Experimental clinical trial:

Variations assessment obtained on some Bio-physical parameters through the use of Far-Infrared (FIR) frequencies BIOWAVER

Keywords: Far Infrared, Acidosis, Oxidative Stress, M.U.S. (Medically Unexplained Symptoms), Extracellular Matrix, Infrared, Biophotons, Biowaver

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ABSTRACT

This experimental research was conducted to evaluate, at the outset, the changes that the use of frequencies in the Far-Infrared spectrum can determine on some Bio-Physical parameters determined through the analysis of indexes of body composition parameters using impedance analysis.

According to the data obtained will be explained in a further experimentation as, a more prolonged administration of such frequencies, can bring benefits at the level of the main Bio-Physiological and Psycho-physical parameters, as well as the parameters related to a better quality of sleep.

The sample, consisting of 92 people, has completed the entire trial. The study is made entirely voluntary, through direct information for auto-enrollment on the ongoing trial, obtained by the attendance of our study.

The use of mats issuers waves of the Far-Infrared (BIOWAVER) significantly improved the Phase Angle (PA) of Bio-impedance analysis and the levels of extracellular water (ECW).

Finally, as regards the compliance of the therapy was rated quite good by 97% of study participants while the degree of well-being obtained from the same has been judged positively by the 98% of the sample.
INTRODUCTION

It is now widely documented in Literature that the augmentation of the acidosis of the tissues, increase, in a proportional way, the percentage of gelled aqueous component of the extracellular matrix. This determines a significant slowdown of both biochemical as well as metabolic bio-physical trade that represent the basis of a correct homeostatic balance fundamental in order to maintain active the complex web of bio-cybernetic exchange between the environment and the cell, represented by the extracellular matrix, as well as the maintenance of the communicational skills at the level of the Psycho-Neuro-Endocrine-Immune-Metabolic axis.

In order to maintain the cell balance is critical that there is a proper supply of oxygen to the body, that allows an aerobic glycolysis, a prerequisite for optimal energy yield to the maintenance of the maximum membrane potential. Indeed a correct nutritional and informational exchanges is fundamental for the well-being of the body.

The battery provides power because its poles have a different electrical potential: the cell nucleus must have an acid reaction and an alkaline cytoplasm. This potential difference is fundamental to allow the exchange of nutrients and informations between the nucleus and the cytoplasm and such exchanges can occur only with a sufficient potential difference.

If the environment in which the cells live becomes much acid, this acidity excess could penetrate within the cells (by altering pH and membrane potential) creating metabolic conditions for those negative phenomena which are commonly referred as "diseases by cellular degeneration." Underlying these changes are the alteration of the microcirculation: all that is muscular acidosis goes into spasm and the small arterial vessels of the microcirculation make no exception. In addition to this, in acidosis, there is the creation of a stacking of red blood cells with less possibility of transferring oxygen coming from the free membrane surface that is indeed greatly reduced. In such a way there is the creation of a vicious circle where the least amount of oxygen to the tissues intake facilitates the greater formation of acids, with reduction of energy production by the cells and lower intake capacity of oxygen to the same tissue caused by acidosis.

The chronic tissue acidosis affects the transport of oxygen and nutrition of the cells, creating toxic conditions predisposing to the onset of inflammation and diseases. Early symptoms of this acidification are the following:

- Lack of mental concentration;
- Decreased muscle strength and increase in recovery time from post-exertion fatigue;
- Significant fatigue, osteoporosis and sweating to feet and hands;
- Sleep disturbances, insomnia;
- Oily skin and less resistance to infection;
- Chilliness, bad breath and constipation;
- Headaches, anxiety, and swings mood.

To reduce the damage given by endocrine imbalances related to the state of tissue acidosis is fundamental to obtain a situation of alkalosis during the night in order to promote the restoration of the functionality of the immune system and its ability to drain-cleaning of toxins. Generally the liver and the kidneys are activated in order to eliminate the acidic metabolic waste produced by the psycho-physical stress. Thanks to the action of enzymes which release acids into the blood stream, these can be brought in the kidney and finally excreted from the body (for this reason the first morning urine are strongly acidic).
Therefore, the extracellular matrix is a transit system and deposit in which the exchanges between the metabolically active cells and the circle happen.
As in respiratory and blood buffer systems, even here, the disposal of acid catabolites is conditioned by an adequate presence of bicarbonates. In addition to a food alkalizing practice, therefore, extreme
importance is also the proper functioning of the fundamental microcirculation architect of mesenchymal drainage. Indeed it’s necessary to considers that the phase of extracellular deposit of the waste metabolism follows that of the cell impregnation much more dangerous and destructive.

The human body is made up of multiple tissues, that are organized into different organs, grouped functionally in equipment or systems. What link these different elements and allows them to communicate with each other and work in synergy is the mesenchyme, consisting of the basic substance (salty and glycoprotein) of the connective tissue, the capillary system, lymphatic terminal and the terminations of the autonomic nervous system. All nutrients, hormones, antigens, to get from the blood and lymphatic tissue compartment must pass through the mesenchyme, which therefore is the seat of each intercellular communication. The disease is determined by a cause acute trigger, which can be both physical as well psychological, and that becomes cause of the acute disease that often leads the patient to the consultation.

The fundamental task of the physician is to determine at what point of this bio-cybernetic complex network is more appropriate to fit for a diagnostic-therapeutic intervention, and, above all, how to do that in scientific form avoiding excessive interventionism, but at the same time ensuring a rigorous accuracy accompanied by high sensitivity and specificity. An acidic environment is a favorable ground for the onset of inflammatory processes, and so it’s very important to alkalize our tissues as far as possible, even through a targeted diet, choosing more alkaline foods such as fruits and vegetables, or supplementing the diet with basifying substances such as mineral salts.

Metabolism is changed in two phases: Orto and Parasympathetic. The first one favours the production of energy, instead the second one is fundamental for the restorative processes. For such reasons is important to support especially the night Parasympathetic stage, that becomes a priority to improve the functionality of the immune system.

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BIOPHOTONS, MICROCIRCULATION, INFRARED AND FAR INFRARED

These statements are even more significant in specific areas such as those of professional sports, where the accumulation of lactic acidosis is closely and proportionally related to the level and duration of the physical effort made during the performance. These accumulations are extremely harmful as they interfere in capacity of long distance transmission of photonic informations that run through the body in matrioms (the meridians of Traditional Chinese Medicine) and which are the basis of a correct energy-postural organization of the body.

