



Pesquisa básica e homeopatia – part 2 Basic research and homeopathy

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Pesquisa básica e homeopatiabasic research and homeopathy

Part 2: The problem of doses/potencies and related questions

C.F.S. Hahnemann Organon, par. 277



"A medicine whose selection has been accurately homoeopathic must be all the more salutary the more its dose is **reduced** to the degree of minuteness appropriate for a gentle remedial effect...

DOSES AND DILUTIONS

12 CH od 24D = approx. 10⁻²⁴ M* = approx 1 molecule/liter (Avogadro's law)

*assuming a MW of 100 for the test substance and 10% W/V of mother tincture

- 10⁻¹⁸ M
- $= 10^{6}$ molecules/l
- = 10³ molecules/ml
- = 10 molecules/µl
- = 1 molecule every 500 cells**
- = 1 molecule every 5.000.000 receptors/enzymes***

assuming 5000 cells/µl (the number of leukocytes in blood)*assuming a mean 10.000 receptors or enzymes/cell

EXAMPLES OF ULTRA LOW-DOSE EXPERIMENTS

System	Agent	Concentr. (M)	Effect	Ref.
Neurons	Naltrexone	10 ⁻¹⁵	Paradoxical analgesia	Crain 1995
NK cells	B-endorphin	10-17	Activation	Williamson 1987
Monocytes	PAF	10-17	Activation	R.Pleszczynski 1992
Macrophages	Opioid peptides	10 ⁻¹⁵	Inhibition	Efanov 1994
Neutrophils	Substance P	10 ⁻¹⁶	Adhesion	DeRose 1994
Neurons	ADNF peptide	10 ⁻¹⁶	Protects from cell death	Brenneman 1996
T-lymphocytes	TGF-β	4x10 ⁻¹⁸	Migration	Adams 1991
T-lymphocytes	Iterleukin-1	2x10 ⁻¹⁹	Proliferation	Orencole 1989
Hypophysis	Leukotrienes	10 ⁻¹⁸	Release of LH	Gerozissis 1987
Mouse	Pregnenolone	10 ⁻²¹	Increases training memory	Flood 1995

Partly adapted from Eskinazi 1999

C.F.S. Hahnemann Organon, par. 278



"How small, in other words, must be the dose of each individual medicine, homeopathically selected for a case of disease, to effect the best cure?" "Is, as may easily be conceived, not the work of theoretical speculation. (...) Pure experiment, careful observation of the sensitiveness of each patient, and accurate experience can alone determine this in each individual case"

EXAMPLES OF HIGH-DILUTION EXPERIMENTS

System	Agent	Dilution	Effect	Ref.
Human basophils	IgE	10 ⁻⁶⁰	Stimulation (not confirmed by others)	Davenas 1998
Cicken embrio	Bursin	15CH 10 ⁻²⁷ g	Immunomodulatory and endocrine activity	Youbicier-Simo 993-971
Rat Hypothalamus	Sodium chloride	10 ⁻⁶⁰	Reduces firing rate in rats under high-salt diet	Sukul 1991-98
Mice nervous system	Nux vomica	30c	Reduction of alchool-induced sleep time	Sukul 1999
Rat duodenum	Atropa belladonna	60c 200c	Increases Ach-induced spasm Icreases Ach-induced spasm	Cristea 1991-98
Mouse blood	Acetylsalycilic acid	10 ⁻³⁰	Prothrombotic	Doutremepuich 1998
Mouse ears	Silica	10 ⁻⁶⁰	Speeds up wound healing	Oberbaum 1998
Wheat germination	Arsenic Silver nitrate	10 ⁻⁴⁵ D26	Protect from toxicity Enhances growth	Betti 1997/200 Pongratz 1998

C.F.S. Hahnemann Organon, par. 269, 295



"The homeopathic system of medicine develops for its special use, to a hitherto unheard degree, the inner spirit-like medicinal powers of the crude substances by means of a process peculiar to it and which has hitherto never been tried, whereby only they all become immeasurably and penetratingly efficacious (...). This process is called **dynamizing**, **potentizing** (development of medicinal power) and the products are dynamizations or potencies in different degrees. (...) On this account it refers only to the increase and stronger development of their power to cause changes in the health of animals and men"

PROPERTIES OF COMPLEX (interacting multicomponent) and DYNAMICAL (changing in time) SYSTEMS >Non linearity of dose-effect relationships Sensitivity to small perturbations (chaos) > Bifurcations, plasticity and memory (e.g.: priming, desensitization, adaptation) >Multiple feed-back loops, networks and attractors Scillations of system variables Fractal patterns ("self-similarity" or "symmetry of scale invariance")

USING SMALL PERTURBATIONS TO CONTROL CHAOS

T. Shinbrot et al., Nature 363, 411-417, 1993

"The extreme sensitivity of chaotic systems to tiny perturbations (the "butterfly effect") can be used both to stabilize regular dynamic behaviours and to direct chaotic trajectories rapidly to a desired state"

"The butterfly effect permits the use of tiny feedback perturbations to control trajectories in chaotic systems – a capability without counterpart in nonchaotic systems"

"Thus small, carefully chosen perturbations are able to effect a large beneficial change in the long-term system behaviour"

