



Homeopathy

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Homeopathy (/ˈhoʊmiˈpəθi/) or **homoeopathy** is a system of alternative medicine created in 1796 by Samuel Hahnemann, based on his doctrine of *like cures like* (*similia similibus curentur*), a claim that a substance that causes the symptoms of a disease in healthy people would cure similar symptoms in sick people.^[1] Homeopathy is a pseudoscience – a belief that is incorrectly presented as scientific. Homeopathic preparations are not effective for treating any condition;^{[2][3][4][5]} large-scale studies have found homeopathy to be no more effective than a placebo, suggesting that any positive feelings that follow treatment are only due to the placebo effect and normal recovery from illness.^{[6][7][8]}

Hahnemann believed the underlying causes of disease were phenomena that he termed *miasms*, and that homeopathic preparations addressed these. The preparations are manufactured using a process of homeopathic dilution, in which a chosen substance is repeatedly diluted in alcohol or distilled water, each time with the containing vessel being bashed against an elastic material, (commonly a leather-bound book).^[9] Dilution typically continues well past the point where no molecules of the original substance remain.^[10] Homeopaths select homeopathics^[11] by consulting reference books known as *repertories*, and by considering the totality of the patient's symptoms, personal traits, physical and psychological state, and life history.^[12]

Homeopathy is not a plausible system of treatment, as its dogmas about how drugs, illness, the human body, liquids and solutions operate are contradicted by a wide range of discoveries across biology, psychology, physics and chemistry made in the two centuries since its invention.^{[7][13][14][15][16]} Although some clinical trials produce positive results,^{[17][18]} multiple systematic reviews have indicated that this is because of chance, flawed research methods, and reporting bias. Continued homeopathic practice, despite the evidence that it does not work, has been criticized as unethical because it discourages the use of effective treatments,^[19] with the World Health Organization warning against using homeopathy to try to treat severe diseases such as HIV and malaria.^[20] The continued practice of homeopathy, despite a lack of evidence of efficacy,^{[6][7][21]} has led to it being characterized within the scientific and medical communities as nonsense,^[22] quackery,^{[4][23]} and a sham.^[24]

Assessments by the Australian National Health and Medical Research Council, the United Kingdom's House of Commons Science and Technology Committee and the Swiss Federal Health Office have each concluded that homeopathy is ineffective, and recommended against the practice receiving any further funding.^{[25][26]}

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Homeopathy

Alternative medicine



Samuel Hahnemann, originator of homeopathy

Claims	"Like cures like", dilution increases potency, disease caused by miasms.
Related fields	Alternative medicine
Year proposed	1796
Original proponents	Samuel Hahnemann
Subsequent proponents	James Tyler Kent, Constantine Hering, Royal S. Copeland, George Vithoulkas
MeSH	D006705
See also	Humorism, heroic medicine

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History



1857 painting by Alexander Beydeman, showing historical figures and personifications of homeopathy observing the brutality of medicine of the 19th century

Historical context

Homeopaths claim that Hippocrates may have originated homeopathy around 400 BC, when he prescribed a small dose of mandrake root to treat mania, knowing it produces mania in much larger doses.^[27] In the 16th century, the pioneer of pharmacology Paracelsus declared that small doses of "what makes a man ill also cures him".^[28] Samuel Hahnemann (1755–1843) gave homeopathy its name and expanded its principles in the late 18th century.

In the late 18th and 19th centuries, mainstream medicine used methods like bloodletting and purging, and administered complex mixtures, such as Venice treacle, which was made from 64 substances including opium, myrrh, and viper's flesh.^[29] These treatments often worsened symptoms and sometimes proved fatal.^{[30][31]} Hahnemann rejected these practices – which had been extolled for centuries^[32] – as irrational and inadvisable;^[33] instead, he advocated the use of single drugs at lower doses and promoted an immaterial, vitalistic view of how living organisms function, believing that diseases have spiritual, as well as physical causes.^[34]

Hahnemann's concept

The term "homeopathy" was coined by Hahnemann and first appeared in print in 1807.^[35]

Hahnemann conceived of homeopathy while translating a medical treatise by the Scottish physician and chemist William Cullen into German. Being sceptical of Cullen's theory concerning cinchona's use for curing malaria, Hahnemann ingested some bark specifically to investigate what would happen. He experienced fever, shivering and joint pain: symptoms similar to those of malaria itself. From this, Hahnemann came to believe that all effective drugs produce symptoms in healthy individuals similar to those of the diseases that they treat, in accord with the "law of similars" that had been proposed by ancient physicians.^[36] An account of the effects of eating cinchona bark noted by Oliver Wendell Holmes, and published in 1861, failed to reproduce the symptoms Hahnemann reported.^{[37]:128} Hahnemann's law of similars is a postulate rather than a scientific law.^[38] This led to the name "*homeopathy*", which comes from the Greek: ὅμοιος *hómoios*, "-like" and πάθος *páthos*, "suffering")

Subsequent scientific work showed that cinchona cures malaria because it contains quinine, which kills the *Plasmodium falciparum* parasite that causes the disease; the mechanism of action is unrelated to Hahnemann's ideas.^[39]

"Provings"

Hahnemann began to test what effects substances produced in humans, a procedure that would later become known as "homeopathic proving". These tests required subjects to test the effects of ingesting substances by clearly recording all of their symptoms as well as the ancillary conditions under which they appeared.^[40] He published a collection of provings in 1805, and a second collection of 65 preparations appeared in his book, *Materia Medica Pura*, in 1810.^[41]

Because Hahnemann believed that large doses of drugs that caused similar symptoms would only aggravate illness, he advocated extreme dilutions of the substances; he devised a technique for making dilutions that he believed would preserve a substance's therapeutic properties while removing its harmful effects.^[10] Hahnemann believed that this process aroused and enhanced "the spirit-like medicinal powers of the crude substances".^[42] He gathered and published a complete overview of his new medical system in his 1810 book, *The Organon of the Healing Art*, whose 6th edition, published in 1921, is still used by homeopaths today.^[43]

Miasms and disease

In the *Organon*, Hahnemann introduced the concept of "miasms" as "infectious principles" underlying chronic disease.^[44] Hahnemann associated each miasm with specific diseases, and thought that initial exposure to miasms causes local symptoms, such as skin or venereal diseases. If, however, these symptoms were suppressed by medication, the cause went deeper and began to manifest itself as diseases of the internal organs.^[45] Homeopathy maintains that treating diseases by directly alleviating their symptoms, as is sometimes done in conventional medicine, is ineffective because all "disease can generally be traced to some latent, deep-seated, underlying chronic, or inherited tendency".^[46] The underlying imputed miasm still remains, and deep-seated ailments can be corrected only by removing the deeper disturbance of the vital force.^[47]

Hahnemann's hypotheses for the direct or remote cause of all chronic diseases (miasms) originally presented only three, psora (the itch), syphilis (venereal disease) or sycosis (fig-wart disease).^[48] Of these three the most important was *psora* (Greek for "itch"), described as being related to any itching diseases of the skin, supposed to be derived from suppressed scabies, and claimed to be the foundation of many further disease conditions. Hahnemann believed psora to be the cause of such diseases as epilepsy, cancer, jaundice, deafness, and cataracts.^[49] Since Hahnemann's time, other miasms have been proposed, some replacing one or more of psora's proposed functions, including tuberculosis and cancer miasms.^[45]

The law of susceptibility implies that a negative state of mind can attract hypothetical disease entities called "miasms" to invade the body and produce symptoms of diseases.^[50] Hahnemann rejected the notion of a disease as a separate thing or invading entity, and insisted it was always part of the "living whole".^[51] Hahnemann coined the expression "allopathic medicine", which was used to pejoratively refer to traditional Western medicine.^[52]

Hahnemann's miasm theory remains disputed and controversial within homeopathy even in modern times. The theory of miasms has been criticized as an explanation developed by Hahnemann to preserve the system of homeopathy in the face of treatment failures, and for being inadequate to cover the many hundreds of sorts of diseases, as well as for failing to explain disease predispositions, as well as genetics, environmental factors, and the unique disease history of each patient.^{[53]:148–9}

19th century: rise to popularity and early criticism

Homeopathy achieved its greatest popularity in the 19th century. It was introduced to the United States in 1825 by Hans Birch Gram, a student of Hahnemann.^[54] The first homeopathic school in the US opened in 1835, and in 1844, the first US national medical association, the American Institute of Homeopathy, was established. Throughout the 19th century, dozens of homeopathic institutions appeared in Europe and the United States,^[55] and by 1900, there were 22 homeopathic colleges and 15,000 practitioners in the United States.^[56] Because medical practice of the time relied on ineffective and often dangerous treatments, patients of homeopaths often had better outcomes than those of the doctors of the time.^[57] Homeopathic preparations, even if ineffective, would almost surely cause no harm, making the users of homeopathic preparations less likely to be killed by the



Samuel Hahnemann Monument, Washington D.C. with "Similia Similibus Curentur" - Like cures Like.