Bioenergetics medicine is a branch of quantum medicine and belongs to the field of non-linear biophysics. Higher organisms react to individual quanta of electromagnetic energy and resonate with specific and certain frequencies. These signals propagate in the body, along microtubules, in traditional Chinese medicine called Meridians, formed from filaments composed of chains of macromolecules (networks of chains peptide), as polarized waves (solitary waves = solitons).

The German scientist F.A. Popp has dedicated her studies mainly to test the hypothesis that the cells communicate with each other (FA Popp in 1985, 1997, 1998, 2000, 2005, 2006, 2007, 2008), especially in remote transmissions with energy light (biophotons) and only secondarily and locally through the biochemistry. The cells communicate in the field of frequencies ranging from infrared to ultraviolet rays, that is, the wavelength (λ) of visible light ranging from 200 to 800 nm.

The biophotons are nothing more than a sophisticated communication language based on the frequency, the intensity, the dimension and waveform: all these features serve to specify the content of the information, its origin and its function through a resonance system between similar structures.

The biophotons are different from each other in function of the amalgamation of the frequencies of the individual atoms from which they are derived (sum of constructive and destructive interference of set) and the intensity of emission given by the energy level related to the components of that tissue or organ.

As each tool has a wave characteristic for shape and size such as to make us recognize the origin of an instrumental sound, so every organ in our body emits particular photons equivalent to specific electromagnetic waves to shape, frequency and size in order to recognize the rest of the organism their origin: the biophoton is characterized by an extreme specificity given by the frequency and the type of different and unique curve for each type of cell or tissue. The basis of its strength comes from phase coherence that allows it to move at the speed of light, but much more effectively, through matrioms (or meridians of Traditional Chinese Medicine), distributing the information to the whole body that are proper. In the case of precisely defined frequencies it will experience clear resonances with certain biomolecules, with cell structures, organs and apparatuses, strengthened by the coherence properties of laser light.

The biophotons, suitably processed by our DNA, which radiates 90%, provide the polarization of cell membranes: a reduced or lack of biophoton intake reduces cell polarization and leads to disease. The alterations of the biophysical criteria, but mainly electrophysical, communicate quickly over long distances in biological fluids along the streets of superconductivity that roughly correspond to the streets of the Chinese acupuncture meridians (Gerber, 1988; Popp 2005 and 2007).

Being electrically conductive, with modern equipment, the path of "meridians" can be measured in the terminal points and at certain other points of the body along their route (or resistance measurements of electrical capacitance of acupuncture points).

The modern biocybernetics and science of bio-resonance allows, by measuring and packaging of regulatory mechanisms in charge of biochemical processes, both a personalized diagnosis as well as a causal therapy allowing to gradually remove all the blocks that prevent the recovery of harmony/balance of the entity mind/body (Formigoni 1998).
This harmony is maintained by the control based on electromagnetic oscillations of different duration, intensity, frequency, and waveform (Martra 1997).

Each organ in the body generates its own frequency and electromagnetic waveform: this hue and pulsatility are characteristics and specific within the body and through these characteristics it’s possible to come into resonance using the various tolls.

The cellular magnetic field (remember that each electric potential difference, also that of the cell membrane, creates an electromagnetic field) is closely linked to the mass-form of the cell: a practical demonstration of this fact is given by the NMR (Nuclear Magnetic Resonance) which highlights the diversity of tissues by discriminating the different endogenous magnetic field produced by each individual cellular units. In magnetic resonance imaging of the target tissue cells are stimulated with exogenous magnetic fields that share the same physical characteristics as the endogenous cellular putting in resonance.

During the application of magnetic fields or frequencies of the Far-Infrared (through BIOWAVER Mats’) we have to keep in mind that we are acting on living tissues and so, the characteristics of cellular magnetic fields are constantly changing, following the health or disease plan of the organism (biochemical/energetical homeostasis related to P.N.E.I.M. system: Psycho-Neuro-Endocrine-Immune-Metabolic).

The most important effects induced by pulsed magnetic fields and frequencies from the Far-Infrared are:

- Anti-inflammatory effect with reduction both in terms of time that intensity of edema;
- Angiogenic action which accelerates the healing process.
- Draining effect on the tissue matrix with detoxification and less water retention and lymphatic tissue;
- Effect of tissue repair, and in particular on the bone tissue or in tissues damaged by radiation;
- Better oxygenation on the tissues with best energy efficiency and membrane potential;

Consider then usually, in everyday life, our body is immersed in electromagnetic fields, that are not always healthy, commonly known as “electromagnetic smog”.

The infrared rays, the far-infrared and their interaction with the human body

A normal infrared ray is a type of electromagnetic wave, which has a wavelength ranging from 760 to 1000 nm (10^{-6} m), and is outside the visible range.

The far infrared rays are referred to that part of radiation that has a wavelength greater than 4-5 μ (microns) and which has a greater power of penetration in the human body. These types of energies can activate the vitality of DNA and RNA in the cells, increase the production of ATP (adenosine triphosphate) which is the ability to produce energy in the human body, facilitate and accelerate the recovery and cell replication in the presence of damage at the cellular and organic structure.

To fully understand these mechanisms of action is necessary to consider three basic aspects in the interactions between matter and energy:

1. The human body is made up of about 70% of water and from organic and inorganic molecules.
2. The human body easily absorbs infrared rays.
3. The human body behaves as a black body with waves of far infrared: retains the waves from which is irradiated and emits new.

When an electromagnetic wave affects our body, the rays of certain wavelengths are reflected, other cross it undisturbed, and others, of a particular wavelength, such as the far-infrared, are absorbed.

The frequency and the vibration energy of the far infrared shrinks the shape and aggregation (cluster) of the water molecules with a consequent increase in the hydration capacity. All this, combined with the increase of the heat of the blood in the vessels and the consequent vasodilatation, involves a greater fluidity of body fluids (blood, lymph, fat) with increase of the movement and a better scavenger effect of toxins accumulated in the extracellular matrix (ECW).

The closer are the blood vessels and denser fluid, the more it reduces the circulation, increases the risk of blood clots, deep vein thrombosis, stroke ...

