized countries, typical users of CAM are middle-aged, female, well-educated members of a high socioeconomic class. Indications for CAM range from chronic benign conditions where mainstream medicine does not offer a cure (e.g. back pain) to life-threatening diseases like cancer and AIDS. Most patients try CAM in parallel with conventional treatment yet 30 to 50% do not tell their conventional healthcare providers that they do so. A medical history should include specific questions about CAM. Reasons for CAM's popularity There is not one but a complex mix of reasons; the following motivations may be important:

- to leave no therapeutic option untried
- to take control over one's own health
- to align one's healthcare with one's global outlook
- to benefit from natural and, by implication, safe treatments
- to be given time, understanding, and empathy by a practitioner
- disenchantment with conventional medicine/science

Table 2.22.1 Various other forms of therapeutic and diagnostic methods

| Name                | Principle                                                                                                                                                                                                             | Main indications/ reasons for use     | Efficacy                                                                                      | Risks                                          |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|-----------------------------------------------------------------------------------------------|------------------------------------------------|
| Alexander technique | Training process of ideal body posture and movement; developed by F M Alexander                                                                                                                                       | Musculoskeletal problems              | Very few clinical trials                                                                      | No serious adverse effects on record           |
| kinesiology         | Diagnostic technique using muscle strength as an indicator; developed by G. Goodheart                                                                                                                                 | n.a.                                  | Repeatedly shown to be not valid                                                              | Can delay reliable diagnoses                   |
| Aromatherapy        | Application of essential oils usually through gentle massage techniques; developed by R.M. Gattefossé                                                                                                                 | Relaxation improvement of well-being  | Systematic reviews are mostly inconclusive                                                    | Allergic reactions to oils                     |
| Autogenic training  | Form of self-hypnosis for relaxation and stress reduction; developed by J. Schultz                                                                                                                                    | Stress management                     | Some evidence for effectiveness                                                               | No serious adverse effects on record           |
| Chelation therapy   | Intravenous infusion of EDTA used in CAM for 'deblocking' arteries from arteriosclerotic lesions                                                                                                                      | Circulatory disorders                 | Shown to be ineffective                                                                       | Serious adverse effects, even deaths, reported |
| Chiropractic        | Popular manual therapy based on the assumption that most health problems are due to misalignment of the spine and treatable through spinal manipulation; developed by D Palmer; seen as mainstream by many proponents | Back pain, neck pain, and many others | Cochrane reviews of chiropractic for back pain show it is not superior to standard therapies, |                                                |

no good evidence for other indications Serious adverse effects have been reported, their exact incidence is not known Colonic irrigation (or colon therapy) Cleansing of the colon through enemas with water or coffee for 'detoxication' Various No sound evidence for effectiveness Serious adverse effects reported Hypnotherapy Induction of trance-like state to influence the unconscious mind Various Some evidence for effectiveness Serious adverse effects probably infrequent Iridology Diagnostic technique using signs and impurities on the iris n.a. Repeatedly shown to be not valid Can delay reliable diagnoses Macrobiotic diet Diet based on the yin/yang principle using whole grains and vegetables Disease prevention Positive effects on cardiovascular risk factors Serious adverse effects reported Massage Various techniques of manual stimulation of cutaneous, subcutaneous, or muscular structures (deemed mainstream on the European continent) Musculoskeletal problems, anxiety, and many others Some evidence for effectiveness in musculoskeletal and psychological problems No serious adverse effects on record Osteopathy Health problems are thought to be due to misalignment of the spine and corrected through spinal mobilization; developed by T Still; seen as mainstream by many proponents Back pain, neck pain, and many others Systematic reviews of osteopathy for back pain are inconclusive Adverse effects less than with chiropractic Reflexology Internal organs correspond to areas on the sole of the feet and can be influenced through massaging these Relaxation Systematic review was inconclusive No serious adverse effects on record Spiritual healing Channelling of 'healing energy' through a healer into a patient Re-establishing a wholesome balance Best evidence fails to show effectiveness No serious adverse effects on record Yoga Meditative, postural, and breathing techniques from ancient India Various Some evidence for effectiveness in asthma, or cardiovascular risk factors, for instance No serious adverse effects on record n.a., not applicable.