A homeopathic preparation made from marsh tea: the "15C" dilution shown here means the original solution was diluted to $1/10^{30}$ of its original strength. Given that there are many orders of magnitude fewer than 10^{30} molecules in the small sample, the likelihood that it contains even one molecule of the original herb is extremely low.

treatment that was supposed to be helping them.^[43] The relative success of homeopathy in the 19th century may have led to the abandonment of the ineffective and harmful treatments of bloodletting and purging and to have begun the move towards more effective, science-based medicine.^[31] One reason for the growing popularity of homeopathy was its apparent success in treating people suffering from infectious disease epidemics.^[58] During 19th-century epidemics of diseases such as cholera, death rates in homeopathic hospitals were often lower than in conventional hospitals, where the treatments used at the time were often harmful and did little or nothing to combat the diseases.^[59]

From its inception, however, homeopathy was criticized by mainstream science. Sir John Forbes, physician to Queen Victoria, said in 1843 that the extremely small doses of homeopathy were regularly derided as useless, "an outrage to human reason".^[60] James Young Simpson said in 1853 of the highly diluted drugs: "No poison, however strong or powerful, the billionth or decillionth of which would in the least degree affect a man or harm a fly."^[61] 19th-century American physician and author Oliver Wendell Holmes, Sr. was also a vocal critic of homeopathy and published an essay in 1842 entitled *Homœopathy and Its Kindred Delusions*.^[37] The members of the French Homeopathic Society observed in 1867 that some leading homeopaths of Europe not only were abandoning the practice of administering infinitesimal doses but were also no longer defending it.^[62] The last school in the US exclusively teaching homeopathy closed in 1920.^[43]

Revival in the 20th century

According to Paul Ulrich Unschuld, the Nazi regime in Germany was fascinated by homeopathy, and spent large sums of money on researching its mechanisms, but without gaining a positive result. Unschuld further argues that homeopathy never subsequently took root in the United States, but remained more deeply established in European thinking.^[63] In the United States, the *Food, Drug, and Cosmetic Act* of 1938 (sponsored by Royal Copeland, a Senator from New York and homeopathic physician) recognized homeopathic preparations as drugs. In the 1950s, there were only 75 pure homeopaths practising in the U.S.^[64] However, by the mid to late 1970s, homeopathy made a significant comeback and sales of some homeopathic companies increased tenfold.^[65] Some homeopaths give credit for the revival to Greek homeopath George Vithoulkas, who performed a "great deal of research to update the scenarios and refine the theories and practice of homeopathy", beginning in the 1970s,^{[66][67]} but Ernst and Singh consider it to be linked to the rise of the New Age movement.^[32] Whichever is correct, mainstream pharmacy chains recognized the business potential of selling homeopathic preparations.^[68] The Food and Drug Administration held a hearing April 20 and 21, 2015, requesting public comment on regulation of homeopathic drugs.^[69] The FDA cited the growth of sales of over-the-counter homeopathic medicines which was \$2.7 billion for 2007.^[70]

Bruce Hood has argued that the increased popularity of homeopathy in recent times may be due to the comparatively long consultations practitioners are willing to give their patients, and to an irrational preference for "natural" products which people think are the basis of homeopathic preparations.^[71]

Preparations and treatment

Homeopathic preparations are referred to as "homeopathics"^[11] or "remedies". Practitioners rely on two types of reference when prescribing: *materia medica* and repertories. A homeopathic *materia medica* is a collection of "drug pictures", organized alphabetically. These entries describe the symptom patterns associated with individual preparations. A homeopathic repertory is an index of disease symptoms that lists preparations associated with specific symptoms. In both cases different compilers may dispute particular inclusions.^[72] The first symptomatic homeopathic *materia medica* was arranged by Hahnemann. The first homeopathic repertory was Georg Jahr's *Symptomenkodex*, published in German in 1835, and translated into English as the *Repertory to the more Characteristic Symptoms of Materia Medica* by Constantine Hering in 1838. This version was less focused on disease categories and would be the forerunner to later works by James Tyler Kent.^{[73][74]} Repertories, in particular, may be very large.

Homeopathy uses animal, plant, mineral, and synthetic substances in its preparations, generally referring to them using Latin or faux-Latin names. Examples include *arsenicum album* (arsenic oxide), *natrum muriaticum* (sodium chloride or table salt), *Lachesis muta* (the venom of the bushmaster snake), *opium*, and *thyroidinum* (thyroid hormone).



Homeopathic preparation *Rhus toxicodendron*, derived from poison ivy.

Some homeopaths use so-called "**nosodes**" (from the Greek *nosos*, disease) made from diseased or pathological products such as fecal, urinary, and respiratory discharges, blood, and tissue.^[73] Conversely, preparations made from "healthy" specimens are called "sarcodes".

Some modern homeopaths use preparations they call "imponderables" because they do not originate from a substance but some other phenomenon presumed to have been "captured" by alcohol or lactose. Examples include X-rays^[75] and sunlight.^[76]

Other minority practices include paper preparations, where the substance and dilution are written on pieces of paper and either pinned to the patients' clothing, put in their pockets, or placed under glasses of water that are then given to the patients, and the use of radionics to manufacture preparations. Such practices have been strongly criticized by classical homeopaths as unfounded, speculative, and verging upon magic and superstition.^{[77][78]}

Preparation

Hahnemann found that undiluted doses caused reactions, sometimes dangerous ones, so specified that preparations be given at the lowest possible dose. He found that this reduced potency as well as side-effects, but formed the view that vigorous shaking and striking on an elastic surface – a process he termed *Schütteln*, translated as *succussion* – nullified this.^[79] A common explanation for his settling on this process is said to be that he found preparations subjected to agitation in transit, such as in saddle bags or in a carriage, were more "potent".^{[53]:16} Hahnemann had a saddle-maker construct a special wooden striking board covered in leather on one side and stuffed with horsehair.^{[80]:31} Insoluble solids, such as granite, diamond, and platinum, are diluted by grinding them with lactose ("trituration").^{[53]:23}

The process of dilution and succussion is termed "dynamization" or "potentization" by homeopaths.^{[9][81]} In industrial manufacture this may be done by machine.

Serial dilution is achieved by taking an amount of the mixture and adding solvent, but the "Korsakovian" method may also be used, whereby the vessel in which the preparations are manufactured is emptied, refilled with solvent, and the volume of fluid adhering to the walls of the vessel is deemed sufficient for the new batch.^{[53]:270} The Korsakovian method is sometimes referred to as K on the label of a homeopathic preparation, e.g. 200CK is a 200C preparation made using the Korsakovian method.^{[82][83]}

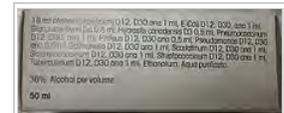
Fluxion and radionics methods of preparation do not require succussion.^{[53]:171} There are differences of opinion on the number and force of strikes, and some practitioners dispute the need for succussion at all while others reject the Korsakovian and other non-classical preparations. There are no laboratory assays and the importance and techniques for succussion cannot be determined with any certainty from the literature.^{[53]:67–69}

Dilutions

Three main logarithmic potency scales are in regular use in homeopathy. Hahnemann created the "centesimal" or "C scale", diluting a substance by a factor of 100 at each stage. The centesimal scale was favoured by Hahnemann for most of his life.

A 2C dilution requires a substance to be diluted to one part in 100, and then some of that diluted solution diluted by a further factor of 100.

This works out to one part of the original substance in 10,000 parts of the solution.^[84] A 6C dilution repeats this process six times, ending up with the original substance diluted by a factor of $100^{-6}=10^{-12}$ (one part in one trillion or 1/1,000,000,000,000). Higher dilutions follow the same pattern.



a preparation made from D dilutions of dangerous materials like botulism, E-coli, thymus gland of unspecified origin, pneumonia, pseudomona, proteus, salmonella, scarlet fever, staph, strep and tuberculosis bacteria. Ethanol is listed as being redundantly diluted in alcohol.



