

# Basic science research in homeopathy

## Homeopathic dilutions

Although the basic idea of homeopathy is similarity, its most controversial claim concerns the properties of ultra-molecular dilutions. Avogadro's Constant, the number of particles (atoms or molecules) in a gram mole of a substance, is of the order of  $10^{23}$ . In homeopathic terminology,  $10^{23}$  corresponds to a 23X or approximately 12C dilution. Homeopathic preparations in dilution less than those contain material traces of the original substance; those in high (ultra-molecular) dilution are unlikely to do so.

## The 'memory of water' theory

The most widespread hypothesis to explain the mechanism of action of homeopathic dilutions refers to 'memory of water' effects: 'Under appropriate circumstances, water retains information about substances with which it has previously been in contact and may then transmit that information to pre-sensitised biosystems'. Standard physico-chemical techniques,<sup>1-2</sup> thermoluminescence,<sup>3-4</sup> Raman and UV-VIS spectroscopy<sup>5-6</sup> and other methods<sup>7</sup> have shown that water displays large changes in its physico-chemical properties as a function of its history. It remains to be proven whether such changes have the features to account for effects of homeopathic medicines in-vivo.<sup>8</sup>

## Molecular clusters and other theories

An alternative mechanism is suggested by the results of research on molecular clustering in water solutions, which has shown that as a solution is made more and more dilute, very stable and larger 'clumps' of material develop in dilute solutions rather than in more concentrated solutions.<sup>9</sup> This means that residual molecular clusters of the original substance might be present in homeopathic dilutions. Succussion might also be responsible for creating very tiny bubbles (nanobubbles) that could contain gaseous inclusions of oxygen, nitrogen, carbon dioxide and possibly the homeopathic source material.<sup>5</sup>

## High-potency effects in biological experiments

A recent meta-analysis evaluated 67 in-vitro biological experiments in 75 research publications and found that high-potency effects were reported in nearly 75% of all replicated studies; however, no positive result was stable enough to be reproduced by all investigators.<sup>10</sup> One example of a series of in-vitro experiments in homeopathy is the model of the allergic response to antibody using the human basophil degranulation test. The earliest study reported inhibition of degranulation with ultra-molecular dilutions of anti-IgE.<sup>11</sup> These initial experiments did not prove to be reproducible.<sup>12, 13</sup> Subsequent studies using a modified method, and using ultra-molecular dilutions of histamine, have shown positive results however. These findings have been reproduced in several independent laboratories,<sup>14, 15</sup> as well as in a multi-centre series of experiments.<sup>16</sup>

## References

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