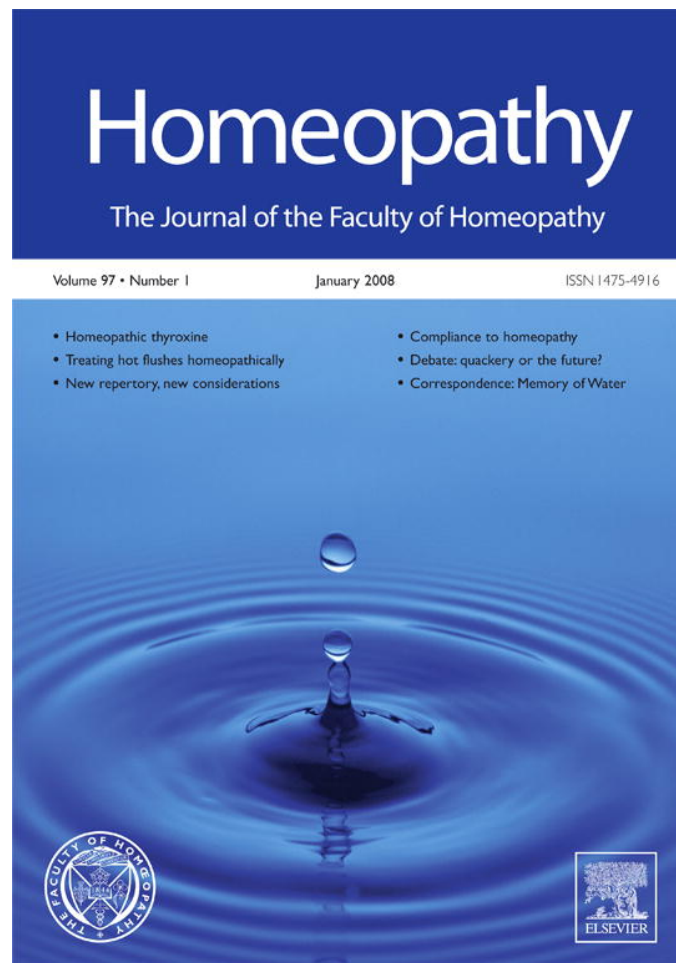


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DEBATE

Homeopathy—quackery or a key to the future of medicine?

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This is an edited transcript of a debate held at the University of Connecticut Health Center, Farmington, Connecticut, USA on 25 October 2007. Homeopathy is a widely used but controversial form of complementary and alternative medicine. Six distinguished international speakers, including advocates and skeptics concerning homeopathy, debated the plausibility, theoretical principles, clinical and basic research evidence, ethical and other issues surrounding homeopathy. *Homeopathy* (2008) 97, 28–33.

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Introduction

Homeopathy is used by tens of millions of people around the world. On 25 October 2007, six internationally renowned experts examined the basic science as well as the clinical and historical evidence around this 200-year old system of medicine. Is homeopathy pure quackery, as some contend, or perhaps the future of medicine? What follows is an abridged version of this debate. To watch the full debate go to www.sonicfoundry.com/uconn.

Steven Novella

My task is to cover the scientific plausibility of homeopathy. What basic science underlies this discipline? There are a number of principles of homeopathy: the Law of Similars, the Law of Chronic Disease, and the Law of Infinitesimals.

So, let us start with the Law of Similars, or the notion that like cures like. In other words, a substance produces symptoms of illness in a well person when administered in large doses. If we administer the same substance in minute quantities, it will cure the disease in a sick person. Hahnemann, the developer of homeopathy, suggested that this is because nature will not allow two similar diseases to exist in the body at the same time. Two hundred years of subsequent scientific development has not discovered any principle in nature or biology that would explain this. There have been modern attempts to explain this apparent effect through an analogy to vaccines, but this is not an apt or a valid analogy.

Hahnemann had a lot of ideas about what illness and disease and health is. In fact, homeopathy is what we could call a philosophy-based medicine. It is based upon a philosophy of health and illness. The modern attempts at making it scientific, or evidence-based, in my opinion, have failed. There are several 'laws of cure' on how homeopathic cures work. Cure starts at the top of the body and works downward, or from within the body outward, or symptoms clear in reverse

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order of appearance. These are fairly superficial observations that do not have any basis in any modern scientific understanding of disease. Hahnemann had his own theory of illness, largely based on the notion of miasms. He thought there were three miasms: psora, syphilitic and the sycotic miasms. Two hundred years of subsequent scientific advance have moved very much away from Hahnemann and his ideas and has not supported a single one of them.

