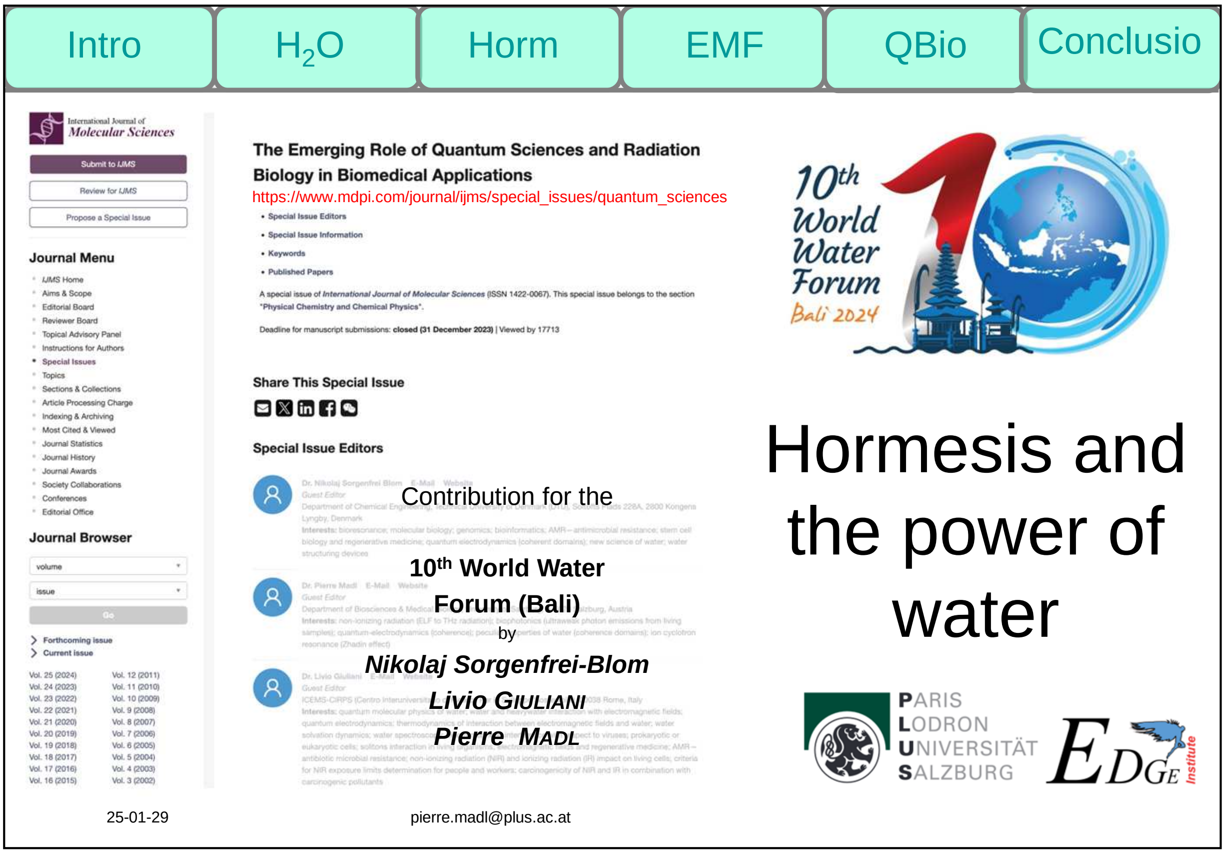

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URL: edge-institute.org/talk/UN-10thWWF.pdf

v.2024.1.3

Intro | H_2O | Horm | EMF | QBio | Conclusio

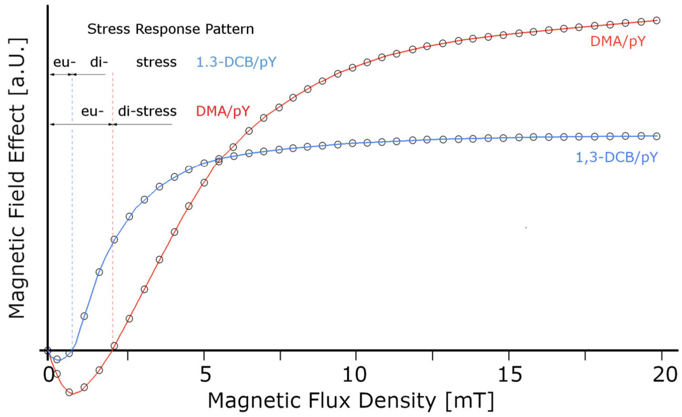
The Approach

Brief introduction:

1. Currently 9 (+ 1 still pending) papers
2. Covering Topics of:

   i) Distant signalling w/o chemistry
   i) Hormesis
   i) EMF Exposure
   i) Quantum Biology

Batchelor et al, 1993



Regardless of the underlying principle (ASL vs. WFL), we are dealing here with a hormetic effect as the dose–response patterns is indeed biphasic. Therein, the authors [1] investigated the minimal field strength required to induce hyperfine and degenerative effects, i.e., the experiment consists of perturbing the spin dynamics arising from the Zeeman interaction of the radicals with an external magnetic field that can either accelerate or slow down the intersystem transition between singlet and triplet states. Although the authors do not explicitly refer to the peculiar behaviour at low magnetic field intensities (<2 mT), the dynamics obtained suggest hormetic principles in action. The superimposition of the static field (BDC) with a weak ELF (BAC with certain frequencies) acts constructively via harmonic coupling such that the induced effects acting on the cyclotron resonance of specific ions can be derived with BAC fields down to the nT range. In addition, hormetic dynamics can be used as a predictor to indicate the lowest values of a substance or agent (e.g., applied magnetic field) that exhibit inhibitory or stimulating effects.

Image. Curves of the modelled magnetic field effects of exciplex systems consisting of pyrene and isomers of dicyanobenzene (1,3- dicyano-benzene (DCB) or dimethyl-aniline (DMA)). Superimposed, the eustress and the corresponding distress response regimes indicating that weak field stimuli promote, whereas strong field stimuli inhibit.

