

## Research involving animals: the case for cutting edge ethics

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Research into homeopathy is undergoing a welcome period of growth driven by the increasing need to provide evidence for the therapy's effectiveness and mode of action.

In mainstream medicine animal-based research has become integral to the development of new drugs and medical procedures, despite only modest success in extrapolating findings in animals to humans. Homeopathy, based on provings conducted on human volunteers and on clinical confirmation of the *similia* principle, is not subject to such shortcomings. Nevertheless animals with artificially induced diseases are being used in homeopathic research in order to supplement existing knowledge and to demonstrate that homeopathy 'works' under laboratory conditions.

To date such research has encompassed a wide range of physical and psychological conditions and involved procedures that have caused suffering – often severe - in experimental animals. Whilst the rights, dignity and welfare of humans participating in homeopathic studies are safeguarded in line with standards laid down in the Declaration of Helsinki, international standards of protection for experimental animals vary widely and are markedly less stringent. Growing interest in homeopathy (and funding for research in this field) could lead to a rise in animal-based studies at a time when public trust in the regulations governing animal use in medical research is falling - and calls for more ethical and scientifically relevant alternatives are on the increase.

This presentation examines some of the scientific, political and legal issues relating to the use of animals in homeopathic research. It addresses the relative value of animal studies in evidence bases; societal drivers in the development of alternatives to animal experiments and the new EU directive on the protection of animals in scientific research. It also considers the implications for homeopathy's reputation as an ethical profession and highlights opportunities to demonstrate cutting edge ethics in the advancement of homeopathic knowledge.

## Pyridinium-N-phenolates as molecular probes of serially diluted and agitated solutions: preliminary results

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A systematic approach to the design of a simple, chemical system for investigating the fundamental nature of homeopathic medicines has led to an experimental protocol for the use of solvatochromic pyridinium-N-phenolate dyes as molecular probes of serially diluted and agitated solutions.

Preliminary results using this molecular probe technology indicate that homeopathic potencies affect the degree of self-association between zwitterionic dye molecules and between dye molecules and a range of cations in solution under non-equilibrium conditions. Reactions have been monitored by following the loss of the characteristic charge transfer band of a representative dye ET30 at 600nm in ethanol using standard quartz or polystyrene cuvettes. The effect of homeopathic potencies is seen with quartz cuvettes, whereas no difference is seen between controls and samples in polystyrene cuvettes. Results are interpreted as indicating

1. A greater level of dynamic ordering occurs in solution in the presence of potencies, favouring both dye-dye and dye-cation interactions.

2. Quartz appears to be essential in propagating and/or amplifying the homeopathic signal- and hence the effects described- whereas polystyrene lacks this ability.

3. High levels of bulk water are not essential for the observed action of potencies. Assays are carried out in ethanol with only low (<0.1%) levels of water. In the assays reported therefore either ethanol is able to substitute for water in any long-range potency induced solvent ordering or the primary focus of ordering lies with quartz itself.

The implications of these results, together with future directions for research in this field, are discussed.

## Use and knowledge of homeopathic drugs by the general population in Spain

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**Introduction:** Homeopathy is already considered as a reality in the daily health practice. More patients and health-care professionals use it on a daily basis as an effective therapeutic alternative. A pioneer investigation, conducted by Boiron in Spain, has developed the 1st Study on Use and Knowledge of Homeopathy in Spain. Further than the academic value of this study, it has proven to be a useful tool for institutional relationships and media awareness purposes.

**Objective:** To show the degree of knowledge, use and satisfaction about the use of the homeopathic medicines in the Spanish population.

**Material and methods:** The study was performed during 2010 and 2011 throughout an online questionnaire applied on a sample of 3,344 people over 18 years old coming from all of the Spanish Regions.

**Results:** Homeopathy has shown to be a more and more demanded therapeutic alternative; thus, one out of three Spanish people (33%) have already used it to relieve or treat several health problems, and 27% use it on an occasional or regular basis. Navarra, Aragón, Cataluña, Murcia and País Vasco stand out as the Autonomies with a higher percentage of occasional and regular users. According to the collected data, the word Homeopathy is recognized by almost all the sample and 75% of it spontaneously identify the homeopathic treatments as a natural medical therapy. Women stand out for a better knowledge on this therapy than men, and the main female users of Homeopathy are between 30 and 50 year old. The lack of adverse events and effectiveness are the main reasons for the Spanish users to start using homeopathic medicines. Flu, cold, cough, sore throat (52%), bronchitis and ear infection (12%) are the most frequently homeopathy treated pathologies.

**Conclusions:** Eight out of ten (82%) people using homeopathy are satisfied or very satisfied with the outcome of their treatments, and this figure grows up to 99% in regular patients. In addition, if we take into account that 87% of the users would recommend it to relatives and friends, future can't be any brighter.

**Keywords:** Homeopathy; Healthcare survey; Demography; Patient satisfaction; Spain/epidemiology

## Effects of homeopathic treatments on the cellular metabolism of wheat: validation of microarrays data by quantitative real-time PCR (qPCR)

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Plant-based models appear to be an useful approach for basic research in homeopathy in order to fill gaps concerning theoretical models and scientific basis. Such models make it possible to overcome some of the inconveniences of clinical trials for instance placebo effect, ethical issues, duration and high costs; moreover they constitute a vast and cheap source of biological material, essential to perform a large number of experimental repetition.

The main objective of the research was to give novel insights on the not yet clarified mode of action of homeopathic treatments and to provide reliable information on their efficacy.

The plant-based model considered was the "wheat growth model". A total of 560 common wheat (*Triticum aestivum* L.) seeds were used to carry out the study; part of the seeds were stressed with As<sub>2</sub>O<sub>3</sub> 0.1% to reduce germination and amplify the effect of homeopathic treatment. The seeds were been equally subdivided into four experimental groups: control (non-stressed seeds grown in distilled water); treated control (non-stressed seeds grown in As<sub>2</sub>O<sub>3</sub> 45x); poisoned (stressed seeds grown in distilled water); poisoned-treated (stressed seeds grown in As<sub>2</sub>O<sub>3</sub> 45x). After 7 days of incubation seedlings were collected for molecular analysis. Total RNA isolated from seedling samples were used for microarray analysis in order to study changes in gene expression over different treatments. Subsequently, statistical and bioinformatic analyses were performed to classify genes in "induced" or "repressed" and to assign them a supposed function. Comparative analyses highlighted the particular effect of As<sub>2</sub>O<sub>3</sub> 45x in stressed seeds. Real time PCR was performed to validate gene expression profiles: data obtained with microarray and real time PCR were found to be well correlated.

This research provided novel insights on the mode of action of homeopathic potencies and constitute an important breakthrough in the study of the molecular responses triggered in wheat by ultra-high diluted treatments.

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## Sensitivity and likelihood ratio of symptoms in patients with good therapeutic response to Lycopodium, compared to patients with good response to treatment with other homeopathic medicines. Retrospective study

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**Background and aims:** Availability of reliable guiding symptoms in order to accurately prescribe homeopathic medicines is a matter of critical importance. Recent published work has highlighted the likelihood ratio (LR) of