Mortar and pestle used for grinding insoluble solids, such as platinum, into homeopathic preparations

In homeopathy, a solution that is more dilute is described as having a higher "potency", and more dilute substances are considered by homeopaths to be stronger and deeper-acting.^[85] The end product is often so diluted as to be indistinguishable from the diluent (pure water, sugar or alcohol).^{[10][86][87]} There is also a decimal potency scale (notated as "X" or "D") in which the preparation is diluted by a factor of 10 at each stage.^[88]

Hahnemann advocated 30C dilutions for most purposes (that is, dilution by a factor of 10^{60}).^[9] Hahnemann regularly used potencies up to 300C but opined that "there must be a limit to the matter, it cannot go on indefinitely".^{[40]:322}

In Hahnemann's time, it was reasonable to assume the preparations could be diluted indefinitely, as the concept of the atom or molecule as the smallest possible unit of a chemical substance was just beginning to be recognized.

The greatest dilution reasonably likely to contain even one molecule of the original substance is 12C.^[89]

Critics and advocates of homeopathy alike commonly attempt to illustrate the dilutions involved in homeopathy with analogies.^[90] Hahnemann is reported to have joked that a suitable procedure to deal with an epidemic would be to empty a bottle of poison into Lake Geneva, if it could be succussed 60 times.^{[91][92]} Another example given by a critic of homeopathy states that a 12C solution is equivalent to a "pinch of salt in both the North and South Atlantic Oceans",^{[91][92]} which is approximately correct.^[93] One-third of a drop of some original substance diluted into all the water on earth would produce a preparation with a concentration of about 13C.^{[90][94][95]} A popular homeopathic treatment for the flu is a 200C dilution of duck liver, marketed under the name *Oscillocochinum*. As there are only about 10^{80} atoms in the entire observable universe, a dilution of one molecule in the observable universe would be about 40C. *Oscillocochinum* would thus require 10^{320} more universes to simply have one molecule in the final substance.^[96] The high dilutions characteristically used are often considered to be the most controversial and implausible aspect of homeopathy.^[97]

Not all homeopaths advocate high dilutions. Preparations at concentrations below 4X are considered an important part of homeopathic heritage.^[98] Many of the early homeopaths were originally doctors and generally used lower dilutions such as "3X" or "6X", rarely going beyond "12X". The split between lower and higher dilutions followed ideological lines. Those favouring low dilutions stressed pathology and a stronger link to conventional medicine, while those favouring high dilutions emphasized vital force, miasms and a spiritual interpretation of disease.^{[99][100]} Some products with such relatively lower dilutions continue to be sold, but like their counterparts, they have not been conclusively demonstrated to have any effect beyond that of a placebo.^{[101][102]}

Provings

A homeopathic "proving" is the method by which the profile of a homeopathic preparation is determined.^[103]

At first Hahnemann used undiluted doses for provings, but he later advocated provings with preparations at a 30C dilution,^[9] and most modern provings are carried out using ultra-dilute preparations in which it is highly unlikely that any of the original molecules remain.^[104] During the proving process, Hahnemann administered preparations to healthy volunteers, and the resulting symptoms were compiled by observers into a "drug picture".

The volunteers were observed for months at a time and made to keep extensive journals detailing all of their symptoms at specific times throughout the day. They were forbidden from consuming coffee, tea, spices, or wine for the duration of the experiment; playing chess was also prohibited because Hahnemann considered it to be "too exciting", though they were allowed to drink beer and encouraged to exercise in moderation.^[105]

After the experiments were over, Hahnemann made the volunteers take an oath swearing that what they reported in their journals was the truth, at which time he would interrogate them extensively concerning their symptoms.



This bottle is labelled *Arnica montana* (wolf's bane) D6, i.e. the nominal dilution is one part in a million (10^{-6}).

Provings are claimed to have been important in the development of the clinical trial, due to their early use of simple control groups, systematic and quantitative procedures, and some of the first application of statistics in medicine.^[106] The lengthy records of self-experimentation by homeopaths have occasionally proven useful in the development of modern drugs: For example, evidence that nitroglycerin might be useful as a treatment for angina was discovered by looking through homeopathic provings, though homeopaths themselves never used it for that purpose at that time.^[107] The first recorded provings were published by Hahnemann in his 1796 *Essay on a New Principle*.^[108] His *Fragmenta de Viribus* (1805)^[109] contained the results of 27 provings, and his 1810 *Materia Medica Pura* contained 65.^[110] For James Tyler Kent's 1905 *Lectures on Homoeopathic Materia Medica*, 217 preparations underwent provings and newer substances are continually added to contemporary versions.

Though the proving process has superficial similarities with clinical trials, it is fundamentally different in that the process is subjective, not blinded, and modern provings are unlikely to use pharmacologically active levels of the substance under proving.^[111] As early as 1842, Holmes noted the provings were impossibly vague, and the purported effect was not repeatable among different subjects.^[37]

Consultation

Homeopaths generally begin with detailed examinations of their patients' histories, including questions regarding their physical, mental and emotional states, their life circumstances and any physical or emotional illnesses. The homeopath then attempts to translate this information into a complex formula of mental and physical symptoms, including likes, dislikes, innate predispositions and even body type.^[112]

From these symptoms, the homeopath chooses how to treat the patient using *materia medica* and repertories. In classical homeopathy, the practitioner attempts to match a single preparation to the totality of symptoms (the *similum*), while "clinical homeopathy" involves combinations of preparations based on the various symptoms of an illness.^[66]

Pills and active ingredients



Homeopathic pills, homeopathic preparation *oscilloccinum*

Homeopathic pills are made from an inert substance (often sugars, typically lactose), upon which a drop of liquid homeopathic preparation is placed and allowed to evaporate.^{[113][114]}

The process of homeopathic dilution results in no objectively detectable active ingredient in most cases, but some preparations (e.g. calendula and arnica creams) do contain pharmacologically active doses. One product, Zicam Cold Remedy, which was marketed as an "unapproved homeopathic" product,^[115] contains two ingredients that are only "slightly" diluted: zinc acetate (2X = 1/100 dilution) and zinc gluconate (1X = 1/10 dilution),^[115] which means both are present in a biologically active concentration strong enough to have caused some people to lose their sense of smell,^[116] a condition termed anosmia. Zicam also listed several normal homeopathic potencies as "inactive ingredients", including *galphimia glauca*,^[117] histamine dihydrochloride (homeopathic name, *histaminum hydrochloricum*),^[118] *luffa operculata*,^[119] and sulfur.

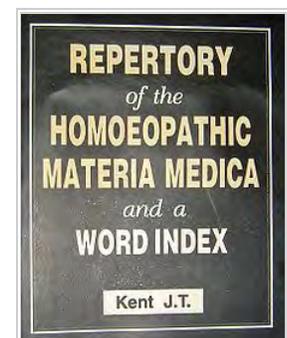
Related and minority treatments and practices

Isopathy

Isopathy is a therapy derived from homeopathy, invented by Johann Joseph Wilhelm Lux in the 1830s. Isopathy differs from homeopathy in general in that the preparations, known as "nosodes", are made up either from things that cause the disease or from products of the disease, such as pus.^{[73][120]} Many so-called "homeopathic vaccines" are a form of isopathy.^[121]

Flower preparations

Flower preparations can be produced by placing flowers in water and exposing them to sunlight. The most famous of these are the Bach flower remedies, which were developed by the physician and homeopath Edward Bach. Although the proponents of these preparations share homeopathy's vitalist world-view and the preparations are claimed to act through the same hypothetical "vital



Homeopathic repertory by James Tyler Kent

force" as homeopathy, the method of preparation is different. Bach flower preparations are manufactured in allegedly "gentler" ways such as placing flowers in bowls of sunlit water, and the preparations are not succussed.^[122] There is no convincing scientific or clinical evidence for flower preparations being effective.^[123]

Veterinary use

The idea of using homeopathy as a treatment for other animals termed "veterinary homeopathy", dates back to the inception of homeopathy; Hahnemann himself wrote and spoke of the use of homeopathy in animals other than humans.^[124] The FDA has not approved homeopathic products as veterinary medicine in the U.S. In the UK, veterinary surgeons who use homeopathy may belong to the Faculty of Homeopathy and/or to the British Association of Homeopathic Veterinary Surgeons. Animals may be treated only by qualified veterinary surgeons in the UK and some other countries. Internationally, the body that supports and represents homeopathic veterinarians is the International Association for Veterinary Homeopathy.

