

# **A BRIEF HISTORY OF ALTERNATIVE THERAPIES IN CUBA**

**2019**



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**Main articles:**

A. González Arias. Ethics in research with people. *The Skeptic* 34, Spring 2014, pp. 34-39

FA Horta Rangel and A. González Arias, *Clinical Trials and Alternative Medicine*. *Elements* 89 Magazine (2013) 29-38

A. González Arias. Notes for a story about alternative medicine in Cuba - I. The Pyramidal Therapies. *Annals Magazine of the Academy of Sciences of Cuba*. Vol. 3, No.1, Year 2013

A. González Arias. Notes for a story about alternative medicine in Cuba. II. Magnetic and electromagnetic therapies. *Annals Magazine of the Academy of Sciences of Cuba*. Vol. 3, No. 2, Year 2013.

A. González Arias. Notes for a story about alternative medicine in Cuba. III. Bioenergetic Therapies *Annals Magazine of the Academy of Sciences of Cuba*. Vol. 4, No. 1, Year 2014.

A. González Arias. Notes for a story about alternative medicine in Cuba - IV. Homeopathic remedies and nosodes. *Annals Magazine of the Academy of Sciences of Cuba*. Vol.5, No.1, Year 2015

FA Horta Rangel and A. González Arias. Acupuncture in the light of contemporary science. *Magazine 'The Skeptic'*, autumn 2014.

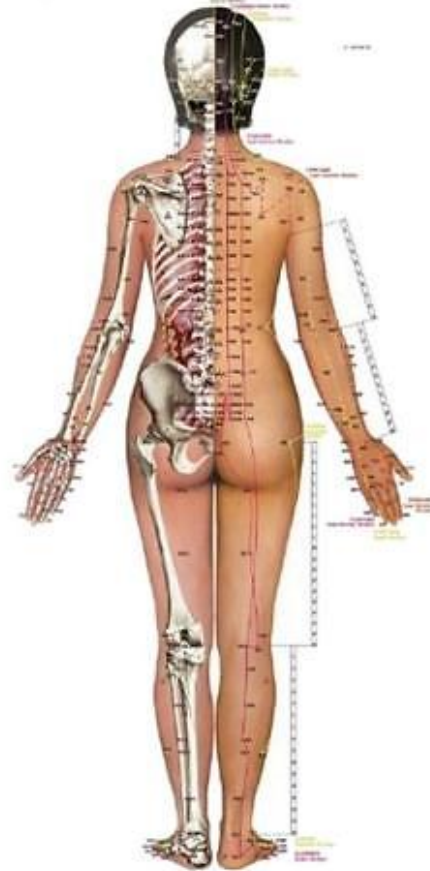
A. González Arias and FA Horta Rangel. Naturism in the light of contemporary science. *Magazine 'The Skeptic'*, No. 42, December 2014

González Arias A. and Horta Rangel FA, *Science, pedagogy and scientific culture*. *Elements* 87 Magazine (2012) p. 3-11

González Arias A. and Horta Rangel FA, *Ozone, Environmental Pollution and Evidence-Based Medicine*, *Rev. Cub. Fis.* **34**, 70 (2017)

González Arias A., *Ayurveda and non-scientific medicine*. Accessible at <https://medium.com/juventud-tecnica/el-ayurveda-y-la-medicina-no-cientifica-45f9dd743f75>).

**针灸穴位挂图**  
Acupuncture Point Wall Chart



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## **FOREWORD 2019**

In this edition, the theme of ozone has been updated with a much more complete review, published in the *Rev. Cub. Fis.* in 2017. Also appears an article on Ayurveda and its comparison with contemporary scientific medicine, due to some attempts to introduce Ayurveda in our country, as discussed in the article. For the rest, the 2017 prologue below remains valid. Pyramidal therapies and magnetotherapy may have lost ground, but homeopathy and ozone therapy are still maintained, and even such absurd and unproven medications such as Vimang are still sold in pharmacies at the time of writing these lines. We hope this edition has as good reception as the previous one.

The author

## **FOREWORD 2017**

A review of the alternative therapies promoted in our country during the last decades, encompassed under the title 'Natural and traditional medicine' or 'Bioenergetic medicine' or similar, yields about 30 different modalities, among which are also some diagnostic methods. They are acupuncture and digital puncture, moxibustion, cupping, microsystems, tuina (Chinese therapeutic massage), shiatsu (pressure with fingers and hands), QiGong (medicinal exercises), yoga meditation, Asian herbalism, laser therapy, magnetotherapy, catgut implantation, pharmacopuncture, transcutaneous electrical stimulation, chromotherapy, trophotherapy (a type of diet), homeopathy, homotoxicology, floral therapy, naturopathic medicine, chiropractic, osteopathy, pyramidal effect, thermalism, mud and medicinal water, aromatherapy, microdosis, bioenergetic medicine and some more. More recently, Ayurveda therapies have been promoted, so this book has included an article about it.