Our body absorbs and simultaneously radiates waves of far infrared: the natural frequency of the water absorption peaks and the constituent proteins of the human body fall in the far infrared, which explains why the human body easily absorbs electromagnetic waves at a frequency between 4-16 μ (far-infrared).

To understand how it works in the human body it is necessary to describe the body as a black body. The laws that manage the physics of blackbody (Planck's law, Wien and Stefan-Boltzmann) are applicable with good approximation to many real-world objects including the human body.

**THE BLACK BODY**

It is a body that absorbs all incident radiation and for this reason it is called "black". It still may issue a new radiation, to become visible.

For example, the sun behaves as a black body. At what frequency you have the maximum emission? Resorting to the Wien law cited above, the rate at which it has the maximum emission is 9.5 microns, the intermediate region of the far infrared (4-16 μ).

A graphical representation of what is enunciated by these laws is represented by the graph below; it is observed that increasing the temperature of the black body has an increase in total energy emitted and a lowering of the wavelength at which there is the maximum emission.

If we considered the human body which has a temperature of about 30 degrees, the curve would have the peak at a wavelength included between the 4-16 μ.

- Human Body Temperature = 305 K (Kelvin) about 32°C
- Room temperature = 293 K (Kelvin) about 20°C
We obtain that the net power emitted by the human body is 95 watts. This means that the human body behaves as if it was a 100 W light bulb with the only difference that it has no emission in the visible (the human body does not light!) But in the infrared spectrum.

Now it can be said that the human body absorbs and emits radiation in the far infrared (FIR) which is decisive for the global energy balance, well visible though an infrared photography.

We can see on the right the natural emission of the human body in an IR image (scale of temperature from 73.6K - 23°C to 93.4K - 35°C). Scientists are unanimous in believing that the far-infrared rays present in sunlight are essential to all forms of animal or plant life.

The pace of modern life and the same human activities of our day have significantly reduced the contribution of solar energy to our body. We live and work in enclosed buildings, we live between the concrete and the asphalt, we do not walk more in direct contact with the earth.

The far infrared radiation that we absorb are rather than the minimum necessary for the harmony and the general well being of our body.

The far infrared rays (FIR) possess the fundamental properties for the physiological well-being.

The most interesting are the follows:

**Reflection**: The infrared rays directly generate heat radiating bodies and are partly reflections from the bodies themselves.

**Penetration**: The far-infrared rays are characterized by the ability to penetrate deep into the body tissues.

**Resonance**: Penetrating in living tissues belonging to the far infrared rays activate (resonate with) the water molecules producing movements of rotary type and a global rise in body temperature.

Therefore the men produce heat that is dispersed into the environment. The skin acts as an interface between the heat production and the environment. This dynamic organ is constantly adjusting to balance the internal and external conditions, meeting the physiological needs of the body and external input.

Several studies have established that the rays of the far infrared (that resonate with the water molecules constituting the human body) are able to generate heat, producing a mild and pleasant elevation of the cutaneous and subcutaneous temperature.

The immediate result of this is, above all, a natural expansion of the capillary vessels resulting in improved blood circulation. Under the exposure of far infrared rays on the body is therefore affected by a special feeling of well-being, but in addition to improved blood circulation, exposure to far infrared producing a further set of benefits:

- Reduces the gelation of the extracellular matrix (temperature dependent);
- It stimulates the scavenger activity of the immune system on the extracellular matrix;
- Normalize the level of oxygen in the blood, improving the supply to the tissues;
- Activate cellular metabolism improved by the greater supply of oxygen;
- Reduces fatigue (reduction in tissue acidosis levels) and relieves stress;
- It improves the sweating system and prevents bacterial growth.

Its marked analgesic and anti-inflammatory properties of far infrared waves are conducted due to their high penetrating power. This produces an acceleration of skin absorption of creams, gels or healing ointments allowing a more rapid effect.
Another important aspect related to the far-infrared radiation is to increase the postural balance of the person both static and dynamic. The results showed an increase in proprioception, the ability to perceive and recognize the own body position in space and the state of contraction of the muscles, without the support of view. The last phenomena is, so far, the less known.

It is believed that the frequencies of the Far Infrared, resonating with the ones naturally used by the brain and the nervous system to control muscle movements, amplify and optimize the signal, allowing optimum utilization of their abilities, with results that are close to those of professional athletes to pursue with the toughest workout.

Due to their wavelength, the Far Infrared rays penetrate deep into the skin and in the muscles (up to 5-7 cm). Depending on the quantity of infrared rays, the inside of the body will heat up, triggering thermoregulatory mechanisms that determines a dilatation of blood vessels and skin sudorifics pores. Toxins, which are mainly contained in the fat layers are simultaneously released and protrude more easily. This phenomenon also promotes healing of wounds and infections. At lower levels, the infrared rays cause a nervous stimulus to the hypothalamus, a part of the brain responsible for the production of a multitude of neurochemical-hormonal substances, which in turn regulate the blood pressure, the immune system, pain, sleep as well as the mood.

They are also capable of crushing the clusters (aggregates of many molecules) of water that are formed naturally in the human body and that can imprison both nutrients, toxins and fatty substances. Breaking the bonds of these macromolecules, promote the absorption of nutrients by the cells, improved circulation of the fluids and the removal of toxins and lactic acid accumulated in the spaces of the extracellular matrix.

It can be obtained a condition very similar to that which occurs during the fever, that usually is important in order to help the body to counteract the excess of toxins or aggressors (bacteria, viruses) which disrupt the normal state of physiological homeostasis of the body.

Whereas in each sports practice the body sweats, as a result of the need to rebalance the internal temperature (hot climate and in the presence of high stress, the production of sweat can also reach 2 liters per hour and even in winter the body during intense sports activity can produce even 1 liter of sweat per hour), it is essential to remove as soon as possible toxins and acidosis produced to prevent the muscle contracture.

The psycho-physical-emotional is a "multimedial" concept, so many and various due to the variables that flow between them to determine this. When the common blood tests have an alteration in blood benchmarks "normal" we are already faced with significant damage cell membranes with cell death, while it would be important not to reach the damage, but take action before it is beyond repair, maybe with minimally invasive therapies such as informational ones (Baron 2012 and 2013, Roberti 2014, Sclauzero 2005 and 2007).

So if we really want to go to the heart of the problem and work in true prevention by keeping the person within the Well-Being and not just of Health, knows as the absence of disease, we have to monitor the function of the organs and the delicate balance underlying the homeostatic exchange processes of trans-membrane and cellular nutrition.

