Formation of Self-organized Structures in Drying Droplets: a Promising Analytical Tool for Homeopathy Basic Research

Maria Olga Kokornaczyk *, Sandra Würtenberger 2, Lucietta Betti 3, Grazia Trebbi 3, Mario Castelan 4, Carlos Acuna 4, Stephan Baumgartner 1,5,6

1- Society for Cancer Research, Arlesheim, Switzerland
2- Hevert-Arzneimittel GmbH & Co. KG, Nussbaum, Germany
3- Department of Agricultural and Food Sciences, Alma Mater Studiorum - University of Bologna, Bologna, Italy
4- Center for Research and Advanced Studies of the National Polytechnic Institute, Saltillo, Mexico
5- Institute of Integrative Medicine, University of Witten/Herdecke, 58313, Herdecke, Germany
6- University of Bern, Institute of Complementary and Integrative Medicine, 3010, Bern, Switzerland

Abstract

Introduction: The droplet evaporation method (DEM) is based on the evaporation-induced pattern formation in droplets and is applied mainly for medical diagnosis [1]. Here, we present a series of experiments performed by our team showing DEM’s potential also for homeopathy basic research, in particular, for the investigation of (i) low potencies, (ii) low potency complexes (physical model), and (iii) the action of high potencies (plant-based model). Methods: (i) DEM differentiated significantly between Luffa, Baptisia, Echinacea, and Spongia until 4x [2]. Furthermore, the patterns varied in function of the number of succussion strokes (0, 10, or 100) applied during potentization [3]. The performance of chaotic succussions vs. laminar flow vs. slight mixing during the potentization of Viscum album quercus 3x influenced the DEM patterns; the chaotic succussions reduced, whereas laminar flow enhanced the patterns complexity vs. the unsuccussed control. (ii) The addition of Mercurius bijodatus 9x to Luffa 4x changed significantly the DEM patterns, even if the material quantity present in the 9x potency lied far beyond that of ultrapure water. (iii) Leakages obtained by placing healthy or arsenic-damaged wheat-seeds into Arsenicum album 45x or heat-damaged into Zincum metallicum 30c vs. water created significantly different DEM structures [4, 5]. Results: The damaged seeds put into the potency created structures characterized by a higher complexity than those obtained from damaged seeds put into control water. Furthermore, the potency action seemed to increase with rising numbers of succussion strokes applied during potentization, as could be shown by means of DEM patterns and germination rate using the same wheat-seed model [6]. In all our studies, the pattern evaluation was computerized (texture and fractal analysis performed by means of ImageJ) or based on deep-learning algorithms and the robustness of the experimental system was checked by means of systematic control experiments. Conclusion: DEM together with other similar methods has also been reviewed by our team for what concerns the application in homeopathy basic research [7].

Keywords: droplet evaporation, patterns, wheat seeds, low potencies, complex remedies

References