Let us turn to the Law of Infinitesimals. Substances become more potent when diluted. Hahnemann believed that only the desired effects of remedies became more intense with dilution; that the undesirable effects became less potent. There is no notion in chemistry or biology that would explain such an effect. The principle of succussion is basically that the energy or essence of a substance is transferred to a solvent when shaken. When Hahnemann formulated his ideas he did not know about Avogadro or Avogadro's number, which is the basis of the dilutional limit. Many of the dilutions which are commonly used in homeopathic preparations are well beyond this limit. A 30c preparation is not uncommon—that means a dilution of 1×10^{-60} . Suffice it to say, you are not getting any active ingredient in a 30c homeopathic remedy. So, clearly, that is not how homeopathic remedies could work. They do not work by retaining any active ingredient.

Many contemporary homeopaths argue that homeopathic remedies could work through some property that has to do with either relativity or, more commonly, quantum mechanics or quantum effects. Now, when a theorist invokes quantum mechanics, or quantum theory, in order to explain a controversial effect that cannot be explainable on the basis of established science, that is a sure sign of abject desperation on their part.

So we are left with the concept of memory of water. Homeopathic qualities are stored in a three-dimensional structure of water molecules, not chemical compounds diluted in it. There is no mechanism for how this structure would survive, would actually remember the information in the chemicals that were diluted in it. We have to extend this to also say that the water knows which substances to remember. There is no plausible basis for biological persistence or activity of alleged water memory.

Rustum Roy

My presentation is based on insights from rudimentary materials science. Material scientists unequivocally reject, as scientifically absurd, the argument used for decades and centuries against the feasibility of homeopathy: "A homeopathy remedy cannot have any effect at all because the final water is chemically identical to the water used to make it". You just heard it from Dr Novella. Now, this argument has been

repeated ad nauseam up to 2007, and is a totally unscientific basis for any criticism of homeopathy. A typical attitude is shown in the next quote, again from Dr Novella: "It is not that we don't know how homeopathy works, it's that homeopathy cannot possibly work. It's just water. There is no possibility within physics—forget biology and medicine—within physics that there could be any therapeutic effect physiologically to homeopathic remedies. ... (Homeopaths) say the water retains memory—but that is functionally the equivalent of saying it is magic because there is no mechanism for what they are saying."

Let us check out this argument that "its just water," by looking at what science does know about water. Let us just look at another simple material—carbon. Graphite is just carbon. Graphite is one of the world's softest material; the world's hardest material is diamond. But in a few nanoseconds, adding absolutely nothing we can make one into the other. It is just carbon. Yet with zero difference in composition, we can see the magic that change of structure can do.

It is true, homeopathic waters really do have identical chemical composition. But composition are not where it is at. What is different about remedies could scientifically be based on different structures, hence even radically different properties. The first law of material science is: "properties are controlled mainly by structure, not by composition." More specifically, changing liquid water is nothing special. Let me show you much more dramatic changes with no changes in composition. All the essential stuff, even solids, in your computer, everything: silicon, the magnets, the dielectrics can be changed structurally with a tiny microwave field in a few seconds. Why is this "magic," or fact, important? Such strong, solid materials, some with tetravalent ions, have bonds over an order of magnitude stronger than water. If their structure can be changed so easily, surely we can change liquid water with very weak vectors.

As a number of very good research studies have shown, the structure of water can be changed easily and retain the new structure for hours and days. The skeptics never point out such facts, possibly because they know so little material science. Elia *et al* and Rey have been structuring ultradiluted pure water in the lab explicitly by mimicking the homeopathic process and using standard material science characterization techniques to demonstrate the differences. They were able to change water and demonstrate the changes. At Penn State we have studied pure water and have done very preliminary work on commercial homeopathic samples of the remedies Natrum muriaticum and Nux Vomica using Raman and UV-Vis spectroscopy. What we have found is that there are differences between such commercial samples, as used in homeopathic practice, of Nux vom and Nat mur and plain water. There are also differences between different potencies—a fact

likely tied to the succussion process in the remedy preparation process.

Our work at Penn State provides standard thermodynamic and crystal chemical spectroscopic data first to dispose once and for all the “anti-science, theological” crowd’s “feasibility” argument against homeopathy. Pure water’s structure and properties can be changed. The key lies in the homeopathic succussion process which introduces three vectors: pressure, epitaxy, and nanobubbles. Each of these things are inherent in remedy preparation. All three of them can change structure.

Donald Marcus

My charge is to look at the clinical evidence for homeopathy. In addition to summarizing some of the clinical trials, I am going to touch on some larger aspects of homeopathy and its relationship to health care.