Oxidative stress is one of the emerging risk factors for the health and is classically defined as the final effect of the imbalance between production and elimination of oxidizing chemical species, namely ROS (Reactive Oxygen Species), generally of a radical nature and centered on the alteration of the oxygen molecules (Giammarioli 1998, Martra 1997, Popp 2007).

Free radicals are "waste" products that naturally coming from the body's cells when oxygen is used in metabolic processes to produce energy (oxidation). In minimum quantities they help the immune system in the elimination of the germs and in the defense against bacteria, but when this production is too high, this could determine a damage, called oxidative stress, which, in the long run, results in a progressive wear.
Numerous studies in Literature suggest an active role of oxidative stress and elevated levels of tissue acidosis (Ciaranfi 1979, Giammarioli 1998, Jammes 2005, Kurtz 1983, Pancheri 1986, Popp 2007 Popp in 2008, Precious 1992, Racciatti 2001, Shanks 1998) can determine functional impairment of the neuro-vegetative system as well as it can give rise to various clinical disorders both organic and psychic (Epstein 2006, Paolelli 2000, Pellegrini 2003, Pizzorno 2001, Sclauzero 2005, Sclauzero 2007, Sclauzero 2008, Selye 1956, Smith 2003, Smith 2004, Weiner 1981, Woivalin 2004) as well as the aging process, which initially manifested by the appearance of MUS (Medically Unexplained Symptoms) very general symptoms such as difficulty concentrating or decreased memory, panic attacks, Crying spells and / or anxiety and / or depression, frustration, persistent drowsiness during the day, disorders of the sexual sphere, insomnia or recurrent nocturnal awakenings, hormonal disorders and / or functional disorders of the thyroid, lowering of the immune system, headaches and / or hands and feet often cold, dermatologic Problems, Variations (decrease / increase) of body weight will not be associated with changes of food’d habits, Feeling of general weakness and / or lack of sweating during movement, muscle-skeletal disorders: bone and joint pain, loss of strength and / or motility, increases in heart rate at rest and / or presence of hypertension / hypotension, functional gastrointestinal disorders: acidity, feeling nausea / fullness / bloating, constipation, irritable bowel syndrome.

If the subject is in a good state of health, these symptoms are not present. Instead in the moment in which someone of these are manifested, the greater the number of symptoms, the worse is the clinical situation. This is linked to the degree of imbalance and impairment of the Neuro-Vegetative System of the person. Moreover, in an indirect way, if the level of acid-base balance is impaired, it can lead more easily to acidosis.

Scientific studies (Popp 2005, 2006) have shown that the radiation from the Far Infrared help the body to remain steady in every situation bringing visible benefits to the postural stability.

The “BIOWAVER” mats emission of radiation from the Far Infrared are constituted by a carbon fiber material that, after a particular treatment, are included in the mat itself and have the property of emitting, at room temperature, the rays of Far Infrared.

This has opened up new vistas to the Wellness and preventive health by giving the ability to stir the toxic substances, as well as the metabolic waste and the body acidosis, from the extracellular matrix to the blood stream from which are then eliminated through sweat, urine and feces. This determine, not only an immediate psychological well-being, but above all an improvement of the body’s homeostasis.

If the organism produces a quantity of acidic metabolic waste higher than that which is able to neutralize and eliminate, the residual waste will accumulate in the extracellular matrix that will, over time, lead to tissue acidosis. In connective tissue, the smaller variations homeostasis may lead to structural changes in the fundamental substance (either protein or related to the percentage of water in the crystalline state).

Many of these changes are to be correlated to the storage of acidic residues, resulting from cellular catabolism or inflammatory reactions. In these cases, it changes the colloidal state of the district and consequently alters the ability to transport and transfer of the physical and chemical messages, but also electromagnetic, between the tissues and the rest of the organism, in particular to the CNS structures deputies to homeostasis (bulbar and hypothalamic centers).
**PURPOSE AND ETHICAL ASPECTS OF THE STUDY**

Evaluate through a Clinical Trial Prospective Longitudinal Observational the effectiveness of the administration, through a mat in Carbon fibers, the frequency of far infrared in improving some anthropo-bio-physical parameters related to a better supply of oxygen to the microcirculation with relative improved tissue oxygenation.

This assessment was carried out by the relief of some clinical parameters and Analysis of Body Composition through Bioimpedensiometry (BIVA method) with Akern BIA 101 equipment.

**purposes**

**Primary**

- Improve some of Psyco-Physical and Wellness indices detected through the analysis of Body Composition through Bioimpedensiometry technique.
  
  - P.A. (Phase Angle): It represents the measurement expressed in degrees of the relationship between resistance and capacitance. A low grade represent a system with few intact cell membranes. On the contrary a high degree is a system with intact membranes and a good cell mass.
  
  - ECW (Extra Cellular Water): indicates the quantity expressed in liters of water present in the extracellular environment and its percentage of total body water (TBW). Its value rises in the presence of chronic inflammation.
  
  - BMR (Basal Metabolic Rate): the basal metabolism is the amount of energy (daily Kcal) consumed by an individual who is in the maximum physical and mental rest conditions, in a comfortable temperature in the room and fasted for about 12 hours. The normal value ranging between 1200 and 1400 Kcal / day. Its value decreases in the presence of stress due to the chronic secretion of glucocorticoids and thyroid hormones.

**Secondary**

- Bring the subject as close as possible to the optimum parameters other additional values of Body Composition affected at the Bioimpedentimetric analysis (BIVA):
  
  - TBW (Total Body Water): total body water is the level of hydration and, together at the ECW, the water holding present;
  
  - BCM (Body Cell Mass): is the metabolically active component of the body;
  
  - Ratio Na / K: a corrected Na / K ratio is an index of good cellular nutrition.

In addition to these preliminary results, additional targets will be considered in the wider future studies.