The use of homeopathy in veterinary medicine is controversial; the little existing research on the subject is not of a high enough scientific standard to provide reliable data on efficacy.^{[125][126][127]} Other studies have also found that giving animals placebos can play active roles in influencing pet owners to believe in the effectiveness of the treatment when none exists.^[125] The British Veterinary Association's position statement on alternative medicines says that it "cannot endorse" homeopathy,^[128] and the Australian Veterinary Association includes it on its list of "ineffective therapies".^[129] A 2016 review of peer-reviewed articles from 1981 to 2014 by scientists from the University of Kassel, Germany, concluded that there was insufficient evidence to support the use of homeopathy in livestock as a way to prevent or treat infectious diseases.^[130]

The UK's Department for Environment, Food and Rural Affairs (Defra) has adopted a robust position against use of "alternative" pet preparations including homeopathy.^[131]

Electrohomeopathy

Electrohomeopathy is a treatment devised by Count Cesare Mattei (1809–1896), who proposed that different "colours" of electricity could be used to treat cancer. Popular in the late nineteenth century, electrohomeopathy has been described as "utter idiocy".^[132]

Homeoprophylaxis

The use of homeopathy as a preventive for serious infectious diseases is especially controversial,^[133] in the context of ill-founded public alarm over the safety of vaccines stoked by the anti-vaccination movement.^[134] Promotion of homeopathic alternatives to vaccines has been characterized as dangerous, inappropriate and irresponsible.^{[135][136]} In December 2014, Australian homeopathy supplier Homeopathy Plus! were found to have acted deceptively in promoting homeopathic alternatives to vaccines.^[137]

Evidence and efficacy

The low concentration of homeopathic preparations, which often lack even a single molecule of the diluted substance,^[113] has been the basis of questions about the effects of the preparations since the 19th century. Modern advocates of homeopathy have proposed a concept of "water memory", according to which water "remembers" the substances mixed in it, and transmits the effect of those substances when consumed. This concept is inconsistent with the current understanding of matter, and water memory has never been demonstrated to have any detectable effect, biological or otherwise.^{[138][139]} Pharmacological research has found instead that stronger effects of an active ingredient come from higher, not lower doses.

James Randi and the 10:23 campaign groups have highlighted the lack of active ingredients in most homeopathic products by taking large 'overdoses'.^[140] None of the hundreds of demonstrators in the UK, Australia, New Zealand, Canada and the US were injured and "no one was cured of anything, either".^{[140][141]}

Outside of the alternative medicine community, scientists have long considered homeopathy a sham^[24] or a pseudoscience,^{[2][3][4][5]} and the mainstream medical community regards it as quackery.^[4] There is an overall absence of sound statistical evidence of therapeutic efficacy, which is consistent with the lack of any biologically plausible pharmacological agent or mechanism.^[6]

Abstract concepts within theoretical physics have been invoked to suggest explanations of how or why preparations might work, including quantum entanglement,^[142] quantum nonlocality,^[143] the theory of relativity and chaos theory. Contrariwise, quantum superposition has been invoked to explain why homeopathy does *not* work in double-blind trials.^[144] However, the explanations are offered by nonspecialists within the field, and often include speculations that are incorrect in their application of the concepts and not supported by actual experiments.^{[53]:255–6} Several of the key concepts of homeopathy conflict with fundamental concepts of physics and chemistry.^[145] The use of quantum entanglement to explain homeopathy's purported effects is "patent nonsense", as entanglement is a delicate state which rarely lasts longer than a fraction of a second.^[146] While entanglement may result in certain aspects of individual subatomic particles acquiring linked quantum states, this does not mean the particles will mirror or duplicate each other, nor cause health-improving transformations.^[146]

Plausibility

The proposed mechanisms for homeopathy are precluded from having any effect by the laws of physics and physical chemistry.^[16] The extreme dilutions used in homeopathic preparations usually leave none of the original substance in the final product.

A number of speculative mechanisms have been advanced to counter this, the most widely discussed being water memory, though this is now considered erroneous since short-range order in water only persists for about 1 picosecond.^{[147][148][149]} No evidence of stable clusters of water molecules was found when homeopathic preparations were studied using nuclear magnetic resonance,^[150] and many other physical experiments in homeopathy have been found to be of low methodological quality, which precludes any meaningful conclusion.^[151] Existence of a pharmacological effect in the absence of any true active ingredient is inconsistent with the law of mass action and the observed dose-response relationships characteristic of therapeutic drugs^[152] (whereas placebo effects are non-specific and unrelated to pharmacological activity^[153]).

Homeopaths contend that their methods produce a therapeutically active preparation, selectively including only the intended substance, though critics note that any water will have been in contact with millions of different substances throughout its history, and homeopaths have not been able to account for a reason why only the selected homeopathic substance would be a special case in their process.^[3] For comparison, ISO 3696:1987 defines a standard for water used in laboratory analysis; this allows for a contaminant level of ten parts per billion, 4C in homeopathic notation. This water may not be kept in glass as contaminants will leach out into the water.^[154]

Practitioners of homeopathy hold that higher dilutions—described as being of higher *potency*—produce stronger medicinal effects. This idea is also inconsistent with observed dose-response relationships, where effects are dependent on the concentration of the active ingredient in the body.^[152] This dose-response relationship has been confirmed in myriad experiments on organisms as diverse as nematodes,^[155] rats,^[156] and humans.^[157] Some homeopaths contend that the phenomenon of hormesis may support the idea of dilution increasing potency,^{[158][159]} but the dose-response relationship outside the zone of hormesis declines with dilution as normal, and nonlinear pharmacological effects do not provide any credible support for homeopathy.^[160]

Physicist Robert L. Park, former executive director of the American Physical Society, is quoted as saying,

"since the least amount of a substance in a solution is one molecule, a 30C solution would have to have at least one molecule of the original substance dissolved in a minimum of

1,000 [or 10⁶⁰] molecules of water. This would require a container more than 30,000,000,000 times the size of the Earth."^[161]

Park is also quoted as saying that, "to expect to get even one molecule of the 'medicinal' substance allegedly present in 30X pills, it would be necessary to take some two billion of them, which would total about a thousand tons of lactose plus whatever impurities the lactose contained".^[161]

The laws of chemistry state that there is a limit to the dilution that can be made without losing the original substance altogether.

^[113] This limit, which is related to Avogadro's number, is roughly equal to homeopathic dilutions of 12C or 24X (1 part in 10²⁴).
^{[90][161][162]}

Scientific tests run by both the BBC's *Horizon* and ABC's *20/20* programmes were unable to differentiate homeopathic dilutions

from water, even when using tests suggested by homeopaths themselves.^{[163][164]}

Efficacy

No individual preparation has been unambiguously shown by research to be different from placebo.

^[6] The methodological quality of the primary research was generally low, with such problems as weaknesses in study design and reporting, small sample size, and selection bias. Since better quality trials have become available, the evidence for efficacy of homeopathy preparations has diminished; the highest-quality trials indicate that the preparations themselves exert no intrinsic effect.

^{[18][53]:206[165]} A review conducted in 2010 of all the pertinent studies of "best evidence" produced by the Cochrane Collaboration concluded that "the most reliable evidence – that produced by Cochrane reviews – fails to demonstrate that homeopathic medicines have effects beyond placebo."^[166]

Government level reviews

Government-level reviews have been conducted in recent years by Switzerland (2005), the United Kingdom (2009) and Australia (2015).