In addition, 'novel' modifications or combinations of these supposed therapies are sometimes promoted, such as low power laser light or magnetotherapy applied at acupuncture points. Alternative diagnostic methods included dowsing, iridodiagnosis and some variants of Voll electrodiagnosis.

What have in common all these therapies and diagnostic methods? That neither one enjoys the recognition of the international medical community, essentially because its effectiveness has not been proven in the light of the knowledge gained by contemporary science. It is not the case of them being less efficient than other methods and medications developed after their existence. The reality is that modern methods of

analysis and repeated experimental evidence accumulated since the last century have proven their ineffectiveness repeatedly. Some of these supposed alternative therapies are even more harmful than helpful.

Not all of them have spread in the same way in our environment. Nor do these therapies expose patients to the same risks. Some are more likely to cause harm than others; however, they all share the characteristic that, since their supposed favorable effect on people is not true, they result in a risk for the patient, which can be worse when they receive a false diagnosis or because they do not undergo the proven treatment that would alleviate their disease. From the latter there are multiple examples, some fatal.

This book is not intended to describe the history of all these therapies and diagnostic methods, but only those that were most widespread in our environment and widely propagated by the national press at the time. Perhaps because they were presented as wonderful panaceas, capable of curing conditions very dissimilar at low cost and with little discomfort or sacrifice for the patient. For that same reason, they are the most likely to cause damage. Thus, a patient can cure or prevent his condition by putting 5 drops of flavored water under his tongue, or rubbing a magnet on the damaged part, or perhaps ingesting some herbs that appeared on some naturist Internet site as 'good' for his condition.

Although it is possible that some therapy currently considered as an alternative could reach universal recognition of science in the future, and become a conventional therapy, those described in this book can never achieve it, unless they are as specific exceptions for some specific conditions; never as the universal panacea for multiple ailments promoted by its supporters.

In fact, some are completely irrational, because (1) they break up very well established laws of physics, chemistry or biological sciences. (2) Or are based exclusively on religious beliefs outside science or on false assumptions that do not resist critical analysis. (3) Or promote procedures not proven, even banned in other countries, capable of causing direct harm to people. (4) Or have not been able to show their validity in the face of repeated and rigorous clinical trials to which they have been subjected worldwide throughout many years. This last particularity, the most important, is common to all of them; some of them comprise together the four characteristics. Examples are pyramidal, magnetic and electromagnetic, bioenergetic, homeopathic, nosodic and floral therapies, acupuncture and other associated therapies such as acupressure. The same is truth for iridology, dowsing and ozone therapies.

However, almost without exceptions, supporters of these procedures always promote these therapies as beneficial, refusing to recognize the overwhelming evidence accumulated against them.

The book also includes as an alternative therapy naturism (attention, not phytotherapy), understood as such remedies based on products that are considered effective only because they are natural or 'traditional', without considering the usual tests to which conventional drugs are submitted to establish appropriate doses, contraindications, adverse reactions, pharmacodynamics and pharmacokinetics, and possible interactions with other medications.

Since ancient times, phytotherapy has been an important source of active ingredients used to make medicines of all kinds, and undoubtedly will continue to be in the future. Naturism promotes practices that may have been common before the twentieth century, but that have nothing to do with advances in science, ethics and patient protection in the last 100 years. Essentially, naturism consists in giving approval to any natural product on the exclusive basis of its origin or tradition (sometimes foreign and very local), without major considerations. There are many examples of supposed naturopathic remedies that are actually harmful.

If in the nineteenth century determining the components of a plant extract could be a very arduous work, but chemical-physical techniques known since the early twentieth century such as gas chromatography and mass spectrometry, among others, now allow us to determine with speed and precision the composition of plant extracts and other substances. This enables the quick identification of its active ingredients and possible toxic components; modern police TV series have been responsible for popularizing the application of these techniques to identify unknown substances.

However, despite the existence of modern analysis techniques, there are those remaining stuck in the past and insist on behaving as if we were in the nineteenth century, against all reasons and only to the detriment of patients. In many of the substances currently used as 'green medicine' and despite the passing of the years, the supposed active ingredients still do not appear. Sometimes the toxicity of the components or the possible side effects in the short, medium or long term is not even known. It is enough that such a plant being reported on the internet as 'good' for a given ailment for some people begin to produce and recommend it. On the other hand, for many persons the alternative therapies are often very attractive and convincing, because they are present-

ed with the clothing of an apparently scientific terminology, but that usually falsifies or misrepresents the meanings, which is not obvious to those who are not specialists in the specific subject in question. Nor is it rare that, in the absence of valid clinical trials, these supposed therapies and remedies come together by falsehoods of all kinds on their supposed efficacy. Thus, in an interview granted to the journalist Carmen R. Alfonso by Dr. Marta Pérez Viñas, head of the Department of Natural and Traditional Medicine of the Ministry of Public Health (MINSAP), published on December 2, 2011 in *Workers*, digital ed., can be read:

“The modalities *scientifically validated* and approved for use in the country by the Ministry of Public Health, are phytotherapy, bee therapy, traditional Asian medicine (acupuncture, moxibustion, cupping, use of microsystems and massages), homeopathy, floral therapy, traditional therapeutic exercises, naturalistic nutritional orientation and ozone therapy”(italics is from the author).