BIOCHEMISTRY AND BIOPHYSICS



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PRODUCTION OF ELECTROMAGNETIC WAVES BY PHAGOCYTES (BIOLUMINESCENCE)

Neutrophil Granulocytes



Bacteria and other inflammatory reactions

EXAMPLES OF MOLECULAR SYSTEMS INTERACTING WITH ELECTROMAGNETIC FIELDS

- Photoreceptors
- Chlorophyll
- G-Proteins
- > 7-pass transmembrane receptors
- CAMP-dependent protein kinase
- Heat-shock protein expression
- Chromosomes
- Na+/K+ ATPase
- Lysozyme

THE "WATER MEMORY" AND ITS EFFECTS ON THE BODY

- Liquid water is organized in H-bonded dynamic structures (*clusters*) (Stillinger 1980, Smith 1989-94, Anagnostatos 1991, Liu 1996, Gregory 1997, Lo 1997)
- Quantum electrodynamic of water postulates the formation of *coherence domains* in water through the *superradiance* effect (Del Giudice 1988, Arani 1995, Preparata 1995)
- NMR (Smith 1966, Young 1975, Luu 1976, Lasne 1989, Weingartner 1992, Demangeat 1992), Thermodynamic (Elia 1999), Spectrometric (Barros 1984, Landa Lechuga 1994, Lo 1998) measurements have provided provisional experimetal evidence of "anomalous states of water" in diluted and succussed solutions
- Water treated with *electromagnetic fields* acquires and maintains the capacity to modify the function of membrane channels (Fesenko 1995) and leukocytes (Thomas 2000). Water may transfer e.m. energy through H-bonds (Nitzan 1999)
- Cells, enzymes, receptors and whole body exhibit high sensitivity to regulation by long-range *electromagnetic interactions* under specific experimental conditions (several authors)
- Nonlinear science (*chaos theory*) postulates the extreme sensitivity of biological systems to small perturbations and possibly the organization of fractal structures in liquids (several authors)
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"Many researchers who acknowledge the reality of the phenomena tend, however, to reject Hahnemann's (vitalistic, n.d.r.) theory, hoping to find their explanation in physics. Any fruitful analysis of this possibility presupposes, naturally, a thorough acquaintance with the complex and highly mathematical physical theories. As a matter of fact, few of those who venture on this area fulfil this requisite."

Silvio Steno Chibeni (Philosopher of science) University of Campinas <u>http://www.unicamp.br/~chibeni</u>

WATER MOLECULES FORMING A PROTON-CONDUCTING SYSTEM (Khorana et al., 1993)



INTER-MOLECULAR ENERGY TRANSFER IN WATER by *excitation* of O-H bond



© P. Bellavite (adapted from Nitzan, 1999 and Woutersen 1999)

WATER CLUSTERS



CLATHRATES

(Anagnostatos, Smith, et al.)

WATER CLUSTERS



(K. Liu et al., Science vol.271, 16 febr. 1996) © P. Bellavite

DYNAMICS OF WATER CLUSTERS



(K. Liu et al., Science vol.271, 16 febr. 1996) © P. Bellavite

A collective approach to the dynamics of water

"The usually neglected interaction between the electric dipole of the water molecule and the quantized electromagnetic (em) radiation field is shown to give rise to collective (superradiant) dynamics, where two phases coexist: one in which molecules rotate coherently in phase, the other, gas-like, produced by thermal fluctuations. Such dynamics occur in microdomains (the coherence domains) whose size is of the order of hundreds microns"



E. Del Giudice and G. Preparata, Institutes of Nuclear Physics and Department of Physics, University of Milano. Presented at the NATO ASI on Hydrogen bonded liquids, 1989

A SCHEMATIC MODEL OF QUANTUM ELECTRODYNAMIC OF WATER



A. DISORDERED VIBRATION (GAS-LIKE) B. COHERENT VIBRATION (SUPERRADIANCE)

INTERACTION BETWEEN WATER AND AN ELECTROMAGNETIC FIELD ACCORDING TO SUPERRADIANCE HYPOTHESIS



E.M. FIELD

WATER

INTERACTION BETWEEN WATER AND OTHER MOLECULES ACCORDING TO THE SUPERRADIANCE HYPOTHESIS

BENZENE



COHERENT WATER



DNA

COHERENT WATER

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THE PARADIGM OF BIOLOGICAL COMMUNICATION



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CHEMICAL AND PHYSICAL COMMUNICATION



HYPOTHETICAL MODEL OF QUANTUM ELECTRODYNAMIC COMMUNICATION



HYPOTHETICAL MODEL OF QUANTUM ELECTRODYNAMIC COMMUNICATION



BASIC RESEARCH THE STATE OF THE ART (SUMMARY)

There are tens of papers reporting stimulatory or inhibitory effects of homeopathic drugs in vitro and in animal systems

- Most effects on cell systems have been obtained using low doses or very low doses
- A few groups have reported effects using high dilutions (beyond Avogadro's number) but these effects have not been reproduced by all the laboratories
- The homeopathic Similia principle is found to be operative also at cellular and molecular level

"Conventional" pharmacology, immunology and cell biology are providing further support to the effect of very low doses