

# Response to the Science and Technology Committee (S&TC) on the selection of homeopathy for a 'second evidence check'

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## 1. Introduction

1.1. The main purpose of this response is not so much to provide an exhaustive account of the evidence for homeopathy – this will be provided by others – but to question what in calling for a 'second evidence check', the S&TC means by 'evidence', and evidence for homeopathy compared to what?

1.2. As Prof Harald Walach (University of Northampton) has pointed out,<sup>1</sup> the problem here revolves around the widely-held assertion, currently circulated by 'sceptics' (more properly, 'detractors': the term 'sceptic' should be reserved for those who have yet to make up their minds) that homeopathy/CAM's (CAM = complementary and alternative medicine) are not evidence-based, while conventional medicine by and large is. Prof Walach,<sup>1</sup> myself,<sup>2,3</sup> and others,<sup>4</sup> have effectively deconstructed this assertion.

1.3. Further, it is my intention to question the term 'evidence-based' and that applying it to conventional medicine is also difficult. In so doing, I hope to level the 'evidence-based' playing field that has been tilted against homeopathy.

1.4. My chief concerns, however, relate to the motivation and objectivity of the S&TC, given the current campaign that is being waged against homeopathy and other CAM therapies in the UK by various high profile detractors in the media,<sup>2,3</sup> and certain organisations.<sup>5</sup>

1.5. Their explicit intention is to pressurise the NHS and PCTs into terminating their commitment to fund and provide homeopathy/CAM services.

1.6. This is being perpetrated regardless of the wishes of a large segment of the UK population who by choice avail themselves of these services, and that a minuscule amount of the NHS budget is currently spent on homeopathy.

1.7. Thus, though perhaps not considered part of its remit, the meaning of the term 'evidence-based' is something the S&TC might usefully wish to consider.

## 2. Evidence-based medicine (EBM)?

2.1. As first formulated, EBM was "*an approach to health care that promotes the collection, interpretation, and integration of . . . patient-reported, clinician-observed, and research-derived evidence. The best available evidence, moderated by patient circumstances and preferences, is applied to improve the quality of clinical judgments.*"<sup>6</sup>

2.2. Thus, the double-blind randomised placebo-controlled trial (DBRCT) was meant originally as part of an evidence “package” derived from multiple sources. David Sackett, one of EBM’s founders, emphasized this in 1992: “*Evidence-based medicine is not restricted to randomised trials and meta-analyses. It involves tracking down the best external evidence with which to answer our clinical questions....If no randomised trial has been carried out for our patient’s predicament, we follow the trail to the next best external evidence and work from there.*”<sup>7</sup>

2.3. EBM as currently practiced, now concentrates solely on the “gold-standard” double-blind randomized-controlled trial (DBRCT) and meta-analyses as the only acceptable scientific evidence for a therapy or procedure.<sup>8</sup>

2.4. Supposedly, this enables purely objective clinical decisions to be taken: other forms of evidence Sackett referred to as essential parts of the decision-making process, have been effectively downgraded or ignored. EBM’s original intentions therefore, have been subsumed by over-emphasis on medicine’s science to the exclusion of its art.<sup>9, 10</sup>

2.5. Complex procedures (where it is virtually impossible to separate the therapy from the context in which it is delivered e.g., CBT, homeopathy, etc) do not readily lend themselves to the DBRCT - itself, implicitly flawed<sup>11-14</sup> - and are seemingly left out in the cold.

2.6. This much narrower interpretation of EBM has elicited trenchant responses, even from within conventional medicine,<sup>15-17</sup> but in particular for its intolerance of therapeutic pluralism.<sup>4</sup>

2.7. The change in EBM’s emphasis equates with rapid increases in our biochemical understanding of life, health, and disease, combined with globalization of the pharmaceutical industry’s commercial and political reach. From this has arisen a desire to place medicine on a similar intellectual footing as other sciences.