However, in the following chapters of this book the opposite is demonstrated: that all or almost all of the aforementioned modalities have not been validated by science that some even violate elementary laws of the natural sciences and that others, such as ozone therapy, can become very harmful to the patient.

A more recent example of fraudulent and irresponsible information consists of an article published on the *Cubadebate* website about the properties of VIMANG, a natural product widely propagated and marketed in our pharmacies until the time of writing these lines. There it is stated that thanks to that medicine:

“The writer and National Prize for Literature Humberto Arenal... did not have to have prostate cancer and did not metastasize to bones, *common in that condition*... Of course he also had a follow-up with allopathic medicine.”(Notes 1 and 2, p. 129).

However, in that same publication, a subsequent comment from a reader who only identifies himself as ”Joshua” suggests that the naturist treatment had nothing to do with the supposed cure:

“The common thing in prostate cancer is that it does NOT have bone metastases at the time of diagnosis. It usually has a favorable evolution and even one of its strategies is only the OBSERVATION. Even with metastases, patients have a survival of several years. Lymphomas of the same style tend to be good responders to standard therapies in any of their stages... for example, in our children it

has a survival of more than 90%” (sic).

The article tells other anecdotes (attention: anecdotes, not clinical trials) as proof that the product serves to cure those evicted by cancer and mentions that it is also effective as an analgesic and anti-inflammatory, which is able to achieve pregnancies, cure giardiasis and *provide for* (prevent?) aging. However, patients who received the medication and died within the expected time (or even earlier) never are mentioned. This is very typical of pseudoscientific propaganda: report only favorable cases, even if only one in a thousand, hiding the unfavorable. Sometimes the propaganda is of such magnitude that the commercial interest, alien to the public health of the population, is obvious.

The *mangerina* word referred to in the Cubadebate article, a supposed active element of VIMANG, does not appear in the search carried out in Google and in Google Scholar (<http://scholar.google.com.cu/>). Nor does any entry appear under the title 'properties of mangerina', which suggests that such mangerina is not a real compound, but a fictitious name devised only with the aim of giving veracity to criteria that lack scientific basis.

The Cubadebate article also refers to the 158th guideline of the Economic and Social Policy of the Party and the Revolution approved in 2011, which guides “to pay maximum attention to the development of natural and traditional medicine”. However, it is unquestionable that promoting the use of natural products at the expense of reporting anecdotes, false results and non-existent products, violating norms established in our country regarding clinical trials and patient protection, may not be the correct way to apply that guidance.



*Reason has freed us from superstition and given us centuries of progress. We abandon it at our own risk.*

*Richard Dawkins (Note 3)*

## **CHAPTER I. ETHICS IN EXPERIMENTS WITH PEOPLE**

### **1.1 The Nazis and the Nuremberg code**

In August 1947, at the end of the Second World War and after were held the trials in the city of Nuremberg to the principal war criminals of Nazi Germany, the Nuremberg Code was published. The document emerged as a sequel to the accusations to which the main fascist leaders and the corresponding deliberations of the court had to respond. From the sentences stood out the inhuman treatment that the Nazis applied to physically disabled people of their own population and to prisoners in concentration camps (figure 1.1). The Code included ten fundamental points to take into account in any medical research, with a view to protecting the patient, which was undoubtedly an important achievement for the advancement of health policies and public health worldwide.

In addition to the process of the main Nazi leaders, another twelve were held in Nuremberg, where junior officials were judged. The trial of the doctors was followed against 23 defendants, of whom 20 were doctors, on charges of planning and carrying out experiments without the consent of those affected in hospitals and concentration camps, in which murders, torture, cruelty and multiple abuses were committed. They were also accused of organizing mass murder with the use of gases, lethal injections, malnutrition and other means in various medical institutions, of people unrelated to the internment camps, but stigmatized as elderly, weak, insane or incurable patient,. Some were accused of participating and collaborating in the mass extermination of men, women and children captive in the concentration camps. Seven of them were sentenced to death and nine to various prison sentences; the rest were acquitted.

The points of the Nuremberg Code take into account aspects such as voluntary consent, the possible real benefit to society, and that the previous results justify the conduct of the experiment. They protect the subject and avoid unnecessary physical and mental suffering, forbid the performance of experiments in which there is probability of damage leading to incapacitation, and state that investigations be carried out only by scientifically qualified persons [The code of...]. It also includes

that the subject is free to interrupt the investigation at any time and that the responsible scientist should be prepared to finish it at any stage.



