HOMEOPATHY

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Complementary and alternative medicine is being merged increasingly into mainstream medicine. Mind/body therapies (hypnosis, imagery), acupuncture, and some nutritional supplements (nutraceuticals and botanicals) are nearing inclusion in the conventional medical armamentarium. One prescriptive approach that still is thought to be untenable to most Western bioscientists is homeopathy. Jonas et al[24] suggested that homeopathy is one of the most frequently used complementary therapies worldwide. This article looks at the historical development, philosophical underpinnings, practice, and evidence basis of homeopathy.

HISTORICAL BACKGROUND

Homeopathy (from Greek *omeos*, meaning *similar*, and *pathos*, meaning *suffering*) is a system of medicine whose first tenet is the principle of similars: A substance that can cause symptoms in a healthy person possibly can stimulate self-healing in a person with an illness presenting similar symptoms. This principle was developed into a system of medicine in the nineteenth century by the renowned German physician Hahnemann. In 1796, Hahnemann[18] published "Essay on the New Curative Principle," in which he wrote about his experience with the principle of similars; the same year, Jenner showed that giving small doses of cowpox to patients protected them against smallpox.[8, 34] Jenner's work proceeded down a more immediately successful path.

From its inception, homeopathy sparked controversy, particularly because of its second tenet: the principle of dilutions. According to this

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principle, even a highly diluted substance (frequently past Avogadro's number) retains its biologic activity. The tenets of homeopathy are not well understood by the public or the medical profession, yet medical consumers are using homeopathic treatments in increasing numbers. In the United States and Europe, the sale of homeopathic medicines increased by 20% to 30% per year in the 1980s and 1990s.[13] In the United States, homeopathy was taught in homeopathic medical schools beginning in the mid-1800s. In 1900, there were 22 such schools; in 1923, 2[44]; and the last (the homeopathic part of Hahnemann Medical School) was closed in 1949.

Since homeopathy's inception, much of the research and use have occurred in Europe. Because of the public's interest, in 1996 the European Parliament issued a mandate to the European Commission to examine whether homeopathy is beneficial. The subsequent report of the Commission's Homeopathy Medicine Research Group recommended that homeopathy be integrated into medical practice.[4] Concordant with these recommendations, in January 1998, the French *Conseil National de l'Ordre des Medecins* (the equivalent of the American Medical Association) called for official recognition of homeopathy, accompanied by inclusion of homeopathy training in the undergraduate medical curriculum and the creation of a postgraduate degree.[32] Concurrently a British commission, formed by the Prince of Wales to examine the possible integration of complementary health care into conventional medical practice, called for education and training in various complementary and alternative disciplines, including homeopathy, and for integrating their delivery into mainstream health care.[20] Before this commission, the Glasgow Homeopathic Hospital already was a part of the National Health Service of Great Britain.

Homeopathic medications have been incorporated in the Food, Drug and Cosmetic Act (FDCA) since its inception in 1938. The *Homeopathic Pharmacopoeia* of the United States was added to the list of official Compendia by Copeland at the original writing of the act. Homeopathic products are recognized officially as *drugs* within the meaning of the FDCA, 21 U.S.C. paragraph 321 (g)(1)(A), 351(b), and 352(e) and 352(g).

PHILOSOPHICAL TENET

Homeopathy originally was based on the *vitalistic theory*. Similar to Aurveda and traditional Chinese medicine, homeopathy emphasizes the self-healing potential of the human body and a close mind/body connection. It is based on a premise that illness is a result of an imbalance of one's *vital force*, or essential energetic makeup. A correctly prescribed remedy leads to a restoration of the balance and ultimately to cure. This focus on the individual's fundamental energy, the foundation of all the world's indigenous healing systems, is something with which Western bioscience has yet to come to terms, including with homeopathy.