The Swiss *programme for the evaluation of complementary medicine* (PEK) resulted in the peer-reviewed Shang publication (see *Systematic reviews and meta-analyses of efficacy*) and a controversial competing analysis^[167] by homeopaths and advocates led by Gudrun Bornhöft and Peter Matthiessen, which has misleadingly been presented as a Swiss government report by homeopathy proponents, a claim that has been repudiated by the Swiss Federal Office of Public Health.^[168] The Swiss Government terminated reimbursement, though it was subsequently reinstated after a political campaign and referendum for a further six-year trial period.^[169]

The United Kingdom's House of Commons Science and Technology Committee sought written evidence and submissions from concerned parties^{[170][171]} and, following a review of all submissions, concluded that there was no compelling evidence of effect other than placebo and recommended that the Medicines and Healthcare products Regulatory Agency (MHRA) should not allow homeopathic product labels to make medical claims, that homeopathic products should no longer be licensed by the MHRA, as they are not medicines, and that further clinical trials of homeopathy could not be justified.^[15] They recommended that funding of homeopathic hospitals should not continue, and NHS doctors should not refer patients to homeopaths.^[172] The Secretary of State for Health deferred to local NHS on funding homeopathy, in the name of patient choice.^[173] By February 2011 only one-third of primary care trusts still funded homeopathy.^[174] By 2012, no British universities offered homeopathy courses.^[175]

The Australian National Health and Medical Research Council completed a comprehensive review of the effectiveness of homeopathic preparations in 2015, in which it concluded that "there were no health conditions for which there was reliable evidence that homeopathy was effective. No good-quality, well-designed studies with enough participants for a meaningful result reported either that homeopathy caused greater health improvements than placebo, or caused health improvements equal to those of another treatment."^[176]

Publication bias and other methodological issues

The fact that individual randomized controlled trials have given positive results is not in contradiction with an overall lack of statistical evidence of efficacy. A small proportion of randomized controlled trials inevitably provide false-positive outcomes due to the play of chance: a "statistically significant" positive outcome is commonly adjudicated when the probability of it being due to chance rather than a real effect is no more than 5%—a level at which about 1 in 20 tests can be expected to show a positive result in the absence of any therapeutic effect.^[177] Furthermore, trials of low methodological quality (i.e. ones which have been inappropriately designed, conducted or reported) are prone to give misleading results. In a systematic review of the methodological quality of randomized trials in three branches of alternative medicine, Linde *et al.* highlighted major weaknesses in the homeopathy sector, including poor randomization.^[178] A separate 2001 systematic review that assessed the quality of clinical trials of homeopathy found that such trials were generally of lower quality than trials of conventional medicine.^[179]



Old bottle of *Hepar sulph* made from calcium sulfide

A related issue is publication bias: researchers are more likely to submit trials that report a positive finding for publication, and journals prefer to publish positive results.^{[180][181][182][183]} Publication bias has been particularly marked in alternative medicine journals, where few of the published articles (just 5% during the year 2000) tend to report null results.^[184] Regarding the way in which homeopathy is represented in the medical literature, a systematic review found signs of bias in the publications of clinical trials (towards negative representation in mainstream medical journals, and *vice versa* in alternative medicine journals), but not in reviews.^[18]

Positive results are much more likely to be false if the prior probability of the claim under test is low.^[183]

Systematic reviews and meta-analyses of efficacy

Both meta-analyses, which statistically combine the results of several randomized controlled trials, and other systematic reviews of the literature are essential tools to summarize evidence of therapeutic efficacy.^[185] Early systematic reviews and meta-analyses of trials evaluating the efficacy of homeopathic preparations in comparison with placebo more often tended to generate positive results, but appeared unconvincing overall.^[186] In particular, reports of three large meta-analyses warned readers that firm conclusions could not be reached, largely due to methodological flaws in the primary studies and the difficulty in controlling for publication bias.^{[17][21][187]} The positive finding of one of the most prominent of the early meta-analyses, published in *The Lancet* in 1997 by Linde et al.,^[187] was later reframed by the same research team, who wrote:

The evidence of bias [in the primary studies] weakens the findings of our original meta-analysis. Since we completed our literature search in 1995, a considerable number of new homeopathy trials have been published. The fact that a number of the new high-quality trials ... have negative results, and a recent update of our review for the most "original" subtype of homeopathy (classical or individualized homeopathy), seem to confirm the finding that more rigorous trials have less-promising results. It seems, therefore, likely that our meta-analysis at least overestimated the effects of homeopathic treatments.^[165]

Subsequent work by John Ioannidis and others has shown that for treatments with no prior plausibility, the chances of a positive result being a false positive are much higher, and that any result not consistent with the null hypothesis should be assumed to be a false positive.^{[183][188]}

In 2002, a systematic review of the available systematic reviews confirmed that higher-quality trials tended to have less positive results, and found no convincing evidence that any homeopathic preparation exerts clinical effects different from placebo.^[6]

In 2005, *The Lancet* medical journal published a meta-analysis of 110 placebo-controlled homeopathy trials and 110 matched medical trials based upon the Swiss government's Programme for Evaluating Complementary Medicine, or PEK. The study concluded that its findings were "compatible with the notion that the clinical effects of homeopathy are placebo effects".^[7] This was accompanied by an editorial pronouncing "The end of homoeopathy",^[189] which was denounced by the homeopath Peter Fisher.^[190]

Other meta-analyses include homeopathic treatments to reduce cancer therapy side-effects following radiotherapy and chemotherapy,^[191] allergic rhinitis,^[192] attention-deficit hyperactivity disorder and childhood diarrhoea, adenoid vegetation, asthma, upper respiratory tract infection in children,^[193] insomnia,^[194] fibromyalgia,^[195] psychiatric conditions^[196] and Cochrane Library reviews of homeopathic treatments for asthma,^[197] dementia,^[198] attention-deficit hyperactivity disorder,^[199] induction of labour,^[200] and irritable bowel syndrome.^[201] Other reviews covered osteoarthritis,^[202] migraines,^[203] postoperative ecchymosis and edema,^[204] delayed-onset muscle soreness,^[66] or eczema^[205] and other dermatological conditions.^[206]

The results of these reviews are generally negative or only weakly positive, and reviewers consistently report the poor quality of trials. The finding of Linde *et. al.* that more rigorous studies produce less positive results is supported in several and contradicted by none.

Some clinical trials have tested individualized homeopathy, and there have been reviews of this, specifically. A 1998 review^[207] found 32 trials that met their inclusion criteria, 19 of which were placebo-controlled and provided enough data for meta-analysis. These 19 studies showed a pooled odds ratio of 1.17 to 2.23 in favour of individualized homeopathy over the placebo, but no

difference was seen when the analysis was restricted to the methodologically best trials. The authors concluded that "the results of the available randomized trials suggest that individualized homeopathy has an effect over placebo. The evidence, however, is not convincing because of methodological shortcomings and inconsistencies." Jay Shelton, author of a book on homeopathy, has stated that the claim assumes without evidence that classical, individualized homeopathy works better than nonclassical variations.^{[53]:209} A systematic review and meta-analysis of trials of individualized homeopathy published in December 2014 concluded that individualized homeopathy may have small effects, but that caution was needed in interpreting the results because of study quality issues – no study included was assessed as being at low risk of bias.^[208]

Statements by major medical organizations

Health organizations such as the UK's National Health Service,^[209] the American Medical Association,^[210] the FASEB,^[149] and the National Health and Medical Research Council of Australia,^[176] have issued statements of their conclusion that there is "no good-quality evidence that homeopathy is effective as a treatment for any health condition".^[209] In 2009, World Health Organization official Mario Raviglione criticized the use of homeopathy to treat tuberculosis; similarly, another WHO spokesperson argued there was no evidence homeopathy would be an effective treatment for diarrhoea.^[211]

The American College of Medical Toxicology and the American Academy of Clinical Toxicology recommend that no one use homeopathic treatment for disease or as a preventive health measure.^[212] These organizations report that no evidence exists that homeopathic treatment is effective, but that there is evidence that using these treatments produces harm and can bring indirect health risks by delaying conventional treatment.^[212]



A homeopathic preparation made from potassium dichromate, the chemical compound well known for its toxic and carcinogenic properties

Explanations of perceived effects

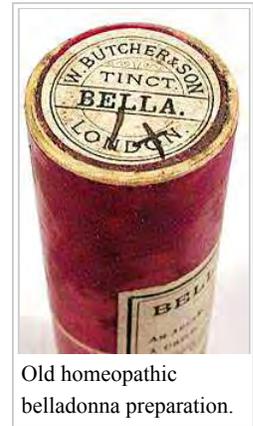
Science offers a variety of explanations for how homeopathy may appear to cure diseases or alleviate symptoms even though the preparations themselves are inert.^{[53]:155–167}

- The placebo effect – the intensive consultation process and expectations for the homeopathic preparations may cause the effect.
- Therapeutic effect of the consultation – the care, concern, and reassurance a patient experiences when opening up to a compassionate caregiver can have a positive effect on the patient's well-being.^[213]
- Unassisted natural healing – time and the body's ability to heal without assistance can eliminate many diseases of their own accord.
- Unrecognized treatments – an unrelated food, exercise, environmental agent, or treatment for a different ailment, may have occurred.
- Regression towards the mean – since many diseases or conditions are cyclical, symptoms vary over time and patients tend to seek care when discomfort is greatest; they may feel better anyway but because of the timing of the visit to the homeopath they attribute improvement to the preparation taken.
- Non-homeopathic treatment – patients may also receive standard medical care at the same time as homeopathic treatment, and the former is responsible for improvement.
- Cessation of unpleasant treatment – often homeopaths recommend patients stop getting medical treatment such as surgery or drugs, which can cause unpleasant side-effects; improvements are attributed to homeopathy when the actual cause is the cessation of the treatment causing side-effects in the first place, but the underlying disease remains untreated and still dangerous to the patient.

