Homeopathy Seen as Personalised Nanomedicine

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Abstract

Among all the discoveries of Hahnemann, potentisation was the most important, though controversial. The curative effect of individualised homeopathic potencies is empirical but inexplicable by the conventional principles of science. This paradox is a highly contentious topic of debate between rationalists and homeopaths. Recent discoveries relating to the nano-particulate nature of homeopathic ultra-high potencies and their potential effect on individual gene expression give new insights into this complex issue. It is concluded that homeopathy may be viewed as 'personalised nanomedicine'.

Keywords

- homeopathy
- nanoparticles
- potentisation
- genetics
- personalised nanomedicine

Introduction

In homeopathy, trituration and succussions are involved in the process of potentisation. Samuel Hahnemann's discovery of potentisation gives homeopathy a unique identity. This was not an accidental discovery such as that of gravitational force by Isaac Newton. We know now that potentisation is a landmark in the history of therapeutic medicine. A close study of Hahnemann reveals that this discovery was the outcome of a gradual step-by-step process that began in 1797. He narrated his experience of treating a patient suffering from abdominal colic with the drug *Veratrum album* in grain doses. Hahnemann prescribed the drug powder containing 4 grains daily for 4 days, but the patient took all the medicine in 2 days.[1] Very shortly, the patient experienced a life-threatening aggravation of his condition.

This experience paved the way for minimising the quantity of medicine prescribed to patients during the 1801 epidemic of scarlet fever in Germany. Hahnemann prescribed one drop of diluted *Belladonna* as a dose containing, in every drop, a five millionth quantity of a grain. By prescribing the same dose, he achieved excellent results in the cure and prevention of scarlet fever. Hahnemann continued his experiments with other medicines as well, such as: *Ignatia* (1/1,200,000); *Veratrum album* (1/4,800,000); *Nux Vomica* (1/1,200,000 to 1/2,400,000); *Pulsatilla* (1/80,000); *Capsicum* (1/1,200,000); *Chamomilla* (1/85,000,000 to 1/3,840,000,000); *Cocculus* (1/3,600,000); *Belladonna* (1/120,000); *Drosera* (1/200,000); *Hyoscyamus* (1/100,000,000).[2]

The success in effective therapy using high dilutions encouraged Hahnemann to discover, a decade later, the process of potentisation of drugs based on the centesimal scale. Having discovered the theory of potentisation, Hahnemann started using 30C potency for conducting drug proving experiments and for treating patients. Potentisation is a process in which medicinal substances are triturated or succussed in the medium of sugar or milk or 90% ethyl alcohol in a specific ratio: that is, 1:99 in centesimal scale and 1:9 in decimal scale. A proving experiment was performed preferably with 30C potency.[3] In his last years of life, Hahnemann discovered a wholly new scale: the LM scale, based on 1:50,000 dilution, which ranges from LM1 to LM30.[4]

As he could not scientifically substantiate the process of drug preparation and the therapeutic action of homeopathic potencies, Hahnemann proposed a reasoning that he called a 'conjecture' (being doubtful). Hahnemann proposed a hypothesis that, in the process of potentisation, there could be development of hidden 'dynamic powers' of the drug substance. Further, he viewed that these dynamic powers of the potency might act on the 'vital force' of the patient in its curative action. Even today most homeopaths find it difficult to remove themselves from this hypothetical statement of Hahnemann.

The hypothesis of Avogadro, proposed in 1811, defines the number of atoms in one mole of any substance as equal to 6.022×10^{23}. The term 'Avogadro's number' was first used by French physicist Jean Baptiste Perrin in 1909. The accurate determinations of Avogadro's number happened only after the American physicist Robert Millikan measured the charge of an

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electron. In the initial periods of potentisation, Hahnemann limited the use of potencies to 30C or less, arguing that there was no possibility of any medicinal content in potencies beyond it, but later he approved the experimental evidence of his followers and agreed to use potencies higher than 30C.

It has now become clear that the method of drug preparation in homeopathy (potentisation) is very close to the modern method of grinding and milling used in nanotechnology to produce nanoparticles (NPs). Corroborating the findings of others,[5–14] the author has shown the nano-particulate nature of homeopathic ultra-high dilutions in all the commonly used potencies.[15–20] His study was conducted with various homeopathic drugs, derived from plants, metals, minerals and nosodes. The presence of original drug substance in the form of NPs in high potencies of metallic and mineral drugs may help to answer the primary question of how homeopathic drug solutions can produce therapeutic action. Therefore, the nanopharmacological[17] therapeutic capability of homeopathic ultra-high dilutions is very relevant and valid.