2.8. Its concomitant is a resurgence of logical positivism\* as an accessible (media-friendly) interpretation of science, and ultimately to justification of the globalised pharmaceutical industry’s attempts to monopolize the health care market.

2.9. Though out-dated<sup>18-28</sup> within the physical sciences (especially quantum physics), logical positivism goes unchallenged, especially in public arenas (e.g., the media and in political debates about science), and still holds sway in biomedicine.

2.10. Logical positivism effectively dominates the discourse of EBM, resulting not only in a downgrading and/or ignoring of other valid forms of evidence; it now means the medical research community potentially has saddled funding agencies and taxpayers with a huge and expensive problem: that of subjecting **all** medical procedures and therapies to the DBRCT, so they can be judged fit for clinical use.

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\* Logical positivism is a school of philosophy that combines empiricism (the idea that observational evidence is indispensable for knowledge of the world), with a version of rationalism incorporating mathematical and logico-linguistic constructs and deductions in epistemology. It was the dominant philosophy of science between the First World War and the Cold War, and has been criticised by among others, Popper, Ayer, Quine, Kuhn, and Putnam.

2.11. This will not be easy because “*Of around 2500 treatments covered, 13% are rated as beneficial, 23% likely to be beneficial, 8% as trade off between benefits and harms, 6% unlikely to be beneficial, 4% likely to be ineffective or harmful, and 46%, the largest proportion, as of unknown effectiveness.... The figures above suggest that the research community has a large task ahead and that most decisions about treatments still rest on the individual judgements of clinicians and patients.*”<sup>29</sup>

2.12. Therefore, the charge often levelled at homeopathy that it is “unscientific” rings hollow when compared to this clear lack of evidence for many conventional medical treatments and procedures.

2.13. Thus, if the challenge against homeopathy raised by EBM is to be at all taken seriously then, by default, it has to be applied with equal rigour to conventional therapies, which will mean that roughly half of all procedures, including nearly all surgical ones, will have to be banned.

### **3. EBM and conventional medicine**

3.1. Such a procedure is set to become a double-edged sword for biomedicine, as the following example shows. Thus trials of one of the world’s biggest selling drugs Prozac, recently found it to be no better than placebo.<sup>30</sup>

3.2. Interestingly, homeopathy/CAM detractors are not campaigning for the removal of Prozac, as they do so vociferously against homeopathy/CAM (even when Prozac and Prozac-like drugs have been known to induce suicidal tendencies). Fortunately, such scientific<sup>†</sup> ‘fundamentalism’<sup>2</sup> is not shared by all in medicine.

3.3. Thus, cancer clinician Karol Sikora (60% of whose patients use some form of CAM as adjuvant therapies) has uncompromisingly castigated the more vociferous homeopathy/CAM detractors as ‘inexperienced armchair physicians’, while berating their ‘Stalinist’ attempts to rid the NHS of its CAM services.<sup>31</sup>

3.4. Sir Michael Rawlins (Chair of NICE and no supporter of homeopathy/CAM) in his Harveian Oration last year,<sup>15</sup> warned: “*RCTs, long regarded as the ‘gold standard’ of evidence, have been put on an undeserved pedestal. Their appearance at the top of hierarchies of evidence is inappropriate; and hierarchies are illusory tools for assessing evidence. They should be replaced by a diversity of approaches that involve analysing the totality of the evidence base.*”

3.5. In this respect, Sir Michael Rawlins simply echoes David Sackett’s much earlier concern that EBM would turn into an evidence ‘mono-culture’, where the primacy of an assumed ‘ideal’ scientifically-determined efficacy would subsume other no less important forms of patient and clinician derived evidence.<sup>7</sup>

3.6. That over a decade later, voices in the nursing profession have been raised concerning EBM’s intolerance of therapeutic pluralism in healthcare systems,<sup>4</sup>

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<sup>†</sup>Scientism describes the view that natural science is superior to all other interpretations of life, such as philosophical, religious, mythical, spiritual, or humanistic explanations, and over other fields of inquiry, such as the social sciences.

suggests Sackett's early warning went completely unheeded. This scientific version of EBM throws up for itself several alarming contradictions.