2.22 Complementary and alternative medicine 203 Examples of CAM methods Acupuncture Description Traditionally, the Chinese believed that the life energy (Qi or Chi) flowing in particular channels (meridians) governs human health. The energy is a balance of opposite characteristics: yin and yang. Illness is understood as an expression of an imbalance between yin and yang. One way of re-establishing the proper equilibrium would be to insert needles in acupuncture points located along the meridians. Instead of or in addition to needles, acupuncturists also use pressure (acupressure), laser light (laser acupuncture), electrical currents (electroacupuncture), heat (moxibustion), or other stimuli to stimulate acupuncture points. Neither the meridians nor the acupuncture points have a morphological basis, and the theory of yin and yang is not supported by facts. Mode of action Neurophysiological research has created a (hypothetical) rationale for acupuncture: activation of brainstem nuclei, and the release of neural transmitters and endorphins in the brain and descending inhibitory control systems. There are considerable differences between traditional Chinese and Western acupuncture. In traditional Chinese medicine, conventional diagnoses are not normally sought, treatment is highly individualized according to each patient's particular yin/yang imbalance, and acupuncture is employed as a 'cure all'. In contrast, Western acupuncturists tailor their treatment to the conventional diagnosis established beforehand and use acupuncture for selected indications for which it might be efficacious. Efficacy Many trials of acupuncture exist but are fraught with methodological problems, such as placebo effect and blinding of patients or therapists. Over 200 systematic reviews and meta-analyses of acupuncture trials for various conditions have been published. As they are often based on biased primary data, their conclusions are not always reliable. According to such reviews, the most convincing evidence exists for the following conditions: •

chronic back pain • dental pain • gastrointestinal endoscopy • idiopathic headache • osteoarthritis of knee • postoperative nausea and vomiting For other indications, the data remain inconclusive because of highly contradictory findings, poor quality research, insufficient quantity of primary data, or a total absence of reliable studies. Recently, new nonpenetrating acupuncture devices have become available which best control for placebo effects in clinical trials. The results of clinical trials employing such devices tend to suggest that most of the therapeutic response to acupuncture relies on placebo effects. Hardly any acupuncture studies are conducted with masking the therapist according to group allocations of patients. Safety Serious complications of acupuncture include: • trauma (e.g. cardiac tamponade, pneumothorax) • infections (e.g. viral hepatitis) With well-trained therapists, such complications are rare. However, mild adverse effects (e.g. pain or bleeding at the site of needling) occur in about 10% of all patients. In addition, there are indirect risks. For instance, some acupuncturists advise their patients about prescription drugs without having the medical competence to do so. Phytotherapy Description Medical herbalism (phytotherapy) is treatment with whole plants, parts of plants, or plant extracts. The term does not cover treatment with single active constituents such as acetylsalicylic acid, originally derived from willow bark. Since all plants contain a multitude of chemicals, phytotherapy involves treatment with a mixture of potentially active compounds. In many cases there is uncertainty about the most important active ingredients and their pharmacological actions. The claim of herbalists that the whole plant (extract) will yield more beneficial effects than any single isolated ingredient (synergy) is largely unproven. Most medical cultures have their version of traditional herbalism. Traditional Chinese medicine has a long history of employing mixtures of herbs to prevent and treat disease. This tradition was modified by the Japanese and resulted in Kampo medicine. The Indian tradition has generated Ayurvedic medicine which relies heavily on plant-based remedies. Likewise, European herbalism has a tradition which is as old as European medicine itself. The scientific investigation of medicinal herbs is, however, a relatively recent innovation. Mode of action There are few differences in principle between pharmacotherapy and phytotherapy except that herbal remedies are multicomponent systems which render them pharmacologically more complex. There is no reason why the rules of pharmacokinetics and pharmacodynamics should not apply. Discernible modes of action exist for every plant-based medicine. In some cases, these have been elucidated; in many other cases, they remain hypothetical. Efficacy Based on authoritative systematic reviews and meta-analysis, good or at least encouraging evidence exists for the efficacy of the following herbal remedies: • *Andropogon paniculata* for upper respiratory tract infections • black cohosh (*Actaea racemosa*) for alleviating menopausal symptoms • cranberry (*Vaccinium macrocarpon*) for prevention of urinary tract infections • devil's claw (*Harpagophytum procumbens*) for treating musculoskeletal pain • garlic (*Allium sativum*) for hypercholesterolaemia • Ginkgo biloba for intermittent claudication

