Long-term Changes in the Properties of Water Systems after Mechanical Influences.

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Long-term effects of vigorous shaking of aqueous solutions of medical drugs upon the properties of these solutions were discovered more then 200 years ago by the German physician Samuel Hahnemann. He noticed that very low and extra-low dilutions of drugs manifested therapeutic activity only if at each dilution step, they were vigorously succussed. This technique was named "potentization" and preparations obtained using it were called "homeopathic medicines". Until recently, and to a large extent even now, the attitude towards homeopathy and homeopathic medicines remained extremely skeptical among most physicians and specialists in the field of physical-chemical biology. Partially this skepticism is based on the a priori notion that properties of aqueous solutions must return to their initial equilibrium state shortly after the termination of the mechanical action. However, during the last decades there accumulated a lot of data proving that even moderate mechanical treatment of water and aqueous solutions may change their properties significantly. As far as we know, the first systematic research in this area was started by Russian physicists G. Domrachev and D. Selivanovsky and their colleagues in the 1990s. They found that H_2O_2, accumulates in the water after water treatment with audible sound, or in water passed through thin capillaries, after its evaporation/condensation, or freezing/thawing. They considered water as a heterogenous system containing quazi-polymeric structures besides free water molecules and suggested a mechanochemical hypothesis of water splitting into radicals and atoms. The phenomenon of water splitting accompanied with H_2O_2, accumulation was later confirmed by other scientists (S. Ikeda et al., V. Bruskov et al., S. Gudkov et al., I. Shcherbakov and others).

Previously we have demonstrated that the addition of minute quantities of H_2O_2 to weak bicarbonate solutions and even mild shaking of them initiates in them a process accompanied with the emergence of self-igniting photon emission. The process may last in activated solutions for many months without a decay. This indicates that mechanical treatment of aqueous systems may convert them into active media due to initiation in them long-lasting red/ox chain processes with reactive oxygen species (ROS) participation. Properties of these aqueous systems depend upon the composition of initial solutions and the number of dilution steps with mechanical agitation at each step. In particular, we compared some physical chemical properties of hydrated C60 fullerene (HyFn) solutions in a wide range of dilutions prepared using potentization with equivalent "dilutions" of pure water. Buffering capacity, rate of evaporation, mesoscopic heterogeneity of both HyFn dilutions and of pure water "dilutions" differed significantly from such properties of non-succussed water up to the calculated HyFn "concentrations" 10^{-31} M. At the same time, the special properties of HyFn dilutions that distinguish them from non-succussed water were expressed much more intensely than that of dilutions of agitated water. These results are consistent with observations of others that mechanical treatment of water changes its properties for a long time, in particular, due to the initiation of long-lasting chain reactions in which ROS participate. Besides, the properties of mechanically treated water systems, even after their extremely high dilution, significantly depend on the initial composition of the aqueous system subjected to potentization.