3.8. Thus, in a recent German randomised controlled back-pain study, acupuncture 'placebo' was shown to be nearly twice as effective as the best conventional medicine has to offer. So, according to the principles of EBM as currently practiced, conventional medicine is less effective than an acupuncture placebo.<sup>19</sup>

3.9. The H1N1 swine flu vaccine is being rushed into production and distribution with little evidence from trials of its effectiveness or safety in humans,

3.10. One of the most frequently quoted studies (by the sceptical literature and the media), supposedly demonstrating homeopathy is no better than placebo, is a 2005 *Lancet* meta-analysis,<sup>32</sup> which has been shown by leading researchers to be thoroughly biased,<sup>33-36</sup>

3.11. In addition, two recent studies have concluded this meta-analysis was also a scientifically seriously flawed piece of work,<sup>37, 38</sup> which broke the *Lancet's* own strict guidelines on methodological and publication transparency.<sup>39</sup>

3.12. The question arises therefore as to why it was ever allowed to appear in such an eminent journal as the *Lancet* in the first place. This leads onto the whole thorny issue of abuse of science in medical and pharmacological research,<sup>40</sup> reported recently in the magazine *Prospect*.<sup>41</sup>

3.13. In 2008, the journal *Nature*, stated that "*in the US around 1000 incidents of suspected fabrication, falsification, and plagiarism go unreported every year*".<sup>42</sup> In the UK, the Committee on Publication Ethics estimates that there are about 50 cases per year of serious fraud in biomedical research, and that academia has been trying to cover up this abuse of science.

3.14. The *Prospect* article concludes, '*We may have to wait for fresh scandals before anyone acts. Until then, patients will remain in real danger of taking expensive drugs whose risk of harm or inability to cure, have been fraudulently suppressed.*' And there is clear evidence of harm perpetrated by conventional medical practice.

3.15. The House of Commons Public Accounts Committee concluded that in 2006 alone, *at least* 2.68 million people in Britain were harmed by conventional medical interventions: a staggering 4.5% of the UK population.<sup>43</sup> In the US, the situation is even worse.<sup>44</sup>

3.16. When no such evidence of fraud or large-scale danger of homeopathy in clinical practice have been reported, one wonders why so much energy is expended trying to demonise homeopathy/CAMs and those who practice them, as 'unproven, unscientific, deadly and dangerous'.

## 4. Evidence for homeopathy

4.1. There are many scientific trials and meta-analyses providing evidence that the effects of homeopathy are more than a placebo response. These are summarised on the Faculty of Homeopathy website.<sup>45</sup>

4.2. If the more inclusive Rawlins and Sackett definitions of evidence are utilised however, then it is clear that there is growing evidence from clinical observation studies<sup>46, 47</sup> for the positive health benefits of homeopathy, and its cost effectiveness.<sup>48-50</sup>

4.3. There is also mounting basic science evidence that homeopathically prepared solutions may very well differ from those that are simply diluted, suggesting the operation of a 'water-memory' effect that surely deserves further exploration.<sup>51-54</sup>

4.4. In addition, laboratory studies suggest that even very high homeopathic dilutions (beyond Avogadro's number) may exert biological effects, though even high quality studies have yet to achieve consistency in experimental methodology.<sup>55-58</sup>

4.5. Some intriguing results which have just been published demonstrate that extremely low doses of cytokines achieve relief from the symptoms of allergic asthma induced in experimental mice, but only when the cytokines have been serially diluted and violently agitated in the homeopathic manner.<sup>59</sup>

## 5. An aside: is the 'Memory of Water' (MoW) possible?

5.1. As someone who originally came into homeopathy with over 30 years experience in chemistry (BSc, MSc, PhD, CChem, FRSC), MoW as a possible mechanism for how homeopathic remedies might produce effects (even when the original substance has been diluted out of existence), has produced in me feelings ranging from outrage to intrigue.