204 section 2 Background to medicine • green tea (*Camellia sinensis*) for prevention of cancer and cardiovascular disease • hawthorn (*Crataegus* spp.) for treatment of chronic heart failure • horse chestnut (*Aesculus hippocastanum*) seed extract for primary venous insufficiency • kava (*Piper methysticum*) as an anxiolytic drug • nettle (*Urtica dioica*) for benign prostate hyperplasia • red clover (*Trifolium pratense*) for hot flushes during menopause • saw palmetto (*Serenoa repens*) for benign prostatic hyperplasia • St John's wort (*Hypericum perforatum*) for mild to moderate depression • valerian (*Valeriana officinalis*) for insomnia • willow (*Salix* spp.) bark for pain For many other popular medicinal herbs, too few clinical trials have been carried out, the studies are methodologically flawed, or their results are contradictory. No good evidence exists for the efficacy

of traditional approaches to herbal medicine where plant mixtures with a multitude of ingredients are used depending, not on a conventional diagnosis, but on the individual patient's set of symptoms, constitution, or other circumstances. Yet these traditional approaches are the ones likely to be applied if a patient consults a medical herbalist. Safety Many medicinal herbs have been associated with serious adverse effects (see Chapter 10.4.3), for example: • aconite (*Aconitum*) cardiotoxic • *Aristolochia* nephrotoxic • black cohosh (*Actaea racemosa*) hepatotoxic • broom (*Cytisus scoparius*) cardiotoxic • chaparral (*Larrea tridentata*) nephrotoxic • comfrey (*Symphytum officinale*) hepatotoxic • kava (*Piper methysticum*) hepatotoxic • liquorice root (*Glycyrrhiza glabra*) induces hypokalaemia • pennyroyal (*Mentha pulegium*) hepatotoxic • skullcap (*Scutellaria lateriflora*) hepatotoxic Herbal remedies can interact powerfully with synthetic drugs (Table 2.22.2), and Asian herbal medicines have been shown repeatedly to be adulterated with synthetic drugs or contaminated with heavy metals. In many countries (e.g. United Kingdom and the United States of America) herbal medicines are marketed as food (or dietary) supplements in the absence of stringent quality control.

