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Update on preliminary elements of a theory of ultra high dilutions

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Introduction: **The different mechanisms: A. of the interaction between the molecular mother substance and the solvent water or ethanol B. of the storage of molecule-specific information in the solvent. C. the physiological basis of the sensitivity of the living organism towards an ultra high dilution (UHD). D. the mechanism of the interaction of the test dilution with the organism are largely unknown. Several ideas have been postulated, and experiments to test them carried out in physics and in biology.**
Method: **The authors revisited a 1994 contribution on 'preliminary elements of a theory on UHDs' and updated it with regard to more recent literature and research findings.**
Results: **Although the experimental basis can still be questioned in most cases, remarkable fundamental observations have been made to explain the effects of UHDs. For some topics in question, it appears that information specific properties of the diluted substance to be transferred is stored by means electromagnetic fields. The interaction between the UHD and the organism seems to be electromagnetic in nature. The transmission of information from (bio-)molecules to the UHD is of special interest. Again, electromagnetic actions and vector potential fields appear to be implicated.**
Conclusion: **The mechanisms of information storage and transfer in UHDs are far from fully understood, but progress has been made at experimental and theoretical levels.** *Homeopathy* (2015) **104**, 337–342.

Keywords: Ultra high dilutions; Homeopathy; Information storage; Information transfer; Sensitivity

Introduction

The major questions addressed in 'Ultra high dilution (UHD)'[1] are how any information can be transferred to the carrier substance water or ethanol, how information can be stored there permanently and how this information can be transferred to the living system (plant, animal, human). These questions have not been answered in 1994, nor in 2015, but pieces of that puzzle have been turned around and elucidated. Furthermore, as already stated in 1994, we wish, of course, to encourage others to perform further experiments in order to solve that puzzle.

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Although the experimental basis can still be questioned in most cases, researchers can start from remarkable fundamental observations in order to explain the effects of UHDs. For some topics in question, it seems to be evident that the information to be transferred is stored in the specific properties of the diluted substance by means of long-range electromagnetic fields. Also, the interaction of the UHD and the organism seems to be based on long-range electromagnetic interactions. The transmission of information from (bio-)molecules to the UHD is an area of special interest.

Method

The authors revisited the 1994 contribution on 'preliminary elements of a theory on UHDs'[1] and updated it with regard to more recent literature, especially to the papers presented in this issue, discussing the authors' own follow up research, and a cornerstone publication by Bellavite *et al.*[2]

Results and discussion

Some unsolved questions

The different mechanisms

A. Of the interaction between the molecular mother substance and the solvent water or ethanol.
B. Of the storage of molecule-specific information in the solvent.
C. The physiological basis of the sensitivity of the living organism towards the UHD.
D. The mechanism of the interaction of the test dilution with the organism are all largely unknown. Several ideas, however, have been postulated.

A. *Transfer of information from the molecule to the UHD*

Homeopathic remedies are traditionally diluted in bipolar liquids such as water and alcohol or are diluted in lactose. An important role of hydrogen bonds (O—H) is what these substances have in common. Especially with regard to water, a theoretically well based approach was formulated by Del Giudice[3]: quantum electrodynamics allows an ensemble of molecules — beyond a density threshold — to move coherently and be kept in phase by an electromagnetic mode with 'coherence domains' the size of which is the wavelength of the mode (superradiance). Thus, with regard to the process of information storage in the solvent, the most common idea is that there is a coherent interaction between the electromagnetic or magnetic vector potential fields of molecules of the diluted mother substance and the dipoles of the solvent water, including the permanent polarization of the water, which thus becomes coherent. The analogy to a laser is used, but in water the coherence is in the ground state. An overview of some recent work on transduction of molecular information through water and electromagnetic waves conducted over the past decade can be found in Montagnier *et al.*[4]

The idea of perimolecular charges (charges linked to the solute molecules) was promoted by Benveniste[5] and an experimental approach to the possibility of their transmission was done.[6] An electronic circuitry was used to transmit information from thyroxine to pure water, which was then tested on a model with amphibians versus water submitted to the same electronic process. Significant differences between test and control group were reported in 1994[6] and in a repetition experiment.[7,8] If an electronic device could transfer biological activity, this would support the hypothesis of the electromagnetic nature of the molecular signal. Benveniste's ideas and findings were since experimentally developed further by Thomas.[9]

Along with the idea that energetic signals play a decisive role in the information transfer from biomolecules to the organism, the possible role of biomolecules as passive (coherent?) resonator systems has to be discussed. This way of looking at the phenomenon could include the recently well-established knowledge of coherent energetic excitations from living organisms, organs and cells (see C below) which would then actively scan the biomolecules and cause resonances (-D-). The information from the biomolecules could then be transferred to different levels, reaching from the direct effect of the molecule and the electric charges which carries to an indirect effect that specifically depends on the actual state of the organism (see below -D-).

During the succussion process, the perimolecular water would then be separated from the molecule, but, continues to carry its bio-information, probably by means of specifically organized water dipoles.

Little was known in 1994 about the processes during agitation were exogenous energy is brought into the dilution. Auerbach[10] described the preparation of UHDs within the frame of fluid dynamics, were the mechanical mixing process combines saddle flow, vortex flow, shear flow and diffusion flow. The issue later evolved in an extended research discussion on so called 'nano particles' and 'nano bubbles'[11–13] (see B below).

B. *Storage of molecule-specific information in the solvent*

Typical water structures such as clathrates, helical structures, different other types of clusters or typical water phases and network systems over the whole fluid were hypothesized and described e.g. by Anagnostatos.[14] As 20 years later was summed up by Bellavite *et al.*,[2] "*the clathrate model is very speculative, but the presence of clusters in water is well established both by computer simulations and analytical evidence. The possibility that clusters may form nanoscale cages in liquid water is universally accepted: infrared spectroscopy and X-ray diffraction have confirmed that clusters of dozens or even hundreds of water molecules exist in nature*." However, "*there is still no consensus on how such aggregates can persist in stable form for sufficiently long periods to justify their medical use as suggested by homeopaths*".[2]

In general and simple terms, it must be kept in mind that the information of a carrier substance that is stable enough to provide long-term effects of UHDs must, to our present knowledge, be based on quantum physical processes that might support coherent structures.

The picture of information storage and transport that has been given by Schulte's comprehensive contribution[15] might be a general picture for a variety of promising theories which had already been developed in 1994. E.g. Berezin[16] has discussed the isotopic diversity of chemical elements as a physical foundation of homeopathy. Homeopathic remedies based on water or water-alcohol mixtures basically consist of molecules built of hydrogen (H), carbon (C) and oxygen (O) atoms. From nuclear physics it is known that, for almost all elements (atoms) there are atoms of the same type, but slightly different mass (caused by a different number of neutrons in the atomic nucleus). Some of those atoms with different mass (isotopes) are stable, most of them are unstable and suffer radioactive decay.

Thus, besides the different chemical and physical properties of atoms in a molecule, we get two more characteristics: the diversity in mass, and the diversity in abundance. With a different mass, the vibrational interaction among the molecules changes. From the natural abundance of the isotopes an average distance may be