**Ethical issues and patient information**

The proposed treatment with the Far-Infrared waves emitting mat seems ethically acceptable because:

a. It does not involve any invasive act and the product is already normally prescribed in the indications of use authorized for marketing in Italy;

b. it is a natural stimulation, which does not involve risks of significant alterations to the body, makes it possible to use without having to make the tightened monitoring of the clinical situation and without presenting a risk for the patient;

c. the patient has the possibility of recourse at any time to any other medications or treatments if and when necessary;

d. the patient is still required to report the type and dosage of the drugs commonly used in daily therapeutic practice;

g. diagnostic and evaluation procedures correspond to standard practice.
**CLINICAL RESEARCH**

**MATERIALS AND METHODS**

People were not selected, excluding the inclusion and exclusion criteria provided by the protocol, but the sample took in consideration represent a random sample formed for following self-enrollment information posted in our outpatient facility. We enrolled patients aged between 18 and 65 years who have had no previous major cardiovascular events and, if heart patients, with a probability of experiencing a first major cardiovascular event in the next ten years less than 20%. Moreover the patients analysed meet inclusion criteria and that does not fall within the exclusion criteria described later. For this reason the cardiac patients was an evaluation of global cardiovascular risk before being recruited for the study. The timing of data collection and diagnostic evaluation of people enrolled in the observational study was reported in the Time-Line. The different operating phases of the research are calibrated on the Gold Standard guidelines for performing this test:

> **Supine position** on a non-conductive surface adducts limbs to prevent short circuits:
  - angle between the trunk limb: 15-30 ° - check absence of contact underarm.
  - angle between the legs: 35- 45 ° - check absence of thigh root contact.

> **Skin temperature**: measuring in a thermo neutrality both environmental (stabilization in the waiting room at a temperature of 25 °C) that subjective (free from fever or high physical activity) to avoid that the cooling results in vasoconstriction and high impedance values; heating instead produces vasodilatation and, thus, low impedance.

> **Skin preparation**: using cotton wool soaked with ethyl alcohol to remove any secretions and desquamated cells of the stratum corneum.

> **Food & Beverage**: fasting subjects within 4 hours and free of alcohol ingestion.

> **Physical activity**: Meters not before 8-12 hours from intense sporting activities.

> **Respiratory dynamics**: rate and physiological respiratory excursion (modifications of the rib cage involve modifications of the conductive volume) evaluated directly.

> **Menstrual cycle**: exclusion of women during the menstrual cycle due to the resulting physiological changes of the TBW for the ECW, expansion in the premenstrual period and changes in body temperature to effect of progesterone.

> **Testistica**: The people were received after 5-10 minutes passed in the waiting room and after measurement of weight and height were made to sit on the couch and prepared for the detection of blood pressure, heart rate and BIVA. After 5 minutes of stabilization in the supine position was performed the first recording BIVA (T0). After that the far infrared mat was activated for 20 minutes and the values were measured again with the same method of before (T1).

**Correct positioning of the electrodes**: The bioelectrical impedance is determined with a four-pole method. The electrodes should be placed at least 2 cm from the electrodes injectors and the gelled adhesive where apply the electrodes must have an area of, at least, 5 cm².

- To make a correct impedentiometric measurement, four electrodes are usually applied:
  - two electrodes that inject current at very low intensity in the following landmarks:
    - on the back of the hand between the second and third metacarpal epiphysis;
    - on the dorsum of the foot at the level of the second metatarsal epiphysis.
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✓ two electrodes voltage detectors in the following landmarks:
  - on the wrist in an intermediate position between the styloid process of the ulna and radius;
  - on the ankle in an intermediate position between the medial and lateral malleolus.

All data reviewed and crops have been systematically cataloged, processed and implemented successfully in a database file for the subsequent extrapolation of the possible variables emerged after the session of rebalancing through frequencies in the Far Infrared rays.

For each patient were recorded, in addition to the test results Bio-anthropometric, also some clinical-anamnestic parameters:

➢ demographic data (age and sex)
➢ clinical-anamnestic data (height, weight, BMI);
➢ pathologies current and previous.

These data are the object of extrapolation and processing of significance for classes. Statistical analysis of the results was performed using the \( \chi^2 \) test or, if this is not applicable, using the Fisher exact method; if its not applicable it was used the \( \chi^2 \) with Yates correction or if not allowed as well, by Sequential Analysis test.

The Sequential Analysis test is based on the following rules: the red lines of the figure are the boundaries of validity for a triangular mirror and sequential tests with a probability of \( p < 0.05 \) error, a probability of the event of 80% and a relative risk of 0.75:

\[ Z \] is the number of observed events in the control group less the number of expected events given by an equivalent process.

\[ V \] is approximately equal to 25% of the number of events observed.

By Sequential Analysis we also evaluated the possible improvements of the Bio-anthropometric parameters highlighted by Bioimpedentometric analysis. The tests performed were carried out by means of analysis with BIVA Akern BIA apparatus 101 and, as regards the nomenclature used and the related parameters of normality, we report the subsequent summary and explanatory image.

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**Total Body Mass**

**Body Weight in kg**

<table>
<thead>
<tr>
<th>FFM (Fat Free Mass)</th>
<th>BCM (Body Cell Mass or ATM)</th>
<th>ECM (Extra Cell Mass)</th>
<th>FM (Fat Mass)</th>
</tr>
</thead>
<tbody>
<tr>
<td>♂ 78-84% ♀ 75-80%</td>
<td>♂ 66% ♀ 63%</td>
<td>♂ 15% ♀ 14%</td>
<td>♂ 16-22% ♀ 20-25%</td>
</tr>
<tr>
<td>Cells, muscles and organs with active metabolism</td>
<td></td>
<td>structure-supporting bone-mesenchymal-plasma-conveyance, metabolically inactive</td>
<td>Structural Fat ♂ 3% ♀ 12%</td>
</tr>
<tr>
<td>TBW (Total Body Water)</td>
<td></td>
<td></td>
<td>Deposit Fat ♂ 12% ♀ 13%</td>
</tr>
<tr>
<td>♂ 58-65% ♀ 55-62% of the body weight</td>
<td></td>
<td></td>
<td>Visceral reserve / defense (Obesity-Stress)</td>
</tr>
<tr>
<td>Intracellular water</td>
<td></td>
<td>Demineralisation</td>
<td>Emaciation</td>
</tr>
<tr>
<td>55-60% of the TBW</td>
<td></td>
<td>Disidratazione</td>
<td>Slimming</td>
</tr>
</tbody>
</table>

**Note:** The table illustrates the breakdown of body mass into its components, including fat mass (FM), fat-free mass (FFM), body cell mass (BCM), extracellular mass (ECM), and total body water (TBW). The percentages indicate the relative contribution of each component to the total body mass.
**RESULTS**

**Analysis of the Question**

The sample initially consisted of 92 individuals, including 57 females and 35 males, aged between 18 and 75 years, as provided by the inclusion / exclusion criteria.

