

EFFECTS OF CYCLOTRONIC FREQUENCIES ON HUMAN RESISTANCE AND REACTANCE IN 31 HEALTHY SUBJECTS

Liguori, A.¹, Liguori, S.², Silli, L.², Bangrazi, S.¹, Petti, F.¹, Pinti, M.³, Pistelli M.I.⁴ and L. Giuliani⁵

¹ MD, *Paracelso Institute, Rome*

² MD, *Paracelso Clinic, Rome*

³ *Development of Environment and Biomedical Technologies*

⁴ *RINA Consulting - Center of Materials Development, Sr. Advisor, Environment and Biomedical Technologies*

⁵ *International Commission for Electromagnetic Safety (ICEMS), Venice – European Cancer and Environment Research (ECERI), Brussels*

ABSTRACT

Aim of this work is to verify resistance and reactance variations, detected in a group of 31 healthy volunteers before and after stimulation with a standard sequence of cyclotron frequencies, emitted from an innovative electromagnetic therapy (EMT) device. These variations were then compared with the variations produced by well-known percutaneous stimuli of mechanical and piezoelectric nature, in this work specifically acupuncture.

The main parameters detected in this test with BYODINAMICS, an impedance analyzer (providing resistance and reactance) through direct measurements on the surface of the body, are the following:

Resistance (R_z , Ω): bioelectric parameter in inverse proportion to the amount of extra cellular body fluids: the more is water the less is resistance.

Reactance (X_c , Ω): bioelectrical parameter in direct proportion to the density of cells in tissues with equal body fluids: the more reactance the more cells or intracellular water.

Phase angle ($X_c/R_z \times 180^\circ$): the ratio between Reactance (X_c) and Resistance (R_z), detected by the current bioimpedance analysis, expresses the phase angle, that in turn provides the ratio between intra and extracellular water volumes.

In the present experiment, the cyclotron frequency f was calculated according to the formula:

$$f = B_0 q / (2\pi m),$$

where f is the cyclotron frequency, q and m are respectively the charge and the mass of the involved ion and B_0 is the component of the geomagnetic induction parallel to Earth surface.

The EMT device has been set to emit the following frequencies in succession, for a duration of 15 minutes each: 1.89 Hz, 7.88 Hz, 30.66 Hz, 50.56 Hz, 15.72 Hz.

Resistance, reactance, phase angle, normalized resistance, normalized reactance at T0, T1, T2 were detected with BYODINAMICS: T0: before treatment, T1: immediately after treatment, T2: 8 hours after the end of treatment.

Results can be considered as significant in both groups: **Cyclotron** and **Acupuncture**. The greater variations brought about by the cyclotron treatment stand out clearly.

1. INTRODUCTION

A basic notion of Eastern Medicine and an experimental evidence of Western Complementary Medicine are acupuncture points. Their dissemination in the body appears as a lattice whose branches are named meridians, connected by nodes: the acupuncture points. Acupuncture points and meridians do not have a stable morphological structure and their location undergoes variations though of small entity. From a practical point of view this kind of delocalization is not serious since practitioners are able to recognize the lattice despite its variability. Such variability outcomes to be inconvenient from the point of view of Western Medicine since physiology uses to regard the subject of its studies as a solid matter-made subject, therefore stable. Nevertheless we can experience that acupuncture points have distinctive electrical and optical properties [1], peculiarly their electrical conductivity differs from the ones of surrounding tissues [2-4]. It has been suggested [5] that meridians are “flows of matter, energy, and information, which can be not uniformly spread over the organism due to self-trapping induced by the correlated coherence domains of interfacial water”. In other words meridians, as well as their nodes, outcome from the spread of interfacial water: a water with a high presence of Coherent Domains, i.e. clusters of water molecules whose quantum oscillations is tuned with the oscillation of an inner trapped electromagnetic field. In this frame, the disposal of interfacial water “forms the dynamical pathways as wave-guides, along which these flows can occur via *soliton* mechanisms” [5]. In other words, we can argue that meridians are a sort of continuous channels on the body, interconnected by nodes as acupuncture points, whose formation is allocated dynamically, depending on the disposal of interfacial water. Coherent water drives *solitons*, carriers of information and energy, through the body, which can be stimulated either by endogenous electromagnetic fields [5], originated by cells and that are typical for each tissue, or by exogenous stimuli.

The latter are not only electromagnetic stimuli, though every stimulus is able to provide energy to Coherent Domains, who act as reservoirs of energy captured from the environment and are able to return energy in a unique degree of freedom, the electromagnetic one, to ion currents needed to perform every electrochemical reaction in living tissues.

While we can recognize that the delocalization of meridians and their nodes is a consequence of the liquid state of water, we can also recognize that the variability of the localization of acupuncture nodes is tight since endogenous electromagnetic fields, able to stimulate *solitons*, are originated by cells. Their frequency, amplitude and wave-form is typical for each tissue [6-7]. Thus *solitons* are forced to follow a unique itinerary, which, even randomized, is traced by the sequence of tissues underlying derma. There is another point that must be explained. Why, in acupuncture points, electrical conductivity is higher than in the surrounding tissues? In the reasonable hypothesis that such electrical property of acupuncture points be aroused by electromagnetic fields, which is their origin? We argue that the environment is the origin of such electromagnetic fields, but they do not belong to the class of exogenous stimuli that can trigger *solitons* or recharge Coherent Domains of interfacial water forming meridians or their nodes. These electromagnetic fields rather allow the increase of conductivity of the uncoherent fraction of interfacial water, forming meridians or accumulating in their nodes, in such way favoring transmission of solitons. It's been tried that magnetic fields at cyclotron frequency of Hydronium and of its hydrates are able to increase the conductivity of water [8]. Even optical properties of water, the refraction index included, result to be altered [9]. As a matter of fact main peaks of Schumann frequencies match the ion cyclotron frequency of Zundel Cation or others hydrates of Hydronium, where the geomagnetic field is about 40 μT and the magnetic inclination is about 60°, as in Middle Italy. In other countries the geomagnetic strength is increasing with latitude while magnetic inclination is decreasing. Moreover Schumann frequencies are tightly varying. Therefore we can argue that electrical conductivity of acupuncture points is varying depending on the intensity of Schumann frequencies, that are an environmental factor, highly variable: more intense when a thunderstorm is near us, weaker when it is far.

