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GUEST EDITORIAL

Reproductions and Reproducibility in Homeopathy: Dogma or Tool?

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One of the most debated points in the scientific discussion about homeopathy is the hypothesis that highly diluted substances—homeopathic potencies—may exert specific remedy effects. Such an assumption is still quite provocative for many scientists and physicians, especially in the case that the dilution level exceeds ubiquity or Avogadro number. Beyond these limits, the probability of having molecules physically present that are relevant for a specific drug action is almost zero. Therefore, mother-tincture–related effects of high homeopathic potencies most probably imply some sort of ultramolecular pharmacology with laws and basic concepts that still need to be understood.

Empirical basic research into homeopathy aims to develop simple laboratory systems to detect and demonstrate the presumed specific effects of homeopathic potencies. However this task is not easy to accomplish. Again and again the effects found in one laboratory are difficult to reproduce at another location. Here a recent example is discussed and possible consequences are outlined.

The basophil degranulation model was introduced into homeopathic research by Murrieta et al.[1] and gained public attention because of the publication of Davenas et al.[2] in *Nature*. Quite a large number of investigations with this model have been published since then, reporting significant effects of highly diluted histamine on human basophil degranulation *in vitro*, with effect sizes comparable to material histamine. We aimed to independently reproduce previous studies with flow cytometry using rigorously controlled experimental conditions.[3] Basophils of the same human donor were incubated with diluted histamine (up to 10^{-34} mol/L) or water controls and activated with anti–immunoglobulin-E (anti-IgE) antibodies. Basophil activation was determined by using bi-colour flow cytometry in randomized and blinded experiments. Histamine at the dilutions 10^{-2} mol/L and 10^{-22} mol/L was associated with a significant inhibition of basophil degranulation of 23.1% and 5.7%, respectively, if compared to the control consisting of identically treated, "diluted" water. When all controls were pooled, only histamine 10^{-2} M had a significant effect. In short, the previously reported great effects of homeopathic histamine dilutions on basophil function of the examined donor could not be confirmed.

Now, what does this mean? Are all previously reported effects false-positive results caused by insufficient methodology? Surely not; but it is now time to *discuss* the differences between the studies, to *think* about the results, and to *raise hypotheses* to explain the differences between the studies.

One important aspect is that inhibiting and noninhibiting dilution levels differed in most studies.[3–8] Even within a multicenter study,[7] results between the participating laboratories varied to a great extent. This concerned not only the inhibiting dilution levels of histamine but also the dependence upon the anti-IgE concentration used.[9] Does this now mean that all these data are just rubbish and noise? Or is there a real phenomenon?

It should be remembered that reproductions of an experiment will yield reproducible results only if all factors that influence the given experimental system are known and controlled. Nonreproducibility just means that the scientists who performed the experiment did not control all crucial parameters, either because they did not know them or because they were not able to do so for technical or principal reasons (just think of chaotic systems or quantum mechanics).

With regard to homeopathy, it is quite evident that the effect of homeopathic potencies in the basophil system depends on parameters not yet identified and therefore uncontrolled or uncontrollable. What such influences can one think of?

One important factor might be the personality of the blood donor. As homeopathy is highly individualized, it might be possible that only certain individuals possess lymphocytes that react to homeopathic dilutions of histamine. In addition

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the inhibiting potency levels might differ between individual blood donors. Discrimination between responders and nonresponders might be necessary—in contrast to the seemingly reproducible effects of material histamine.[3,4,7,8]

Other more technical parameters might be the temperature during incubation[3] and the quality of the homeopathic preparations (age,[3] preparation modes, diluent,[10] etc.). In addition, transmission of the homeopathic "information" through sealed glass vials has been reported in an animal model.[11] This raises the important topic of contamination between potencies and controls that may lead to false-negative results. As long as nature and mode of action of homeopathic potencies are unknown, one has to be well prepared for astonishing effects. Just think of electrostatics, where air humidity and the clothes and soles of the experimenter may be crucial for a successful experiment.