Source: [1] Batchelor, S.N.; Kay, C.W.M.; McLauchlan, K.A.; Shkrob, I.A. Time-resolved and modulation methods in the study of the effects of magnetic fields on the yields of free-radical reactions. J. Phys. Chem. **1993**, 97, 13250–13258

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The new face of water

Source: Schroecker G (2017) Wasser lebt (Living Water) – see achkowledgement

Intro | H_2O | Horm | EMF | QBio | Conclusio

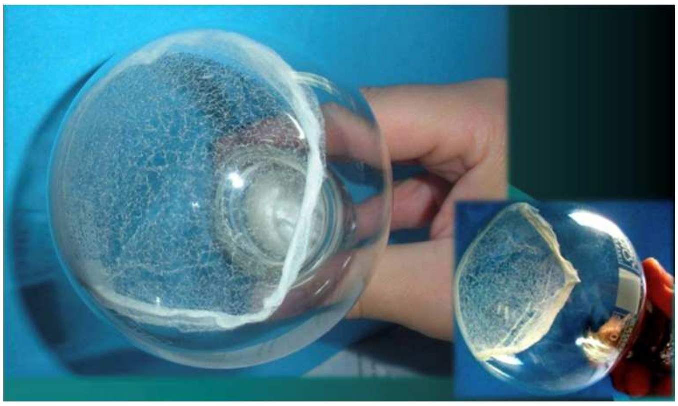
Paper: **Xerosydryle**

- xeros dry
- hydro water
- yle matter

.... solid-state water polymer (at T_{room});

Guena et al., 2024

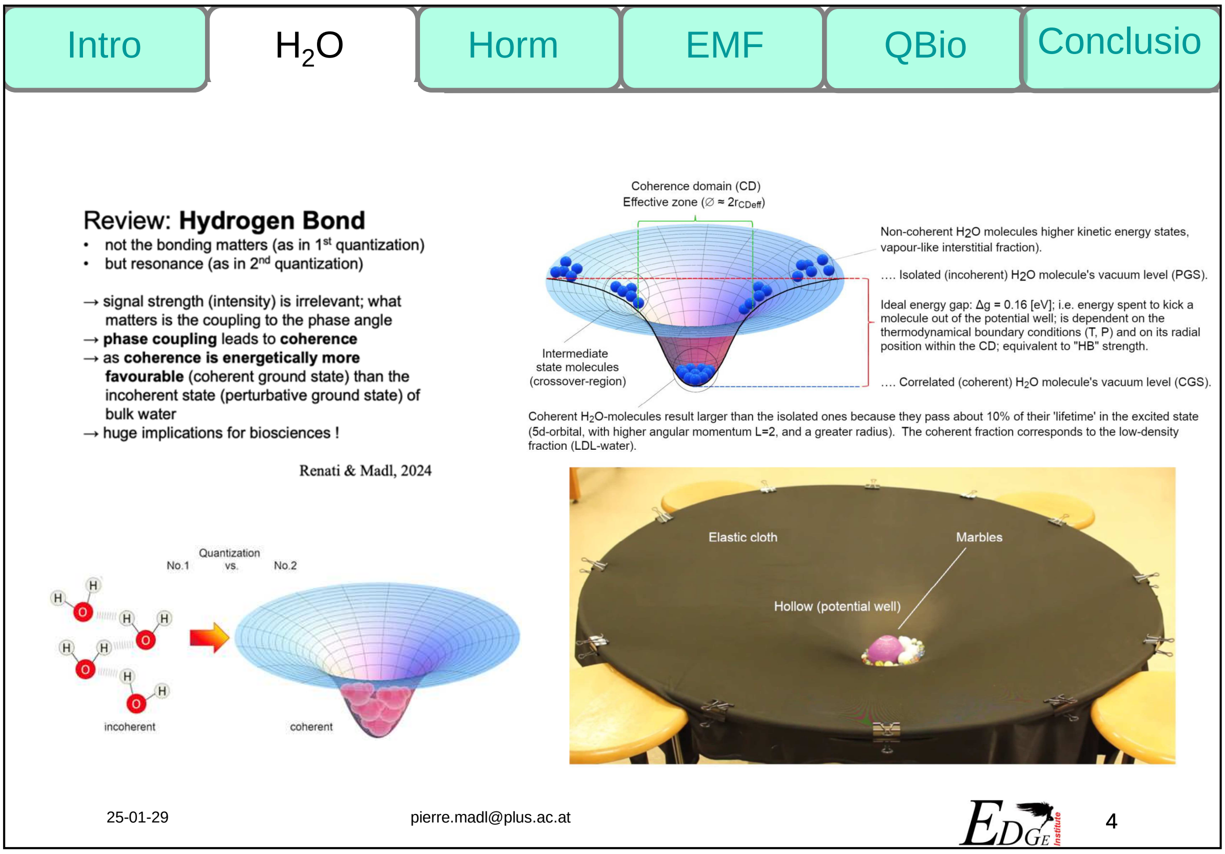
Paper still under review



25-01-29 pierre.madl@plus.ac.at EDGE Institute 3

Xerosydryle belongs to a novel category of materials resulting from the interaction of water with various hydrophilic polymers. These materials can exhibit different properties based on the original material used to contact water. Previous research confirmed the existence of a solid manifestation of water at room temperature. The thermal characteristics of dissolved Xerosydryle in water resemble those of biological macromolecules during denaturation, but with greater thermal resistance. In this study, it has been investigated for the first time the biological activity of Xerosydryle on a living system, using seed germination as model of interaction. The interaction was assessed using morpho-physiological tests like chlorophyll shifts, potassium (re)uptake during the onset of germination as well as a transcriptome approach. In particular, transcriptional analysis revealed a number of up- and down-regulated genes between Xerosydryle and distilled water as control when used as growth medium for seedlings. Collectively, the experiments performed indicate that Xerosydryle, even at low concentrations, perturbates seedling growth in a manner resembling an osmotic modulator. This work paves the way to a wider exploration of the biological role and activity of Xerosydryle and similar compounds on living matter and opens to speculations on the interactions at the boundaries between physics, chemistry, and biology.

Source: Geuna F, Pensotti A, Germano R (under review) Biological activity of Xerosydryle: preliminary evidence on seed germination