Therefore we shall consider physical properties of meridians and their nodes, both optical and electrical, randomized as randomized is their location on the body, though approximately stable.

2. AIM AND DESIGN

2.1 Aim

Aim of this work is to verify the variations of resistance and reactance detected in a group of healthy volunteers before and after stimulation with a standard sequence of cyclotron frequencies, emitted by an innovative electromagnetotherapy (EMT) device. These variations were then compared with the variations produced by well-known percutaneous stimuli of mechanical and piezoelectric nature such as those of acupuncture, well documented in literature [10,11].

In more general terms, the aim is to harvest clinical data highlighting the role of exogenous magnetic fields in human health in the frame of previous achievements [12].

2.2 Design

Stimulations and clinical observations were done from September 3rd 2018 until April 30th 2019. Volunteers underwent two sessions, one of abdominal acupuncture and one of exposure to EMT, generating cyclotron frequencies. The sessions were taken in two different days at an interval of one week, starting either with abdominal acupuncture or with EMT cyclotron frequencies, in intentionally random mode.

3. MATERIALS AND METHODS

3.1. Inclusion/Exclusion Criteria. The sample included 35 healthy volunteers, normo-weight, both genders, ageing 30 to 65, not currently subject to any kind of therapy (neither antihypertensive, nor anti-diabetic, nor hormonal therapy etc.). The volunteers were included after urinalysis and standard blood test (CBC and electrolytes, ESR, CRP, glycated HB, glycemia, uricaemia, γ GT, protein electrophoresis, TSH, FT3, FT4, creatinine, BUN), in order to exclude any evidence of one or more of the most frequent metabolic and thyroid diseases, and upon informed written consent [13]. Volunteers that showed even only one blood chemistry value outside usual laboratories standards were excluded.

3.2. Instructions before and after sessions. Volunteers were recommended to arrive in the morning on an empty stomach. They were required to urinate until complete bladder emptying immediately before treatment as well as to drink 200 cc of water right after urination. After treatment, they were asked to have a light breakfast, that is free of sugar, jam, honey, fruit, and a lunch limited to 150g of meat. They had also to limit physical movement during the day and to reduce their usual work and/or occupations to a minimum, since physical efforts and heavy meals are supposed to alter the impedance indices.

3.3. Resistance and Reactance Measurements: Byodinamics device and its use with probes. BYODINAMICS is an impedance analyzer (providing resistance and reactance), through direct measurements on the surface of the body. It is usually used for an analysis of body composition such as fat mass, lean mass, intra and extracellular body water. The test was made by using self-adhesive patch electrodes. Two rectangle-shaped patch electrodes, size 23x34 mm, were placed transversely on the back of the right hand, the first one between half the length of the metacarpals on the back of the right hand and the 4th and 5th metacarpophalangeal joints, transversely to the 5°-4° and 4°-3° metacarpal interspaces, and the second at the level of the wrist 5 cm away from the first. Likewise, two other electrodes of equal shape and size were placed transversely on the back of the right foot, one proximal to the metatarsal-phalangeal joint, transversely to the 5°-4° and 4°-3° metatarsal interspaces, and the other near the ankle 5 cm away from the first patch.

The main parameters detected in this test are the following:

Resistance (R_z, Ω): bioelectric parameter in inverse proportion to the amount of extra cellular body fluids present in the body: the more is water the less is resistance [14,15,16].

Reactance (X_c, Ω): bioelectrical parameter in direct proportion to the density of cells in the tissues: with equal body fluids, the more reactance the more cells or intracellular water [17,18].

Phase angle ($X_c/R_z \times 180/\pi$): the phase angle is a linear method to measure the ratio between Reactance (X_c) and Resistance (R_z) detected by the current bioimpedance analysis and is a numerical value that expresses the ratios between intra and extracellular water volumes [19,20,21,22].

The impedance measurements and the EMT and abdominal acupuncture sessions were carried out in a room at a constant temperature of 26°C.

3.4 Cyclotron Frequencies. Cyclotron resonance is a phenomenon associated with the movement of ions, which from a circular motion pass to a spiral movement when subjected to a cyclotron tuned magnetic field (with amplitude in the same order as the one present on the Earth surface).

In the present experiment, the cyclotron frequency f was calculated according to the formula:

$$f = B_0 q / (2\pi m) \quad (1)$$

where f is the cyclotron frequency, q and m are respectively the charge and the mass of the involved ion and B_0 is the component of the geomagnetic induction parallel to the Earth surface.

3.5 The MED CRI device for electromagnetic cyclotron treatment: exposure system to magnetostatic and alternated magnetic fields. This study adopts an innovative EMT device, capable of being adjusted to emit surface electromagnetic waves at frequencies up to 24 Megahertz. The output power from the generator is 20-25 W. The magnetic induction of the emitters is 3 to 15 μ T.