Yet one also has to be well aware of the methodological problems of the basophil system. Basophil activation is extremely sensitive to external influences. Even mechanical vibrations can cause an activation. Furthermore, a highly significant correlation of basophil activation to the microtiter-plate position was observed,[3] although great efforts were made to avoid such effects. Seemingly minor variables of the experimental set-up can strongly influence the results if not properly controlled. Such effects illustrate the importance of randomization and blinding of a sufficient number of replicates within each experiment. Lack of randomization might yield false-positive results and therefore may be partially responsible for the varying results among different investigations. From a conventional point of view, the investigation of homeopathic potencies is nothing but the investigation of the stability and the noise limits of the experimental system. To demonstrate convincingly specific effects of homeopathic potencies, one has to compare the results obtained to an equivalent number of systematic negative controls.

In the present study,[3] the experimental procedures were adapted from earlier studies,[4,8] in which considerable effects of high histamine dilutions were reported. However a more stable experimental set-up might be obtained in future studies by using improved buffer solutions,[6,12] isolation of leukocytes,[12] or basophils, as well as by assessing basophil activation with an improved flow-cytometric system[10,12] or by measuring histamine release.[7]

Finally, if all the above-mentioned factors were excluded, the effects of homeopathic potencies in preclinical systems could be similar to those in chaotic systems or quantum mechanics; that is, the effects induced cannot be predicted, either for technical or fundamental reasons. However this is no principal obstacle for science: physics managed the inherent indeterminism of the quantum world quite successfully. Thus irreproducibility may be an inherent feature of the part of the world that one investigates. However only empiricism can demonstrate whether this is the case or not.

REFERENCES

1. Murrieta M, Leynadier F, Dry J. Dégranulation des basophiles humains et substances dites homéopathiques [in French], Bull Acad Nat Med 1985;169:619–622.
2. Davenas E, Beauvais F, Amara J, et al. Human basophil degranulation triggered by very dilute antiserum against IgE. Nature 1988;333:816–818.
3. Guggisberg AG, Baumgartner S, Tschopp CM, Heusser P. Replication study concerning the effects of homeopathic dilutions of histamine on human basophil degranulation in vitro, Complement Ther Med 2005;13:91–100.
4. Sainte-Laudy J, Belon P. Analysis of immunosuppressive activity of serial dilutions of histamine on human basophil activation by flow cytometry. Inflamm Res 1996;45(Suppl. 1): S33–S34.
5. Sainte-Laudy J, Belon P. Application of flow cytometry to the analysis of the immunosuppressive effect of histamine dilutions on human basophil activation: Effect of cimetidine. Inflamm Res 1997;46 (Suppl. 1):S27–S28.
6. Sainte-Laudy J. Stimulatory effect of high dilutions of histamine on activation of human basophils induced by anti-IgE. Inflamm Res 2001;50 (Suppl. 2):S63–S64.
7. Belon P, Cumps J, Ennis M, et al. Histamine dilutions modulate basophil activation, Inflamm Res 2004;53:181–188.
8. Brown V, Ennis M. Flow-cytometric analysis of basophil activation: inhibition by histamine at conventional and homeopathic concentrations. Inflamm Res 2001;50(Suppl.2): S47–S48.
9. Baumgartner S, Guggisberg A. Journal Club: Basophilendegranulation, dritter Akt: Homöopathie und Basophilenreaktion—weniger klar, als manche das gern hätten. Kommentar [in German]. Forsch Komplementärmed Klass Naturheilkd 2005;12:52–54.
10. Lorenz I, Schneider EM, Stolz P, et al. Influence of the diluent on the effect of highly diluted histamine on basophil activation. Homeopathy 2003;92:11–18.
11. Endler PC, Pongratz W, Smith CW, Schulte J. Non-molecular informations transfer from thyroxine to frogs with regard to homoeopathic toxicology. J Vet Hum Toxicol 1995; 37:259–260.
12. Lorenz I, Schneider EM, Stolz P. Sensitive flow cytometric method to test basophil activation influenced by homeopathic histamine dilutions. Forsch Komplementärmed Klass Naturheilkd 2003;10:316–324.

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