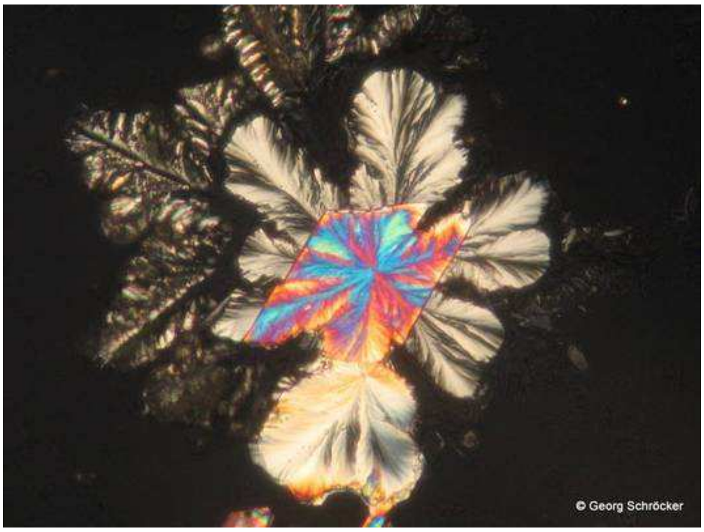


In this paper we would like to highlight the problems of conceiving the “Hydrogen Bond” (HB) as a real short-range, directional, electrostatic, attractive interaction and to reframe its nature through the non-approximated view of condensed matter offered by a Quantum Electro-Dynamic (QED) perspective. We focus our attention on water, as the paramount case to show the effectiveness of this 40-year-old theoretical background, which represents water as a two-fluid system (where one of the two phases is coherent). The HB turns out to be the result of the electromagnetic field gradient in the coherent phase of water, whose vacuum level is lower than in the non-coherent (gas-like) fraction. In this way, the HB can be properly considered, i.e., no longer as a “dipolar force” between molecules, but as the phenomenological effect of their collective thermodynamic tendency to occupy a lower ground state, compatible with temperature and pressure. This perspective allows to explain many “anomalous” behaviours of water and to understand why the calculated energy associated with the HB should change when considering two molecules (water-dimer), or the liquid state, or the different types of ice. The appearance of a condensed, liquid, phase at room temperature is indeed the consequence of the boson condensation as described in the context of spontaneous symmetry breaking (SSB). For a more realistic and authentic description of water, condensed matter and living systems, the transition from a still semi-classical Quantum Mechanical (QM) view in the first quantization to a Quantum Field Theory (QFT) view embedded in the second quantization is advocated.

Source: Renati P, Madl P (2024) What Is the "Hydrogen Bond"? A QFT-QED Perspective. Int J Mol Sci. 25(7):3846. doi: 10.3390/ijms25073846.

Hormetic effects

mediated by water



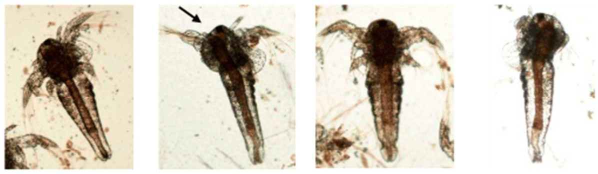
Source: Schroecker G (2017) Wasser lebt (Living Water) – see achkowledgement

Paper: **Glyphosate at low doses**

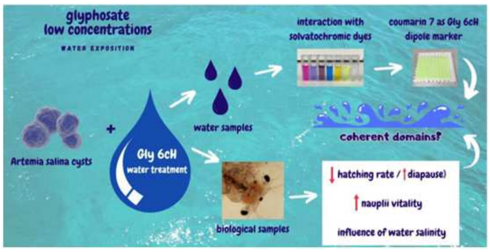
- *Artemia salina* used as a bioindicator organism
- Cysts (embryos) → exposed to glyphosate in UHD concentrations (c6, c30, c200)

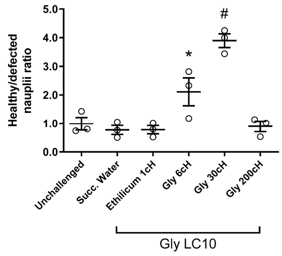
Chronic low dose glyphosate-based herbicide exposure:
→ Induced abnormal nauplii development !
→ toxic for brine shrimp !

De Oliveira Nagai et al , 2023



Normal | Lack of one antennule (arrow) | No antennule | No antenna





Glyphosate is an herbicide widely used in agriculture but can present chronic toxicity in low concentrations. *Artemia salina* is a common bio-indicator of ecotoxicity; it was used herein as a model to evaluate the effect of highly diluted-succussed glyphosate (potentized glyphosate) in glyphosate-based herbicide (GBH) exposed living systems. *Artemia salina* cysts were kept in artificial seawater with 0.02% glyphosate (corresponding to 10% lethal concentration or LC10) under constant oxygenation, luminosity, and controlled temperature, to promote hatching in 48 h. Cysts were treated with 1% (*v*/*v*) potentized glyphosate in different dilution levels (Gly 6 cH, 30 cH, 200 cH) prepared the day before according to homeopathic techniques, using GBH from the same batch. Controls were unchallenged cysts, and cysts treated with succussed water or potentized vehicle. After 48 h, the number of born nauplii per 100 µL, nauplii vitality, and morphology were evaluated. The remaining seawater was used for physicochemical analyses using solvatochromic dyes. In a second set of experiments, Gly 6 cH treated cysts were observed under different degrees of salinity (50 to 100% seawater) and GBH concentrations (zero to LC 50); hatching and nauplii activity were recorded and analyzed using the ImageJ 1.52, plug-in Trackmate. The treatments were performed blind, and the codes were revealed after statistical analysis. Gly 6 cH increased nauplii vitality ($p = 0.01$) and improved the healthy/defective nauplii ratio ($p = 0.005$) but delayed hatching ($p = 0.02$). Overall, these results suggest Gly 6cH treatment promotes the emergence of the more GBH-resistant phenotype in the nauplii population. Also, Gly 6cH delays hatching, another useful survival mechanism in the presence of stress. Hatching arrest was most marked in 80% seawater when exposed to glyphosate at LC10. Water samples treated with Gly 6 cH showed specific interactions with solvatochromic dyes, mainly Coumarin 7, such that it appears to be a potential physicochemical marker for Gly 6 cH. In short, Gly 6 cH treatment appears to protect the *Artemia salina* population exposed to GBH at low concentrations.

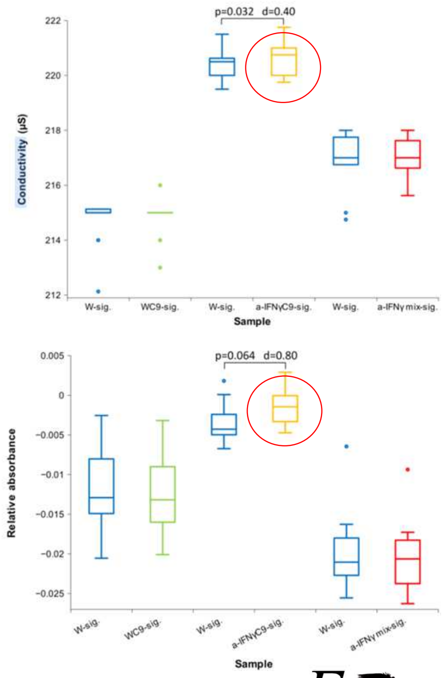
Source: de Olivera Nagai MY, Mohammad SN, Pinto AAG, Coimbra EN, Peres GB, Suffredini IB, Bernardi MM, Tournier AL, Jerman I, Cartwright SJ, Bonamin LV (2023) Highly Diluted Glyphosate Mitigates Its Effects on *Artemia salina*: Physicochemical Implications. Int J Mol Sci. 24(11):9478. doi: 10.3390/ijms24119478.