BASIC SCIENTIFIC TENETS

Homeopathy essentially rests on two scientific tenets: the principle of similars and a claim concerning the biologic effects of high dilutions. Despite the principles' apparent contradictions of *common sense* in medicine and a clear mechanism of action in physics, careful examination shows that they actually are compatible with many current common biomedical observations.[13]

Principle of Similars

The principle of similars suggests that one can ameliorate a disease process using a dilute form of a substance that can induce the same symptoms in the patient when healthy.[19] This is in contrast to *allopathy* (from Greek, *allo*, meaning *opposite*, and *pathos*, meaning suffering), which is the treatment that more commonly uses the principle of opposition or suppression, with the intent to interfere or block pathologic processes. In common biomedical terms, this principle may be restated as follows: A given concentration (or homeopathic dilution) of a substance may have opposite (not just different) effects if physiologic conditions are different (e.g., healthy versus ill organism). There also can be two different concentrations (or homeopathic dilutions) of a given substance that have opposite effects in a given physiologic state of a living system.[2]

Several observations in biomedicine are compatible with this definition of the principle of similars (Table 1), as follows[13]:

1. Drugs and other substances may induce symptoms they can relieve. Aspirin at a therapeutic dose can be used to lower temperature, whereas a toxic dose may induce life-threatening hyperthermia.[17] Agents used to manage angina or arrhythmia can induce or aggravate angina (e.g., nitroglycerin) or arrhythmia (e.g., digoxin).[17] Allergens are used to desensitize patients whose allergies have been induced by these specific substances.
2. Drugs may have effects that are opposite to their expected therapeutic activities in some patients. Benzodiazepines, normally used for sedation, have induced agitation and disorientation in some patients.[17] Interferon, usually considered to be an immunopotentiating agent, can induce immunodeficiency.[17]
3. Pre-exposure to low reagent concentrations may modulate the response to subsequent exposure. Exposure to low-level radiation can protect, to some extent, subjects subsequently exposed to high radiation doses.[30] Preincubation with low concentrations of cell response modulators (e.g., mitogens, tumor necrosis factor, interleukin-2) can change the expected response of preincubated cells to subsequent exposure to *normal* doses of the same agents.[14]
4. Biologic agents and drugs can exhibit a nonlinear pharmacody-

Table 1. BIOLOGIC ACTIVITY OF LOW CONCENTRATIONS IN CONVENTIONAL RESEARCH

Factor	Effect Tested	Lowest Active Concentration (mol/L)*	Lowest Tested Concentration (mol/L)*	Return to Control Values?	Reference†
Somatostatin, substance P	Decrease of IgE and IgG4 synthesis	10^{-12}	10^{-13}	Yes	28
Tumor necrosis factor	Synergistic action with various drugs	10^{-13}–10^{-14}	10^{-13}–10^{-14}	No	29
Vasoactive intestinal peptide	Increase interleukin-2 release	10^{-14}	10^{-14}	No	30
Substance P	Increase interleukin-2 release	10^{-15}	10^{-15}	No	31
Transforming growth factor-β	Neutrophils migration	10^{-15}	10^{-15}	No	32
Metenkephalin	Increase free cytosolic Ca^{++}	10^{-15}	10^{-15}	No	33
Substance P	Neutrophil adhesion to bronchial cells	10^{-16}	10^{-18}	Yes	34
Platelet-activating factor	Tumor necrosis factor production by HL-60	10^{-15}	10^{-16}	Yes	35
	saline cells				
	cytosolic Ca^{++}	10^{-17}	10^{-18}	Yes	
Platelet-activating factor	Decrease of luteinizing hormone somatostatin	10^{-17}	10^{-17}	No	36
β-Endorphin	Modulates natural killer cell activity	10^{-18}	10^{-18}	No	37
ADNF-14	Prevents neuronal cell death	10^{-18}	10^{-18}	No	38
Transforming growth factor-β	T lymphocytes migration	4×10^{-18}	4×10^{-18}	No	39
Leukotrienes	Release of luteinizing hormone	10^{-18}–10^{-20}	10^{-20}	Yes	40
Interleukin-1	T-cell clone proliferation	2.5×10^{-19}	2.5×10^{-19}	No	41
Proline	Nematocysts release	10^{-22}	10^{-24}	Yes	42
Interleukin-1	Protects against infection	8 ng per mouse	0.8 ng per mouse	Yes	43
Pregnenolone	Increases training memory	15–150 molecules per mouse	1.5–15 molecules per mouse	Yes	44
Pheromones	Neural firing	1 molecule	?	?	45