This innovative apparatus has been equipped with special devices in order to avoid geomagnetic interference in the treatment area. These devices are capable of zeroing the vertical component (Z) of the Earth magnetic field. The alignment of the device to the South-North direction allows to maximize the superficial geomagnetic flux.

In the adopted procedure, the values of the three components of the geomagnetic field (X, Y, Z) in the bed zone of treatment were checked with suitable probes before starting each session of therapy.

To eliminate the interference given by the Earth magnetic field, the bed was aligned in a position where the value of the Earth magnetic component Y (at EST) turned out equal to zero. In order to zero the vector component Z, a pair of vertical axis Helmholtz coils was powered up to create a magnetic flux in the direction opposite to that of Z.

These two emitters, both of suitable dimensions, have been placed above and below the bed, in a horizontal position and parallel to each other. The three vertical coils provide the alternating magnetic field parallel to the superficial Earth magnetic field, artificially produced.

3.6. SELECTION OF FREQUENCIES AND TIMING OF ADMINISTRATION

The MED CRI device has been set to emit the following frequencies in succession, for a duration of 15 minutes each:

- estimated resonance frequency of the water coherent domains: 1.89 (1.87) Hz,
- Schumann main peak frequency i.e. ion resonance frequency of hydroxonium tetrahydrate: 7.88 (7.83) Hz,
- resonant frequency of the divalent Calcium ion: 30.66 (30.44) Hz,
- resonant frequency of the divalent Magnesium ion: 50.56 (50.19) Hz,
- resonant frequency of the monovalent Potassium ion: 15.72 (15.60) Hz.

In brackets the nominal cyclotron frequencies of cations, which in the experiment were increased by 0.7% to take into account the quasi-static field self-induced by the ionic currents aroused in the cells of the organism under exposure.

The frequencies range between 1.87Hz and 50.56Hz; altogether the selected frequencies require a treatment time of 1h and 15' for each session.

The ion resonance frequency of the coherence domains was selected in view of the formation of the mixed coherence domains, a prerequisite of the Liboff-Zhadin effect releasing the required energy for the ionic currents [23,24], promoters of the cellular and enzymatic metabolism, which was the goal of the present research. The Schumann frequency was selected to enhance water conductivity through the ion cyclotron resonance of the *eigen cation* (hydronium tetramer) [15]. The Ca, K ion cyclotron frequency was selected to enhance the calcium and potassium ion pumps [25, 26].

3.7. Abdominal Acupuncture. Abdominal acupuncture, namely one of the microsystems of traditional Chinese acupuncture, is a technique that allows standardization of the acupuncture treatment and has effect on the main functional components of the human body (rebalancing cenesthesia and the functions of internal organs). The selected acupoints were CV12 and CV10, located on the anterior midline between the sternum ensiform apophysis and the navel; CV6 and CV4, located on the anterior midline between the navel and the pubis; St25 and Sp15, located on both sides of the navel. The disposable needles were selected with a diameter of 0,22mm and a length of either 40mm or 50mm, according to the body build of the subject. The needles were retained for 20'. This treatment method does not involve any kind of manipulation of the needle, which makes treatment homogeneous.

3.8. DATA DETECTION: resistance, reactance, phase angle, normalized resistance, normalized reactance at T0, T1, T2 were detected with BYODINAMICS:

- T0: before treatment, after emptying the bladder and taking 200 cc of water,
- T1: immediately after treatment,
- T2: 8 hours after the end of the treatment.

3.9 STATISTICAL SURVEYS: average, SD and 95% confidence intervals (CI) of the parameters relative to Resistance, Reactance and Phase angle were calculated at T0, T1 and T2. The Student's T test on the average values was processed to give just an approximate indication, due to the limited number of subjects submitted to analysis.

3.10 ETHICS COMMITTEE: the design, conduct of the study and the research informed consent form were reviewed by the Ethics Committee of the Interuniversity Commission for Research on Acupuncture, an organism composed of University Professors established by AIAM (Italian Association of Acupuncture-Moxibustion and Traditional Chinese Medicine).

4. RESULTS

56 of the initial 91 volunteers willing to participate in the study were excluded, either because their standard blood tests showed altered values or because in hindsight they occasionally resorted to one or more drug therapies. Out of the 35 remaining subjects, another 4 were further excluded, 3 for health problems and 1 because he moved to another city for family needs: for these reasons they were unable to go through the second treatment cycle. Therefore, 31 subjects completed the two planned treatments at an interval of one week.

At inclusion, one month before the trial, the 31 subjects, 20 females and 11 males, had an average age of 54.32 ± 5.40 , mean weight 65 ± 7.62 kg and mean height: 172.10 ± 4.56 cm.

The calculation of the average values of resistance, reactance, phase angle and the relative variations at T0, T1, T2 showed results that can be considered as significant. The changes of the averages values both in the case of cyclotronic treatment and in the case of acupuncture treatment are shown in the respective Diagrams (Diagrams 1-6).