Intro | H_2O | Horm | EMF | QBio | Conclusio

Paper: **IFNγ signal transfer over distances 1v2**

- inducer solution of IFNγ in UHD (c12, c30, c50) and water (9×10^{-2})
  W-sig: em-coupled signals from dist. Water (treated as if doped)
  a-IFNγC9-sig: em-coupled signals from the a-IFNγC9
- receiver solution: water
- signal transfer **direct** via «glass» (donor & receiver flask touch e/o)
- Duration of inducer-receiver contact: 1 hr

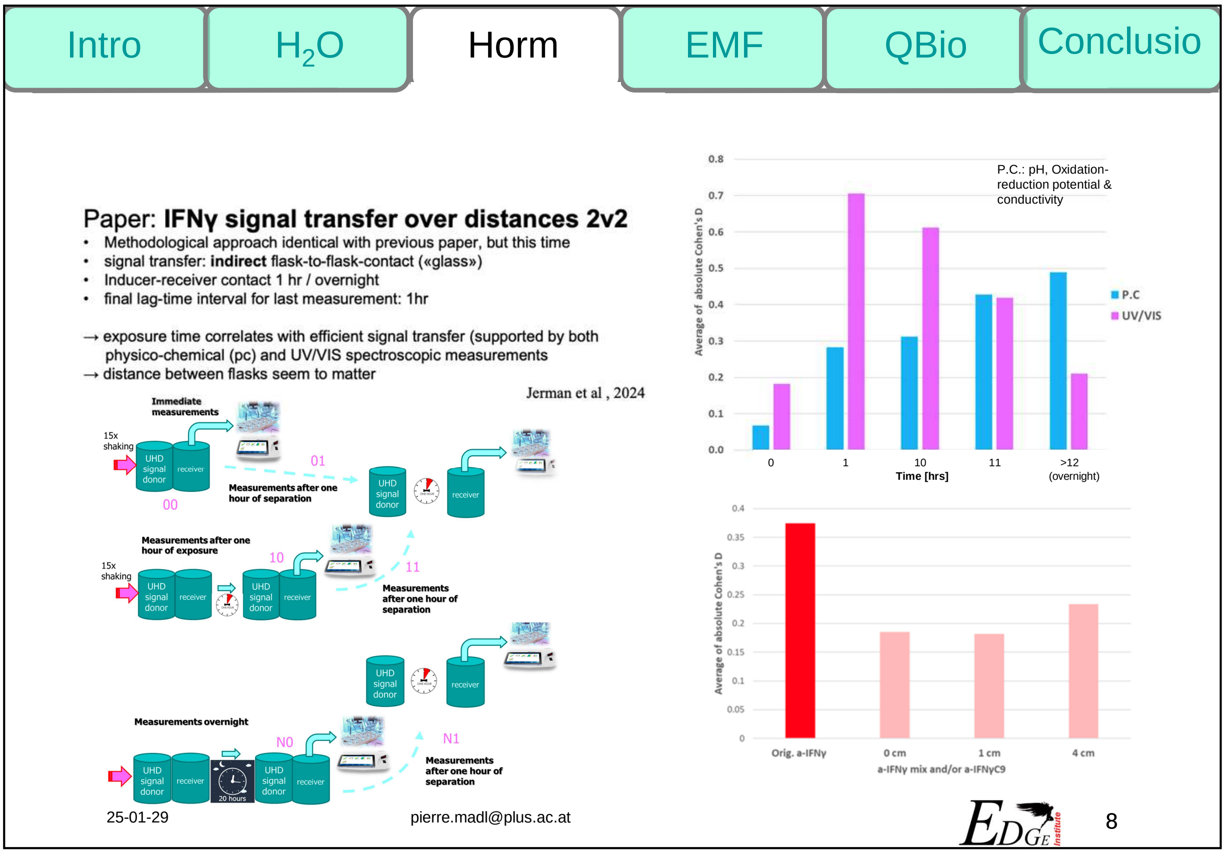
although signals of receiver were weaker than those of inducer flasks, there are observable differences in UV-VIS and conductivity data sets:
i.e. in terms to sham-treated W-sig (9×10^{-2}), a-IFNγC9-sig is
→ slightly better conductive;
→ slightly higher UV-VIS absorbance;
→ whereas interdependence of the other samples is inverse.



Jerman et al , 2024

Physicochemical investigations of (UHD) solutions subjected to certain physical factors (like shaking) are becoming more frequent and increasingly yielding convincing results. A much less studied phenomenon is the transfer of molecular information (UHD signals) from one fluid to another without an intermediate liquid phase. The purpose of this study was to investigate the possibility of such a UHD signal transfer from UHD solutions into the receiver fluid, especially when the molecular source used in solutions was a biologically active molecule of antibodies to interferon-gamma. We used physicochemical measurements and UV spectroscopy for this purpose. The results of this large pilot study confirm the possibility of such a transfer and a rough similarity to the original UHD signal donors, the weaker signal detection relative to the original donor fluids, and that exposure time improves the effect.

Source: Jerman I, Ogrizek L, Krapež VP, Jan L (2024) Molecular Signal Transfer of Highly Diluted Antibodies to Interferon-Gamma Regarding Kind, Time, and Distance of Exposition. Int J Mol Sci. 25(1):656. doi: 10.3390/ijms25010656.



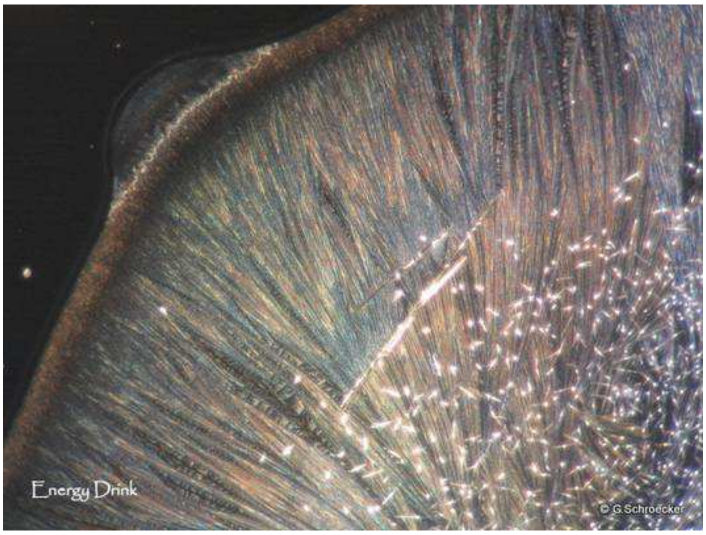
Physicochemical examinations of very high dilution (UHD) solutions subjected to certain physical factors (such as shaking) are becoming more frequent and are increasingly producing conclusive results. A much less studied phenomenon is the transfer of molecular information (i.e., UHD signals of dilute substances) from one liquid to another without an intermediate liquid phase. The aim of this study was to investigate the possibility of such a transfer of the UHD signal from the UHD solutions to the receiver solution, in particular, if the molecular source used in the donor solutions was the biologically active antibodies to interferon-gamma molecule. We were especially interested in how the transfer of the UHD signal is affected by the time of exposure of the receiver to the donor, the distance between the two, and how the transfer is affected by activation (striking) versus exposure alone. Signal transfer was evaluated by differential measurements of electrical conductivity, ORP, pH, and UV/VIS spectroscopy of the exposed liquid. The results showed that activation strongly influences signal transfer and that this can be compensated to some extent by prolonged direct exposure. In principle, exposure time has a positive effect on signal transfer. Interestingly, the results of different distances between the donor and receiver showed similar changes in the parameters in the range of 0-4 cm, as estimated in this study. While the study mainly confirms the two hypotheses, it also raises a number of new questions and provides clues for further research.