*ADNF-14 indicates activity-dependent neurotrophic factor. Data are expressed in moles per liter unless otherwise indicated.
†See Eshkinazi[5] for references.
From Eshkinazi D: Homeopathy re-revisited. Arch Intern Med 159:1981–1987, 1999; with permission.

namic behavior. Paradoxical stimulatory effects of toxic substances at low doses can be followed by inhibitory effects at higher doses (hormesis),[5, 35, 45] or inhibition can be followed by stimulation. Primary exposure to varying doses of antigen may induce a state of heightened response (immunization) or a state of specific unresponsiveness (low-dose and high-dose tolerance) to subsequent exposure to the same antigen.[40] Finally, low doses of epinephrine can induce vasodilation, whereas high doses can induce vasoconstriction.[17]

The first three sets of examples represent the first interpretation of the principle of similars that a same dose can induce opposite effects in different physiologic states. The fourth set of examples represents the second interpretation that there can be different concentrations of a given substance that produce opposite effects. These and other similar examples[6, 15, 31, 33, 43] suggest that the law of similars, if rephrased, may be compatible with many common observations in biomedical practice. It might provide a unifying framework for explaining these unexpected biomedical observations. Other examples of these phenomena can be found in a comprehensive monograph by Bellavite and Signorini.[2]

Biologic Effects of High Dilutions

Although the law of similars causes enough controversy in the biomedical community, it is the assertion that high dilutions may have biologic activity that has brought the most criticism to homeopathy. This statement seems incompatible with the molecular model.

Although homeopathy is equated systematically with extremely high dilutions, many commonly used homeopathic remedies contain detectable amounts of the material substance corresponding to dilutions of $1{:}10^{-3}$ or $1{:}10^{-6}$ of the starting material. Are such concentrations likely to be biologically active? One way to answer this question is to compare these concentrations with those found to be active in biomedical research. The answer may depend on the substance and bioassay. Eskinazi[13] pointed out that low concentrations of many substances have biologic activity in conventional biomedical research. Eskinazi[13] presented cases of conventional biomedical research that indicate low concentrations (10^{-22} mol/L) can be biologically active. Some examples are represented in Table 1.

All the mechanisms discussed in this section focus on conventional biomedicine and biomedical research, *not* on homeopathy research: The principle of similars is known in the biologic activities of a broad range of substances, and many homeopathic dilutions are in the range of those found to have activity in biomedical research. The two principles of homeopathy cannot be considered to be always in conflict with biomedicine.

The problem is when the homeopathic substance's dilution is

greater than Avogadro's number. How can something be efficacious that is diluted to a point beyond which there theoretically exists no matter? Modern physics has no answers to this at present. Perhaps after physicists find the top quark and move to the next level of matter and energy interface, they may be able better to propose a mechanism. For now, one must look at the published evidence of clinical outcomes to ascertain if homeopathy is credible. This evidence is discussed later. First, a discussion of how the practice of homeopathy works follows.

PRACTICE OF HOMEOPATHY

Remedy Selection

The description of symptoms in the homeopathic book on pharmacology called *Materia Medica* is based on toxicology of the substance elicited mainly by the process called *proving* (from German *Prüfung*, meaning *test*) or descriptions of accidental poisoning. The first proving was performed by Hahnemann. He took repeated doses of diluted *China* (quinine) in an attempt to understand the origin of its efficacy in the treatment of malaria. To his surprise, he developed symptoms similar to malaria, which led him to more experiments and reading and, ultimately, a formulation of the principle of similars. Further provings were performed by Hahnemann on himself, family members and students, and later healthy volunteers (*provers*).

Provings, essentially a phase I pharmacologic study, are performed according to a strict protocol. Although conventional researchers are looking for physiologic tolerance in healthy individuals without too many side effects, homeopaths pay attention to those side effects, trying to find as many as they can. Homeopaths use the *side effects* to guide their prescribing.