These findings call for the next phase of deeper enquiry into the therapeutic activity of NPs in the subtle and complex biological system of human beings and other organisms. Scientific evidence is accumulating that homeopathic drugs have the ability to initiate a variety of modifications in the genetic system.[21–45] For example, Samadder et al have repeatedly reported the regulation of gene expression by potentised homeopathic drugs: for example, they observed that *Lycopodium clavatum* 5C-15C has anti-cancer effect on HeLa cells in vitro.[23] Another study by Mondal et al implicated DNA interaction in apoptosis induced by *Conium maculatum* through generation of reactive oxygen species.[24] Saha et al have also reported that homeopathic high potencies of *Hydrastis canadensis* and *Marsdenia cundurango* can alter gene expression profiles in HeLa cells in vitro.[27] Das et al have shown that *Arsenicum album* 30C modulates protein biomarkers and gene expressions in the yeast *Saccharomyces cerevisiae* after its exposure to arsenite.[33] Olsen observed that ultra-high dilutions of *Sodium butyrate* could induce gene expression in HEK 293 cells.[45]

Kay and Khuda-Bukhsh proposed the concept of 'homeogenomics'.[46] Subsequently, Kay and Rashid discussed the significance of sequence-specific homeopathic DNA therapy and micro-immunotherapy based on a personalised genetic approach.[47] Baldwin et al found that sequence recognition occurs between intact DNA duplexes without any single-stranded elements.[48] The possible interaction of NPs of homeopathic ultra-high dilutions selected on the basis of 'similia similibus curentur' (let like be cured by like) with the DNA double helix is intriguing and demands further investigation.

Issues Under Debate

Two serious questions repeatedly raised by critics of homeopathy are to be addressed:

1) Does drug content exist in higher potencies?
2) What is the basis of the therapeutic action of higher potencies?

From Hahnemann's originally proposed 'dynamic powers' of homeopathic potencies, several more recent theories have been developed. These include water memory,[49–51] formation of clathrates,[52] epitaxy[53] and quantum physical aspects,[54,55] each of which relies on the dynamic nature of potencies. The silica hypothesis[56] is different in that it proposes the possibility that silicon NPs, leeching from the glassware, act as the therapeutic agents of a homeopathic solution. But the varieties of therapeutic action of homeopathic drugs cannot be confined to only the one type of NP. The discovery of NPs of the original drug materials by Chikramane et al in six metallic homeopathic drugs of 6C, 30C and 200C opened a new era of inquiry into the contents of ultra-high dilutions.[5] However, in validating the homeopathic potencies on the basis of their discoveries, Chikramane et al attempted to explain their findings solely within the limits of Avogadro's number,[57] which has narrowed the scope of enquiries beyond that limit.

The basic concept of homeopathy stands on the strength of homeopathic drug proving experiments. These experiments, on healthy human beings, produce signs and symptoms that disappear with the withdrawal of the drug.[3] The findings of Khuda-Bukhsh et al[21–45] seem as relevant in the drug proving setting as they do in explaining the therapeutic action of homeopathic potencies. As the homeopathic drugs seem capable of initiating epigenetic changes in the patients that are curative, the same may initiate transient epigenetic modifications during a drug proving experiment. The discovery of immediate early genes (IEGs) may help in conceptualising the science behind such effects. The total number of IEGs is thought to be close to 100, only few of which have been extensively characterised. The expression of IEGs (e.g. *c-fos, c-jun, arc*) occurs rapidly and transiently on exposure to induced stress and a wide variety of cellular stimuli. The expression of IEGs is low or undetectable in quiescent cells, but is rapidly induced at the transcriptional level within minutes of extracellular stimulation; this transcriptional induction is independent of new protein synthesis.[58,59] These discoveries offer a new testable hypothesis on homeopathic drug proving.

It is observed that homeopathic drugs of metallic and mineral origin, from 6C to CM in centesimal scale and LM1 to LM30 in 50 millesimal scale, are NPs of smaller size, and that the majority of particles measure less than 10 nm.[16–18,20] A critical scale below 10 nm shows that the properties of particles are different and highly potent and modified in comparison to the mass material.[60] NPs of smaller dimensions have the unique ability to penetrate through the cell walls and into the cell nucleus.[61] The peculiar properties of NPs seem mainly due to their high surface to volume ratio.[62]