There has been no drop-out during the trial that was completed by all the 92 people recruited.

The Tab. 1 shows the data relative to the sample examined and the following breakdown by age groups and gender belong: in the table can be highlighted as the most representative age group (51.7%) is that of full maturity (including between 40 and 55 years) and as regarding the sexual belonging the sample is represented to a greater extent by women (73% ♀, 27% ♂).

<table>
<thead>
<tr>
<th>GENDER</th>
<th>AGE (N°)</th>
<th>%</th>
<th>TOTAL (N°)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>MALE</td>
<td>≤ 40 YEAR</td>
<td>9</td>
<td>45.0</td>
<td>25.7</td>
</tr>
<tr>
<td></td>
<td>41-55 YEAR</td>
<td>16</td>
<td>33.3</td>
<td>45.7</td>
</tr>
<tr>
<td></td>
<td>&gt; 55 YEAR</td>
<td>10</td>
<td>41.7</td>
<td>28.6</td>
</tr>
<tr>
<td></td>
<td>AVERAGE AGE</td>
<td>48,6</td>
<td>14.85</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td>38,0</td>
<td>100,0</td>
<td></td>
</tr>
<tr>
<td>FEMALE</td>
<td>≤ 40 YEAR</td>
<td>11</td>
<td>55.0</td>
<td>19.3</td>
</tr>
<tr>
<td></td>
<td>41-55 YEAR</td>
<td>32</td>
<td>66.7</td>
<td>56.1</td>
</tr>
<tr>
<td></td>
<td>&gt; 55 YEAR</td>
<td>14</td>
<td>58.3</td>
<td>24.6</td>
</tr>
<tr>
<td></td>
<td>AVERAGE AGE</td>
<td>48,4</td>
<td>11.72</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td>62,0</td>
<td>100,0</td>
<td></td>
</tr>
</tbody>
</table>

**Evaluation of the Bio-physiological Components**

The total body water (TBW) in the body is one of the most important parameters to evaluate the hydration levels of the people. In our sample (Table 2) we can see that, as a percentage, the males than women are more normohydrated (74.3% ♂, 61.4% ♀).

We can also notice a higher level of dehydration in the male sample than female (17.1% ♂, 8.8% ♀) where instead manifests more discreet water retention less present in males (8.6% ♂, 29.8% ♀). This distribution is statistically significant (χ² = 6.319 with G.L. = 2 and a p <0.0424).

<table>
<thead>
<tr>
<th>GENDER</th>
<th>TBW LEVEL LOW M &lt; 55% F &lt; 46%</th>
<th>N°</th>
<th>%</th>
<th>NORMAL M 55-64% F 46-57%</th>
<th>N°</th>
<th>%</th>
<th>HIGH M &gt; 64% F &gt; 57%</th>
<th>N°</th>
<th>%</th>
<th>TOTAL N°</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>MALE</td>
<td>6</td>
<td>55.6</td>
<td>17.1</td>
<td>26</td>
<td>42.6</td>
<td>74.3</td>
<td>3</td>
<td>15.0</td>
<td>8.6</td>
<td>35</td>
<td>38.0</td>
</tr>
<tr>
<td>FEMALE</td>
<td>5</td>
<td>45.4</td>
<td>8.8</td>
<td>35</td>
<td>57.4</td>
<td>61.4</td>
<td>17</td>
<td>85.0</td>
<td>29.8</td>
<td>57</td>
<td>62.0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>11</td>
<td>100.0</td>
<td>12.0</td>
<td>61</td>
<td>100.0</td>
<td>66.3</td>
<td>20</td>
<td>100.0</td>
<td>21.7</td>
<td>92</td>
<td>100.0</td>
</tr>
</tbody>
</table>

In addition to the hydration level (expressed as TBW) the important point it’s to estimate how much of this water is present in a biologically active status (ICW) or simply conjugated to toxins when expressed by ECW values (Extra-Cellular Water).
Whereas the normal levels of Extracellular water (ECW) change according to gender and age of the people (see diagram) for a more accurate assessment in terms of these parameters we have divided the sample (Tab. 3), in function of the ECW levels, in:

- > Low.
- > Normal.
- > High.

### Table 3

<table>
<thead>
<tr>
<th>ECW LEVEL</th>
<th>LOW</th>
<th>NORMAL</th>
<th>HIGH</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N°</td>
<td>%</td>
<td>N°</td>
<td>%</td>
</tr>
<tr>
<td>MALE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>0</td>
<td>0,0</td>
<td>29</td>
<td>43,9</td>
</tr>
<tr>
<td>Normal</td>
<td>0</td>
<td>0,0</td>
<td></td>
<td>82,9</td>
</tr>
<tr>
<td>High</td>
<td>0</td>
<td>0,0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>0</td>
<td>0,0</td>
<td>66</td>
<td>100,0</td>
</tr>
</tbody>
</table>

No one resulted in the low levels of ECW parameters, while increased levels of ECW (28.3% of the sample) are more prevalent in women (twice) than males (35% ♀, 17% ♂). Such distribution, however, is not statistically significant ($\chi^2 = 3.444$ with G.L. = 1 and a $p < 0.0635$).

The Body Mass Index (BMI) is used to obtain an overall assessment of bodyweight by relating it to the height of the subject. It is obtained by dividing the weight (Kg) of the subject with the square of height (m). The result of this ranking formula places the subject in an area that weight can be: underweight, normal, overweight and obesity.

The Tab. 4 shows the distribution of the sample divided by Gender and Body Mass Index (BMI).

We can see that the class of Underweight with Low BMI values are present only 2 women, while in Overweight (♀ 19%, 51% ♂) and the obese (16% ♀, 17% ♂) there is a greater presence of Male sex. Consequently in the normal weight it is more expressed the female component (61% ♀, 31% ♂).