The first documented homeopathic trials that used blinding and placebo date back to 1885.[4] Kent[25] talked about blinded placebo-controlled provings as a standard in his *Lectures on Homeopathic Philosophy* first published in 1900. Most provings carried out in the last 100 to 150 years have been performed with substances diluted to 30C (10^{-60}) to ensure safety of volunteers. That is almost three times the Avogadro number. Still, authors report noticing a distinct effect in healthy individuals.[39]

To date, almost 2500 substances have been described in homeopathic literature. A cross-reference tool used for finding a group of remedies most closely corresponding to the symptom complex presented by the patient is called a *Repertory.* It first was developed by Hahnemann and later advanced by others. Modern Repertories are computerized and serve as a cross-reference tool allowing one to search numerous databases simultaneously. At the end of the repertorization process, a homeopath usually arrives at one or more possible remedies. A thorough

knowledge of toxicologic pictures of the remedies (*Materia Medica*) and experience lead the homeopath to the final choice.

Clinical Practice

Symptoms are considered to be a part of the natural response of the body (and mind) to external or internal stresses. According to homeopathic philosophy, the constellation of symptoms represents the best way the person's integrative systems can deal with the particular stressful event at a particular time. Focusing only on treating symptoms (i.e., nasal discharge with decongestants or rash with ointment) merely suppresses imbalances that are being expressed by the body.

A homeopathic physician attempts to base the prescription on unique characteristics of symptoms in the particular individual. Two patients with tonsillitis might receive two different medications, if one has diffusely erythematous tonsils versus a unilateral pustular presentation.

The homeopathic evaluation consists of the general medical examination with the standard organ and system review. The interview is structured to provide data necessary to match a unique symptom picture of the patient with the characteristics of one of the remedies. The most important factor in the evaluation is the chief complaint and the circumstances around it. Key points of the homeopathic interview are not dissimilar to a conventional history but with much more detail. Important elements include the following:

1. *Mental and emotional* symptoms (i.e., mood, anxieties, fears).
2. *Sensations* with concrete examples (i.e., burning as in hot, or burning as in a chemical burn).
3. *Location*. Where is the symptom located? The side of the body is important.
4. *Direction*. Does the symptom move or shift from one location to another?
5. *Concomitant symptoms*. What else is happening at the same time as the other symptom is occurring? Underused in most conventional medical approaches, this information is essential for a homeopath. It provides the data that is unique for the particular individual.
6. *Modalities*. What makes the sensation occur, become worse, or become better (i.e., temperature, position, food or lack thereof, and time of the day)?
7. *Intensity*. Usually patients are asked to compare a present symptom with other symptoms they have had.
8. *Duration* of symptoms.
9. *Onset* (the actual date and time). A symptom occurring late at night puts one in a different symptom classification from one occurring at 10 AM.

10. *Sequence of events*. What were the circumstances before the patient experienced the symptom?

After taking the list of complaints and addressing characteristics of the personality, lifestyle, and reactivity to emotional and physical events, the patient's case is evaluated in its entirety. Frequently the emerging clinical picture readily corresponds with the toxicologic picture of one of the common remedies (in homeopathic parlance, they are called *polychrests*). The situation in which such an *easy* match does not happen is common. In that case, the homeopath *repertorizes* the case. Symptoms and physical findings graded according to the level of importance and severity are cross-referenced using either print or computerized versions of the repertory. This analysis yields a list of remedies whose toxicologic picture closely corresponds to the case presented. A homeopath, using his or her knowledge of homeopathic toxicology and sometimes after consulting one of numerous reference sources, then makes a final decision on the remedy that has to be prescribed.

Illustrative of the application of the method is the use of homeopathic preparations *Allium cepa* (red onion) and *Euphrasia* (eyebright). Most people have increased lacrimation while cutting an onion. Usually the tears are bland and nonirritating, but the nasal discharge has an irritating, burning quality. Eyebright, if taken repeatedly, causes severe irritation of the eyes with bland, nonirritating nasal discharge. If a homeopath sees a person presenting with acute symptoms of seasonal allergies with the main presentation of increased lacrimation and nasal discharge, the choice of one of the remedies just described is based on a striking difference in the quality of the discharge of these two remedies. If the main presentation of the allergic reaction is itching of the palate or cough or both, without significant lacrimation, other remedies are considered. This method of prescribing is called *classic* or *constitutional* homeopathy and is practiced by most homeopaths in most European countries, India, South America, and the United States.

