“Aqueous systems can store quanta of electromagnetic information.”

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“The greatest challenge to any thinker is stating the problem in a way that will allow a solution”

Bertrand Russell
Aqueous systems not only provide the basis for the origin of life but, very likely, play a dynamic active integrative role in the maintenance of allostasis, namely the ceaseless process aimed to keep stability through dynamic changes, in any cell and organism *

Interestingly aqueous systems possess not only the longtime acknowledged biochemical properties but also some recently disclosed biophysical features providing a completely new framework to biology and medicine *

Dynamic electro magnetic fields are endogenously generated as biophysical correlates of biochemical activities into cells, tissues, organs and organisms *.


These electro-dynamic fields meet the requirements to induce a coherent collective behavior into single cell components as well as into water molecules surrounding them and into water molecules inside internal or external aqueous system. These electro-dynamic field are self trapped in form of electro-solitons contributing to the maintenance of the dynamic stability of any system component without loss of energy or information *

At ambient conditions our traditional view of water is an homogeneous distribution of tetrahedral structure hydrogen bonded. In spite of this very simple description a more complex picture arise from recent reports identifying the presence, even at ambient condition, of inhomogeneous structures that fit the concept of “coherence domains” in agreement with the Quantum Electrodynamic Theory (QED) *


According to QED liquid water can be viewed as equilibrium between two components: the coherent and the incoherent one.

The coherent component is contained within spherical, so called "Coherence Domain" (CD), where all water molecules synchronously oscillate with the same phase and emit coherent electromagnetic radiations.

Coherence Domains are surrounded by the incoherent component where water molecules oscillate in random phases.

"Coherence Domain" (CD) could have different size becoming a resonant antenna for different but selective frequencies.


Consequently aqueous system, such ones enfolded in livings, could play an additional role in modulating biological functions by generating dissipative structure providing basis for processing, storing and retrieving information mediated by electro-magnetic signals*.


Furthermore any pattern of electro-magnetic signals, both endogenous and exogenous, when became resonant with some of the coherent domains of water, can induce a dipole moments re-patterning inducing them to oscillate coherently each other generating a new phase correlation described as a super-coherent, a true fourth phase of water *


Therefore external patterns of electro-magnetic signals can be stored, translated and transferred by the water structure of the aqueous systems to biological targets selectively modulating their activity both at cellular and systemic level *


We was able to confirm this hypotheses transferring the signals from a retinoic acid solution to cell culture medium of human neuroblastoma and teratocarcinoma cell line *.

1. Input coil
2. Retinoic acid
3. Oscillator
4. Output coil
5. Lan 5 and NT2/D1 medium (37 °C, 5% CO2, 97% Humidity)
Electromagnetic Signals setting:

7 Hz, modulated at 3 KHz

WAVE GENERATOR
Vega Select 719

Retinoic Acid

Cell culture medium

Input Signal

Output signal
Cellular metabolic activity and proliferation by WST assay

LAN-5 and NT2/D1 cells were exposed to the electronically transmitted RA EMIT conditioned medium by Vega select 719. For each experiment LAN-5 and NT2/D1 cells were plated into 25 ml 4.2 x 5.2 cm base Corning flasks (2.0 x 105 /ml cells in a total volume of 5 ml). The flasks were kept into the exposure system continuously for up to 5 days. Cells were then counted and metabolism determined by WST-1 method. The experiment was repeated three times.
Electronically transmitted RA effect on LAN-5 cell metabolism

The cell growth rate was analyzed by the WST-1 both in LAN-5 (1) and NT2/D1 (3) cells as control (not grown by RA EMIT medium) or grown by RA EMIT conditioned medium (2-4). A statistically significant inhibition in cell metabolism ($p < 0.01$) was detected after 5 days culture.
Electronically transmitted RA conditioned medium effect on LAN-5 and NT-2 cell morphology

By phase contrast microscopy LAN-5 and NT2/D1 control cells appeared small, polygonal, without neurite-like structures. Cells cultured by electronically transmitted RA showed a morphological changes toward a more differentiated neuronal phenotype: the cells were stretched out and rich of neurite-like structures with blebs, mimicking the same effect induced by molecular retinoic acid treatment.
Electronically transmitted RA conditioned medium effect on LAN-5 and NT-2 cell morphology by contrast microscopy

contrast microscopy of LAN-5 cells in absence (A-C) or presence (B-D) of electronically transmitted RA conditioned medium on LAN-5 and NT2/D1 cell. The differentiation effect in figure B-D is shown by the presence of neurofilaments between cells.
RA-EMIT conditioned medium effect on neurofilament expression

Indirect immunofluorescence analysis of control and RA EMIT grown LAN-5 and NT2/D1 cells with antibodies against the 200 KD neurofilaments proteins is reported in the next figure. While control cell were little or not positive for NF 200 (CTR) the neurofilament protein become more fluorescent in cells cultured by RA EMIT medium. The same results were achieved by ReverseTranscriptase-PCR analysis for mRNA expression coding for NF-200 as a result of an epigenetic effect.
Electronically transmitted RA conditioned medium effect on LAN-5 and NT-2 cell by NF-200 indirect immunofluorescence

NF-200 indirect immunofluorescence (red fluorescence) of LAN-5 cells and NT2/D1 in absence (A-C) or presence of electronically transmitted RA conditioned medium (B-C)
NF-200 mRNA RT PCR analysis on electronically transmitted RA effect on LAN-5 cell