Purported effects in other biological systems

While some articles have suggested that homeopathic solutions of high dilution can have statistically significant effects on organic processes including the growth of grain,^[214] histamine release by leukocytes,^[215] and enzyme reactions, such evidence is disputed since attempts to replicate them have failed.^{[216][217][218][219][220][221]} A 2007 systematic review of high-dilution experiments found that none of the experiments with positive results could be reproduced by all investigators.^[222]

In 1987, French immunologist Jacques Benveniste submitted a paper to the journal *Nature* while working at INSERM. The paper purported to have discovered that basophils, a type of white blood cell, released histamine when exposed to a homeopathic dilution of anti-immunoglobulin E antibody. The journal editors, sceptical of the results, requested that the study be replicated in a separate laboratory. Upon replication in four separate laboratories the study was published. Still sceptical of the findings, *Nature* assembled an independent investigative team to determine the accuracy of the research, consisting of *Nature* editor and physicist Sir John Maddox, American scientific fraud investigator and chemist Walter Stewart, and sceptic James Randi. After investigating the findings and methodology of the experiment, the team found that the experiments were "statistically ill-controlled", "interpretation has been clouded by the exclusion of measurements in conflict with the claim", and concluded, "We believe that experimental data have been uncritically assessed and their imperfections inadequately reported."^{[139][223][224]} James Randi stated that he doubted that there had been any conscious fraud, but that the researchers had allowed "wishful thinking" to influence their interpretation of the data.^[223]



Old homeopathic belladonna preparation.

In 2001 and 2004, Madeleine Ennis published a number of studies which reported that homeopathic dilutions of histamine exerted an effect on the activity of basophils.^{[225][226]} In response to the first of these studies, *Horizon* aired a programme in which British scientists attempted to replicate Ennis' results; they were unable to do so.^[227]

Ethics and safety

The provision of homeopathic preparations has been described as unethical.^[19] Michael Baum, Professor Emeritus of Surgery and visiting Professor of Medical Humanities at University College London (UCL), has described homeopathy as a "cruel deception".^[228]

Edzard Ernst, the first *Professor of Complementary Medicine* in the United Kingdom and a former homeopathic practitioner,^{[229][230][231]} has expressed his concerns about pharmacists who violate their ethical code by failing to provide customers with "necessary and relevant information" about the true nature of the homeopathic products they advertise and sell:

"My plea is simply for honesty. Let people buy what they want, but tell them the truth about what they are buying. These treatments are biologically implausible and the clinical tests have shown they don't do anything at all in human beings. The argument that this information is not relevant or important for customers is quite simply ridiculous."^[232]

Patients who choose to use homeopathy rather than evidence-based medicine risk missing timely diagnosis and effective treatment of serious conditions such as cancer.^{[193][233]}

In 2013 the UK Advertising Standards Authority concluded that the Society of Homeopaths were targeting vulnerable ill people and discouraging the use of essential medical treatment while making misleading claims of efficacy for homeopathic products.^[234]

In 2015 the Federal Court of Australia imposed penalties on a homeopathic company, Homeopathy Plus! Pty Ltd and its director, for making false or misleading statements about the efficacy of the whooping cough vaccine and homeopathic remedies as an alternative to the whooping cough vaccine, in breach of the Australian Consumer Law.^[235]

Adverse effects

Some homeopathic preparations involve poisons such as Belladonna, arsenic, and poison ivy, which are highly diluted in the homeopathic preparation. In rare cases, the original ingredients are present at detectable levels. This may be due to improper preparation or intentional low dilution. Serious adverse effects such as seizures and death have been reported or associated with some homeopathic preparations.^{[236][237]}

On 30 September 2016 the FDA issued a safety alert to consumers^[238] warning against the use of homeopathic teething gels and tablets following reports of adverse events after their use. The agency recommended that parents discard these products and "seek advice from their health care professional for safe alternatives"^[239] to homeopathy for teething. The pharmacy CVS announced, also on 30 September, that it was voluntarily withdrawing the products from sale^[240] and on 11 October Hyland's (the manufacturer) announced that it was discontinuing their teething medicine in the United States^[241] though the products remain on sale in Canada.^[242] On 12 October BuzzFeed reported that the regulator had "examined more than 400 reports of seizures, fever and

vomiting, as well as 10 deaths" over a six year period. The investigation (including analyses of the products) is still ongoing and the FDA does not know yet if the deaths and illnesses were caused by the products.^[243] However a previous FDA investigation in 2010, following adverse effects reported then, found that these same products were improperly diluted and contained "unsafe levels of belladonna, also known as deadly nightshade" and that the reports of serious adverse events in children using this product were "consistent with belladonna toxicity".^[244]

Instances of arsenic poisoning have occurred after use of arsenic-containing homeopathic preparations.^[245] Zicam Cold remedy Nasal Gel, which contains 2X (1:100) zinc gluconate, reportedly caused a small percentage of users to lose their sense of smell.^[246] 340 cases were settled out of court in 2006 for 12 million U.S. dollars.^[247] In 2009, the FDA advised consumers to stop using three discontinued cold remedy Zicam products because it could cause permanent damage to users' sense of smell.^[248] Zicam was launched without a New Drug Application (NDA) under a provision in the FDA's Compliance Policy Guide called "Conditions under which homeopathic drugs may be marketed" (CPG 7132.15), but the FDA warned Matrixx Initiatives, its manufacturer, via a Warning Letter that this policy does not apply when there is a health risk to consumers.^[249]

A 2000 review by homeopaths reported that homeopathic preparations are "unlikely to provoke severe adverse reactions".^[250] In 2012, a systematic review evaluating evidence of homeopathy's possible adverse effects concluded that "homeopathy has the potential to harm patients and consumers in both direct and indirect ways".^[236] One of the reviewers, Edzard Ernst, supplemented the article on his blog, writing: "I have said it often and I say it again: if used as an alternative to an effective cure, even the most 'harmless' treatment can become life-threatening."^[251] A 2016 systematic review and meta-analysis found that, in homeopathic clinical trials, adverse effects were reported among the patients who received homeopathy about as often as they were reported among patients who received placebo or conventional medicine.^[252]

Lack of efficacy

The lack of convincing scientific evidence supporting its efficacy^[253] and its use of preparations without active ingredients have led to characterizations as pseudoscience and quackery,^{[254][255][256][257]} or, in the words of a 1998 medical review, "placebo therapy at best and quackery at worst".^[258] The Chief Medical Officer for England, Dame Sally Davies, has stated that homeopathic preparations are "rubbish" and do not serve as anything more than placebos.^[259] Jack Killen, acting deputy director of the National Center for Complementary and Alternative Medicine, says homeopathy "goes beyond current understanding of chemistry and physics". He adds: "There is, to my knowledge, no condition for which homeopathy has been proven to be an effective treatment."^[253] Ben Goldacre says that homeopaths who misrepresent scientific evidence to a scientifically illiterate public, have "... walled themselves off from academic medicine, and critique has been all too often met with avoidance rather than argument".^[184] Homeopaths often prefer to ignore meta-analyses in favour of cherry picked positive results, such as by promoting a particular observational study (one which Goldacre describes as "little more than a customer-satisfaction survey") as if it were more informative than a series of randomized controlled trials.^[184]

Referring specifically to homeopathy, the British House of Commons Science and Technology Committee has stated:

In our view, the systematic reviews and meta-analyses conclusively demonstrate that homeopathic products perform no better than placebos. The Government shares our interpretation of the evidence.^[8]

In the Committee's view, homeopathy is a placebo treatment and the Government should have a policy on prescribing placebos. The Government is reluctant to address the appropriateness and ethics of prescribing placebos to patients, which usually relies on some degree of patient deception. Prescribing of placebos is not consistent with an informed patient choice - which the Government claims is very important - as it means patients do not have all the information needed to make choice meaningful.

