

# “Ultra High Dilution 1994” revisited 2015 – the state of follow-up research



P Christian Endler<sup>1,\*</sup>, Jurgen Schulte<sup>2</sup>, Beate Stock-Schroer<sup>3</sup> and Sandra Stephen<sup>1</sup>

<sup>1</sup>Interuniversity College for Health and Development Graz/Castle of Seggau, Austria

<sup>2</sup>Faculty of Science, University of Technology, Sydney, Australia

<sup>3</sup>Karl and Veronica Carstens-Foundation, Essen, Germany

**Background:** The “Ultra High Dilution 1994” project was an endeavour to take stock of the findings and theories on homeopathic extreme dilutions that were under research at the time in areas of biology, biophysics, physics and medicine. The project finally materialized into an anthology assembling contributions of leading scientists in the field. Over the following two decades, it became widely quoted within the homeopathic community and also known in other research communities. The aim of the present project was to re-visit and review the 1994 studies from the perspective of 2015.

**Method:** The original authors from 1994 or close laboratory colleagues were asked to contribute papers covering their research efforts and learnings in the period from 1994 up to 2015. These contributions were edited and cross-referenced, and a selection of further contributions was added.

**Results:** About a dozen contributions reported on follow-up experiments and studies, including further developments in theory. Only few of the models that had seemed promising in 1994 had not been followed up later. Most models presented in the original publication had meanwhile been submitted to intra-laboratory, multicentre or independent scrutiny. The results of the follow-up research seemed to have rewarded the efforts. Furthermore, contributions were provided on new models that had been inspired by the original ones or that may be candidates for further in-depth ultra high dilution (UHD) research.

**Conclusion:** The project “Ultra High Dilution 1994 revisited 2015” is the latest output of what might be considered the “buena vista social club” of homeopathy research. However, it presents new developments and results of the older, established experimental models as well as a general survey of the state of UHD research. *Homeopathy* (2015) 104, 223–226.

**Keywords:** Ultra high dilution; Homeopathy; Research

## Introduction

“Research in ultra-high dilutions, and the interaction of ultra-high dilutions and living systems, has reached a level of quality and popularity that it is about to be taken seriously by current ... sciences ...” the editors wrote in their introduction to “Ultra High Dilution. Physiology and Physics”, published by Kluwer (now Springer) in 1994.<sup>1</sup> Back then, this anthology assembled contributions of leading scientists in fundamental and clinical research

on homeopathy. Over the following two decades, it became widely quoted within the homeopathic community and also known in other research communities. The aim of this project was to re-visit and review the 1994 studies in biology, physics, biophysics and clinics from the perspective of 2015.

## Methods

As a rule, the original authors from 1994 or close laboratory colleagues were asked to contribute papers covering their research efforts and learnings in the period from 1994 up to 2015. These contributions were edited and cross-referenced, and further contributions were added on a meta-level by the editors of this special issue.<sup>2</sup>

\*Correspondence: P.C. Endler, Interuniversity College for Health and Development Graz/Castle of Seggau, Austria.

E-mail: [college@inter-uni.net](mailto:college@inter-uni.net)

Received 17 June 2015; accepted 24 July 2015

## Results

About a dozen contributions reported on follow-up experiments and studies, including further developments in theory. Only few of the models that had seemed promising in 1994 had not been followed up later. Most models presented in 1994 had meanwhile been submitted to intra-laboratory, multicentre or independent scrutiny. The results of the follow-up research seemed to have rewarded the efforts. Furthermore, contributions were provided on new models that had been inspired by the original ones or that may be candidates for further in-depth ultra high dilutions (UHDs) research.

### Part 1 (Biology)

*Menachem Oberbaum*, who was also the author on this topic in 1994,<sup>1</sup> reported on dose-dependent hormesis effects in low and very low doses. Hormesis research, meanwhile well established in conventional biosciences, provides a conceptual background for exploring the high sensitivity of living systems and as well as the possibility of dual effects, e.g. the stimulation of a process by a specific dilution (not a homeopathic potency) and its inhibition by a different dilution of the same substance.<sup>3</sup>

*Christian Endler et al.* gave an update on the state of replication of fundamental research models in UHDs. This bibliometric study provides an overview of biochemical and biological studies that used high homeopathic potencies and that have been subjected to laboratory-internal, multicentre or independent repetition trials. As of 2015, a total of 126 studies were found. Of these, 28 were initial studies referring to 28 models. The null-hypothesis was that repetition studies would not show any differences between test group and control group (“zero result”). However, about 70% of the repetition studies yielded results comparable to their respective initial study, 20% produced a zero result and 9% opposite results.<sup>4</sup> As of 1994, the figures had been: a total of 35 studies, 15 models, about 70% comparable, 25% zero, and 5% opposite replication results.<sup>4</sup>