**Homeopathy** Description Samuel Hahnemann, a German physician, believed in two major principles which formed the basis of an entirely new school of medicine: homeopathy. The 'like cures like' principle postulates that, if a given drug induces symptoms (e.g. a headache) in healthy individuals, it can be employed to treat headaches in patients who suffer from it. The second principle holds that 'potentizing' (i.e. shaking and stepwise diluting) drugs makes them more potent for the treatment of illness. Homeopathic dilutions prepared in this way are believed to be clinically effective even if not a single molecule of the original medicine is contained in the potentized remedy. For 200 years, scientists have pointed out that these principles fly in the face of science and that therefore homeopathy cannot possibly work beyond a placebo effect. Homeopaths, however, insist that their remedies act via 'energy' transfer from the original substance to the diluent (the theory of a 'memory of water'). Homeopaths do not treat diseases but claim to treat the whole individual. They take a detailed history with the aim to match the totality of the symptoms and characteristics of that patient with a 'drug picture' (the 'like cures like' principle). This homeopathic remedy, given in the correct potency, should then be the optimal treatment for that patient. Clinical improvement may, however, take weeks or months, and, in about 20% of all cases, symptoms may deteriorate before they become better, a phenomenon termed 'homeopathic aggravation'. At the time of Hahnemann there were very few effective treatments and many that were overtly harmful. Homeopathic remedies had virtually no adverse effects. Hahnemann can therefore be credited with clinically exploiting the placebo effect to the best benefit of his patients. It is hardly surprising then that homeopathy conquered many countries (e.g. France, the United States, India, South America) by storm. The advent of effective synthetic drugs and other efficacious treatments led to the sharp decline of homeopathy; the recent boom of CAM, however, has brought about a revival.

**Mode of action** Several hypotheses have been developed to explain the transfer of 'energy' from the mother tincture to the diluent. However, none has so far withstood the scrutiny of independent assessment. Neither has the 'energy' ever been defined in physical terms, nor are there rational explanations as to how this 'energy' (if it exists) might affect human health. Therefore, homeopathy remains among the least plausible forms of CAM.

**Efficacy** A meta-analysis of all 89 randomized and/or placebo-controlled clinical trials published by 1995 calculated an overall odds ratio of 2.45 in favour of homeopathy. When only the 26 most rigorous studies were meta-analysed, the odds ratio fell to 1.66 but remained statistically significant. This publication was criticized (e.g. for pooling data for all medical conditions and all homeopathic remedies, and for including trials that were not randomized or placebo-controlled and studies of material (low dilution) remedies for which efficacy is not

disputed). The results of about a dozen subsequent systematic reviews generally fail to demonstrate effects beyond placebo. Therefore, the best evidence available to date fails to suggest efficacy. Safety Highly diluted homeopathic remedies cannot cause pharmacological adverse effects. Homeopaths claim that 'homeopathic aggravations' (an exacerbation of presenting symptoms after administration of the optimal remedy) occur in about 20% of cases; if that were true, they might represent a safety issue. 'Indirect' safety problems include the substitution of effective interventions by homeopathy. For instance, non-medically qualified homeopaths tend to advise their clients against immunization and advocate homeopathic remedies instead. If this happens on a large scale, it jeopardizes herd immunity against serious infectious diseases.

2.22 Complementary and alternative medicine 205 Table 2.22.2 Possible interactions between some popular herbal remedies and synthetic drugs