I will start with a review by Professor Ernst, Chairman of the Department of Complementary and Alternative Medicine at Exeter University in England. Based on over 20 reviews since 1997, he believes there is no evidence homeopathic remedies differ from placebos. Recently, the British National Health Service has conducted a review of the evidence supporting the use of homeopathy for the purpose of making recommendations for reimbursing homeopathic care. Their conclusion was there is insufficient evidence to support the use of homeopathy. In 2005, *The Lancet* came to the conclusion that there is no point in making further investments in research in clinical trials in homeopathy.

What about safety? Essentially, there is no regulation or inspection of homeopathic medicines by the FDA or any external agency. Another safety concern is that some homeopathic practitioners recommend against vaccination. Finally, I am concerned that some people who practice homeopathy are unqualified to perform a general medical evaluation and may miss a serious and treatable condition.

Summarizing the clinical trial data, I believe there is no rigorous evidence to support the efficacy of homeopathy. As a result, I do not think that federal funds should be used to support further clinical trials of homeopathy. A related question, aside from the randomized controlled trials, is does homeopathy help people? I think it is clear that some people who receive treatment feel better. I believe that patients feel better because of their interaction with a supportive and sympathetic practitioner, and because of the placebo effect of taking any kind of remedy, homeopathic or conventional.

What is the rationale for homeopathy? One claim made by advocates for homeopathy and other alternative therapies is that biomedicine is mechanistic, reductionist, and unaware of mind–body interactions.

Contemporary medicine taught in this medical school and other medical schools, is not reductionistic. It is based broadly on biochemical, physical, behavioral sciences, and there is a great deal of research on mind–body interactions.

Another claim is that quantum physics and the Heisenberg Uncertainty Principle have overturned our view of the world, and that biomedical science is merely a cultural construct that has no greater validity than other systems of health care. The Heisenberg principle concerns atomic and subatomic particles and it does not invalidate Newtonian physics. There is no justification for taking this concept from physics and applying it to humanities, social sciences, or health care.

Finally, I would like to consider the role of homeopathy in health care. From the perspective of an academic medical center, homeopathy should be evaluated by the same standard of evidence used for all therapies. Patients should be informed that there is no rigorous evidence for the health claims made for homeopathic remedies. Advocacy of homeopathy by some academic integrative medicine programs undermines scientific and scholarly standards. On the other hand, homeopathy is a belief system and not a science. I believe it will persist in the community because its practitioners and adherents will ignore the negative data from clinical trials.

Iris Bell

I will cover three main points: pre-clinical and clinical studies demonstrate biological effects of homeopathic remedies; multiple observational studies on thousands of patients are overwhelmingly positive for homeopathic treatment in real world clinical practice; and randomized controlled trials and the meta-analyses based on them show mixed findings, but raise significant methodologic concerns, especially regarding external validity.

First, biological effects. To address the most controversial laboratory work, that of Benveniste and his collaborators, European scientists in 2004 (Belon *et al*) published a multi-center study involving four different laboratories, showing, with more objective measurement techniques, that dilutions of histamine, including those below Avogadro’s number, do modulate basophil activation in a non-linear manner. In a thrombogenesis model, other investigators used ultra-high dilutions of aspirin prepared homeopathically and showed an objective, measurable non-linear dose–response relationship for actives versus controls. These findings have precedents in the phenomenon of hormesis within the field of toxicology, involving bidirectional and non-linear dose–response relationships.

In animal research ranging from experimentally induced paw edema through experimental stroke,

arsenic poisoning, chemically induced liver cancer, and changes in normal physiology, such as EEG sleep stages, researchers have repeatedly demonstrated objectively that homeopathic remedies have biological activity not seen with placebo. To my knowledge, there have been no negative studies to counter—yet skeptics choose to ignore this entire body of literature. In my laboratory, we performed a double-blind placebo controlled randomized trial of individualized homeopathy in people with fibromyalgia, including a sub-study involving quantitative EEG recordings. We found that alpha EEG frequency magnitude increased over time in people who received active remedies, but decreased in people who received placebo. Skeptics have not published any data to counter these findings.

What about observational evidence? Multiple peer-reviewed observational research studies on thousands of homeopathic patients demonstrate an average rate of 70–80% favorable outcomes and excellent safety profiles in real-world practice. Although skeptics dismiss observational studies, papers in respected conventional medical journals such as the *New England Journal of Medicine*, have shown that well-designed cohort or case-controlled observational studies do not overestimate treatment effect sizes. There are no negative observational studies of homeopathy.