Toxic substances in high doses can kill, while low doses may stimulate biological systems.[63] The discovery of NPs in homeopathic ultra-high dilutions paves the way for further enquiries into homeopathic drug action. The subtlety and sensitivity of the genetic system make it amenable to the typical 'butterfly effect' of Edward Lorenz, with a cascading effect on the chain of physiological and psychological events. The butterfly effect is the sensitive dependence on initial conditions in which a small change in one state can

have non-linear impacts on a complex system. It explains the possibility of massive changes at the end by a simple stimulus in the initial condition. This model is highly applicable for many human pathological states, where everything starts from a simple alteration of the coding in genes. A single genetic mutation can cause serious disease conditions: for example, a genetic mutation and its cascading effect in the organism can produce the formation of malignant tumors.[64] In a homeopathic drug proving, a few pills of 30C potency seem capable of initiating a chain of events leading to detectable signs and symptoms in healthy human beings. In homeopathy, many times a single dose of a high potency may initiate a therapeutic action even where pathological changes are established. The scientific basis of homeopathy seems to lie within the subtler levels of human biology.

We know that virtually any step of gene expression can be modulated, from transcriptional initiation, to RNA processing and to the post-translational modification of a protein into the gene regulatory network—a subtle and complex system. It regulates the expression of genes by a multitude of mechanisms such as phosphorylation (temporary modification), methylation (permanent changes), histone acetylation, gene silencing, up-regulation or down-regulation. Homeopathic prescriptions are based on specific characteristic signs and symptoms of mind and body: arguably, therefore, they are the true expressions of the genetic system. The collective clinical experiences of homeopaths across the world show that cures in chronic diseases can be long lasting. Under the conventional bio-molecular system, a quantity of medicines is prescribed on the basis of patient body weight, whereas homeopathic prescriptions contain nanoscale material that may be sufficient in quantity to initiate a therapeutic action.

Nanomedicine as a part of conventional medicine has a short history of two to three decades and is conceived as the medical application of nanotechnology. Current research in nanomedicine is focused on biological devices, nano-electronic biosensors, biological machines, etc. Considerable time and resources are being applied to study the toxicity and environmental impact of nanoscale materials. The concept and utilisation of nanomedicine in the conventional therapeutic mode are focused on delivering drugs to specific cellular tissue using NPs that reduce the wider cytotoxic effect of a chemotherapeutic agent, especially in cancer.[65] The current research approach of nanomedicine is based on the belief that conventional biomolecular medicine is the only true therapeutic approach. It is a paradox that while conventional medicine tries to discover the utility of NPs to transport and deliver drug molecules to kill targeted cells, homeopathically prepared and utilised NPs of potentised substances are used as curative agents. The current discoveries in science and some clinical results of homeopathic medication in acute and chronic diseases unveil the hitherto unknown nano-pharmacological aspect of homeopathic drug potencies and their therapeutic efficacy. It would seem wise to inculcate the nano-pharmacology of homeopathy into conventional nanomedicine research to maximise novel and beneficial outcomes in patient care.

The selection of patient-specific medicines and the modus operandi evolved in the last two centuries make homeopathy a nanomedicine suited individually for each patient.

Homeopaths always relied on the individual nature and peculiarities of patients to choose the right medicine (simillimum) and potency. We know the signs and the symptoms that homeopaths identify in a patient: the characteristics of their personality, reactions to heat/cold, specific cravings and aversions to food and drinks, specific mental likes and dislikes, causative factors, etc. These are the expressions of the genetic system of each individual. Though we know that the genetic codes of all human beings are closely similar, there are quite a few genes that differ per individual, giving them personal identity and individual existence, unique in nature. It seems to me that the totality of the characteristic signs and symptoms of individuals identified by a homeopathic practitioner in the selection of simillimum reflects a part of the 'genetic blueprint' mapped out for that person.

Conclusion

From the very beginning, homeopathy has been looked upon with scepticism and sometimes with contempt. Recent scientific discoveries bring into the light hitherto unknown realities of human existence in the fields of health, disease and cure. With the changing milieu of science, from the study of gross matter to the atomic and subatomic levels, medicine and associated therapeutics are likely to undergo changes. Conventional therapeutics have recently coined the idea of 'personalised medicine', a concept that has always been the essence of homeopathic medicine.

Accrued over more than 200 years, the methods, experience and research evidence in homeopathy reveal that: (1) homeopathic drug proving is unique and produces temporary signs and symptoms in volunteers; (2) in homeopathic practice, irrespective of the disease diagnosed, patients are administered medicines based on their individual characteristic signs and symptoms, and hence medication is highly personalised; (3) homeopathic potencies could impact on epigenetic programming in patients, leading to cure of a disease; (4) nanoparticles are formed during the process of homeopathic drug potentisation. The above points to the potential of homeopathy as a 'personalised nanomedicine' and its important position in the next generation of therapeutic medicine.

Conflict of Interest
None declared.

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