| Herbal remedy                                     | Usage or pharmacological effect                         | Possible interaction                                                                                                                                                                                         |
|---------------------------------------------------|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Aloe ( <i>Aloe spp.</i> )                         | Various                                                 | With chronic use, potentiation of cardiac glycosides or antiarrhythmic drugs due to loss of potassium                                                                                                        |
| Black cohosh ( <i>Actaea racemosa</i> )           | Oestrogenic                                             | Increased effects of antihypertensives                                                                                                                                                                       |
| Borage ( <i>Borago officinalis</i> )              | Anti-inflammatory                                       | Interaction with antiepileptics, may increase risk of seizure                                                                                                                                                |
| Broom ( <i>Cytisus scoparius</i> )                | Antiarrhythmic, diuretic                                | Increased effects of antidepressants, $\beta$ -blockers, and cardiac glycosides                                                                                                                              |
| Cascara ( <i>Rhamnus purshiana</i> )              | Laxative, cathartic                                     | Loss of potassium with chronic use, potentiation of cardiac glycosides, or antiarrhythmic drugs                                                                                                              |
| Chamomile ( <i>Matricaria recutita</i> )          | Spasmolytic, anti-inflammatory                          | May potentiate effects of anticoagulants through its coumarin content                                                                                                                                        |
| Chasteberry ( <i>Vitex agnus castus</i> )         | Hormonal effects                                        | Increased effects of other hormonal drugs                                                                                                                                                                    |
| Cranberry ( <i>Vaccinium macrocarpon</i> )        | Urinary tract infections                                | May enhance elimination of drugs normally excreted in urine                                                                                                                                                  |
| Ephedra ( <i>Ephedra sinica</i> )                 | Central nervous system (CNS) stimulant, sympathomimetic | Cardiac glycosides/halothane: arrhythmias, guanethidine: enhanced sympathomimetic effect, monoamine oxidase enzyme (MAO) inhibitors: enhanced sympathomimetic effect, secal alkaloids/oxytocin: hypertension |
| Garlic ( <i>Allium sativum</i> )                  | Hypocholesterolaemic                                    | Increased effects of anticoagulants and antiplatelet drugs                                                                                                                                                   |
| Ginger ( <i>Zingiber officinale</i> )             | Antiemetic                                              | Increased effects of anticoagulants                                                                                                                                                                          |
| Ginseng ( <i>Panax ginseng</i> )                  | Various                                                 | Interaction with MAO inhibitors, interaction with stimulants and phenelzine, increased effect of hypoglycaemics                                                                                              |
| Hawthorne ( <i>Crataegus spp.</i> )               | Digitalis-like                                          | Can increase hypotensive effects of nitrates, antihypertensives, cardiac glycosides, and CNS depressants                                                                                                     |
| Hops ( <i>Humulus lupulus</i> )                   | Hypnotic                                                | Antagonism with antidepressants, can increase effects of CNS depressants and hypnotics, interference with hormonal drugs                                                                                     |
| Horse chestnut ( <i>Aesculus hippocastanum</i> )  | Anti-inflammatory                                       | Increased effects of anticoagulants                                                                                                                                                                          |
| Kava ( <i>Piper methysticum</i> )                 | Anxiolytic                                              | Potentiation with other anxiolytics, can increase parkinsonian symptoms with levodopa                                                                                                                        |
| Lavender ( <i>Lavandula angustifolia</i> )        | Sedative                                                | Increased effects of CNS depressants                                                                                                                                                                         |
| Liquorice ( <i>Glycyrrhiza glabra</i> )           | Corticosteroid activity for gastric irritation          | Potassium loss (e.g. with thiazide diuretics, water, and sodium retention with corticosteroids), increased effects of digoxin, decreased effects of antihypertensives                                        |
| Lily of the valley ( <i>Convallaria majalis</i> ) | Congestive heart failure                                | Increased (side) effects of quinidine, calcium, saluretics, laxatives, glucocorticoids, $\beta$ -blockers, calcium channel blockers, and digitalis                                                           |
| Mistletoe ( <i>Viscum album</i> )                 | Anticancer drug                                         | Increased effects of CNS depressants, antihypertensives, and cardiac drugs                                                                                                                                   |
| Nettle ( <i>Urtica dioica</i> )                   | Diuretic                                                | May potentiate effects of other diuretics                                                                                                                                                                    |
| Pumpkin seed ( <i>Curcubita pepo</i> )            | Anthelmintic, diuretic                                  | Can increase effect of diuretics                                                                                                                                                                             |
| Sage ( <i>Salvia officinalis</i> )                | Antispasmodic                                           | Interaction with antiepileptics, may increase risk of seizure, decreased effect with antiglycaemics                                                                                                          |
| St John's wort ( <i>Hypericum perforatum</i> )    | Antidepressant                                          | Increased effects                                                                                                                                                                                            |

of digoxin MAO inhibitors or serotonin uptake inhibitors, decreased effect of drugs metabolized by the cytochrome P450 enzyme system Valerian (*Valeriana officinalis*) Hypnotic Increased effects of CNS depressants and hypnotics Yew (*Taxus spp.*) Antirheumatic, anticancer Chemotherapeutic agents may potentiate its effects a Plant source in brackets. b Not comprehensive.