Beyond ethical issues and the integrity of the doctor-patient relationship, prescribing pure placebos is bad medicine. Their effect is unreliable and unpredictable and cannot form the sole basis of any treatment on the NHS.^[15]

The National Center for Complementary and Alternative Medicine of the United States' National Institutes of Health states:

Homeopathy is a controversial topic in complementary medicine research. A number of the key concepts of homeopathy are not consistent with fundamental concepts of chemistry and physics. For example, it is not possible to explain in scientific terms how a preparation containing little or no active ingredient can have any effect. This, in turn, creates major challenges to the rigorous clinical investigation of homeopathic preparations. For example, one cannot confirm that an extremely dilute preparation contains what is listed on the label, or develop objective measures that show effects of extremely dilute preparations in the human body.^[260]

Ben Goldacre noted that in the early days of homeopathy, when medicine was dogmatic and frequently worse than doing nothing, homeopathy at least failed to make matters worse:

During the 19th-century cholera epidemic, death rates at the London Homeopathic Hospital were three times lower than at the Middlesex Hospital. Homeopathic sugar pills won't do anything against cholera, of course, but the reason for homeopathy's success in this epidemic is even more interesting than the placebo effect: at the time, nobody could treat cholera. So, while hideous medical treatments such as blood-letting were actively harmful, the homeopaths' treatments at least did nothing either way.^[261]

In lieu of standard medical treatment

On clinical grounds, patients who choose to use homeopathy in preference to normal medicine risk missing timely diagnosis and effective treatment, thereby worsening the outcomes of serious conditions.^{[193][233][262][263]} Critics of homeopathy have cited individual cases of patients of homeopathy failing to receive proper treatment for diseases that could have been easily diagnosed and managed with conventional medicine and who have died as a result,^{[264][265]} and the "marketing practice" of criticizing and downplaying the effectiveness of mainstream medicine.^{[184][265]} Homeopaths claim that use of conventional medicines will "push the disease deeper" and cause more serious conditions, a process referred to as "suppression".^[266] Some homeopaths (particularly those who are non-physicians) advise their patients against immunization.^{[262][267][268]} Some homeopaths suggest that vaccines be replaced with homeopathic "nosodes", created from biological materials such as pus, diseased tissue, bacilli from sputum or (in the case of "bowel nosodes") faeces.^[269] While Hahnemann was opposed to such preparations, modern homeopaths often use them although there is no evidence to indicate they have any beneficial effects.^{[270][271]} Cases of homeopaths advising against the use of anti-malarial drugs have been identified.^{[263][272][273]} This puts visitors to the tropics who take this advice in severe danger, since homeopathic preparations are completely ineffective against the malaria parasite.^{[263][272][273][274]} Also, in one case in 2004, a homeopath instructed one of her patients to stop taking conventional medication for a heart condition, advising her on 22 June 2004 to "Stop ALL medications including homeopathic", advising her on or around 20 August that she no longer needed to take her heart medication, and adding on 23 August, "She just cannot take ANY drugs – I have suggested some homeopathic remedies ... I feel confident that if she follows the advice she will regain her health." The patient was admitted to hospital the next day, and died eight days later, the final diagnosis being "acute heart failure due to treatment discontinuation".^{[275][276]}

In 1978, Anthony Campbell, then a consultant physician at the Royal London Homeopathic Hospital, criticized statements by George Vithoulkas claiming that syphilis, when treated with antibiotics, would develop into secondary and tertiary syphilis with involvement of the central nervous system, saying that "The unfortunate layman might well be misled by Vithoulkas' rhetoric into refusing orthodox treatment".^[277] Vithoulkas' claims echo the idea that treating a disease with external medication used to treat the symptoms would only drive it deeper into the body and conflict with scientific studies, which indicate that penicillin treatment produces a complete cure of syphilis in more than 90% of cases.^[278]

A 2006 review by W. Steven Pray of the College of Pharmacy at Southwestern Oklahoma State University recommends that pharmacy colleges include a required course in unproven medications and therapies, that ethical dilemmas inherent in recommending products lacking proven safety and efficacy data be discussed, and that students should be taught where unproven systems such as homeopathy depart from evidence-based medicine.^[279]

In an article entitled "Should We Maintain an Open Mind about Homeopathy?"^[280] published in the *American Journal of Medicine*, Michael Baum and Edzard Ernst – writing to other physicians – wrote that "Homeopathy is among the worst examples of faith-based medicine... These axioms [of homeopathy] are not only out of line with scientific facts but also directly opposed to them. If homeopathy is correct, much of physics, chemistry, and pharmacology must be incorrect...".

In 2013, Mark Walport, the UK Government Chief Scientific Adviser and head of the Government Office for Science, had this to say: "My view scientifically is absolutely clear: homoeopathy is nonsense, it is non-science. My advice to ministers is clear: that there is no science in homoeopathy. The most it can have is a placebo effect – it is then a political decision whether they spend money on it or not."^[281] His predecessor, John Beddington, referring to his views on homeopathy being "fundamentally ignored" by the Government, said: "The only one [view being ignored] I could think of was homoeopathy, which is mad. It has no underpinning of scientific basis. In fact, all the science points to the fact that it is not at all sensible. The clear evidence is saying this is wrong, but homoeopathy is still used on the NHS."^[282]

Regulation and prevalence

Homeopathy is fairly common in some countries while being uncommon in others; is highly regulated in some countries and mostly unregulated in others. It is practised worldwide and professional qualifications and licences are needed in most countries.^[283] In some countries, there are no specific legal regulations concerning the use of homeopathy, while in others, licences or degrees in conventional medicine from accredited universities are required. In Germany, to become a homeopathic physician, one must attend a three-year training programme, while France, Austria and Denmark mandate licences to diagnose any illness or dispense of any product whose purpose is to treat any illness.^[283]

Some homeopathic treatment is covered by the public health service of several European countries, including France, the United Kingdom and Luxembourg. In other countries, such as Belgium, homeopathy is not covered. In Austria, the public health service requires scientific proof of effectiveness in order to reimburse medical treatments and homeopathy is listed as not reimbursable,^[284] but exceptions can be made;^[285] private health insurance policies sometimes include homeopathic treatment.^[283] The Swiss government, after a 5-year trial, withdrew coverage of homeopathy and four other complementary treatments in 2005, stating that they did not meet efficacy and cost-effectiveness criteria,^[189] but following a referendum in 2009 the five therapies have been reinstated for a further 6-year trial period from 2012.^[286]



Hampton House, the former site of Bristol Homeopathic Hospital, one of three Homeopathic Hospitals in NHS.^[15]



Homeopathics at a homeopathic pharmacy in Varanasi, India.

The Indian government recognizes homeopathy as one of its national systems of medicine,^[287] it has established AYUSH or the Department of Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homoeopathy under the Ministry of Health & Family Welfare.^[288] The south Indian state of Kerala also gives the final nod for AYUSH department where homeopathy and Ayurveda are the main streams along with Sidha, Unani and Yoga.^[289] The Central Council of Homoeopathy was established in 1973 to monitor higher education in homeopathy, and National Institute of Homoeopathy in 1975.^[290] A minimum of a recognized diploma in homeopathy and registration on a state register or the Central Register of Homoeopathy is required to practise homeopathy in India.^[291]

On 28 September 2016 the UK's Committee of Advertising Practice (CAP) Compliance team wrote to homeopaths^[292] in the UK to "remind them of the rules that govern what they can and can't say in their marketing materials."^[293] The letter highlights that "homeopaths may not currently make either direct or implied claims to treat medical conditions" and asks them to review their marketing communications "including websites and social media pages" to ensure compliance by 3 November 2016. The letter also includes information on sanctions in the event of non-compliance including, ultimately, "referral by the ASA to Trading Standards under the Consumer Protection from Unfair Trading Regulations 2008."^[294]

Public opposition

In the April 1997 edition of FDA Consumer, William T. Jarvis, the President of the National Council Against Health Fraud, said "Homeopathy is a fraud perpetrated on the public with the government's blessing, thanks to the abuse of political power of Sen. Royal S. Copeland [chief sponsor of the 1938 Food, Drug, and Cosmetic Act]."^[295]

Mock "overdosing" on homeopathic preparations by individuals or groups in "mass suicides" have become more popular since James Randi began taking entire bottles of homeopathic sleeping pills before giving lectures.^{[296][297][298][299]} In 2010 The Merseyside Skeptics Society from the United Kingdom launched the 10:23 campaign, encouraging groups to publicly overdose as groups. In 2011 the 10:23 campaign expanded and saw sixty-nine groups participate; fifty-four submitted videos.^[300] In April 2012, at the Berkeley SkeptiCal conference, over 100 people participated in a mass overdose, taking *coffea cruda*, which is supposed to treat sleeplessness.^{[301][302]}