There are other schools of homeopathic technique. *Clinical homeopathy* (or *homeotherapeutics*) is based on simultaneously prescribing numerous remedies that are known to help for a particular diagnostic condition in lower potencies (more material concentrations). This prescribing technique, although sophisticated and complex, seems to be more appealing to conventional practitioners because it is based on conventional pathologic, rather than systemic, holistic philosophy. Numerous such *combination remedies* (preparations that combine a few homeopathic medicines, usually in material concentrations) aimed at alleviation of particular common conditions have been sold around the world. These preparations have been shown to be efficacious for temporary relief of some acute conditions. A few preparations based on one homeopathic remedy (called by homeopaths *single-remedy preparations)* have been reported to be efficacious in temporary relief and prophylaxis of acute cold and influenza.

Numerous other modalities, including *anthroposophic medicine*, have

been employing homeopathically prepared substances, basing their prescriptions on theories different from *classic homeopathy*. Currently, there are insufficient data to evaluate the efficacy of these applications of homeopathic remedies.

At present, no explanation of mechanisms by which homeopathic medicines affect biologic systems is available. In essence, however, principles of similars and small doses are used widely in vaccination and desensitization techniques. The debate around homeopathy always has focused essentially on the legitimacy of a practice for which a plausible scientific explanation for its mechanism of action has been persistently lacking. This situation is not unique, considering that until more recently, most medications, including lithium, antipsychotics, antidepressants, and metformin, were discovered by chance and have been used empirically with great therapeutic success without an equally successful initial understanding of their mechanism of action. Controversy around the choice of different treatment approaches is a norm rather than an exception in the daily life of medical practitioners. Even when the mechanism of action of the medicinal substance is well understood, a proof of efficacy in clinical trials must follow. It is essential to show carefully that there actually is an effect, even if the mechanism is not understood, before committing substantial resources toward identifying putative underlying mechanisms. This topic is discussed in the section on "Clinical Outcomes Research."

HOMEOPATHY TRAINING AND CERTIFICATION

Training

Although in other countries homeopathic training and certification have been available for decades, the United States has not had full-time homeopathic schools or accredited professional education for more than 40 years. There are general courses for consumers and professionals at many schools in the United States that offer their own certificates. Many of these courses are reasonably comprehensive. There currently is no formal academic continuing medical education training in homeopathy in the United States, although many such courses are in the final planning stages.

Certification

Three states, Arizona, Nevada, and Connecticut, have implemented a process of certification of medical professionals practicing homeopathy. The Council of Homeopathic Education has implemented a voluntary certification process that includes a written multiple-choice examination, an oral examination, a videotaped interview, and 10 case reports. A person can be admitted to examination only after completion of a re-

quired curriculum and clinical supervision. As of this date, this certification process has not been recognized by US (or other) medical boards.

CLINICAL OUTCOMES RESEARCH

Meta-Analyses

To date, two meta-analyses of the clinical effects of homeopathy have been published.[26, 28] A review by Kleinjnen at al[26] in 1991 assessed 107 controlled trials in 96 published reports. Overall, of the 105 trials with interpretable results, 81 trials indicated positive results versus 24 trials in which no positive effects of homeopathy were found. In studies judged to have better research designs, 15 trials showed positive results, whereas in 7 trials, no positive results could be detected.

A review by Linde et al[28] in 1997 assessed 186 double-blind or randomized (or both) trials. Of these trials, 119 met the inclusion criteria, and 89 had adequate data for meta-analysis. The combined odds ratio was 2.45 in favor of homeopathy. The odds ratio for the 26 good-quality studies was 1.66, and when corrected for estimated publication bias, the ratio remained about the same (1.78).