5.2. Consequently, I can sympathise with those for whom MoW<sup>60</sup> seems to contravene 'common sense' and fundamental scientific principles, such as the Laws of Thermodynamics.

5.3. The problem with understanding MoW is the prevalence of so-called 'common sense', which ultimately is only an indication of a particular paradigm's power over peoples' imaginations. New experiences, repeated often enough make prevailing paradigms redundant.<sup>61</sup>

5.4. Not so long ago, the idea that the world was flat was 'common sense.' So, one's experience and common sense are just as likely to be shaped by one's beliefs, as the other way around, and are not fundamental.

5.5. MoW describes the apparent ability of bulk water to be "imprinted" with the "signature" of a substance once dissolved, but now diluted *and violently agitated out of existence*. The agitation is absolutely necessary, as mere dilution on its own does not reproduce this phenomenon. The term was first coined by Prof Jacques

Benveniste, and in his controversial *Nature* paper, he clearly distinguishes between mere dilution and dilution plus agitation.<sup>62, 63</sup>

5.6. In chemical terms, MoW might be considered a *supra-molecular* phenomenon involving trillions of water molecules. Thus, it is an *emergent* dynamic property of bulk liquid water (i.e., the whole is more than the sum of its individual molecular parts) and, as such, defies simple explanation in terms of conventional chemical ideas of static bonding and additive behaviour of individual water molecules.

5.7. Certainly, water molecules' ability to dynamically switch hydrogen bonding to each other is of crucial importance here, as are other weak intermolecular interactions (e.g., van de Waals forces). Prof Martin Chaplin gives a fulsome account of this behaviour on his website.<sup>64</sup>

5.8. The point is, the principles of *equilibrium* thermodynamics that one learns at school and university *cannot* explain this behaviour, because it involves so-called critical or instability points very far from chemical equilibrium. It is a type of behaviour first described by Prof Ilya Prigogine's Nobel Prize-winning work on the thermodynamics of non-equilibrium chemical reactions very close to chaos, *such as those that necessarily occur in all living organisms*.<sup>65</sup>

5.9. One plausible hypothesis is that such instability points act as local *dynamic attractors* of the system. These necessarily exist in such microscopic form, it requires a novel quantum description that predicts effects at the macroscopic level, with consequences not dissimilar to those of superconductors and super-fluids in low-temperature physics. The model is applicable to several systems of complementary medicine, including homeopathy.<sup>66</sup>

5.10. This means that it is quite possible for the physical and chemical properties of a solution to depend on its dilution history: in other words, for it to have a 'memory' of what has been diluted in it. A series of interesting experiments indicating this possibility, was reported recently using solutions of different substances at various (non-homeopathic) dilutions.<sup>67</sup>

5.11. Sixteen years after Benveniste's controversial work, a successful version of his experiments was performed involving a multi-centre European trial over 5 years, in five separate laboratories.<sup>56</sup>

5.12. In a completely different area, Rey obtained thermoluminescence data from homeopathically prepared ultrahigh dilutions of lithium and sodium chloride, which were reproducibly different from pure water diluted with itself.<sup>51</sup> This suggests that the dynamically-altering pattern of hydrogen bonds described in 5.7., might survive removal of the original material.

5.13. The field of materials science has demonstrated that it is changes to the *structure* of water rather than its *composition* that fundamentally affects its properties.<sup>68</sup> In this regard, water can adopt a range of dynamic structures which have been used to account for its many well-known anomalies as a liquid.<sup>64</sup>

5.14. There is also compelling thermodynamic evidence that extremely diluted solutions prepared in the homeopathic manner, by sequential dilution and violent agitation, are measurably and reproducibly different from similar solutions that have simply been diluted.<sup>53</sup>

5.15. Dr Cyril Smith in the UK has for over 30 years researched how living things make use of electro-magnetic fields and frequencies, and their connection with MoW.<sup>69</sup>

5.15. All the above experimental work supports a theoretical mechanism for MoW first put forward by Italian physicists Profs Del Guidice and Preparata over 20 years ago,<sup>70</sup> that the homeopathic process of serial dilution and violent agitation triggers formation of dynamic 'structures' in water that can survive removal of all traces of the original dissolved substance.

