Adaptive Response: Perspectives for Understanding the Mechanism of Action homeopathy

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SUMMARY

The adaptive response is an example of a universal cell response to the action of damaging factors of various nature. The article provides the substantiation of the author's assumptions that homeopathic therapy is nothing more than the initiation of a reaction of forced adaptation to the action of a homeopathic medicine, which ultimately leads to the formation of an adaptive cell response, and for the purposeful formation of the latter, a number of conditions must be met, which is the subject homeopathic therapy.

The author of the article made the following conclusions:

1. The therapeutic effect of homeopathy is based on cross-adaptive answer, the formation of adaptive epigenetic rearrangements.

2. To initiate an optimal adaptive response in classical homeopathic treatment requires strict adherence to the "principle of similarity".

Keywords:homeopathic treatment, mechanisms of action homeopathy, homeopathy, adaptive response.

RESUME

Adaptive response is one of the samples of universal reaction of cell to affecting factors of various nature. The an justification of author's hypothesis that homeopathic therapy is initiation of forced adaptation reaction to the action of homeopathic remedy that in result causes the formation of cell adaptive response which require fulfillment of certain conditions that are subject of homeopathic therapy is presented.

Conclusions:

1) The basis of curative effect of homeopathy is in crossed adaptive response, formation of adaptive epigenetic transformations.

2) To initiate the optimal adaptive response in the classical homeopathic treatment strict compliance with the “principle of similarity” must be observed.

Keywords: homeopathic treatment, mechanisms of homeopathy, homeopathy, adaptive response.

There are a number of phenomena that are inextricably linked to the practical application of homeopathy. First of all, this is the "principle of similarity", erected in

the rank of the law, the need for potentiation and dynamization of a substance for its acquisition of medicinal properties and the determination of indications for the use of homeopathic medicines on the basis of tests (provings). Each of them is a mystery and requires understanding from the standpoint of modern science. Analysis of literature data on various aspects of the interaction of a healthy and diseased organism with the environment (and drugs, being xenobiotics, also refer to environmental factors), shows that the explanation of the mechanism of action of homeopathy should be sought not in the “memory” of water and the intricacies of quantum-wave interactions (although, no doubt, these phenomena are also important and participate in the mechanisms of action of homeopathy), and in the achievements of modern physiology and molecular genetics. Therefore, the purpose of this article is to explain the mechanism of action of homeopathy in terms of adaptation theory and molecular medicine. Practical experience and the results of meta-analyzes of controlled clinical trials show that, provided the correct choice of the drug (MP), homeopathic therapy is effective in the treatment of both acute and chronic diseases in humans and animals. And this is regardless of the etiology, localization and form (mental disorder, infection, allergy, tumors, etc.) of the disease [18]. It follows from this that the point of application of a potentized drug is a universal mechanism, which, firstly, plays a key role in all processes (at least most) associated with the vital activity of a healthy and diseased organism (i.e., it is nonspecific for pathology, tissues, cells) and, secondly,

Despite the fact that the basic principles of homeopathic therapy were formulated back in the 19th century, many of S. Hahnemann's recommendations are quite modern and require their interpretation from the standpoint of modern knowledge and ideas about health and disease states. These, first of all, include the recommendations from §3 of the Organon, where S. Hahnemann points out that "... a good and observant doctor will understand what to treat in a disease" [5]. Obviously, before deciding “what to treat in a disease”, it is necessary to determine how the state of the disease and health should be understood.

It is now known that non-infectious pathology is based on a disruption in the functioning of biochemical systems associated with mutations in certain genes, which lead to a change in gene expression levels. Of these, a significant proportion (94–96%) refers to the so-called multifactorial diseases (MDDs). These include such widespread diseases as arterial (essential) hypertension, bronchial asthma, ischemic heart disease, many forms of cancer, psoriasis, rheumatism, type I diabetes mellitus, schizophrenia and manic-depressive psychosis, gastric ulcer and duodenal ulcer and others. Their development is due to the joint action of genetic (hereditary) and non-genetic (non-hereditary) reasons, on the basis of which a hereditary predisposition is formed. Hereditary predisposition

includes individual and family components based on the unique uniqueness of the individual (his genetic constitution), on the one hand, and the presence of genes in common with close and distant relatives, on the other. When certain values of susceptibility are exceeded - the so-called exposure threshold - the mechanism for the development of a multifactorial disease is triggered [12].