Positive Clinical Studies

Many homeopathic studies have suffered from inadequate methodology, with inadequate numbers or subjectivity. Nevertheless, many studies published in mainstream journals can be evaluated. In a well-known, controlled, randomized study, Reilly et al[37] evaluated the efficacy of homeopathic treatment of *asthma*. These authors have tested, under independent conditions, the reproducibility of evidence from two previous trials that showed homeopathy differs from placebo. Twenty-eight patients with allergic asthma, most of them sensitive to house-dust mite, were assigned randomly to receive either oral homeopathic immunotherapy to their principal allergen or an identical placebo. The test treatments were given as a complement to the patients' unaltered conventional care. A difference in favor of homeopathic immunotherapy appeared within 1 week of starting treatment and persisted for 8 weeks ($P = .003$). There were similar trends in respiratory function and bronchial reactivity tests. The meta-analysis of all three trials strengthened the evidence that homeopathy has an effect greater than placebo at $P = .0004$ (see a rebuttal of this in the next section). Reilly et al,[38] among the pioneers of controlled studies of homeopathy, also published a study on the treatment of *hay fever*, in which they reported a statistically significant difference between the experimental treatment (a homeopathic preparation) and the placebo group.

In August 2000, Reilly's research team[42] reported a trial of homeopathic preparations of principal inhalant allergens versus placebo in

treatment of perennial *allergic rhinitis*. Fifty patients completed the study showing a significant objective improvement in nasal air flow compared with the placebo group. Compared with placebo, homeopathy caused a clear, significant, and clinically relevant improvement in nasal respiratory flow, similar to that found in topical steroids.

The effectiveness of homeopathy in *vertigo* was examined in a double-blind randomized study of the efficacy and safety of a combination homeopathic remedy versus betahistine hydrochloride.[49] The study was conducted in 15 study centers in Germany in 119 patients. Homeopathic and conventional treatment showed a clinically relevant reduction in the mean frequency, duration, and intensity of vertigo attacks. The therapeutic equivalence of the homeopathic remedy and betahistine was established statistically. The authors concluded that the efficacy and safety of the homeopathic remedy in the treatment of vertigo of various origins was probable within the framework of a phase III clinical study.

A double-blind, placebo-controlled study from Harvard[7] found that the homeopathic treatment of mild traumatic brain injury (60 subjects) was beneficial. The authors suggested that homeopathy may have a role in treating *persistent mild traumatic brain injury.*

A group of researchers from Germany conducted a randomized equivalence trial comparing the efficacy and safety of a combination homeopathic spray with cromolyn sodium spray in the treatment of seasonal *allergic rhinitis*.[48] The study showed that for the treatment of hay fever, the homeopathic nasal spray was as effective and well tolerated as the conventional therapy with cromolyn sodium. A similar design of the research protocol was used by another research team[16] to evaluate a comparative efficacy of aspirin and a homeopathic remedy. The authors concluded that both preparations were equally effective in treatment of symptoms of the common cold.

Interesting results have been found in the treatment of *postoperative ileus*.[1] Meta-analyses of studies comparing homeopathic remedies in different concentration ranges with placebo indicated a statistically significant change in favor of homeopathy.

In another clinical study,[21] a randomized double-blind, placebo-controlled clinical trial that compared homeopathic medicine with placebo in the treatment of *acute childhood diarrhea* was reported. There were 81 children in the study. The treatment group had a statistically significant ($P<.05$) decrease in duration of diarrhea and number of stools.

The principal investigator of this study, Jacobs, reported similar results reproduced in another double-blind, placebo-controlled study.[23] In this study, 116 children completed the trial. The study showed statistically significant improvement in the treatment group compared with placebo.

Jacobs et al[23] reported the results of a randomized placebo-controlled trial of homeopathic treatment of *acute otitis media* in children. This study included 75 children. There were fewer treatment failures in the group receiving homeopathy after 5 days, but these differences were not statistically significant. There was a statistically significant decrease in symp-

toms at 24 and 64 hours after treatment in favor of homeopathy. Sample size calculations indicated that 243 children in each group would be needed for significant results.