206 section 2 Background to medicine Spinal manipulation Description In most cultures, spinal manipulation has been practised by bone setters for centuries. Today such therapeutic techniques are practised by chiropractors, osteopaths, physiotherapists, doctors, and other health professionals. Spinal manipulation is the hallmark therapy for chiropractors who use it to adjust 'subluxations', malalignments of the spine claimed to be at the root of all health problems. During spinal manipulation vertebral joints are often moved beyond their physiological range of motion but not far enough to destroy joint structures. A typical technique is the short-lever, high-velocity thrust which is used by chiropractors on most patients. Mode of action Many chiropractors believe that vertebral 'subluxations' adversely affect human health and that consequent spinal manipulation will improve it. The mechanism of action is, however, unclear. Some theories hold that it breaks fibrous adhesions within joints, that it affects mechanoreceptors of the joint, or that it modulates central nervous system excitability. Efficacy Most of the trial data pertain to back pain. A Cochrane review of spinal manipulation found no evidence that it is superior to standard treatments for acute or chronic back pain, but some evidence that it is better than harmful interventions or sham treatments. For all other indications (e.g. neck pain, headache, dysmenorrhoea, colic, asthma), the current best evidence fails to indicate effectiveness. Safety Several prospective studies have shown that spinal manipulation leads to transient, mild adverse effects such as local pain in about 50% of all patients. In addition, serious adverse effects such as arterial dissection, stroke, and death have been reported in about 700 cases. Chiropractors claim that the incidence of such complications is exceedingly low. Due to significant underreporting, this may not be so. At present, the true incidence of complications is not known and no adequate reporting systems for adverse effects are in place. Other forms of CAM CAM is a highly diverse field comprising more than 150 different forms of therapeutic and diagnostic methods (see Table 2.22.1). FURTHER READING Assendelft WJJ, et al. (2003). Spinal manipulative therapy for low back pain. A meta-analysis of effectiveness relative to other therapies. *Ann Intern Med*, 138, 871–81. Capasso F, et al. (2003). *Phytotherapy: a quick reference to herbal medicine*. Springer Verlag, Berlin. Cochrane reviews related to complementary medicine. <https://cam.cochrane.org/cochrane-reviews-related-complementary-medicine> Derry CJ, et al. (2006). Systematic review of systematic reviews of acupuncture published 1996–2005. *Clin Med*, 6, 381–6. Ernst E (2002). A systematic review of systematic reviews of homeopathy. *Br J Clin Pharmacol*, 54, 577–82. Ernst E (2006). Acupuncture—a critical analysis. *J Intern Med*, 259, 125–37. Ernst E (2008). Chiropractic: a critical evaluation. *J Pain Symptom Manage*, 35, 544–62. Ernst E, Smith K (2018). More Harm than Good?: The Moral Maze of Complementary and Alternative Medicine. Springer. Ernst E, et al. (2008). *Oxford handbook of complementary medicine*. Oxford University Press, Oxford. Mathie R, Fok Y, Viksveen P, To A, Davidson J (2019). Systematic Review and Meta-Analysis of Randomised, Other-than-Placebo Controlled, Trials of Non-Individualised Homeopathic Treatment. *Homeopathy*, 108(2), 88–101. Newman M (2018). Is cancer crowdfunding fuelling quackery? *BMJ*, 362, k3829. Reisman S, Balboul M, Jones T (2019). P-curve accurately rejects evidence for homeopathic ultramolecular dilutions. *PeerJ*, 23(7), e6318. Rubinstein S, et al. (2019). Benefits and harms of spinal manipulative therapy for the treatment of chronic low back pain: systematic review and meta-analysis of randomised controlled trials. *BMJ*, 364, l689. Singh S, Ernst E (2008).

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