Source: Jerman I, Ogrizek L, Periček Krapež V, Jan L (2023) Physicochemical Study of the Molecular Signal Transfer of Ultra-High Diluted Antibodies to Interferon-Gamma. Int J Mol Sci. 24(15):11961. doi: 10.3390/ijms241511961.

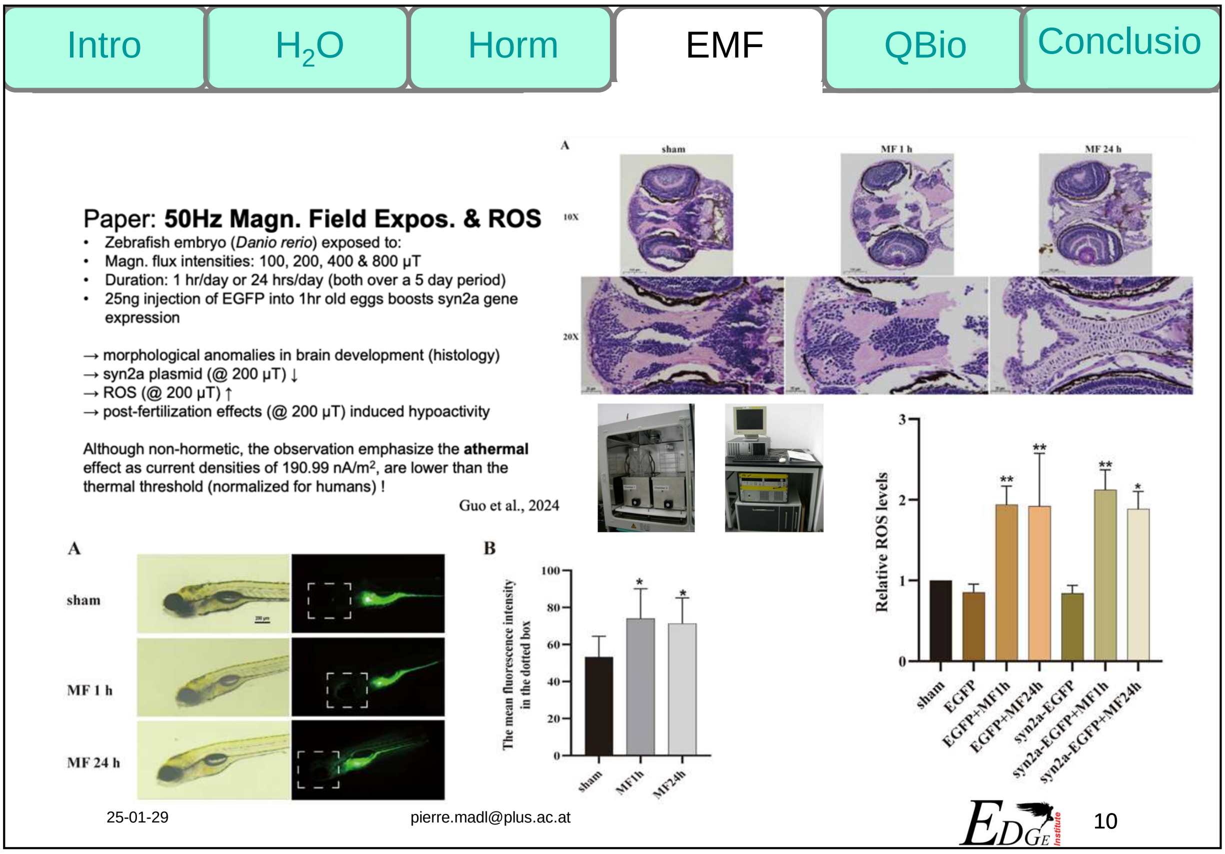
Intro | H_2O | Horm | EMF | QBio | Conclusio