Negative Clinical Studies

One of the most popular homeopathic remedies is *Arnica*, used to help recovery from tissue *trauma.* Ernst and Pittler[11] published a meta-analysis of eight studies on *Arnica* in surgery. Six of the eight studies reported negative results. Ramelet et al[36] published a study on homeopathic *Arnica* in postoperative *hematomas*. They reported negative results in 130 consecutive patients undergoing saphenous stripping (204 legs) randomized to *Arnica* and placebo. Studies done on homeopathy in treatment of *migraine headaches*[41, 47, 50] consistently have shown negative results. One study done in children with recurrent upper respiratory tract infections found no difference with homeopathy in terms of sick days and use of antibiotics. Placebo and treatment groups had fewer flare-ups, which was attributed to counseling patients about preventive measures.[10]

There are also studies showing *marginal* results. One group headed by Cucherat[9] published a *meta-analysis* of clinical trials in homeopathy. They concluded that there is some evidence that homeopathic treatments are more effective than placebo; however, their analysis showed that the strength of the evidence was low because of low methodologic quality of the trials. Cochrane reviewed by Vickers and Smith[46] concluded that the data supporting the hypothesis that *Oscillococcinum* reduces the duration of illness in patients presenting with *influenza* symptoms are not strong enough because of a small sample size. Another Cochrane review[29] analyzed three studies on asthma, involving 154 patients. Two of the three studies showed positive outcomes in favor of homeopathy (with the other neutral). In contradistinction to Reilly's conclusion, the investigators believed that there was insufficient evidence currently to assess homeopathy's role in asthma. This conclusion was due primarily to the methodology, present in many homeopathy trials, that allows differential remedies to be administered to the treatment group in the same trial.

SUMMARY

Especially in the United States, homeopathy has not become integrated into mainstream medical practice; this is partly because of the historical paucity of quality published research studies or quality educational programs. More recently, there have been better-designed studies in reputable journals, although historically most studies have been inconclusive or of poor methodology. The confusion around homeopathy in the United States exists for several reasons:

1. One of the main reasons for the relative disinterest or opposition to homeopathy is that even well-designed clinical studies on homeopathy leave the reader without any protocol-driven tools to take into daily practice. Individualization of treatment, or, as it is called today, *differential therapeutics*, is the main requirement of successful homeopathic prescribing. Only well-trained homeopathic practitioners are able to carry out such a task. In many articles that reported positive outcomes for homeopathy, numerous homeopathic remedies had been prescribed for the same diagnostic category. Critics suggest that the pooling of data from trials using different therapeutic agents to assess the overall success of homeopathic prescribing is incorrect.[27] Research protocols that employ combination remedies, in which a medication contains several homeopathic remedies, fall into the same category.
2. Many of the positive and negative studies published are flawed with numerous methodologic problems. One of the most common problems is a lack of objective validated outcome measures. Another common problem is a small sample size. In most positive and negative meta-analyses published to date, research data are pulled together artificially based on either a diagnostic category or a particular remedy. Frequently the concentration of the remedy used and the conditions to which it has been applied are different. Ernst and Pittler[12] published a letter with a critique of the methodology used in one of the meta-analyses of clinical trials of homeopathy. Most importantly, professional homeopaths and conventional scientists criticize the choice of remedy or the condition to which it was applied or both. The design and follow-up in migraine studies has been criticized extensively by one of the world's leading homeopaths, Vithoulkas (personal communication, 1997). Most of the *Arnica* studies have been designed with either an inappropriate dosing regimen or an inappropriately chosen procedure. In most positive studies on homeopathy, the outcome measures were subjective and poorly quantifiable.
3. Few well-designed studies have been reproduced by independent research teams. This situation exists for two major reasons: lack of sufficient funding and lack of a sufficient number of well-trained homeopaths qualified and interested to participate in research.
4. More rigorous educational programs on homeopathy for professionals need to be encouraged. Most of the existing programs are designed for consumers; academic continuing medical education–quality courses are needed.

Meanwhile, while the debate around homeopathy still continues in conventional medical circles, the general public has been using the services of homeopathic practitioners and homeopathic remedies increasingly. In many countries, homeopathy and other complementary

modalities have been integrated successfully into a larger armamentarium for the modern physician. According to a study published in 1995 in the *Journal of the American Board of Family Practice*,[3] 69% of family practice physicians expressed interest in learning more about homeopathy.

Increasing public and professional interest calls for attempts to study homeopathy in a more systematic way and to provide quality academic overview for medical practitioners. The growing number of complementary and alternative medicine centers affiliated with major teaching hospitals should provide a solid interface between evidence-based biologic medicine and many emerging complementary and alternative medicine modalities, including homeopathy.

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