*Figure 1.1. Main Nazi leaders in the Nuremberg trials. Top left, Hermann Göring, 2nd Nazi in importance after Hitler, who committed suicide after Berlin fell. Out of 24 defendants, 12 were executed, 7 were sentenced to various prison sentences and 5 were acquitted.*

Voluntary consent means that the person involved must have legal capacity to give consent. His situation must be such that he or she may be able to exercise a free choice, without the intervention of any element of force, fraud, deceit, coercion or other form of constraint or intimidation; the person must achieve sufficient knowledge and understanding of the elements involved that enable him/her to make a reasonable and enlightened decision. This last element requires that before the subject of experimentation makes an affirmative decision, he must know the nature, duration and purposes of the experiment. Also, the method and the means by which it will be performed, as well as all the inconveniences and risks that can be reasonably expected, and the effects that may originate from the participation in the experiment concerning his/her person and illness. The duty and responsibility to ensure the quality of the consent resides with each individual who initiates, directs, or is involved in

the experiment. That personal duty and responsibility cannot be arbitrarily delegated.

The extension and clarification of these concepts were recorded in the 1964 Helsinki Declaration and in subsequent revisions. Its current version is considered the most important document that exists on the ethics of research with human beings, although not a legal instrument that links countries to comply with its clauses. Its basic principle is the respect for the individual (art. 8) [Declaration of Helsinki]. It is worth mentioning three of its operational principles: research must be conducted and managed by expert researchers (Art. 15); the information related to the study must be publicly available (Art. 16); experimental investigations should always be compared in terms of the best existing methods, but under certain circumstances a placebo or a control group should be used (Art. 29).

From the 80's of the last century the concept 'evidence-based medicine' (EBM) was universally generalized, which considered the traditional pathophysiological reasoning insufficient until the moment to make clinical decisions. The published works of Archie Cochrane, John Wennenberg, Iván Ilich and Thomas McKeown from the 70s [Gervas 2005] are recognized as pioneers in the development of the EBM. The points to be considered by the EBM are:

- The search and finding of the original and relevant biomedical literature, its critical reading and correct interpretation to establish its real level of evidence.
- Clinical experience and systematic knowledge of the context of that experience.
- Patient preferences.

The Nuremberg Code and the Declaration of Helsinki laid the foundations for a true social revolution in the field of medicine, reinforced by the criteria of Evidence-Based Medicine, introduced in the last two decades of the last century.

## **1.2 How medications are tested**

A recent contribution by the World Health Organization to the popular dissemination of the scientific and ethical requirements that must accompany medical research was the publication in 2010 of the Spanish version of the book "How treatments are tested; better research for better health care" [Evans 2010]. The text also constitutes an important contribution to health promotion in public health. Aimed at both medi-

cal staff and patients and the public, it has three fundamental objectives:

1. Increase public knowledge about clinical trials;
2. Promote a more critical public evaluation of the effects of treatments and;
3. Improve interaction between patients and health professionals.

The book also reflects a serious concern to avoid exposing patients to unproven treatments, which can be more harmful than helpful. Previously there were already calls for attention in this regard, such as that of the quotation that appears on p.60:

“If a doctor tries a new treatment with the idea of studying it carefully, evaluating the results and publishing them, he is doing research. (...) On the other hand, a doctor can try this new treatment with no intention of studying it, just because he thinks it will help his patients. In such a case, testing the new treatment is not research. (...) (The first doctor) is evaluating the treatment, while his colleague in the second situation is using the treatment based on his imperfect hunch. However, since the codes of ethics that try to protect patients are aimed at producing knowledge that can be generalized, they regulate the responsible investigator and not the irresponsible adventurer” (sic) [Lantos 1994].

The previous paragraph refers to novel treatments, but; what about those who insist on applying old treatments whose effectiveness has never been demonstrated, despite having repeatedly undergone clinical trials for many years with negative results? Moreover, without complying with the minimum principles established long ago in Nuremberg and Helsinki, not even roughly? Well, that is the case of most of the so-called alternative therapies, so helped by some in our country.

According to the doctor Pedro Caba Martín, former vice-president of the World Health Organization, alternative therapies are systematized practices of therapies not verified by the medical scientific community [Caba 2011]. Hence, they are not part of the conventional medical practices agreed upon by the international medical community. One of the usual characteristics of these apocryphal therapies is that it is not necessary to possess medical knowledge for their application; just follow a recipe established in advance, sometimes written by someone unknown and without the possibility of verification. Most of the time they are applied to the unwary patients in the private sphere and by practitioners

without medical studies, although this is not always the case. Among these therapies are, among others, pyramidal therapy, magnetotherapy, bioenergetic therapies, homeopathy and nosodes, floral therapies, dowsing, acupuncture and other relatives: acupressure, auriculotherapy and moxibustion.