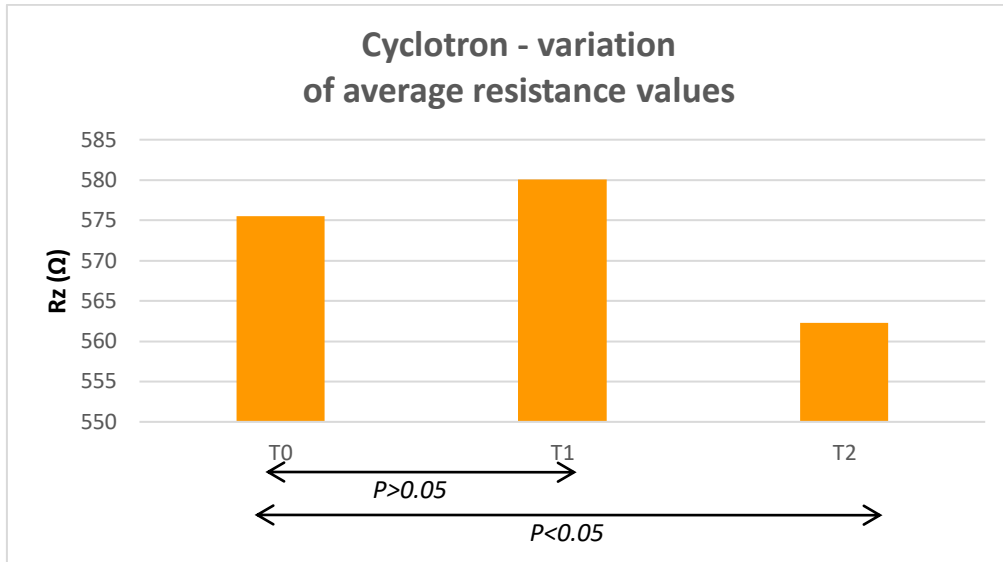
The calculation of the variations at T0, T1, T2 of the average values of resistance, reactance, phase angle gave results that can be considered as significant. The changes of the averages values both in the case of cyclotronic treatment and in the case of acupuncture treatment are shown in the respective Diagrams (Diagrams 1-6).

In the diagrams showing the variation of the average phase angle (reactance/resistance $\times 180/3.14$, a parameter that represents the ratio between intra and extracellular water volumes), the greater variation brought about by the cyclotronic treatment stands out clearly (Diagrams 3, 6 and especially 9).

In addition to the graphic expression of the average values of the three electromagnetic parameters, the observed variations were statistically processed. The T test was applied for purely indicative purposes, being aware that, due to the limited size of the sample and the characteristics of the sample curves, this value is not specific. The T test is reported under each Diagram.

CYCLOTRON

Diagram 1



Cyclotron frequencies group, the average resistance (Ω) is:

- 575.48 at T0
- 580.03 at T1
- 562.29 at T2

A clear decrease in resistance is detectable between T0 and T2. These data encourage to make further studies, based on larger numerical samples.

The T test shows no significant increase between T0 and T1, $P > 0.05$ ($P = 0.15$) while it is significant between T0 and T2 $P < 0.05$ ($P = 0.0038$) (Diagram 1).

Table 1 shows the lower and upper values of the resistance for a 95% confidence interval and the deltas (not SD) of the averages recorded between T0 T1 and T0 T2:

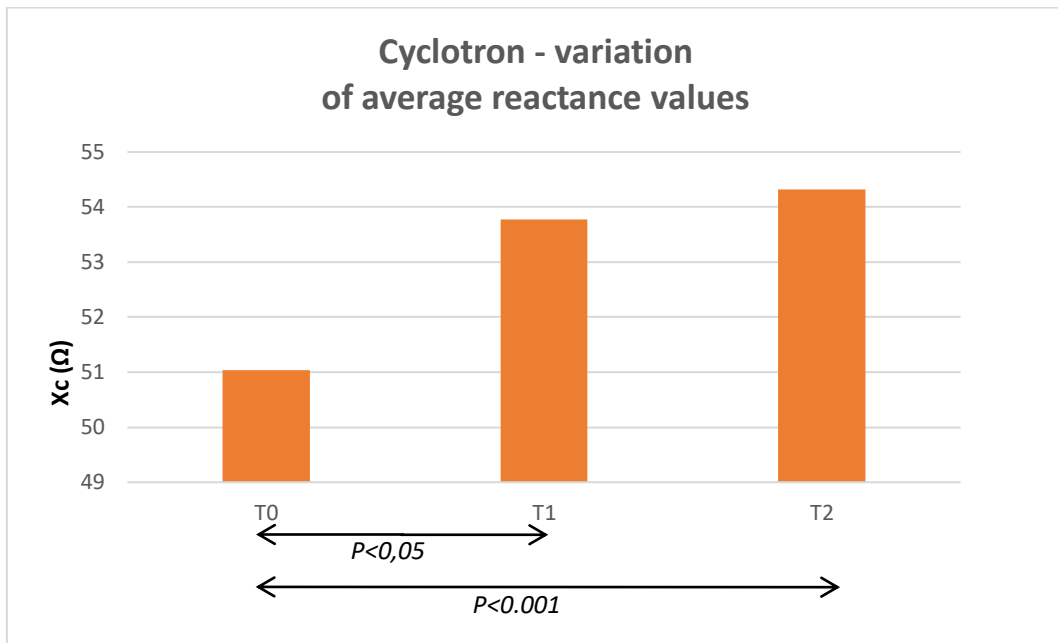
$\Delta T0 T1 = + 4.6$

$\Delta T0 T2 = -13.2$ (table 1).

**Table 1. Cyclotron - lower and upper values of resistance (Ω)
Delta of average resistance values (Ω)**

RESISTANCE AT:	95% confidence interval for the difference		ΔT_0
	Lower	Upper	
T0	557	590	
T1	560	594	+4.6
T2	554	586	-13.2

Diagram 2



Cyclotron frequencies group, the average reactance (Ω) is:

51.03 at T0

53.77 at T1

54.32 at T2

The increase of reactance between T0 and T2 is clearly detectable.