From the point of view of modern physiological science, health and disease are an integral part of the adaptation processes and are aimed at developing an optimal strategy for the system that ensures its homeostasis. The most characteristic indicator of the norm (health) is the body's ability to adequately change its functional parameters and maintain optimality in various conditions. The inability of sanogenetic and compensatory mechanisms to maintain (restore) homeostasis triggers adaptation mechanisms. The triggering mechanism of adaptation is the energy mechanism - the lack of energy determines the further chain of informational, metabolic and structural changes. The adaptation process is of a staged nature,

Thus, the task of any therapeutic approach is (in terms of the theory of adaptation) the elimination of disorders in the course of adaptation-adaptive processes, the restoration of the body's ability to adequately change its functional parameters and maintain optimality in different conditions. And for this (in terms of molecular medicine), it is necessary to restore the normal regulation of biochemical reactions and expression of genes, mutations in which are the cause of pathology. It is obvious that only in this case it is possible to achieve a stable restoration of health.

Analysis of the results of homeopathic therapy of MDs, as well as a number of phenomena associated with homeopathic therapy, the use of small doses of potentiated drugs in experimental models in vitro, as well as literature data, devoted to the phenomenology of adaptation processes in response to the impact of various environmental factors, incl. xenobiotics, suggests that homeopathic therapy is nothing more than the initiation of a reaction forced adaptation to the action of homeopathic medicine, which, as a result, leads to the formation of an adaptive response of the cell, and for the purposeful formation of the latter, a number of conditions must be met, which is the subject of homeopathic therapy. Let's dwell on these aspects in more detail.

First of all, it should be noted that the adaptive response (AO) is an example of a universal cell response to the action of damaging factors of various nature. AO is to increase the resistance of cells and organism to high doses of toxic and genotoxic agents, which is formed after preliminary exposure to these agents in low doses. It has been experimentally proven that, firstly, AOs cause irradiation of various physical nature and xenobiotics, and secondly, there is no single mechanism,

conditioning AO for all types of damaging agents. At the same time, it is obvious that the phenomenon is of a general biological nature [8, 10]. Described also cross AO when adaptive response to one adaptive factor forms resistance to the other. Thus, the preprocessing of cells with low doses of radiation or $CdCI_2$, make the cell DNA chain resistant to subsequent exposure to damaging doses, for example, $CdCI_2$... It was also shown that low concentrations of compounds of nickel, chromium and other heavy metals have the ability to form resistance to damaging doses of radiation [7].

In certain conditions can observe electoral sensitivity to homeopathic medicines. So, welcome a healthy person of toxic doses of substances of mineral, plant or animal origin, as a rule, causes a number of symptoms of a toxic nature. For example, taking a tincture of the Arnica Montana plant produces a bruised and bruised sensation. At the same time, it is known that the body is very sensitive to the homeopathic remedy Arnica when patients have similar sensations, both in connection with the trauma and without it. From such examples, on which the clinical application of homeopathy is based, it can be concluded that as a result of exposure to endogenous or exogenous (environmental) factors, the cell begins to react to some substances unexpectedly strong and demonstrates effects that differ from pharmacological. These effects are nothing more than idiosyncrasy (in our example - idiosyncrasy to Arnica). It is to her that we owe the existence of a high sensitivity to homeopathic medicines, which manifests itself on condition that the "principle of similarity" is observed. Therefore, it is obvious that a discussion of the mechanisms of action of homeopathy cannot be correct without a discussion of the phenomenon of idiosyncrasy and, more importantly, the "principle of similarity".

Thus, susceptibility, in other words, selective sensitivity to drugs is, firstly, a condition for the implementation of the effects homeopathic drugs, and secondly, fundamentally distinguishes the effects of homeopathic drugs from the effects of "small" and "ultra-low doses" observed in the experiment, since in the latter case, the models on which the effect of SMD is studied are not burdened with idiosyncrasy towards the substance under study.