The method to verify the effectiveness of any medication or therapy has been regulated in Cuba for many years. The National Coordinating Center for Clinical Trials (CENCEC) was created in 1991 to ensure the clinical evaluation is required for registration and marketing of medical-pharmaceutical or biotechnology products and medical equipment. The Cuban Public Registry of Clinical Trials, freely available on the website <http://rpcec.sld.cu/> summarizes the status of any trial duly registered in the country on any therapy or medication [CENCEC]. Together with the CECMED (Center for State Control of the Quality of Medicines, Devices and Medical Equipment, figure 1.2), it is the function of CENCEC to guarantee the safety, protection, rights and benefits to all subjects involved in the biomedical research, in accordance with international ethical principles. The CECMED must also certify that the clinical trials are carried out with a design, conduct and analysis in accordance with scientific principles and within the principles of good practice, as stated in provisions issued by the Ministry of Public Health [Ramos 2012]. Both centers meet the criteria recommended by the World Health Organization to test medical treatments of any kind.

Were these criteria applied regularly in our country? Unfortunately not. For a while, 'investigations' of all kinds proliferated that did not take into account the informed consent and were carried out by personnel without scientific training without complying with the guidelines of regulatory bodies. There are many examples cited in the following chapters.

On the other hand, clinical trials are nothing more than the form that the scientific method, the research method par excellence in natural sciences and other related ones, takes in medical sciences.



*Figure 1.2. CECMED emblem.*

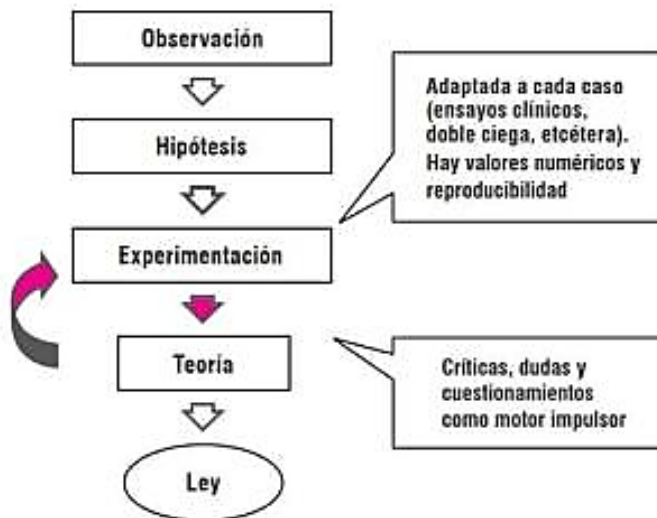
### **1.3 The scientific method**

When you have a notion of a certain phenomenon (*observation*), usually a rational assumption is set forth about why it occurs and what are its causes (*hypothesis*, figure 1.3). It is then necessary to repeat the phenomenon (or part of it) in a controlled manner (*experimentation*), in order to avoid interference from outside agents that affect what you want to study, and thus be able to obtain reliable and reproducible numerical values. The word *controlled* is of primary importance. It is necessary to control all the factors that can affect the result to get to know if what was initially assumed is true or not, since some other factor not taken into account could be responsible for the observed result. (So a reliable result of the experiment in question would not be obtained).

Besides, if the results of an experiment are not reproducible in other laboratories, by other operators and using other instruments, absolutely none of the results obtained can be affirmed. It means that the particular result obtained was, if not erroneous, was casual. It is an indication that the experiment was not sufficiently controlled and that there were unidentified factors that affected the result.

Once you have the result of an experiment (which can confirm or deny the hypothesis), it is necessary to look for some rational explanation based on the previous knowledge that you have (theory). And when a theory is possessed, from this it is always possible to try to predict what will happen in some other similar situation, and to devise some other experiment that will serve as proof to the previous one, and also to the theory (hence the double arrow in Figure 1.3). This establishes a continuous interaction between theory and experiment, which constitutes the essential core and driving force of the scientific method to obtain

new knowledge.



**Figure 1.3.** *The scientific method. From Elementos 87 (2012) 3-11. Legend: observation, hypothesis, experimentation, theory, law. Adapted to each case (clinical trials, double blind, etc.). There are numerical values and repeatability. Criticism, doubts and questionings as a power force.*

Associated with this interaction there is a process of international dissemination of results through publications in arbitrated scientific journals, criticisms, errors and rectifications. In addition, it may happen that very well established theories must be reformed, when a new phenomenon is detected that the existing theory is not able to explain satisfactorily.

When the theory becomes sufficiently broad and solid, when is capable of explaining a large number of phenomena and cause-effect relationships, and reject rationally any criticism, the law is reached. The laws are not eternal either. Many times, it is necessary to generalize them in order to explain phenomena not detected so far. There are many physical, chemical, biological, economic, and other sciences laws: they all come from the process just described.