The T test shows a significant increase between T0 and T1, $P < 0.05$ ($P = 0.005$) and between T0 and T2 $P < 0.001$ ($P = 7.97E-09$) (Diagram 2).

Table 2 shows the lower and upper values of reactance for a 95% confidence interval and the deltas (not SD) of the averages recorded between T0 and T1 and T0 and T2:

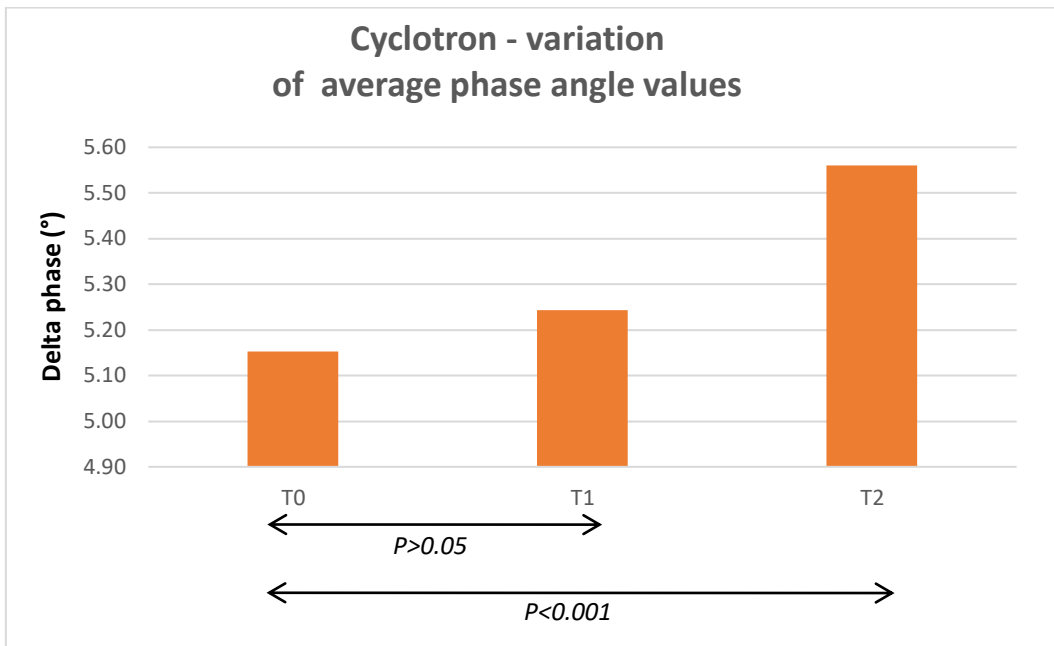
Δ T0-T1 is + 2.7

Δ T0-T2 is + 3.3 (table 2).

**Table 2. Cyclotron - lower and upper values of reactance (Ω)
Delta of average reactance values (Ω)**

REACTANCE AT:	95% confidence interval for the difference		Δ_{T_0}
	Lower	Upper	
T0	50	55	
T1	52	57	+2.7
T2	51	56	+3.3

Diagram 3



Cyclotronic frequencies group, the average phase angle ($X_c/R_z X180/\pi$) is:

5.15 at T0

5.24 at T1

5.56 at T2

The increase of the phase angle between T0 and T2 is clearly detectable.

The T test shows a not significant variation between T0 and T1. $P > 0.05$ ($P = 0.22$). and a very significant variation between T0 and T2 $P < 0.001$ ($P = 7.83E-8$) (Diagram 3).

Table 3 shows the lower and upper values of phase angle for a 95% confidence interval and the difference (not SD) of the average values recorded between T0 and T1 and between T0 and T2:

$\Delta T0 T1$ is +0.1

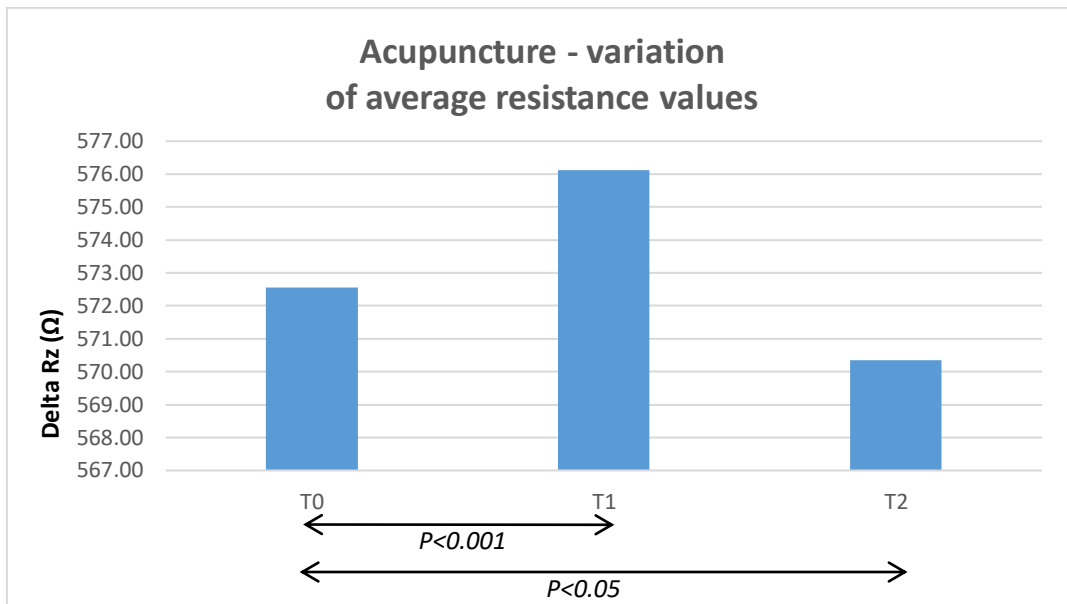
$\Delta T0 T2$ is +0.4 (table 3).

