

Our results confirm and build upon the hypothesis that high dilutions of biologically active compounds may indeed have an effect which mimics that of lower dilutions/higher doses. So far there is no satisfactory or unifying theoretical explanation for these observations, but recent evidence seems to point to organisation of the solvent water on a mesoscopic scale: the nano-heterogeneous structure of water can be determined by interactive phenomena such as coherence [1;2], epitaxy [3], temperature-pressure processes during strong agitation, and formation of colloidal nanobubbles containing gaseous inclusions of oxygen, nitrogen, carbon dioxide, silica, and possibly the remedy source material [4-6]. So far, nuclear magnetic resonance (NMR) studies of homeopathic solutions have yielded controversial data, but recently high histamine dilutions (beyond 10^{-20} mol/L) were distinguished from water solvents on the basis of their NMR relaxation rates [4;7;8]; moreover, after heating of the histamine samples, all the relaxation observed as a function of dilution vanished. It was suggested that histamine molecules might act as nucleation centres, amplifying the formation of stable supramolecular structures, involving nanobubbles of atmospheric gases and highly ordered water around them. In the future, the possible existence and the nature of clathrate-like hydrate nanostructures formed during the dilution and succussion process might be explained by cluster science, in which different geometrical structures of clusters composed of the same chemical species may differ in their chemical reactivity [9]. These unusual properties of high dilutions, which merit further investigation, are potentially relevant not just to homeopathic pharmaceutical practice, but also to basic research into cell sensitivity to regulation.

References

- [1] Del Giudice E, Preparata G: Coherence electrodynamics in water; in Schulte J, Endler C (eds): *Fundamental Research in Ultrahigh Dilution and Homeopathy*. Dordrecht, Kluwer, 1998, pp 89-100.
- [2] Smith CW: Quanta and coherence effects in water and living systems. *J Altern Complement Med* 2004;10:69-78.
- [3] Rao ML, Roy R, Bell IR, Hoover R: The defining role of structure (including epitaxy) in the plausibility of homeopathy. *Homeopathy* 2007;96:175-182.
- [4] Demangeat JL, Gries P, Poitevin B, Drosbeke JJ, Zahaf T, Maton F, Piérart C, Muller RN: Low-field NMR water proton longitudinal relaxation in ultrahighly diluted aqueous solutions of silica-lactose prepared in glass material for pharmaceutical use. *Appl Magn Reson* 2004;26:465-481.
- [5] Elia V, Niccoli M: New physico-chemical properties of extremely diluted aqueous solutions. *J Thermal Anal Calorim* 2004;815-836.
- [6] Chaplin MF: The Memory of Water: an overview. *Homeopathy* 2007;96:143-150.

- [7] Demangeat JL: NMR relaxation evidence for solute-induced nanosized superstructures in ultramolecular aqueous dilutions of silica-lactose. *J Mol Liquids* 2010;155:71-79.
- [8] Demangeat JL: NMR water proton relaxation in unheated and heated ultrahigh aqueous dilutions of histamine: evidence for an air-dependent supramolecular organization of water. *J Mol Liquids* 2009;144:32-39.
- [9] Roy R, Tiller W, Bell IR, Hoover MR: The structure of liquid water. Novel insights from materials research; potential relevance to homeopathy. *Mat Res Innovat* 2005;9:98-103.