Electro-Magnetic Field effects

mediated by water

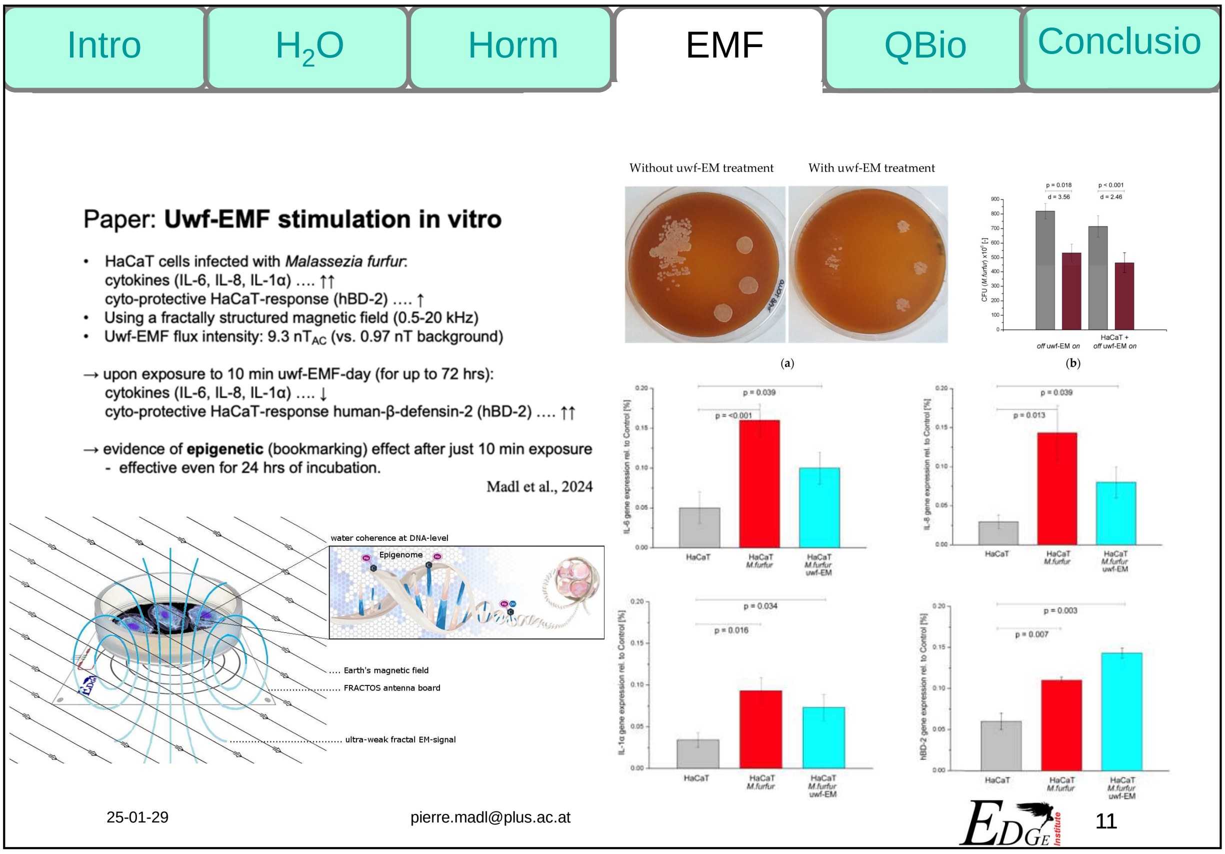


Source: Schroecker G (2017) Wasser lebt (Living Water) – see achkowledgement



Extremely low frequency electromagnetic field (ELF-EMF) exists widely in public and occupational environments. However, its potential adverse effects and the underlying mechanism on nervous system, especially behavior are still poorly understood. In this study, zebrafish embryos (including a transfected synapsin IIa (syn2a) overexpression plasmid) at 3 h post-fertilization (hpf) were exposed to a 50-Hz magnetic field (MF) with a series of intensities (100, 200, 400 and 800 μT, respectively) for 1 h or 24 h every day for 5 days. Results showed that, although MF exposure did not affect the basic development parameters including hatching rate, mortality and malformation rate, yet MF at 200 μT could significantly induce spontaneous movement (SM) hypoactivity in zebrafish larvae. Histological examination presented morphological abnormalities of the brain such as condensed cell nucleus and cytoplasm, increased intercellular space. Moreover, exposure to MF at 200 μT inhibited syn2a transcription and expression, and increased reactive oxygen species (ROS) level as well. Overexpression of syn2a could effectively rescue MF-induced SM hypoactivity in zebrafish. Pretreatment with N-acetyl-L-cysteine (NAC) could not only recover syn2a protein expression which was weakened by MF exposure, but also abolish MF-induced SM hypoactivity. However, syn2a overexpression did not affect MF-increased ROS. Taken together, the findings suggested that exposure to a 50-Hz MF inhibited spontaneous movement of zebrafish larvae via ROS-mediated syn2a expression in a nonlinear manner.

Source: Guo Y, Fu Y, Sun W (2023) 50 Hz Magnetic Field Exposure Inhibited Spontaneous Movement of Zebrafish Larvae through ROS-Mediated syn2a Expression. Int J Mol Sci. 24(8):7576. doi: 10.3390/ijms24087576.



Malassezia spp. are dimorphic, lipophilic fungi that are part of the normal human cutaneous commensal microbiome. However, under adverse conditions, these fungi can be involved in various cutaneous diseases. In this study, we analysed the effect of ultra-weak fractal electromagnetic (uwf-EMF) field exposure (12.6 nT covering 0.5 to 20 kHz) on the growth dynamics and invasiveness of *M. furfur*. The ability to modulate inflammation and innate immunity in normal human keratinocytes was also investigated. Using a microbiological assay, it was possible to demonstrate that, under the influence of uwf-EMF, the invasiveness of *M. furfur* was drastically reduced (d = 2.456, $p < 0.001$), while at the same time, its growth dynamic after 72 h having been in contact with HaCaT cells both without (d = 0.211, $p = 0.390$) and with (d = 0.118, $p = 0.438$) uwf-EM exposure, were hardly affected. Real-time PCR analysis demonstrated that a uwf-EMF exposure is able to modulate human-β-defensin-2 (hBD-2) in treated keratinocytes and at the same time reduce the expression of proinflammatory cytokines in human keratinocytes. The findings suggest that the underlying principle of action is hormetic in nature and that this method might be an adjunctive therapeutic tool to modulate the inflammatory properties of *Malassezia* in related cutaneous diseases. The underlying principle of action becomes understandable by means of quantum electrodynamics (QED). Given that living systems consist mainly of water and within the framework of QED, this water, as a biphasic system, provides the basis for electromagnetic coupling. The oscillatory properties of water dipoles modulated by weak electromagnetic stimuli not only affect biochemical processes, but also pave the way for a more general understanding of the observed nonthermal effects in biota.

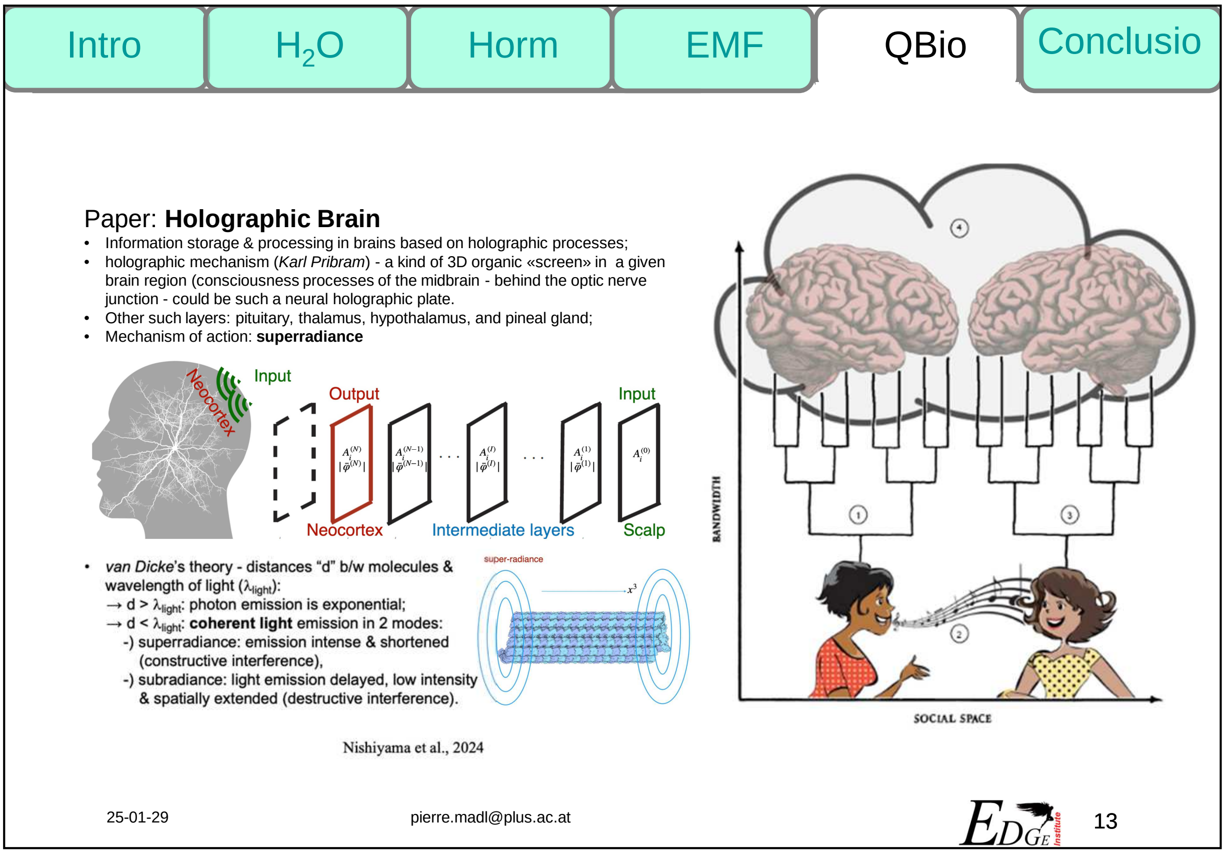
Source: Madl P, Germano R, Tedeschi A, Lettner H (2023) Effects of Ultra-Weak Fractal Electromagnetic Signals on *Malassezia furfur*. Int J Mol Sci. 24(4):4099. doi: 10.3390/ijms24044099.