In medical sciences, it is essential to establish valid theories in order to reveal the mechanisms that cause diseases. Only in this way is it possible to find increasingly effective ways to prevent them, cure them, or find less burdensome and expensive treatments. Among many examples, this is the way in which the relationship between hereditary diseases and alterations in various specific genes present in cells has become known,

The 'theories' proposed by alternative therapies are always illusory, unknown, or very irrational. They are not theories, only postulates or unfounded claims. When laws are cited, they were 'discovered' by someone - usually by a single person - and do not come from the process described above.

In some very specific sciences, it is materially impossible to carry out controlled experiments in relation to a given phenomenon. This is the case, for instance, in archeology, geology, astronomy and in the social sciences, whose methods of analysis and research do not conform exactly to the scheme in fig. 1. However, in those cases, accurate and reproducible observation replaces the experiment, and theories are considered valid only when:

- a) They are able to rationally associate many apparently independent facts, and
- b) They manage to predict the existence of relationships and phenomena not detected so far.

As stated above, the common thing to all alternative therapies is that, unlike conventional medicines, their supporters fail to pass them through the sieve of the scientific method and add them to conventional medicine, even though they carry tens or hundreds of years trying to convince others of its validity.

As there is no interaction between theory and experiment, alternative therapies are given once and forever. They have no way of advancing and perfecting themselves; they are just a set of recipes that are still applied as they were created hundreds or thousands of years ago, long before the development of contemporary medical science and the mechanisms of physiological interaction between the various organs, metabolic processes in the body or how drugs act when ingested.

#### **1.4 Alternative therapies in Cuba**

In Cuba, for reasons that have never been explained, alternative therapies were given the rank of conventional medicines by ruling, the description of 'alternatives' was omitted and all of them - although very dissimilar - were grouped into a 'sui generis' medical specialty: the so-called 'Natural and Traditional Medicine', possibly unique in the world. In principle, as there is no regulation that controls the inclusion of therapies in that 'specialty', any alternative therapy not demonstrated nor recognized by international medical science can be considered in Cuba as a Natural and Traditional Medicine, with a range similar to that of



therapies endorsed by clinical trials. Such consideration is clearly specified in the third point of agreement No. 4282 of the Executive Committee of the Council of Ministers [Agreement 4282]. The document establishes that the health executives of the Popular Power must guarantee to "Promote traditional and natural medicine as an integrating specialty that it is, without rejecting any of its modalities". In this way green light was given to the immediate application of any therapy or medication that was classified as 'traditional' or 'natural', without the need to previously prove its validity through clinical trials, or even verify its safety. The document also does not specify who decides if a therapy not included in the document qualifies as 'natural' or 'traditional', or who were trained to recognize them as such or evaluate their possible effectiveness, which allowed all types of hospitals and polyclinics apply these fantasies as if they were valid medical treatments. Enforcing the agreement became the responsibility of the political bodies of the Popular Power, not of the Ministry of Public Health and, significantly, in the brief of 8 pages and 2000 words, the terms patient, placebo or clinical trial do not even appear. Much less are mentioned the ethics and patient's rights, which had already been subject to universal recognition in the Nuremberg Code in the middle of the last century.

There is no doubt about the validity of the well-known saying about the need to know where we came from to know where we are going. As regards alternative medicine, if we wish to honor this saying, it seems increasingly necessary to compile the origin and evolution of alternative therapies in our country, at least the most widespread ones.

The greatest danger to science is the expansion or conversion of ideology and popular beliefs in science.

*Garry Abelev, Russian academic (note 4)*

## **CHAPTER II. PYRAMIDAL THERAPIES (NOTE 5)**

### **2.1. International background**

Unlike other alternative therapies such as magnetotherapy or acupuncture, on which it is possible to find references hundreds or thousands of years old, the pyramidal illusion has not yet reached a century of existence. However, its dissemination in recent decades occurred very quickly, almost at the same pace as the recent revolution in information and communications, along with the emergence of the World Wide Web global network. There are currently hundreds or thousands of English-language Internet sites that appear in search engines by typing 'Pyramid power' or 'Pyramid healing', which are no more than the original English versions of the Cubanized 'pyramid energy', supposed 'theoretical foundation' of pyramidal therapies. As a rule, these websites are private ones and do not represent research centers, universities or any other place with a minimum of credibility; neither do they cite valid references from the scientific point of view. When books are mentioned, they belong to unknown authors, have been published in non-scientific publishers, or have essentially a commercial character and often a purely esoteric profile, foreign to science.