In 2011, the non-profit, educational organizations Center for Inquiry (CFI) and the associated Committee for Skeptical Inquiry (CSI) have petitioned the U.S. Food and Drug Administration (FDA) to initiate 'rulemaking that would require all over-the-counter homeopathic drugs to meet the same standards of effectiveness as non-homeopathic drugs' and 'to place warning labels on homeopathic drugs until such time as they are shown to be effective'. In a separate petition, CFI and CSI request FDA to issue warning letters to Boiron, maker of Oscilloccinum, regarding their marketing tactic and criticize Boiron for misleading labelling and advertising of Oscilloccinum.^[303] In 2015, CFI filed comments urging the Federal Trade Commission to end the false advertising practice of homeopathy.^[304] On 15 November 2016, FTC declared that homeopathic products cannot include claims of effectiveness without 'competent and reliable scientific evidence.' If no such evidence exists, they must state this fact clearly on their labeling, and state that the product's claims are based only on 18th-century theories that have been discarded by modern science. Failure to do so will be considered a violation of the FTC Act.^[305] CFI in Canada is calling for persons that feel they were harmed by homeopathic products to contact them.^[306]

In August 2011, a class action lawsuit was filed against Boiron on behalf of "all California residents who purchased Oscillo at any time within the past four years".^[307] The lawsuit charged that it "is nothing more than a sugar pill", "despite falsely advertising that it contains an active ingredient known to treat flu symptoms".^[308] In March 2012, Boiron agreed to spend up to \$12 million to settle the claims of falsely advertising the benefits of its homeopathic preparations.^[309]

In July 2012, CBC News reporter Erica Johnson for *Marketplace* conducted an investigation on the homeopathy industry in Canada; her findings were that it is "based on flawed science and some loopy thinking". Center for Inquiry (CFI) Vancouver skeptics participated in a mass overdose outside an emergency room in Vancouver, B.C., taking entire bottles of "medications" that should have made them sleepy, nauseous or dead; after 45 minutes of observation no ill effects were felt. Johnson asked homeopaths and company representatives about cures for cancer and vaccine claims. All reported positive results but none could offer any science backing up their statements, only that "it works". Johnson was unable to find any evidence that homeopathic preparations contain any active ingredient. Analysis performed at the University of Toronto's chemistry department found that the active ingredient is so small "it is equivalent to 5 billion times less than the amount of aspirin ... in a single pellet". Belladonna and ipecac "would be indistinguishable from each other in a blind test".^{[310][311]}

Homeopathic services offered at Bristol Homeopathic Hospital in the UK ceased in October 2015,^{[312][313]} partly in response to increased public awareness as a result of the 10:23 Campaign and a campaign lead by the Good Thinking Society,^[314] University Hospitals Bristol confirmed that it would cease to offer homeopathic therapies from October 2015, at which point homeopathic therapies would no longer be included in the contract.^[313] Homeopathic services in the Bristol area were relocated to "a new independent social enterprise"^[313] at which Bristol Clinical Commissioning Group revealed "there are currently no (NHS) contracts for homeopathy in place."^[313] Following a threat of legal action by the Good Thinking Society campaign group, the British government has stated that the Department of Health will hold a consultation in 2016 regarding whether homeopathic treatments should be added to the NHS treatments blacklist (officially, Schedule 1 of the National Health Service (General Medical Services Contracts) (Prescription of Drugs etc.) Regulations 2004), that specifies a blacklist of medicines not to be prescribed under the NHS.^{[315][316][317]}

In March 2016, the University of Barcelona cancelled its Master's degree in Homeopathy citing "lack of scientific basis", after advice from the Spanish Ministry of Health stated that "Homeopathy has not definitely proved its efficacy under any indication or concrete clinical situation".^[318] Shortly afterwards, in April 2016, the University of Valencia announced the elimination of its Masters in Homeopathy for 2017.^[319]

In June 2016, blogger and sceptic Jithin Mohandas launched a petition through Change.org asking the government of Kerala, India, to stop admitting students to homeopathy medical colleges.^[320] Mohandas said that government approval of these colleges makes them appear legitimate, leading thousands of talented students to join them and end up with invalid degrees. The petition asks that homeopathy colleges be converted to regular medical colleges and that people with homeopathy degrees be provided with training in scientific medicine.^[321]

United States Food and Drug Administration (FDA) 2015 hearing

On April 20–21, 2015, the FDA held a hearing on homeopathic product regulation. Invitees representing the scientific and medical community, and various pro-homeopathy stakeholders, gave testimonials on homeopathic products and the regulatory role played by the FDA.^[322] Michael de Dora, a representative from the Center for Inquiry (CFI), on behalf of the organization and dozens of doctors and scientists associated with CFI and the Committee for Skeptical Inquiry (CSI) gave a testimonial which summarized the basis of the organization's objection to homeopathic products, the harm that is done to the general public and proposed regulatory actions:^[323]

The CFI testimonial stated that the principle of homeopathy is at complete odds with the basic principles of modern biology, chemistry and physics and that decades of scientific examination of homeopathic products shows that there is no evidence that it is effective in treating illnesses other than acting as a placebo. Further, it noted a 2012 report by the American Association of Poison Control Centers which listed 10,311 reported cases of poison exposure related to homeopathic agents, among which 8,788 cases were attributed to young children five years of age or younger,^[324] as well as examples of harm – including deaths – caused to patients who relied on homeopathics instead of proven medical treatment.^{[323][325]}

The CFI urged the FDA to announce and implement strict guidelines that "require all homeopathic products meet the same standards as non-homeopathic drugs", arguing that the consumers can only have true freedom of choice (an often used argument from the homeopathy proponents) if they are fully informed of the choices. CFI proposed that the FDA take these three steps:

1. *Testing for homeopathic products* The FDA will mandate that all homeopathic products on the market to perform and pass safety and efficacy tests equivalent to those required of non-homeopathic drugs.
2. *Labelling for homeopathic products* To avert misleading label that the product is regulated by the FDA, all homeopathic products will be required to have prominent labels stating: 1) the product's claimed active ingredients in plain English, and 2) that the product has not been evaluated by the FDA for either safety or effectiveness.
3. *Regular consumer warnings* Encouraged by the FDA's recent warning of the ineffectiveness of homeopathic products, CFI urged the FDA to issue regular warning to the consumers in addition to warning during public health crises and outbreaks.^[323]

Official conclusions and recommendations

In March 2015, the National Health and Medical Research Council of Australia issued the following conclusions and recommendations:^[176]

- There is no reliable evidence that homeopathy is effective for treating health conditions.
- Homeopathy should not be used to treat health conditions that are chronic, serious, or could become serious.
- People who choose homeopathy may put their health at risk if they reject or delay treatments for which there is good evidence for safety and effectiveness.
- People who are considering whether to use homeopathy should first get advice from a registered health practitioner. Those who use homeopathy should tell their health practitioner and should keep taking any prescribed treatments.

In November 2016, The United States FTC issued an "Enforcement Policy Statement Regarding Marketing Claims for Over-the-Counter Homeopathic Drugs" which specified that the FTC will hold efficacy and safety claims for OTC homeopathic drugs to the same standard as other products making similar claims.^[326] A November 15, 2016 FTC press release summarized the policy as follows:

"The policy statement explains that the FTC will hold efficacy and safety claims for OTC homeopathic drugs to the same standard as other products making similar claims. That is, companies must have competent and reliable scientific evidence for health-related claims, including claims that a product can treat specific conditions. The statement describes the type of scientific evidence that the Commission requires of companies making such claims for their products... For the vast majority of OTC homeopathic drugs, the policy statement notes, 'the case for efficacy is based solely on traditional homeopathic

theories and there are no valid studies using current scientific methods showing the product's efficacy.' As such, the marketing claims for these products are likely misleading, in violation of the FTC Act."^[327]

In conjunction with the 2016 FTC Enforcement Policy Statement, the FTC also released its "Homeopathic Medicine & Advertising Workshop Report", which summarizes the panel presentations and related public comments in addition to describing consumer research commissioned by the FTC. The report concluded:

"Efficacy claims for traditional OTC homeopathic products are only supported by homeopathic theories and homeopathic provings, which are not accepted by most modern medical experts and do not constitute competent and reliable scientific evidence that these products have the claimed treatment effects."^[328]

See also

- Fringe science
- List of topics characterized as pseudoscience

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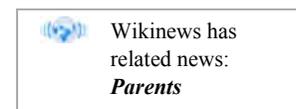
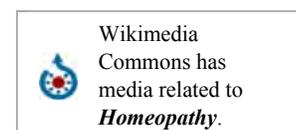
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