5.16. Contrary to what some homeopathy/CAM detractors think therefore, MoW is not only possible, it does NOT contravene known scientific laws and principles.

## 6. Conclusions

6.1. The charge often levelled at homeopathy by its detractors, that it is "unscientific" even "deadly" does not withstand close scrutiny when compared to the clear lack of evidence for many conventional medical treatments and procedures, including some of the latest vaccines, and the clear evidence of harm through side-effects of some conventional interventions.

6.2. With its increasing reliance solely on the results of randomised-controlled trials, Evidence-based Medicine as currently understood and practiced is no longer a reliable or cost-effective 'tool' for investigating the efficacy or safety of many conventional medical procedures, let alone homeopathy/CAMs.

6.3. There is clear evidence of bias and dependence on flawed science by some assessing and reporting the supposed lack of efficacy of homeopathy, while at the same time, abuse of science and its cover-up are unfortunately not rare occurrences in medical and pharmaceutical research.

6.4. From RCTs, meta-analyses, clinical observational studies, and basic science experiments, there exists a steadily growing evidence base for homeopathy, the efficacy of some of its remedies, and their possible mode of action. Work is also beginning to elaborate homeopathy's cost-effectiveness

6.5. Finally, I would bring to the S&TC's attention this quote from Professor Martin Ryder of Colorado University on the dangers of scientism encroaching into public policy *"....Policy can be informed by science, and the best policies take into account the best available scientific reasoning. Law makers are prudent to keep an ear open to science while resisting the rhetoric of the science industry in formulating policy. It is the role of science to serve the primary interests of the polity. But government in a free society is not obliged to serve the interests of science.... positivism and*

scientism move in where the discourse of science lacks self-reflection and where the spokesmen of science exempt themselves from public scrutiny.”<sup>71</sup>

6.6. In conclusion, I would hope therefore that the S&TC considers the substantive points I have made, in regard to the growing evidence for this more than 200-year-old therapy, regardless of the accompanying bias and abuse I have itemised above. For without that, it will be doubtful in my view, whether the STC will be able to achieve an objective assessment of the evidence for homeopathy.

(2960 words: excluding references and footnotes. Declaration of interests; none).