**Table 3. Cyclotronic - lower and upper values of phase angle ($X_c/R_z X180/\pi$)
Delta of average phase angle values (°)**

PHASE ANGLE (°) AT:	95% confidence interval for the difference		ΔT_0
	Lower	Upper	
T0	4.99	5.61	
T1	5.14	5.70	0.1
T2	5.12	5.67	0.4

ACUPUNCTURE

Diagram 4



Abdominal acupuncture group, the average resistance (Ω) is:

572.55 at T0

576.13 at T1

570.35 at T2

A clear decrease in resistance is observable between T0 and T2. These data encourage further studies based on larger numerical samples.

The T test shows a significant variation between T0 and T1 $P < 0.001$ ($P = 0.0004$). The variation is significant also between T0 and T2 $P < 0.05$ ($P = 0.047$) (Diagram 4).

Table 4 shows the lower and upper values of the resistance for a 95% confidence interval and the deltas (not SD) of the averages recorded between T0 T1 and T0 T2:

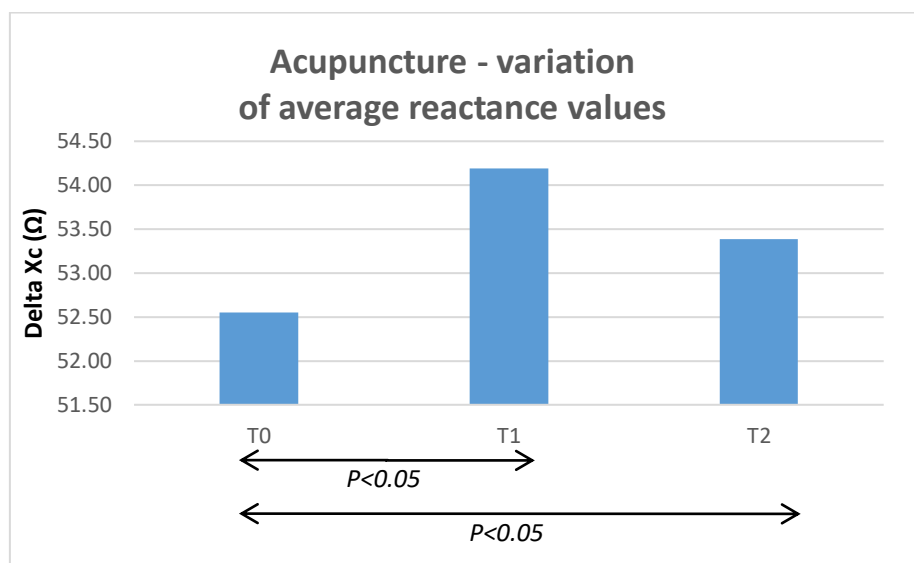
Δ T0-T1 is +3.6

Δ T0-T2 is -2.2 (table 4).

**Table 4. Acupuncture - lower and upper values of resistance (Ω)
Deltas of average resistance values (Ω)**

RESISTANCE AT:	95% confidence interval for the difference		Δ T ₀
	Lower	Upper	
T0	555	590	
T1	558	594	+3.6
T2	552	589	-2.2

Diagram 5



Abdominal acupuncture group, the average reactance (Ω) is:

52.55 at T0

54.19 at T1

53.39 at T2

The increase of reactance between T0 and T2 is clearly visible.

The T test shows a significant increase between T0 and T1. $P < 0.05$ ($P = 0.011$) and between T0 and T2 $P < 0.05$ ($P = 0.045$) (Diagram 5).

Table 5 shows the lower and upper values of reactance for the 95% confidence interval and the deltas (not SD) of the averages recorded between T0 and T1 and T0 and T2:

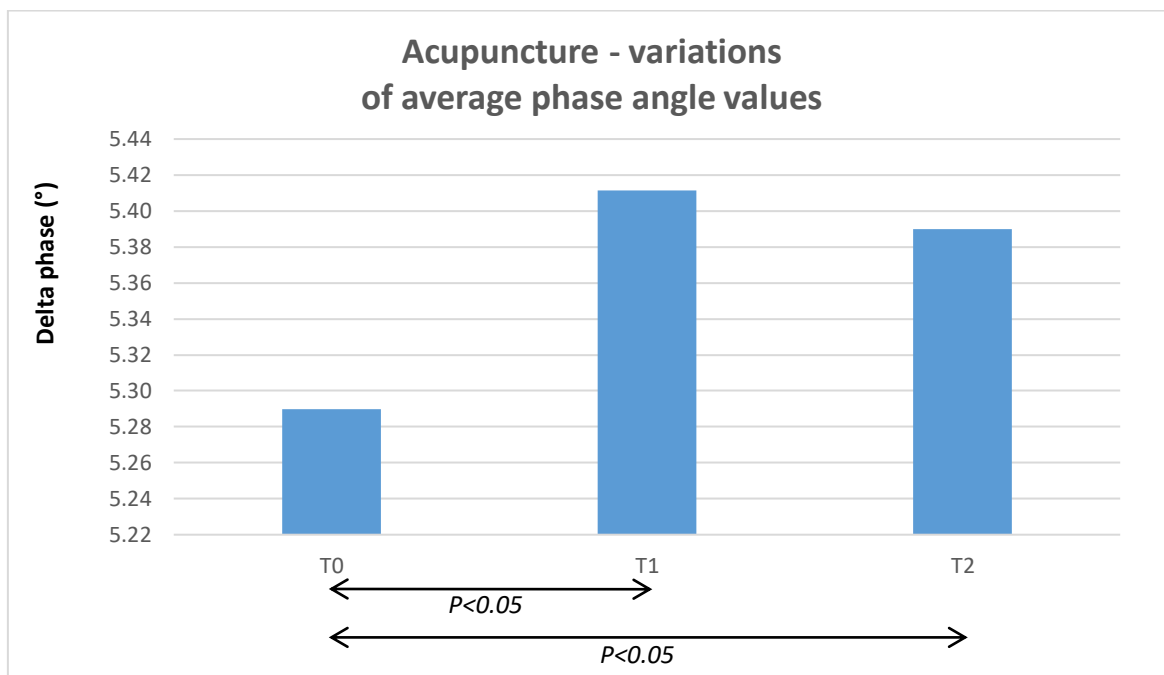
Δ T0 T1 is +1.7

Δ T2 T0 is +0.8 (table 5).

**Table 5. Acupuncture - lower and upper values of reactance (Ω)
Deltas of average reactance values (Ω)**

REACTANCE AT:	95% confidence interval for the difference		Δ T ₀
	Inferiore	Superiore	
T0	50	55	
T1	51	57	+1.7
T2	51	56	+0,8

Diagram 6



Abdominal acupuncture group, the average phase angle ($X_c/R_z X_{180}/\pi$) is:

5.29 at T0

5.41 at T1

5.39 at T2

The increase of the phase angle between T0 and T2 is clearly visible.

The T test shows a significant variation between T0 and T1 $P < 0.05$ ($P = 0.038$) and a significant variation also between T0 and T2 $P < 0.05$ ($P = 0.02$) (Diagram 6)

Table 6 shows the lower and upper values of the phase angle for a 95% confidence interval and the difference (not SD) of the average values recorded between T0 and T1 and between T0 and T2:

$\Delta T0 T1$ is 0.1

$\Delta T2 T0$ is 0.1 (table 6).

**Table 6. Acupuncture - lower and upper values of the phase angle ($X_c/R_z X_{180}/\pi$)
Deltas of the average phase angle values (°)**

PHASE ANGLE AT:	95% confidence interval for the difference		ΔT_0
	Inferiore	Superiore	
T0	4.97	5.61	
T1	5.13	5.70	+0.1
T2	5.10	5.67	+0.1

Comparison cyclotron vs acupuncture

The Diagrams 7, 8 and 9 compare the variations of resistance, reactance, phase angle in the cyclotron group vs. the acupuncture group.