### Table 4

<table>
<thead>
<tr>
<th>BMI</th>
<th>SESSO</th>
<th>Underweigh &lt;18,5</th>
<th>Normal 18,5 - &lt;25</th>
<th>Overweight &gt;25 - &lt;30</th>
<th>Obesity ≥ 30</th>
<th>TOTAL N°</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MALE</td>
<td>0</td>
<td>11</td>
<td>18</td>
<td>6</td>
<td>35</td>
<td>38,0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0,0</td>
<td>23,9</td>
<td>31,4</td>
<td>62,1</td>
<td>17,2</td>
<td>100,0</td>
</tr>
<tr>
<td></td>
<td>FEMALE</td>
<td>2</td>
<td>35</td>
<td>11</td>
<td>6</td>
<td>9</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100,0</td>
<td>76,1</td>
<td>37,9</td>
<td>19,3</td>
<td>60,0</td>
<td>15,8</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td>2</td>
<td>46</td>
<td>29</td>
<td>15</td>
<td>92</td>
<td>100,0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100,0</td>
<td>100,0</td>
<td>100,0</td>
<td>100,0</td>
<td>100,0</td>
<td></td>
</tr>
</tbody>
</table>

The $\chi^2$ test resulted statistically significant ($\chi^2 = 12.251$ with GL = 3 and a $p < 0.0066$) highlighting how the normal weight of the component is more representative of women than in men and, in our sample, overweight and obesity are more present in the male class.
**Evaluation of the variations obtained**

We can better highlight the changes that occurred between the **Time 0** and **Time 1** by means of representation with sequential data analysis as set forth in the following figures:

**Resistance variation (Rz)**

The resistance is the ability of all biological structures to oppose the passage of electric current and then evaluates the electrical resistance of the tissues. The fat-free tissues are good conductors, and so represent a path of low resistance ideal for the passage of the current. The adipose tissues, poor conductors, constitute a very resistive electrical pathway. From this we can deduce that a subject very fat, with a low TBW, represent a body with high strength in comparison to a muscular and lean subject. The body stimulation with frequencies of Far Infrared determines a significant increase (Fig.1) of the values of body resistance, index of both the decrease of the ECW and the increased of the BCM (T₀ vs T₁).

**Variation of the Reactance (Xc)**

Also known as capacitive resistance, it’s the force that opposes the passage of an electric current due to a capacity, or rather, a capacitor. In the human body the cell mass behaves as a capacitor constituted by a lipid non-conductive membrane material interposed between two conductive layers of protein molecules. The reactance is therefore an indirect measure of cell membranes intact and is representative of the cell mass. A significant recovery of the integrity of cell membranes will then expression of a better exchange at this level of: Oxygenation cell; Nutritional intake; Drainage of catabolites; electrolytic polarization of the cell membrane. The body stimulation with the Far Infrared frequencies (Fig. 2) results in a significant increase in body reactance values index of integrity of cell membranes (T₀ vs T₁).

**Variation of the Total Body Water (TBW)**

The Total Body Water (TBW) represents the volume of fluid in the body. It is part of the Fatty Free Mass (FFM) and includes the intra and extracellular water. Water retention is closely related to dehydration because the less you drink, the more it increases the accumulation of toxins in the interstitial spaces with gelling of the water that is used to dab the retained toxins. The body stimulation (Fig. 3) with frequencies of Far Infrared determines a significant reduction of the values of Total Body Water (TBW), a potential index of water retention (T₀ vs T₁).

This significant decrease in total body water (TBW) is related predominantly to the reduction of the Extracellular Water (ECW) buffering in the Matrix accumulated toxins from the body (see following Fig. 4).
**Variation of the Extracellular Water (ECW)**

The Extracellular Water is the volume of fluid that is located outside the cells. It is localized mainly in the interstitial space between the cells, in the blood vessels, lymph tissue and spinal fluid. With age tends to increase following the chronic accumulation of toxins in the interstitial spaces. Indirectly represents the level of toxicity of the Matrix.

The body stimulation with frequencies of Far Infrared (Fig. 4) determines a significant reduction of the Extracellular Water values (ECW), index of water and toxic retention (T₀ vs T₁). This significant decrease of the Extracellular Water (ECW) can be correlated to the reduction of toxins (and water retention of the same buffer) and the reduced presence of inflammation and edema in the extracellular matrix.

**Variation of the Fatty Free Mass (FFM)**

The Fatty Free Mass (FFM) is the result of the sum of the Body Cell Mass (BCM), the compartment that contains the internal tissue cells, rich in potassium, which exchanges the oxygen and which oxidizes the glucose, and the Extra-cellular Mass (ECM) that includes the extracellular tissue such as the plasma, the interstitial fluid, the extracellular water, the trans cellular water like the cerebrospinal fluids as well as the joint fluid, the tendons, the dermis, the collagen, the elastin and the skeleton.

The body stimulation with the Far Infrared frequencies (Fig. 5) determines a discrete reduction of Fatty Free Mass (FFM) values of which the total body water (TBW) comprising the extracellular (ECW related to water retention) is part (T₀ vs T₁).

This significant decrease of the Fatty Free Mass (FFM) is related to the elimination of toxins and the same water-blocking material from the extracellular matrix.

**Variation of the Intracellular Water (ICW)**

The intracellular water (ICW) is the portion of the water contained within the cells and is the fundamental constituent within the mitochondria, together with oxygen, and moreover is necessary for the activation of the energy metabolism. Being the main constituent of the cell is also an indicator of metabolically active body mass (BCM) and its increase indicates improved energy production.

The body stimulation with the Far Infrared frequencies (Fig. 6) results in a significant increase in the levels of intracellular water (ICW) for Increased Cellular Wellness index (T₀ vs T₁). This significant increase of the Intracellular Water (ICW) can be correlated to a better water hydration capacity (for breaking of Clusters) and Electrodynamic changes in cell membrane that are reflected on the Na/K pump and the transport of these ions across the cell membrane.
Variation of the Active Body Cell Mass (BCM)

The Active Body Cell Mass represents the total volume of living cells. It constitutes the metabolically active tissue in Fatty Free Mass (FFM) of the human body. It’s the portion of the FFM that carries the cellular work and, therefore, exchanges and consumes oxygen, produces CO₂ by means of the oxidation of glucose and provides potassium to the tissues. In sports the relief of its reduction during training can be correlated to a overtraining situation.

The body stimulation with the Far Infrared frequencies (Fig. 7) results in a significant increase in Active Body Cell Mass (BCM), an index of greater metabolic activation (T₀ vs T₁).