### **Bibliography**

1. Walach H. The campaign against CAM and the notion of ‘evidence-based’. *J Altern Complement Med* 2009;15(10):1139-1142. ¶
2. Milgrom LR. Homeopathy and the New Fundamentalism: a critique of the critics. *J Altern Complement Med* 2008;14:589. ¶
3. Milgrom LR. Under pressure: homeopathy UK and its detractors. *Forsche Komplementärmed* 2009;16:256-261. ¶
4. Holmes D, Murray SJ, Perron A, Rail G. Deconstructing the evidence-based discourse in health sciences: Truth, power, and fascism. *Int J Evid Based Healthc* 2006;4:180. ¶
5. Promoting good science and evidence for the public. Sense About Science. [www.senseaboutscience.org.uk](http://www.senseaboutscience.org.uk). Accessed June 10<sup>th</sup> 2009.
6. McKibbin KA, Wilczynski N, Hayward RS, et al. The medical literature as a resource for evidence based care. Working paper from the Health Information Research Unit, McMaster University, Ontario, Canada, 1995. Online document At: <http://hiru.mcmaster.ca/hiru/medline/asis-pap.htm>. Accessed October 19, 2008.
7. Sackett DL, Rosenberg WMC, Muir Gray JA, et al. Evidence based medicine: What it is and what it isn't. *BMJ* 1996;312:71–72.
8. Kaptchuk, T. J. "The double-blind randomized controlled trial: Gold standard or golden calf?" *Journal of Clinical Epidemiology* 2001;54:541-549.
9. Muney AM. Evidence-based medicine needs to be promoted more vigorously. *Managed Care Magazine*, February 2002. Online document at: [www.managedcaremag.com](http://www.managedcaremag.com) Accessed October 19, 2008.
10. Tobin MJ. Evidence-based medicine lacks a sound scientific basis. *Chest* 2008;133:1071.
11. Weatherley-Jones E, Thompson EA, Thomas KJ. The placebo-controlled trial as a test of complementary and alternative medicine: Observations from research experience and individualised homeopathic treatment. *Homeopathy* 2004;93:186–189.
12. Schulz KF, Grimes DA. Allocation concealment in randomised trials: Defending against deciphering. *Lancet* 2002;359:614.
13. Pildal J, Chan A-W, Hrobjartsson A, et al. Comparison of descriptions of allocation concealment in trial protocols and the published report: Cohort study. *BMJ* 2005;330:1049.
14. Milgrom LR. Are randomised controlled trials (RCTs) redundant for testing the efficacy of homeopathy? A critique of RCT methodology based on entanglement theory. *J Altern Complement Med* 2005;11:831–838.

15. Rawlins M. De Testimonio: On the evidence for decisions about the use of therapeutic interventions. The Harveian Oration. Delivered to the Royal College of Physicians, London, October 16, 2008. Online document at: [www.rcplondon.ac.uk=news=news.asp?PR\\_id¼422](http://www.rcplondon.ac.uk=news=news.asp?PR_id¼422) Accessed November 1, 2008.
16. Smith GCS, Pell JP. Hazardous journey: Parachute use to prevent death and major trauma related to gravitational challenge. Systematic review of randomised controlled trials. *BMJ* 2003;327:1459–1461.¶
17. Haake M, Muller HH, Schade-Brittinger C, et al. German Acupuncture Trials (GERAC) for chronic low back pain: Randomized, multicenter, blinded, parallel-group trial with 3 groups. *Arch Intern Med* 2007;167:1892-1898.
18. Okasha S. Philosophy of science: A very short introduction. Oxford, UK: Oxford University Press, 2002.
19. Popper K. The Logic of Scientific Discovery. New York: Basic Books, 1959.
20. Derrida J. Speech and Phenomena and Other Essays on Husserl's Theory of Signs. Evanston, IL: Northwestern University Press, 1973.
21. Lakatos I. The Methodology of Scientific Research Programmes: Philosophical Papers, Vol. 1. Cambridge: Cambridge University Press, 1978.
22. Feyerabend P. Science in a Free Society. London: Routledge, 1979.
23. Feyerabend P. Against Method: Outline of an Anarchistic Theory of Knowledge. Atlantic Highlands, NJ: Humanities Press, 1975.
24. Kuhn T. The Structure of Scientific Revolutions. Chicago: University of Chicago Press, 1963.
25. Collingwood RG. An Essay on Metaphysics. Revised ed. Oxford: Clarendon Press, 1998, orig. 1940.
26. Polanyi M. Personal Knowledge: Towards a Post-Critical Philosophy. Chicago: University of Chicago Press, 158.
27. Auyung SY. How Is Quantum Field Theory Possible? Oxford, UK: Oxford University Press, 1995.
28. Zeilinger A. Quantum Teleportation and the Nature of Reality. 2004. Online document at: [www.btgjapan.org=catalysts=anton.html](http://www.btgjapan.org=catalysts=anton.html). Accessed March 21, 2008.
29. BMJ Clinical Evidence web-site. Online document at: <http://clinicalevidence.bmj.com/ceweb/about/knowledge.jsp>. Accessed October 19, 2008.
30. Kirsch I, Deacon BJ, Huendo-Medina T, Scoboria A, Moore TJ, Johnson BT. Initial severity and antidepressant benefits: a meta-analysis of data submitted to the Food and Drug Administration. *PloS Med* 2008;5(2): e45.
31. Sikora K. Complementary medicine does help patients. Times Online, February 3rd 2009. Online document at: [www.timesonline.co.uk/tol/life\\_and\\_style/court\\_and\\_social?article5644142.ece](http://www.timesonline.co.uk/tol/life_and_style/court_and_social?article5644142.ece) Accessed February 18, 2009.¶
32. Shang A, Huwiler-Müntener K, Nartey L, et al. Are the clinical effects of homoeopathy placebo effects? Comparative study of placebo-controlled trials of homoeopathy and allopathy *Lancet* 2005;366:726–32.
33. Bell IR. All evidence is equal, but some evidence is more equal than others: Can logic prevail over emotion in the homeopathy debate? *J Altern Complement Med* 2005;11:763-769.