Finally, what about the randomized control trial data and the meta-analyses of homeopathy that derive from individual studies? Linde *et al*'s famous positive meta-analysis published in *Lancet* in 1997 has been vigorously attacked. That study concluded that while the evidence was insufficient to recommend homeopathy for any one conventional condition, the data suggested an overall effect different from placebo. However, an important problem with both the Linde *et al* positive meta-analysis and the recent negative meta-analysis by Shang *et al* published by *Lancet* is the pooling of studies of all types of practice involving homeopathic remedies across all types of clinical conditions. For instance, as only 16% of the studies sampled by Shang *et al* involved individual remedies prescribed by classical homeopathic principles. In addition, Shang *et al* started with 110 pairs of conventional and homeopathic studies, but then disrupted their own pairing when they boiled their sample down to 8 of trials of homeopathy and 6 of conventional treatment to reach their negative conclusions about homeopathy. Experts on meta-analysis state that such pooling of heterogeneous practices across heterogeneous patient populations and unpairing the studies sampled methodologically weaken the conclusions drawn.

In discussing research on the placebo effect in psychotherapy, Bootzin and Bailey in 2005, wrote that the theory of how a treatment produces change predicts when to label effects “specific” versus “non-specific” (including “placebo”). Homeopathic theory predicts patterns of multiple changes across the patient

as a whole over time, not by disease or diagnosis, but Shang *et al* randomly chose only one outcome from multiple reported outcomes in each study, thus compromising the external validity of homeopathic studies. Experts in meta-analysis consider the Shang *et al* paper heavily methodologically flawed for multiple reasons. Relying on mainstream criteria for judging internal validity leads researchers to ignore important external validity issues.

A fairer test of homeopathy needs to consider that homeopaths claim to alter the long-term trajectory of the person's illness process toward fewer, shorter, and less severe illness flares and delayed complications, not necessarily to suppress symptomatic manifestations of a specific disease at a given point in time. High-quality clinical trials should measure not only the short-term disease endpoints and quality of life as required for conventional medical research, but also overall health trajectory outcomes across diagnoses for a given individual over time as predicted for homeopathic clinical research.

In summary, homeopathic remedies exhibit biological activity across multiple *in vitro* and *in vivo* models. Observational studies consistently show real-world effectiveness of individualized homeopathic treatment across multiple conditions, especially with long-term follow up. Randomized controlled trials and meta-analyses to date have major methodologic limitations, positive or negative in conclusions.

Nadav Davidovitch

My presentation aims to historicize the current debate on the relationship between homeopathy and conventional medicine. I will analyze this current debate mainly through the changes in the use of placebo in clinical practice and research. In general contemporary discussions of the alternative *vs* orthodox medicine debate are steered almost immediately in the direction of Randomized Controlled Clinical Trial. While the claim that the successes of alternative treatment originate in the placebo effect is old, the steering of the debate towards the methodology of statistical research is relatively new. At the beginning of the 20th century, it was alternative medicine, particularly homeopathy that attempted to use statistics and the placebo effect to prove its claims, encountering a skeptical orthodox medical profession hostile to the use of statistics and the placebo effect within the realm of the clinical encounter.

A deeper, more historical look at the various contexts in which the placebo is present in the medical debate enables questions such as: What is scientific medicine? What is considered acceptable proof in the clinical world? Who should judge what treatments are considered to be effective and, generally, what treatments “deserve” to be available to the public.

The widespread use of placebo at the end of the 19th century, while denying the attendant ethical problems, prevailed until the middle of the 20th century. Paternalism, being entrenched so deeply in the medical profession at the turn of the 20th century and the common practice of what was termed as 'benevolent deception' were central factors in the establishment of this approach. However, what is equally interesting is the phenomenon of the extensive use of the placebo by homeopaths in this period, in their medical practice but notably also for research purposes.

The turning point in the image of placebo came after World War II. The world of clinical research underwent a transformation in these years, symbolized by research into penicillin and streptomycin, research which, in fact, laid the practical and theoretical foundations for the image of the randomized controlled trial (RCT) as we know it today. The flag bearers of this revolution were no longer the laboratory researchers, but clinicians, epidemiologists and statisticians. At the time, the objective was not how to harness what are called, in the medical school world the 'basic sciences', for the good of clinical diagnosis; but to turn the treatment interaction into one that could be scientifically tested. The development of the methodologies of clinical research, with RCT at the top of the pyramid, were the primary concern of those people who sought to make the clinic scientific. At this point the placebo came into action—not the placebo that served mainly in the treatment interaction, but a placebo that could help in clinical medical research. From the 1980s, research that was not RCT had little chance of being published in a leading medical journal.