The first known history of the supposed beneficial influence of the pyramids dates back to a booklet written in the 30s of the last century by Antoine Bovis, where the author claims to have discovered the 'pyramid power' enclosed in the pyramids of Egypt (Figure 2.1) [Bovis 1935]. Mr. Bovis, owner of a hardware store and a follower of dowsing - pseudoscience that had already been rejected by scientific circles and rational people - postulated the existence of the power of the pyramids without ever visiting them: he said so in his writings. Attracted by the alignment of the pyramids in the north-south direction, he wrote:

“I assumed that the Egyptians were very good dowsers and had oriented their pyramids using rods and pendulums. Without the possibility of going there to experience and verify the radiation of the Cheops pyramid, I built some cardboard pyramids...”

Apparently, Bovis did not take into account that the sun rises in the

east and sets in the west, which led with relative ease to many ancient cultures accurately align their buildings according to the cardinal points.

Subsequently, all kinds of fanciful lucubrations emerged, where the radiesthetic pendulum (his 'research tool' par excellence) is rarely mentioned, and Bovis is falsely credited with observing the effects of pyramidal power in situ. That is the version that still exists in our environment and that has appeared even in national medical journals. For example, in an article published in the *Rev. Cub. of Med. Gen. and Integr.* it reads:

"Bovis based his research on the experience gained by visiting the pyramids in Egypt and observing that the small animals that entered the pyramid labyrinths could not leave and die, but without decomposing..." [Orbera 2003].



*Figure 2.1. The dowser Antoine Bovis*

In another place a slightly different story appears:

"... Bovis, who after visiting the Great Pyramid of Cheops could observe that in the King's Chamber, and despite the humidity prevailing in the place (note 6), the dead animals' bodies did not decompose and kept mummified. Bovis used the pendulum to conduct studies of the energy inside the pyramid..." [Orbera and Sosa 2003].

## **2.2. First national attempts**

The first national reference to the pyramids arises very shortly after the fall of the Berlin Wall and the dismemberment of the Soviet Union. When the URSS disappeared, all kinds of pseudoscientific supermarkets flourished in Russia, and apparently, some of them had their reflection in Cuba [Declaration of 32...]. On the website of the Félix Varela center, Aquarium Publications, it is read that in the VII forum of spare parts, held in the province of Matanzas in 1992, the engineer Mengele Montenegro Lara presented a pyramidal device to preserve the edge of shave blades [Montenegro 2007]. According to the article, at that time there was an authorization from the Price Directorate of the city of Cárdenas to market the device, reflecting the lucrative interest of the matter [Fernández 2001; Pyramidal Energy (a)]. It never occurred to anyone to observe under the microscope what happened to the cutting edge while the 'pyramid treatment' was applied. Thus the effectiveness of the procedure could be easily verified, comparing the edge with a similar one placed near and outside the pyramid. On the contrary, it was enough to repeat the lie enough times for many to believe it. Goebbels - Hitler's propaganda minister -, who said that a repeated lie often becomes a truth, would be very pleased with those results.

Actually, the matter of the blades was nothing new. On November 4, 1949, the Czech Karle Drably applied for a patent for a method to recover the razor blade edge at the Patent and Invention Office of his country. His method was to place them as long as possible inside a hollow pyramid, made of insulating material, of dimensions preferably proportional to the great pyramid of Cheops. The controversial patent was not granted until ten years later. The supposed "theory" on which he based his request, as reflected in the original document, is that the pyramid concentrates inside the earth's magnetic field, which would really be responsible for sharpening the blade [Method 1952]. Drably never showed microscopic photos of the edge, or magnetic measurements that supported his proposals, although both measurement techniques were already well known and accessible in his time.

The compound microscope was invented in 1590, long before the pyramidal illusion. Magnetometers, instruments capable of

detecting very small variations of the Earth's magnetic field, have been known since the 19th century; The book entitled "Examination of iron deposits by magnetic measurements", dates from 1879. The magnetometers reached a great development during the 2nd. World War, because were used to detect from the air the presence of submerged enemy submarines. There is documentary evidence of the use of US P2V planes to detect Russian submarines in Cuban waters during the Missile Crisis in 1962. To avoid electromagnetic interference, the magnetometer is placed in a pole protruding from the tail of the plane, which gives it a characteristic profile (figure 2.2).



*Figure 2.2. Lockheed P2V Maritime Patrol Neptune of the US Navy, in use in 1962.*

It is necessary to make clear that owning a patent is not, much less, guarantee of scientific endorsements. Anyone can obtain patent rights about what he/she can think of, from a can opener to a method to explore the solar system, without previously presenting experimental or theoretical results that attest to its effectiveness or truthfulness. Simply describe what you want to protect as your own creation and pay the corresponding fees; there are thousands of files accumulating dust in patent offices that never will be used.