Another D.T. Kent wrote that “if a person did not have receptivity, if there was no such condition as idiosyncrasy, then there would be no homeopathy. If there was no susceptibility, there would be no disease, and homeopathy would not be needed. " Thus, even 100 years ago, before the outstanding discoveries of genetics D.T. Kent saw the existence of a clear connection between states of susceptibility, idiosyncrasy, and illness. The concept of "idiosyncrasy", in accordance with modern concepts, is a genetically determined, "paradoxical" reaction, which differs from the pharmacological effects of a drug, is unpredictable in nature with a sharply increased sensitivity of the patient to the corresponding drug with an unusually strong and long-lasting effect. As the nature of the violation of biochemical processes becomes more precise,

the type of defective enzyme, the use of the term "idiosyncrasy" began to narrow, and reactions are no longer designated as idiosyncrasy, but as a deficiency of the corresponding enzyme. Thus, there has been a tendency to replace the concept of "idiosyncrasy" with the concept of "genetic enzymopathy" [1, 11]. A large number of genetic enzymopathies have been described, which, on the one hand, are the cause of diseases and determine the characteristics of its course, and on the other, they form the individual characteristics of the body's reactions to drug administration, including increased sensitivity to xenobiotics [1, 14].

Both genetic mutations and epigenetic rearrangements can be not only the cause of illness and idiosyncrasy, but also underlie stable and inherited adaptive reactions. From an evolutionary perspective, mutations provide enough genetic diversity to allow species to adapt to environmental conditions through natural selection, a process under the control of the cell. It is known that mutations resulting from targeted formation are called “adaptive mutations”. This phenomenon of the formation of adaptive mutations has been experimentally proven in a series of experiments with mutant E. coli cells incapable of using lactose as a carbon source (Lac- phenotype) [16]. The authors found that the rate of formation of revertants in the case if mutant bacteria were incubated on plates in the presence of lactose, significantly exceeded that expected from the accidental occurrence of reverse mutations in stationary bacterial culture. On this basis, the authors concluded that selective environmental conditions affect the range of mutations that occur in bacterial cells. The work claims that bacterial cells can control their mutation process by directing it towards formation of the necessary mutant enzymes, which allows cells to adequately respond to environmental signals. The conclusions of J. Cairns and his co-authors were experimentally confirmed in the works of other authors using bacterial and yeast cells as an object [17]. In this regard, the data of experimental studies, in which the neurobiological effect of morphine and its potentiated dosage form in doses of 10^{-60} and 10^{-400} masses. shares and it was shown that the substance and its potentiated form have the same "points of application" or "targets" in the body, affect the same functional processes. As a result of these studies, it was also concluded that ultralow doses themselves have biological activity [9]. In this regard, it is logical to assume that, firstly, potentiated drugs, like the raw materials from which they are made, belong to xenobiotics, and secondly, their effects are also realized through the mechanisms of AO. As you know, dilutions of homeopathic medicines go far

outside the range indicated as 10^{-18} M (ie, the limits of the range of "ultra-low doses", SMD). At concentrations below this threshold, the experimental volume (on the order of a milliliter) may not contain a single substance molecule, i.e. concentration is several orders of magnitude lower than the minimum observed dissociation constants of ligand-receptor complexes (10-10-10^{-11} M). In theory, there should be no effect in this case. However, it exists and is paradoxical. It is paradoxical that it exists at all, there is a polymodal dependence, "dead zones", etc. [3, 13].