Diagram 7

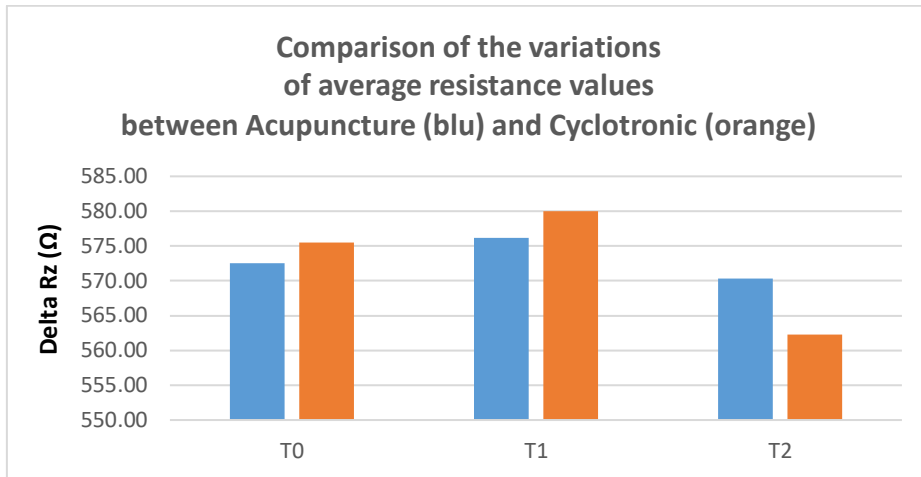


Diagram 8

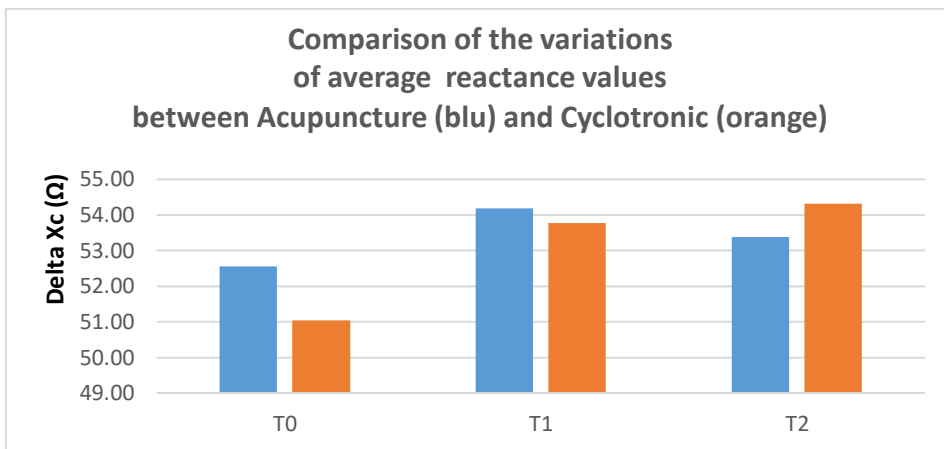


Diagram 9

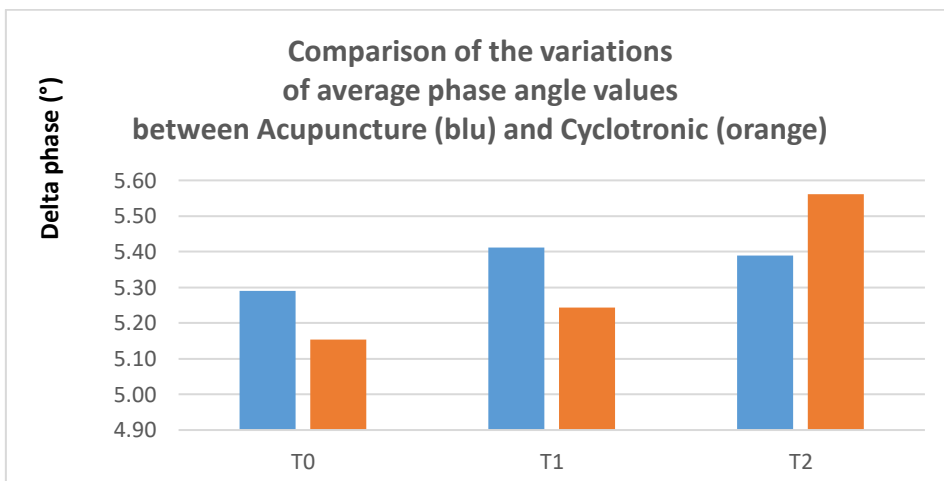


Table 7 compares the deltas of the average values of resistance, reactance and phase angle in the two groups:

Table 7. Cyclotron vs Acupuncture - Comparison of deltas of T0 T2 average values of resistance (Ω), reactance (Ω), phase angle ($^\circ$)

Cyclotronic		Acupuncture	
T0-T2 resistance	- 13.2	T0-T2 resistance	- 2.2
T0-T2 reactance	+ 3.3	T0-T2 reactance	+ 0.8
T0-T2 phase angle	+ 0.4	T0-T2 phase angle	+ 0.1

The comparison Cyclotron vs Acupuncture shows that the cyclotron variations of the three parameters: resistance, reactance, phase angle at T2 are higher, indicating a greater effect of cyclotron treatment, albeit within the limits of the limited size of the sample.

Tab. 8. T test values in the comparison Cyclotron vs Acupuncture at T2

T test resistance comparison at T2	$P = 0.0062$	$P < 0.05$
T test reactance comparison at T2	$P = 0.0001$	$P < 0.001$
T test phase angle comparison at T2	$P = 1.58101E-05$	$P < 0.001$

5. DISCUSSION

The results of the experiment highlight the similar effects of both acupuncture (at the specified points) and exposure to the sequence of ion cyclotron frequencies specified in Materials and Methods.

As expected from the consolidated theory on the function of acupuncture, after acupuncture on acupoints with proved effect, at a distance of 8 hours, the electrical resistance decreases while reactance and phase angle increase. This is in accordance with what happens in the presence of an amount of intracellular water greater than extracellular water. The same happens even more markedly with exposure to the cyclotron frequencies.

The above gives as well an explanation of the phenomenon: the intracellular water is notoriously a water with greater conductivity and lower viscosity than ordinary water, which justifies the decrease in resistance and the increase in inductive reactance. The latter in fact opposes the passage of current and increases in relation to the increase in current. Once we consider the cell, in particular the cytoplasm, as an aqueous solution of ions and amino acids [23, 24], the cyclotron frequency has the effect of producing ionic currents in cells. These results are compatible with the two-phase water model that arises from the quantum molecular physics of liquid water. According to this model, liquid water consists of a fraction of coherent water, where the water molecules are organized in *clusters* or *coherent domains*, which are formed by molecules whose quantum oscillations are in phase, and from an incoherent fraction, formed by molecules isolated or linked by the weak hydrogen bond. As indicated by this model, intracellular water has a greater fraction of coherence domains than extracellular water and the results of this experiment appear consistent with this hypothesis, indeed providing a therapy to increase intracellular water through acupuncture or exposure to cyclotron frequency.

Since this model also describes the coherence domains as free energy *reservoirs*, which allow the ionic currents to overcome the kinetic noise caused by the Brownian motion of the bulk molecules [25], a higher coherent fraction of the cytoplasmic water means a greater chemical activity of the cell, greater trophism, greater cell tone and ultimately greater viability.

6. CONCLUSIONS

Both acupuncture and exposure to the alternating magnetic field, tuned with the geomagnetic field to generate ion-resonant cyclotron frequencies, determine a decrease in resistance and an increase in reactance and phase angle of impedance at the points of application. This effect leads to an increase of intracellular water, which in turn indicates a greater quantity of free energy, available for chemical activity and ultimately for cell viability.

Further research is needed to consolidate the results of this experiment as well as to highlight the opposite effect: induction of the efflux of intracellular water into the volume of extracellular water through the use of cyclotron resonance suitable to modulate the *ion-gated* membrane channels.

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Figure 1: MED CRI device for cyclotron electromagnetic treatment

The value of the vector component **X** (relative to the NORTH) of the geomagnetic field, parallel to the alternating magnetic field, was increased by creating a relatively strong static magnetic field (**40 μT**), in the same direction of the alternating field. The selected cyclotron frequencies for treatment were calculated through the formula (1).