*Waltraud Scherer-Pongratz et al.*, also authors in 1994,<sup>1</sup> reported on further results from the “classical” model with wheat and an UHD of a silver salt. Based on a protocol from Kolisko from the 1930s, Scherer-Pongratz et al. had reported an increase of wheat stalk growth due to silver nitrate 24× (i.e. potency 10e−24) in 1994. This finding was further scrutinized since, with the outcome of 2 comparable, 1 zero, and 0 opposite new results.<sup>4,5</sup>

*Endler et al.*, also authors in 1994,<sup>1</sup> reported on the model with highland amphibians and an UHD of the hormone thyroxine. Based on a protocol from König from the 1930s, their multicentre study in 1994 had reported a decrease of metamorphosis speed in highland amphibians as a result of thyroxine 30× being added to the basin water. This finding was further scrutinized since, including histological research of an independent team, with the outcome of 9 comparable, 2 zero, and 0 opposite new results.<sup>4,6</sup>

A study on animals from lowland biotopes and thyroxine 30× added to the basin water had already shown not to be

promising<sup>1</sup> in 1994 and had therefore not been pursued further.

A multicentre study using thyroxine 30× sealed in glass vials that were hung into the basin water had yielded a decrease of metamorphosis speed in highland amphibians in 1994.<sup>1</sup> This finding was further scrutinized since, with the outcome of 2 comparable, 1 zero, 0 opposite new results. (However, the study yielding the zero result involved a greater number of animals than those yielding comparable results).<sup>4,6</sup>

A multicentre study on thyroxine 30× on the climbing activity of juvenile frogs that had reported a decrease in activity,<sup>1</sup> although promising,<sup>4</sup> was not pursued further due to ethical considerations.

*Scherer-Pongratz and Endler* reported on a new model<sup>7</sup> involving the treatment of wheat with a plant hormone, with the outcome of 3 results comparable to that of the initial researcher and 2 opposite.<sup>4</sup> In spite of these differences in outcome the model may be promising because the direction of the result (i.e. increase or decrease of stalk growth) seems to depend on the experimental season (i.e. winter or growth season).

*Leoni Bonamin* reported on the immunological models presented by Madeleine Bastide (decedée) in 1994.<sup>1</sup> These models on high dilutions of hormones, antigens, cytokines, and then remedy silica have had a considerable influence on follow-up high and UHD research on other models,<sup>8</sup> including the studies with amphibians and thyroid hormone.

*Bernard Poitevin*, also an author in 1994,<sup>1</sup> reported on the overall state of immunological models.<sup>9</sup> A study on basophils and high diluted histamine had reported inhibition of degranulation in 1994. This finding was further scrutinized since, with the outcome of 11 comparable, 3 zero, 2 opposite new results.<sup>4</sup> The model seems to be promising, although the result may depend on the sensitivity of the individual blood donor.

A study on basophils and high diluted apis mellifica had reported reduction of degranulation in 1994.<sup>1</sup> Although it was not yet pursued further, in the light of today’s insights it seems to be a promising candidate for further research.

Studies on basophils and high diluted antiserum against IgE had shown very diverse results already in 1994 and therefore were not pursued any further.<sup>4,9</sup>

*Tim Jäger et al.* gave a survey on botanical,<sup>10</sup> and *Bonamin et al.* one on zoological research<sup>11</sup> in homeopathy and high dilutions. Although not nearly all the models referred to here investigated high dilutions, they may yet prove to be good candidates for UHD research in the future.

### Part 2 (Biophysics)

*Roeland van Wijk et al.*, also authors in 1994,<sup>1</sup> reported on effects of homeopathic medicines in closed vials on electrical skin conductivity in humans.<sup>12</sup> This study had reported changes in conductivity in 1994. This finding was further scrutinized since, with the outcome of 2 comparable, 0 zero, and 0 opposite new results.