It is possible that the key role in the reception of the information signal

potentiated drugs belongs to reactive oxygen species (ROS). We substantiate this assumption, firstly, by the results of studies in which it was shown that processes with the participation of ROS have the ability to self-organize in redox model reactions, which is expressed in the appearance of oscillations of the redox potential or color in the Belousov-Zhabotinsky reaction and the Meillard reaction (the latter continuously occur in cells and non-cellular space). These oscillations do not decay for a long time and can have a complex shape, i.e. represent pronounced nonlinear fluctuations. Oscillatory modes of photon emission were characteristic not only for individual cells, but also for suspensions of neutrophils, were complex, multilevel, and the periods of oscillations ranged from tens of minutes to their fractions [4]. Secondly, of the many bioregulatory substances, ROS are the most suitable candidates for the role of triggers of oscillatory processes, because they are in constant motion, more precisely, they are continuously generated and die, but when they die, electronically excited states are born - pulses of electromagnetic energy. Reactions with the participation of ROS are essentially unpaired electron transfer reactions occurring in an active medium. Processes of this kind, as follows from modern concepts of the physics of nonlinear self-oscillating systems, are very sensitive to very weak in intensity, but resonant influences [6]. This creates conditions for strengthening the initial because they are in constant motion, more precisely - they are continuously generated and perish, but when they die, electronically excited states are born - pulses of electromagnetic energy. Reactions with the participation of ROS are essentially unpaired electron transfer reactions occurring in an active medium. Processes of this kind, as follows from modern concepts of the physics of nonlinear self-oscillating systems, are very sensitive to very weak in intensity, but resonant influences [6]. This creates conditions for strengthening the initial because they are in constant motion, more precisely - they are continuously generated and perish, but when they die, electronically excited states are born - pulses of electromagnetic energy. Reactions with the participation of ROS are essentially unpaired electron transfer reactions occurring in an active medium. Processes of this kind, as follows from modern concepts of the physics of nonlinear self-oscillating systems, are very sensitive to very weak in intensity, but resonant influences [6]. This creates conditions for strengthening the initial as follows from modern concepts of physics of nonlinear self-oscillating systems, they are very sensitive to very weak in intensity, but resonant influences [6]. This creates conditions for strengthening the initial as follows from modern concepts of physics of nonlinear self-oscillating systems, they are very sensitive to very weak in intensity, but resonant influences [6]. This creates conditions for strengthening the initial weak signal when it initiates branched chain reactions due to absorption of energy by adequate molecular components of the cell, which in the response to this is to increase or decrease their chemical activity.

As a result, certain regulatory processes are excited in the cell, which are ultimately realized in a specific physiological response of the cell to a change in the stationary level of ROS in the external or internal environment of the cell [4].

As emphasized above, adherence to the "principle of similarity" when choosing a homeopathic remedy is a prerequisite for the development of a therapeutic effect in homeopathic therapy. It is this non-compliance that distinguishes homeopathy from experimental studies of the effects of ultra-low doses. The need to comply with the "principle of similarity" is associated, in my opinion, with the well-known fact that one and the same trait (phenotype) can be due to mutations in different genes, gene copying [12] or epigenetic rearrangements. Therefore, a scrupulous analysis of the clinical picture with the selection individual phenotypic traits allows you to achieve the formation of adaptive mutations in a given gene. That is why, in practice, the effective use of homeopathy turns out to be a difficult task, since in the treatment of, for example, such an MD as essential hypertension, different patients may require different individually selected drugs.

A large number of epigenetic rearrangements, which may have a similar phenotypic manifestation, necessitates strict adherence to the "principle of similarity" when choosing drugs from the large arsenal of the modern homeopathic pharmacopoeia: only in this case, a purposeful

selection of a homeopathic drug with a selective effect on the mechanisms that underlie the disorders (pathology) of a particular patient. The benchmark for determining the selectivity of the impact, in our case, on the adaptive rearrangement of the genome, are the results of tests on healthy volunteers - "provings".

So, from the analysis carried out, the most important conclusion follows that the purposeful initiation of adaptive epigenetic rearrangements by acting on cells weighed down by the disease with low doses of potentiated xenobiotics can change the responses of a living cell to environmental stimuli.

On the basis of this conclusion, we formulated a hypothesis about the mechanism of homeopathy: when using potentiated drugs in accordance with the "principle of similarity", the formation of cross AO, the formation of adaptive epigenetic rearrangements in a gene burdened by an acquired or congenital mutation, eliminates the enzymopathy underlying susceptibility and pathology, reduces sensitivity to the pathogen, leads to the correction of disturbed biochemical processes and, as a result, to recovery.

The proposed hypothetical mechanism of homeopathy meets the requirements of universality, which were formulated above and is based on one of the fundamental properties of living matter - the ability to adapt and is not unique to homeopathy, since it is obvious that any therapeutic approach that can restore the ability to adapt will be effective. It is due to its objectivity, despite more than 200 years of criticism and persecution, that the method is developing and attracting an increasing number of supporters among doctors and patients.

Conclusions:

1. The therapeutic effect of homeopathy is based on cross-adaptive answer, the formation of adaptive epigenetic rearrangements.

2. To initiate an optimal adaptive response in classical homeopathic treatment requires strict adherence to the "principle of similarity".

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