Left bar (A-B) NF-200 mRNA Reverse Transcriptase PCR analysis on control LAN-5 cells and RA conditioned medium cultured,
right bar (C-D) NF-200 mRNA RT PCR analysis of control and electronically transmitted RA medium effect on NT2/D1 cells
These data support an evident effect of the electronically transmitted retinoic acid (RA-EMIT) medium in driving neuroblastoma and Teratocarcinona stem cells toward a neuronal differentiation, which mimics the effect determined by chemical morphogen, such as retinoic acid in its molecular form. The possibility to induce differentiation elicited by our system by Electro Magnetic Information Transfer (EMIT) through aqueous system could represent an effective, minimally manipulating, and safe biomedical tool to improve neurogenic differentiation some neurodegenerative diseases.
Moreover we translate this concept into a clinical trial in which we demonstrate that patterns of endogenous dysfunctional signals recorded by an electro-medical device (Med Select 729) and transferred to an aqueous system (Nomabit Base) were able to induce both systemic and local effect on pain in respect to placebo *

Electromagnetic
Signal setting:

7 Hz
modulated at
4-12 Hz

Endogenous signals
recorded on pain
site

Microelements solution
Nomabit base
sealed ampule

Input signals

Output signal
A pilot clinical trial was designed to assess the effectiveness of a single biophysical treatment recorded on an aqueous system compared to a common anti-inflammation drug (ibuprofen) and compared to placebo.

A total of 66 patients (40 females and 26 males) were enrolled in the study, in the respect of the declaration of Helsinki, upon delivery of an informed consent.
The 66 patients was divided into 3 groups as follow:

1. 26 in the **Biophysical** group (17 f, 9 m),
2. 23 in the **pharmacological** group (11 f, 9 m);
3. 17 in the **placebo** group (12 f, 5 m).

Visual Analogue Scale (VAS) score was recorded at the beginning, after one week, after one month.
1-The biophysical Therapy group was treated by a 2 step protocol using an electro-medical device (Med Select 729). Synchronously a copy of the output therapeutic signals was recorded on a commercial available aqueous system (Nomabit Base) placed into the output coil built-in into the device. The aqueous solution was then assumed once a day along 1 month by the patients in order to deliver quanta of the recorded electromagnetic information.
2- The Pharmacological therapy group: was treated with Ibuprofen 600mg twice a day, on full stomach, it was administered to each patient of this group for 10 days.
3-The Placebo group: To the patients of this group assumed only the Nomabit Base solution as placebo. Therefore it was not placed into the Med Select to be selectively recorded. It was administered with the same protocol as for the Biophysical group once a day along 1 month.
MODIFICATION OF PAIN INTENSITY BY VAS AFTER 1 WEEK

IMPROVED

UNCHANGED

WORSED

Column color correspondence: Biophysical, Pharmacological, Placebo
MODIFICATION OF PAIN INTENSITY BY VAS AFTER 1 MONTH

IMPROVED

UNCHANGED

WORSED

statistical significance with
$\chi^2 = 12.153$ and $p < 0.02$

Column color correspondence: Biophysical, Pharmacological, Placebo
Biophysical therapy mimics the dynamics of the pharmacological treatment and is long lasting in their effects. Interestingly a very low amount of worsening cases was reported in the biophysical group and especially no side effect was reported.

Moreover many patients of the Biophysical group reported feelings of general relaxation following the treatment presumably due to the systemic effect of the biophysical therapy besides the local effect at the pain site.
Remarkably the use of a single recording procedure during the Biophysical Therapy protocol allowed to perform a single session of treatment with the patient. The entire sequence of the treatment required comprehensively only 20 minutes. It was therefore able to save time and to reduce the cost of the treatment.

Biophysical treatment was consequently shown to be time effective from both patient’s and practitioner’s viewpoint; and cost effective for both patients and healthcare providers.
Additionally, the biophysical treatment fulfill the requirement to be considered as a personalized medication because the pattern of signals are recorded on the site of the pain.

Such patterns of endogenous electromagnetic signals are indeed unique and characteristic for any single person at any single time enfolding the local and systemic efforts made to cope with his own life’s experiences through pain.

Biophysical therapy become consequently tailored.

Furthermore the recording of the output signals on the aqueous system, a commercial available solution of micro elements is consistent with previous findings and demonstrate the clinical feasibility of such a procedure as a useful integrative tool in clinical practice.

It also confirm the hypotheses that an aqueous system could be able to record, store, and transfer biophysically active information towards different biological targets such as cells, tissues and organisms yielding local and systemic effects at once.

Further clinical trials are certainly requested to confirm and widen the data presented in this preliminary pilot study, someone has been already done, and some are in process to better define the clinical areas besides pain in which a biophysical strategy could improve quality of life of the increasing number of patients with chronic diseases and multiple comorbidities that require to be treated effectively and safely reducing the number of drugs to be used.
“There are two possible outcomes: If the result confirm the hypothesis, then you’ve made a measurement. If the result is contrary to the hypothesis, then you’ve made a discovery.”

Enrico Fermi
The emerging perspective is that aqueous systems, could play an additional role in modulating biological functions providing basis for processing, storing and retrieving information mediated by electro-magnetic signals with both short-range and long-range, namely local and systemic, effects with potential very fruitful application in medical practice *


“The important thing in science is not so much to obtain new facts as to discover new ways of thinking about them.”

Sir Lawrence Bragg