*Yolène Thomas* reported on the approach to transferring molecule information by electromagnetic means presented by Jacques Benveniste (deceased) in 1994.<sup>1,13</sup> Benveniste, and, independently of him, Massimo Citro et al. 1994,<sup>1</sup> had reported effects on bio-assays analogous to the effects of molecule information transferred via the potentization process of stepwise dilution and succussion in homeopathy. This finding was further scrutinized since, with the outcome of 2 comparable, 0 zero, and 0 opposite new results.<sup>14</sup> Furthermore, a procedure was tested to record, digitalize and replay such signals.<sup>13</sup>

*Cyril Smith* et al., also authors in 1994,<sup>1</sup> reported on a method of monitoring resonance frequencies from thyroxine 30× and subsequently exposing amphibian larvae to these frequencies as mimicked by a frequency generator. This study had reported a specific effect (i.e. decrease of metamorphosis speed analogous to the effect of thyroxin 30×) in 1994. Although this study has not yet been pursued further, it seems to be a promising candidate for further research in the light of today's insights.<sup>15</sup>

### Part 3 (Physics)

*Jurgen Schulte*, also an author in 1994,<sup>1</sup> reported on experimental physical methods and theories for investigating UHDs.<sup>16</sup> His contribution in 1994 had reported on research on ice crystal structures of UHDs, nano-scale effects of succussion, clathrate structures, isotopic self-organisation, electromagnetic superradiance and coherent states as described in quantum physics, including implications of spectroscopy (UV, X-ray, Raman) and nuclear magnetic resonance experiments. New developments were outlined, with special emphasis on non-local entanglement theory.<sup>16,17</sup> Following a classification scheme by Becker-Witt et al.<sup>18</sup> Schulte classified studies according to publication quality<sup>19</sup> and concluded that the body of knowledge is promising but requires a concerted action if it is to lead to field. In an update on preliminary elements of a theory on UHDs<sup>20</sup> *Schulte and Endler* re-addressed questions surrounding different mechanisms of (i) interaction between the molecular mother substance and the solvent, (ii) storage of molecule-specific information in the solvent, (iii) physiological basis of the sensitivity of the living organism towards an UHD and (iv) interaction of the test dilution with the organism. Here, the work of Belavite et al.<sup>21,22</sup> has been instrumental in guiding the field.

### Part 4 (Clinic)

*Harald Walach*, also an author in 1994,<sup>1</sup> reported on remedy proving, i.e. attempts to create symptoms in healthy volunteers that would be similar to the symptoms to be cured by the same remedy in diseased persons.<sup>23</sup> His pilot study in 1994 had reported differences between an UHD and placebo in only about half of the study participants. More recently a triple-blind placebo-controlled model was developed to differentiate between specific and unspecific symptoms in experienced volunteers using stringent data collection methods. The findings of the pilot

studies were further scrutinized, with the outcome of 2 comparable, 0 zero, and 0 opposite results.

*Robert Mathie* reported on clinical research on homeopathy<sup>24</sup> as a follow-up to Max Haidvogel's contribution (Haidvogel being retired) in 1994.<sup>1</sup> In 1994 Haidvogel had stated that while controlled clinical studies proving the efficacy of homeopathic remedies did exist, most of them lacked methodological quality. He pointed out that studies on humans needed to take into account the characteristics of homeopathic drug prescription, i.e. the person-specific, individualized choice of the remedy. Research using randomized clinical trials was further pursued since, with more than a doubling of the proportion that investigated individualized homeopathy. This led to the publication of four comprehensive systematic reviews. Of these, 3 concluded cautiously that homeopathy may be superior to placebo, 1 found a zero result, i.e. in line with the null-hypothesis, and 0 found an opposite result.

### Further contributions

*Beate Stock-Schröer* reported on the result of a Delphi process among research experts on quality and standards of reporting on high dilution and homeopathy research.<sup>25</sup> Such reporting guidelines are common in many fields of conventional research (e.g. consort statement). They are not only of interest for publishing studies, but also for planning and executing research. Apart from promoting transparency in research communication, they are aimed at facilitating independent replication of studies.

*Marco Righetti*, also an author in 1994,<sup>1</sup> reported on "aims of homeopathy research in 1994 and 2015".<sup>26</sup> He makes it clear that usually homeopathy research is far away from real homeopathic practice. Even if the inner validity of such research may be high, its external or model validity, i.e. its representation of real practice, is low. He inquires into how 200 years of clinical experience with homeopathy, involving millions of patients, can be taken into account in the assessment of homeopathy, and suggests outcome studies in the real-life surroundings of medical care as probably the most appropriate way to investigate the evidence.

### Conclusion

The project "Ultra High Dilution 1994 revisited 2015" is the latest output of what might be considered the "buena vista social club" of homeopathy research. However, it presents new developments and results of the older, established experimental models as well as a general survey of the state of UHD research.

### Statement of conflict of interest

There is no conflict of interest.