The significant increase in Active Body Cell Mass (BCM) can be correlated to better hydration and greater transport of ions and oxygen inside the cells that promotes glucose oxidation in mitochondria.

Variation of Basal Metabolism (BMR)

The Basal metabolism (BMR) is the energy expenditure of an organism at rest and includes the energy required for vital metabolic functions (breathing, blood circulation, digestion, activity of the CNS and PNS). It is directly connected with the quantity of BCM of the subject, the intra and extracellular water and the ratio between intra and extracellular mass.

The body stimulation with the Far Infrared frequencies (Fig. 8) causes a significant increase in basal metabolism (BMR), index of greater energy production (T₀ vs T₁).

The significant increase in the Basal Metabolism Rate (BMR) can be correlated to increased mitochondrial energy production that is related to the increased of glucose oxidation.

Variation of the Sodium/Potassium rate (Na/K)

This ratio is a very important value that indicates the proper functioning of the cell. The ideal value is a ratio of 1:1, if it rises, it means that you are holding onto Na and therefore we are in the presence of water retention and protein malnutrition. if instead it goes down we are in the presence of severe dehydration and energy malnutrition (you have to increase your daily calories). Recall that the K promotes cell entry of thyroxine.

The body stimulation with the Far Infrared frequencies (Fig. 9) determines a nearly significant reduction in the Na/K ratio, whereas 30% of people had a water retention (increase of the extracellular Na values) this result indicates a better cell nutrition sharing (T₀ vs T₁).

The significant reduction of the Na / K ratio can be correlated to increased ejection of the renal ion and, for increased tissue perfusion, reduction of inflammatory processes at the level of the extracellular matrix.
Variation of the Phase Angle (PA)

The Phase Angle represents the ratio between the two electrical measurements of resistance and reactance and in the human body expresses the intra and extracellular proportions. The phase angle has been shown to have a strong prognostic value in a variety of chronic diseases and it's an indicator of the general level of well-being of the physical state. The more it decrease, the worst the inflammation is (chronic inflammation).

The body stimulation through the Far Infrared frequencies (Fig. 10) causes a significant increase in the Phase Angle (PA) index of a General Welfare Board ($T_0$ vs $T_1$).

A significant increase of the phase angle indicates a reduction in chronicity levels of inflammation, supported by a better reactive response capacity of the immune system.

All these findings are an indication of:

- Better cellular oxygenation;
- Better nutritional intake;
- Increasing drainage of catabolites from Extracellular matrix;
- Best electrolytic polarization of the cell membrane.

All this is due to the properties of the Far Infrared which acts both at the level of the size of water clusters favoring a greater exchange of this element between the cell membranes and the nip (by removing the catabolites), is restoring the balance of the Sodium/Potassium pump.

The vasodilation of arteries and veins determine a much supply of nutrients and facilitates the healing of myofibrillar lesions induced by exercise or excessive accumulation of fatty tissue level (e.g. under stress). All these data are even more important when we consider the athletic performance of athletes, the result of a combination of several factors including the recovery time, where is necessary to restore muscle glycogen reserves used during the training and dispose of lactic acid accumulated with the activation of the Cori cycle. We can briefly summarize all the results obtained with the following diagram:

![Changes of Body Composition (BIVA) related to the stimulation frequency of the Far Infrared (FIR)](image)
CONCLUSIONS

The tests carried out and in the light of the proceeds from research data previously exposed, we can state that the use of radiation of Far Infrared (BIOWAVER) improves Bio-anthropometric parameters tested with no doubt for the body wellness. In addition to test results, many of the participants (98%) reported a feeling of improvement and well-being carried out after the session. Furthermore, as regards the sports field, it has long been established that the far infrared has numerous benefits on the human body.

These frequencies have the power to stimulate cell regeneration, improve blood circulation, resulting in a faster physical recovery after exercise load mainly because accelerates the natural elimination of lactic acid and have an analgesic and anti-inflammatory effect on the muscular system, in particular for those competitive sports where you have to support rhythms and particularly intense workloads.

A widely demonstrated effect of this type of infrared ray is to cause a photo excitation of the water particles (clusters) supplying their energy and causing a rupture of the hydrogen bonds which hold together more clusters; reducing their size, these aggregates of particles can therefore pass more easily through the cell membrane and hydrating the cell better than a normal situation. In addition, the frequencies of the Far Infrared, causing an acceleration and a vibration of electrolytes to about 2500 times per minute, producing thermal energy, affecting the cells of the whole organism. This promotes the re-establishment of a balance between the extracellular and the intracellular metabolism (an increase of the temperature determines the transition from phase of Sol to phase of Gel of the extracellular matrix).

Another effect of this type of infrared is to cause vasodilation allowing a greater influx of oxygen and metabolites to the cells and a consequent increase of the elimination of catabolites from the Extracellular Matrix: it was well demonstrated the increase in cellular hydration (ICW) as well as the reduction of the extracellular water (ECW) in 70% of participants.

An extremely important parameter in the sport is the Recovering stage that must be adequate to allow full recovery of muscle glycogen stores, the overhaul of myofibrils (that may have damaged during physical exertion) and recover metabolic balance in muscle cells themselves to prevent overtraining. From the search results we can say that the stimulation of the Far Infrared rays determines a greater hydration of the body's cells and a lower toxicity level of the extracellular matrix which will be reflected in lower levels of inflammation and therefore pain.

Beyond many words or comments that could be made on the validity of this type of treatment the most significant thing that we should note is the full achievement of the objectives, both primary as well as secondary, that we set at the beginning of the study.

Briefly we can sum it all up with the following table:

<table>
<thead>
<tr>
<th>Experimentation objectives</th>
<th>Increase of the Phase Angle</th>
<th>Decrease of the ECW (Extra Cellular Water)</th>
<th>Metabolic enhancement (↑ BMR: Basal Metabolic Rate)</th>
<th>Rebalancing of the TBW (Total Body Water)</th>
<th>BCM increase (Body Cell Mass)</th>
<th>Rebalancing of the Na/K rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>Improve core indices Psycho-physical Wellness detected through the analysis of Body Composition through Bioimpedienziometry</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
</tr>
<tr>
<td>Secondary</td>
<td>Bring as close as possible to the optimal parameters also other additional values of Body Composition affected at the analysis of Bioimpedienziometry</td>
<td>Rebalancing of the TBW (Total Body Water)</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
</tr>
</tbody>
</table>
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