Intro | H_2O | Horm | EMF | QBio | Conclusio

Quantum Biology

mediated by water

Source: Schroecker G (2017) Wasser lebt (Living Water) – see achkowledgement



We investigate Quantum Electrodynamics corresponding to the holographic brain theory introduced by Pribram to describe memory in the human brain. First, we derive a super-radiance solution in Quantum Electrodynamics with non-relativistic charged bosons (a model of molecular conformational states of water) for coherent light sources of holograms. Next, we estimate memory capacity of a brain neocortex, and adopt binary holograms to manipulate optical information. Finally, we introduce a control theory to manipulate holograms involving biological water's molecular conformational states. We show how a desired waveform in holography is achieved in a hierarchical model using numerical simulations.

Source: Nishiyama A, Tanaka S, Tuszynski JA, Tsenkova R (2024) Holographic Brain Theory: Super-Radiance, Memory Capacity and Control Theory. Int J Mol Sci. 25(4):2399. doi: 10.3390/ijms25042399

Review: **QED & Hormesis**

- In phase coupling induces coherence
- Not signal **intensity** is relevant but **phase angle**;

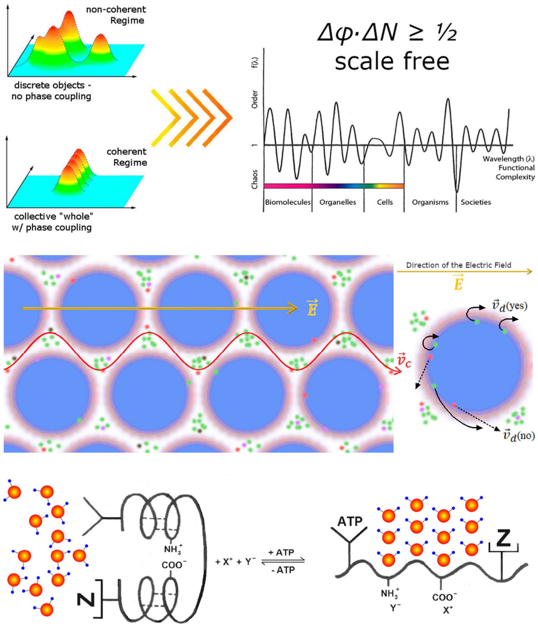
Implications:
→ organisms are 75 % H_2O by mass but **98 % by molar**;
→ water comes in 2 fractions (40 % coherent & 60 % bulk @ 300 K);
→ "fundamental uncertainty relationship" ($\Delta\varphi\Delta N \geq ½$) is scale free
-) in coherence, the individual oscillators loses physical meaning,
-) uncountable quanta couple to an em-field;
-) the massless quasiparticle becomes the only definable object
-) being scale free it engulfs micro-, to macro-domain;

H_2O w/n organism becomes the dominant player in biochemical pathways;
→ **Zhadin-effect** as a macroscopic manifestation of wider biochemical loops (e.g. CAC);

→ Association-Induction Hypothesis (**AIH**, *Gilbert Ling*) assign water the primate in protein de/activation;

→ coherent coupling is **not dependent on signal intensity** but on phase angle, enabling weak field intensities to have a macroscopic effect (superconductivity, ferromagnetism, phtotosynthesis, etc.)
→ 2nd quantization (reality is field- not matter-driven);