### References

- 1 Endler PC, Schulte J (eds). *Ultra High Dilution – Physiology and Physics*. Dordrecht: Kluwer Academic Publishers, 1994.

- 2 Endler PC, Schulte J, Stock-Schroerer B, Stephen S. "Ultra High Dilution 1994" revisited 2015 – the state of follow-up research. *Homeopathy* 2015; **104**: 223–226.
- 3 Oberbaum M, Gropp C. Update on hormesis and its relation to homeopathy. *Homeopathy* 2015; **104**: 227–233.
- 4 Endler PC, Bellavite P, Bonamin L, Jäger T, Mazon S. Replications of fundamental research models in ultra high dilutions 1994 and 2015 – update on a bibliometric study. *Homeopathy* 2015; **104**: 234–245.
- 5 Scherer-Pongratz W, Endler PC, Lothaller H, Stephen S. Wheat and ultra high diluted silver nitrate – further experiments and re-analysis of data. *Homeopathy* 2015; **104**: 246–249.
- 6 Endler PC, Scherer-Pongratz W, Harrer B, Lingg G, Lothaller H. Amphibians and ultra high diluted thyroxine – further experiments and re-analysis of data. *Homeopathy* 2015; **104**: 250–256.
- 7 Endler PC, Scherer-Pongratz W, Lothaller H, Stephen S. Wheat and ultra high diluted gibberellic acid – further experiments and re-analysis of data. *Homeopathy* 2015; **104**: 257–262.
- 8 Bonamin LV, Bellavite P. Immunological models in high dilution research following M Bastide. *Homeopathy* 2015; **104**: 263–268.
- 9 Poitevin B. Survey of immuno-allergological ultra high dilution research. *Homeopathy* 2015; **104**: 269–276.
- 10 Jäger T, Scherr C, Shah D, et al. The use of plant-based bioassays in homeopathic basic research. *Homeopathy* 2015; **104**: 277–282.
- 11 Bonamin LV, Cardoso TN, Cunha de Carvalho A, Amaral JG. The use of animal models in homeopathic research – a review of 2010 – 2014 PubMed indexed papers. *Homeopathy* 2015; **104**: 283–291.
- 12 van Wijk R, Wiegant FAC. Physiological effects of homeopathic medicines in closed phials – a critical evaluation. *Homeopathy* 2015; **104**: 292–294.
- 13 Thomas Y. From high dilutions to digital biology: the physical nature of the biological signal. *Homeopathy* 2015; **104**: 295–300.
- 14 Schulte J, Endler PC (eds). *Fundamental Research in Ultra High Dilution and Homeopathy*. Dordrecht: Kluwer Academic Publishers, 1998, pp 168–175.
- 15 Smith CW. Studies on electromagnetic and magnetic vector potential bio-information and water. *Homeopathy* 2015; **104**: 301–304.
- 16 Schulte J. Experimental physical methods and theories – then and now. *Homeopathy* 2015; **104**: 305–310.
- 17 Schulte J. Publications on experimental physical methods to investigate ultra high dilutions – an assessment on quality. *Homeopathy* 2015; **104**: 311–315.
- 18 Becker-Witt C, Weissshuhn T, Luedtke R, Willich S. Quality assessment of physical research in homeopathy. *J Altern Complement Med* 2003; **9**(1): 113–132.
- 19 Schulte J. Observations on entanglement, non-locality and ultra-high dilutions. *Homeopathy* 2015; **104**: 316–321.
- 20 Schulte J, Endler PC. Update on preliminary elements of a theory of ultra high dilutions. *Homeopathy* 2015; **104**: 337–342.
- 21 Bellavite P, Marzotto M, Oliosio D, Moratti E, Conforti A. High-dilution effects revisited 1. Physicochemical aspects, 2. Pharmacodynamic aspects. *Homeopathy* 2014; **103**: 4–21.
- 22 Bellavite P, Marzotto M, Oliosio D, Moratti E, Conforti A. High-dilution effects revisited. 2. Pharmacodynamic mechanisms. *Homeopathy* 2014; **103**: 22–43.
- 23 Walach H, Teut M. Scientific proving of ultra high dilutions on humans. *Homeopathy* 2015; **104**: 322–327.
- 24 Mathie RT. Controlled clinical studies of homeopathy. *Homeopathy* 2015; **104**: 328–332.
- 25 Stock-Schröer B. Reporting Experiments in Homeopathic Basic Research (REHBaR). *Homeopathy* 2015; **104**: 333–336.
- 26 Righetti M. Aims of homeopathy research, 1994 and 2015. *Homeopathy* 2015; **104**: 343–344.