34. Frass M, Schuster E, Muchitsch I, et al. Bias in the trial and reporting of trials of homeopathy: A fundamental breakdown in peer review and standards? *J Altern Complement Med* 2005;11:780-782.
35. Kienle H, Kienle GS, von Schön-Angerer T. Failure to exclude false negative bias: A fundamental flaw in the trial of Shang et al. *J Altern Complement Med* 2005;11:783.
36. Peters D, Shang, et al. Carelessness, collusion, or conspiracy? *J Altern Complement Med* 2005;11:779-780.
37. Ludtke R and Rutten ALB. The conclusions on the effectiveness of homeopathy highly depend on the set of analyzed trials. *J Clin Epidemiol* 2008;61;(12):1197-1204.
38. Rutten ALB, Stolper CF. The 2005 meta-analysis: the importance of post-publication data. *Homeopathy* 2008;97(4):169-177.
39. Moher D, Cook DJ, Eastwood S, Olkin I, Rennie D, Stroup DF. Improving the quality of reports of meta-analyses of randomised controlled trials: the QUOROM statement. Quality of Reporting of Meta-analyses *Lancet* 1999;354:1896–1900.
40. Fanelli D How Many Scientists Fabricate and Falsify Research? A Systematic Review and Meta- Analysis of Survey Data. *PLoS ONE* 2009;4(5):e5738. doi:10.1371/journal.pone.0005738.¶
41. Naish J. Faking it. *Prospect*, August 2009, p63.¶
42. Titus SL, Wells AJ, Rhoades LJ. Repairing research integrity. *Nature* 453, 980-982 (19 June 2008) | doi:10.1038/453980a.
43. Leigh E. A safer place for patients: Learning to improve patient safety. 51st report of session 2005–06 report, together with formal minutes, oral, and written evidence. House of Commons papers 831 2005–06, TSO (The Stationery Office). July 6, 2006:
44. See, <http://www.health-care-reform.net/causedeath.htm>
45. See, [http://www.facultyofhomeopathy.org/export/sites/faculty\\_site/research/evidencesummary.pdf](http://www.facultyofhomeopathy.org/export/sites/faculty_site/research/evidencesummary.pdf)
46. Spence D, Thompson E, Barron S. Homeopathic treatment for chronic disease: a 6-year university hospital-based outpatient observational study. *J Altern Complement Med* 2005;5:793-8.¶
47. Sharples F, van Haselen R, Fisher P. NHS patients' perspective on complementary medicine. *Complement Ther Med* 2003;11:243-8. ¶
48. Witt C, Keil T, Selim D, et al. Outcome and cost of homeopathic and conventional treatment strategies: a comparative cohort study in patients with chronic disorders. *Complement Ther Med* 2005;134:79-86.¶
49. Witt CM, Lütke R, Baur R, Willich SN. Homeopathic medical practice: long-term results of a cohort study with 3981 patients. *BMC Public Health* 2005;5:115.¶
50. Trichard M, Chaufferin G, Nicoloyannis N. Pharmaco-economic comparison between homeopathic and antibiotic treatment strategies in recurrent acute rhinopharyngitis in children. *Homeopathy* 2005;94:3-9.¶
51. Rey L. Thermoluminescence of ultra-high dilutions of lithium chloride and sodium chloride. *Physica (A)* 2003;323:67-74.
52. Bell IR, Lewis DA, Brooks AJ, et al. Gas discharge visualisation evaluation of ultramolecular doses of homeopathic medicines under blinded, controlled conditions. *J Altern Complement Med* 2003;9:25-38.
53. Elia V, Niccoli M. Thermodynamics of extremely diluted aqueous solutions. *Ann N Y Acad Sci* 1999;879:241-8.¶