Without dwelling excessively on the way the alternative doctors and therapists conducted the debate between themselves and orthodox medicine, their response can be divided in two possible categories. One possibility is to accept the rules of the language of the hegemony and attempt to answer the RCT challenge by means of monitored research that demonstrates the superiority of alternative treatments over placebos. Another possibility is a refusal to accept the rules of the game, especially in the light of the claim that the basic assumptions of controlled, blinded research inherently contradict the holistic, individual perception of alternative medicine. This question is closely aligned to the question of how various unconventional doctors see themselves in relation to orthodox medicine: Is unconventional medicine complementary to orthodox medicine, constituting an answer at the point from which orthodox medicine does not have answers, or is it alternative medicine, which should, therefore, serve as a radical alternative to the bankrupt bio-medical paradigm?

The changing role of the placebo reflects historical shifts within the medical discourse. The current tendency to differentiate between the deceitful "clinical placebo" and the unbiased "research placebo," assist

to erect a wall of silence regarding serious ethical drawbacks in contemporary medical research practices. The ethical debates concerning the information/deception aspects of placebo use in clinical practice cannot remove us from other pressing questions of using placebos in the context of clinical trials as a substitute for the best established therapy, both in conventional and complementary medicine. Both problematic dichotomies, the clinical *vs* research placebo and physician as caretaker *vs* researcher, need a thorough historical evaluation in order to assist our analysis of ethical issues in present experimental medicine.

André Saine

With more than 25,000 volumes, the homeopathic literature is very rich in reports about the results obtained by homeopathy during epidemics. Results obtained by homeopathy during epidemics reveal a very important and clear constancy: namely, a very low mortality rate. This constancy remains, regardless of the physician, institution, time, place or type of epidemical disease, including diseases carrying a very high mortality rate, such as cholera, smallpox, diphtheria, typhoid fever, yellow fever and pneumonia. This low mortality rate is always superior to the results obtained by the allopathy practiced at that particular time and, as a rule, the allopathy of today.

Despite well-documented and official reports, the results obtained by homeopathy have been almost completely ignored by the scientific and medical communities, as if they had occurred in a void of time and space. I will give five examples to illustrate these results:

When cholera first invaded Europe in 1831, the mortality throughout Europe was generally between 40% and 60%. To the surprise of many, mortality rates reported by homeopathic physicians was generally below 10%, and commonly under 4%. Let me present two typical cholera reports, which have a stamp of officialdom. The first one comes from the territory of Raab in Hungary where in 1831 a Dr Joseph Bakody treated 223 patients with mild to severe cholera, 14 of which were in a state of collapse. He lost a total of 8 patients, a mortality of 3.6%. A similar situation occurred in Cincinnati in 1849. The Board of Health issued an order calling for physicians to report all cases of cholera. Reports of a high mortality rate were received by the Board from the city hospital and allopathic physicians. However, six homeopathic physicians attracted national attention when they reported not a single death out of their first 350 cases of cholera. Two of these homeopathic physicians, Dr Pulte and Ehrmann would eventually report treating 2646 cases with 35 deaths, or a mortality rate of 1.3%. Allopaths reported fatal outcomes in about 50% of their cases.

Now, let us look at pneumonia, whose incidence and virulence has remained fairly uniform through time. Before the era of antibiotics, the average death rate from pneumonia was 30%. Since the introduction of antibiotics, the death rate has only gone down to 18%. On the other hand, the death rate under genuine homeopathic treatment has always been less than 1–3%, even in patients suffering from the most fulminant type of pneumonia.

Let us push our inquiry a bit further and look at one of the most deadly of all infectious diseases, rabies. I have been able to document more than a dozen well-described cases with unmistakable, fully developed clinical rabies that had uneventful recoveries with homeopathic treatment, and this without any prophylaxis whatsoever to assuage the virulence of the disease.

This small sample of case reports should be sufficient to illustrate the potential of homeopathy, and incite real scientists, honest physicians, and intelligent people to examine homeopathy more seriously. Such extraordinary outcomes are not an exception in homeopathy but are the rule for all 33 infectious diseases which I have so far investigated, including typhus, malignant scarlet fever, meningitis, tetanus, anthrax, septicemia, and malaria.

What you have seen today makes it clear—homeopathy is very plausible and there is both ample clinical and epidemiological evidence that it works. Homeopathy will become an integral part of medicine despite the paradoxical nature of its remedies and all other prejudices against it, simply because it is safe, efficacious and cost-effective.