Madl & Renati, 2023

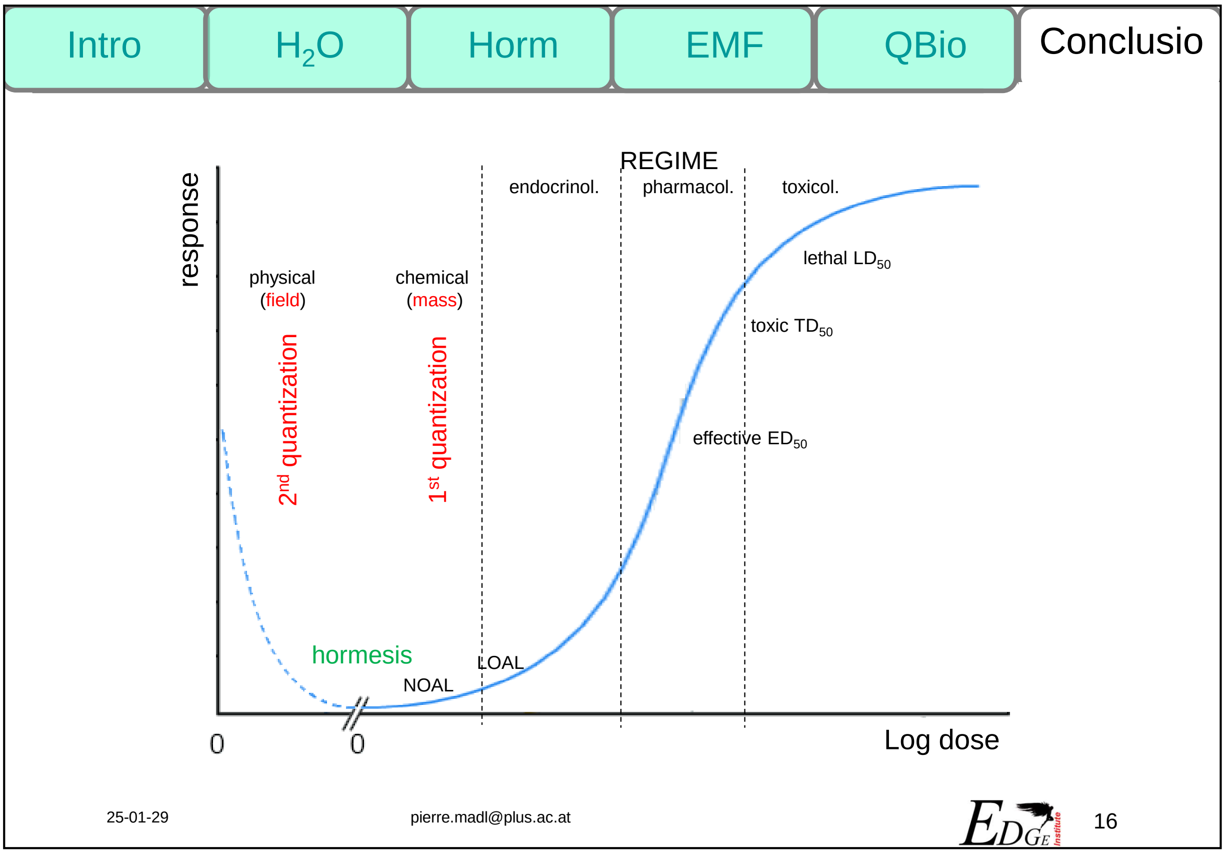


"Quantum biology" (QB) is a promising theoretical approach addressing questions about how living systems are able to unfold dynamics that cannot be solved on a chemical basis or seem to violate some fundamental laws (e.g., thermodynamic yield, morphogenesis, adaptation, autopoiesis, memory, teleology, biosemiotics). Current "quantum" approaches in biology are still very basic and "corpuscular", as these rely on a semi-classical and approximated view. We review important considerations of theory and experiments of the recent past in the field of condensed matter, water, physics of living systems, and biochemistry to join them by creating a consistent picture applicable for life sciences. Within quantum field theory (QFT), the field (also in the matter field) has the primacy whereby the particle, or "quantum", is a derivative of it. The phase of the oscillation and not the number of quanta is the most important observable of the system. Thermodynamics of open systems, symmetry breaking, fractals, and quantum electrodynamics (QED) provide a consistent picture of condensed matter, liquid water, and living matter. Coherence, resonance-driven biochemistry, and ion cyclotron resonance (Liboff-Zhadin effect) emerge as crucial hormetic phenomena. We offer a paradigmatic approach when dealing with living systems in order to enrich and ultimately better understand the implications of current research activities in the field of life sciences.

Source: Madl P, Renati P (2023) Quantum Electrodynamics Coherence and Hormesis: Foundations of Quantum Biology. Int J Mol Sci. 24(18):14003. doi: 10.3390/ijms241814003.

Concluding remarks ….

…. In view of the paradigm shift ahead



Hormesis is a biological phenomenon where a beneficial effect results from exposure to low doses of an agent that is otherwise toxic or harmful at higher doses. Hormesis is characterized by a biphasic dose-response relationship, where low doses stimulate a beneficial adaptive response, while high doses cause inhibition or damage.

Key Aspects of Hormesis regard:

1. **Biphasic Dose-Response Curve**:

- **Low Dose**: At low doses, the agent induces a positive response, enhancing cellular and organismal functions. This might include improved growth, stress resistance, and longevity.
- **High Dose**: At higher doses, the same agent becomes detrimental, leading to negative effects such as toxicity, cell damage, or even death.

2. **Examples of Hormetic Agents**:

- **Physics**: Low doses of (ionizing) radiation can stimulate DNA repair mechanisms and other protective responses in cells, whereas high doses can cause cancer and other serious health issues.
- **Chemicals**: Certain toxins or drugs, like ethanol or resveratrol, can have beneficial effects at low doses, such as promoting cardiovascular health, but are harmful at higher concentrations.
- **Exercise**: Physical exercise induces a hormetic response; moderate exercise improves overall health and fitness, while excessive exercise can lead to injury and physiological stress.

3. **Mechanisms of Hormesis**:

- **Stress Response Activation**: Low doses of stressors activate adaptive stress response pathways, such as heat shock proteins, antioxidant enzymes, and DNA repair enzymes.
- **Cellular & Molecular Adaptation**: Cells adapt to low-level stress by enhancing their defense mechanisms, improving resilience against subsequent higher levels of stress.
- **Metabolic & Immune Modulation**: Hormetic agents can modulate metabolic pathways and immune function, contributing to enhanced health and disease resistance.

4. **Applications of Hormesis**:

- **Medicine & Pharmacology**: Understanding hormesis can aid in drug development, where low doses of certain drugs might be used to elicit therapeutic effects without adverse side effects.
- **Toxicology & Risk Assessment**: Hormesis challenges traditional views on dose-response relationships and can influence guidelines for exposure limits to various chemicals and environmental agents.
- **Aging & Longevity Research**: Hormesis is a key concept in aging research, suggesting that mild stress can promote longevity and healthy aging by activating maintenance and repair mechanisms.

Source: adapted and modified version of ChatGPT4 (2024)

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Thank you for your attention !

Acknowledgement:
DI *Georg Schroecker* for the teaser images

https://web.archive.org/web/20160709162854/http://wasser-lebt.at/index.php?id=1

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Living water: Take a look at Georg Schroecker's hobby. For several decades he has been trying to fathom and understand the fascinating processes of nature. Inspired by the magnificent life's work of the forester and naturalist Viktor Schauberger, he immersed himself in the world of water and what it means to "move it naturally". In doing so, he became aware of the world of water, its beauty and its subtle powers, which - at least for those who learn to see them - reveal a hidden dimension that many have not yet perceived. A drop of water on a object slide, when dried, reveals under the microscope extraordinary patterns of crystallisation. This simple experience was the beginning of a journey into the secrets of one of the most important primary substances of life: water. The images shown here are intended to provoke thought and respect for the wonders of nature. The scientific works published on water are still unable to grasp this wonderful facet of water, leaving a vast field largely mysterious and unexplored. Perhaps scientific and technical knowledge has reached its limits in the current paradigm, which means that it is time to open up to a vision that makes room for the relational dimension. In essence, our judgmental interpretation of these images remains solely the result of subjective perception.

Source: Schroecker G (2017) Wasser lebt (Living Water):
https://web.archive.org/web/20160709162854/http://wasser-lebt.at/index.php?id=1