54. Roy R, Tiller WA, Bell I, Hoover MR. The structure of liquid water: novel insights from materials research. Potential relevance to homeopathy. *Mat Res Innov* 2005;9(4):557-608.
55. Linde K, Jonas WB, Melchart D et al. Critical review and meta-analysis of serial agitated dilutions in experimental toxicology. *Hum Exp Toxicol* 1994;13:481-492.
56. Belon P, Cumps J, Ennis M et al. Histamine dilutions modulate basophil activation. *Inflamm Res* 2004;53:181-8.¶
57. Witt CM, Bluth M, Albrecht H et al. The in vitro evidence for an effect of high homeopathic potencies – a systematic review of the literature. *Complement Ther Med* 2007;15:128-38.¶
58. Milgrom LR. “...Macavity’s Not There!” *J Altern Comp Med* 2009;15:1051-1053.¶
59. Gariboldi S, Palazzo M, Zanobbio L et al. Low dose oral administration of cytokines for treatment of allergic asthma. *Pulmonary Pharmacology & Therapeutics* 2009 doi:10.1016/j.pupt.2009.05.002, article in press¶
60. Schiff M. *The Memory of Water: Homeopathy and the Battle of Ideas in the New Science*. Thorsons (an imprint of HarperCollins), London 1994.
61. Kuhn, TS. *The Structure of Scientific Revolutions*, 2nd ed., enlarged. Chicago: The University of Chicago Press, 1970.
62. Milgrom LR. A homeopath’s response to unjust scepticism. *J Alt Comp Med* 2007;13:186-189.¶
63. Davenas E, Beauvais F, Amara J, et al. Human basophil degranulation triggered by very dilute antiserum against IgE. *Nature* 1988;333:816–818.
64. Chaplin M. *Water Structure and Behaviour*. Regularly updated online document at: [www.lsbu.ac.uk/water/](http://www.lsbu.ac.uk/water/)
65. Prigogine I, Stengers I. *Order out of Chaos*. London, UK: Fontana, 1985.
66. Hankey A. Are we close to a theory of energy medicine? *J Alt Complement Med* 2004;10:83–86.
67. Samal S, Geckler KE. Unexpected solute aggregation in water on dilution. *Chem Commun* 2001;21:2224–2225.
68. Roy R, Tiller WA, Bell I, Hoover MR. The structure of liquid water; novel insights from materials research; Potential relevance to homeopathy. *Mat Res Innovat* 2005;9:559–576.
69. Smith CW. Frohlich’s interpretation of biology through theoretical physics. In Herbert Frohlich FRS: *A Physicist Ahead of His Time* (ed Hyland GJ and Rowlands P), University of Liverpool, Liverpool, 2nd edn, pp107-154. 2008.
70. Del Giudice E, Preparata G, Vitiello G. Water as a free-electron dipole laser. *Phys Rev Lett* 1988;61:1085–1088.
71. Ryder M. Scientism. Entry in the *Encyclopaedia of Science, Technology, and Ethics*. Copyright 2001-2006 by Macmillan Reference USA, an imprint of the Gale Group.¶