The pyramidal fantasies of Bovis and Drbal were reinforced in the 70s of the last century thanks to the authors of the book "Psychic discoveries behind the iron curtain", which in its time reached certain popularity among English-speaking readers [Ostrander 1970]. Much more recent Statements in the national press, which attribute the conservation of the

edge to the pyramid inhibiting oxidation, also lack microscopic demonstration. If the observations were carried out, they would undoubtedly convince those who make these claims of their mistake [Pyramid Energy (b) 2004].

Moreover, why nobody is responsible for telling these people the mistake they make? The philosopher Mario Bunge has given a good answer to this question:

“The lineage of hypotheses matters a lot, because nobody has time or resources to investigate fancy conjectures. A supporter of a natural product demands that it be put to the test, the scientist will answer that the weight of the proof of a conjecture rests with the one who proposes it”[Bunge 2012].

In addition, and as a rule, supporters of these alternative procedures are so convinced that they are right - by belief or convenience - that claiming one reason or another dismisses any theoretical argument or experimental demonstration contrary to their criteria. Even more, it can be stated that not accepting contrary evidence is a characteristic quite common to all pseudosciences.

***First medical reports.*** It was in 1995 that reports on medical applications of the alleged pyramidal energy began to appear in Cuba. It is striking that the first speakers were not doctors, but intruders: the engineers Meneleo Montenegro (not to be confused with the doctor of the same name) and Noel Hernández. The other speaker was Mr. Guillermo J. Vázquez, who had the collaboration of doctors Dionisio Brook and Arnoldo Cobo, from the Antonio Guiteras polyclinic, in Old Havana. The papers presented were about the application of therapy in an industrial medical office and its use in sports injuries [Pyramid energy (c). Other works 2003].

In 1996, following the guidance of the now disappeared National Center for Natural and Traditional Medicine (CENAMENT), Pyramid Energy began to be applied in four dentistry clinics in Matanzas. The 'pyramidal water' was also used as an antiseptic and anti-inflammatory, María A. Ruiz, dentist from the city of Cárdenas, used it against gingivitis, pulp exposure and hyperesthesia. The number of patients harmed by not using sterile water was never reported.

The explanation offered by the promoters about the supposed beneficial effects was that the water placed in a vessel under a pyramid is sterilized after a reasonable time has elapsed. As with the cutting edge

of the blades, nobody came up with something as simple as verifying the supposed disinfection using a microscope instead of experimenting with people.

### **2.3. The rise of pyramidal therapies**

By 1998, four National Workshops had been organized and, in 2002, there were already a large number of reports favorable to the medical use of pyramidal energy, all cut by a similar pattern. That is, performed by staff without adequate scientific training and sometimes by intruders completely oblivious to medical sciences [González 2013]. These people lacked the minimum knowledge necessary to conduct satisfactory clinical trials; for instance, is notorious the absence of control groups in almost 100% of cases.

One example of these articles is the following:

"Pyramidal Energy in the Recovery of Parts and Complete Rotor of the Aircraft, and the Water for Autoclave in Stomatology Equipment",

by the dentist Isabel Mestre de la Cruz where, according to the summary of the article, it was 'demonstrated' that dentist burrs self-sharpen inside a pyramid, and that worn parts of the engine are self-repaired when applying the same process. It attracts attention this kind of 'reverse intrusion', where someone trained in stomatology makes research and present conclusions about metallurgy and mechanical equipment.

Another article refers to a mission abroad: "Experience of a Year of Work in an Internationalist Mission with a Pyramid Energy Card in Nicaragua," by Dr. Lázara Fernández Collado and Mr. Amado Fernández Mosquera. The 'pyramid energy card' is able, according to its promoters, to cause the same effect as the pyramid. Clinical trials? Obviously not. Apparently, it is easier to sell a card than a pyramid. Or apply it to an unwary native Nicaraguan to see what happens to him (figure 2.3).

Will pyramid therapy be suitable for other conditions? According to its promoters, at least for the following: pain and inflammation of the osteomyoarticular system (OS), including, properly surgical conditions such as the spring finger, carpal tunnel syndrome and Querrain disease; asthma, hypertension and painful and inflammatory soft tissue conditions not directly related to OS, having analgesic, anti-inflammatory, bacteriostatic, muscle relaxant and sedative actions. Also for anxiety and depression, scabiosis, simple herpes, duodenal, peptic and varicose ulcers, extreme exhaustion, ciatalgia, migraine, joint pain, cervicitis,

headaches, carpal tunnel syndrome, psoriasis, bursitis, conjunctivitis, hiatal hernia, hypertension, dermatitis, osteoarthritis, gastritis, sacro-lumbalgia and arthritis. In short, according the writer, pyramidal therapy consisted of a combination of philosopher's stone, Holy Grail and source of eternal youth that heals everything.



**Figure 2. 3.** *The pyramidal card of the engineer Meneleo Montenegro Lara and the doctor Meneleo Montenegro Díaz. (Annals Magazine of the Academy of Sciences of Cuba, Vol. 3, No. 1, Year 2013).*

In 2003, the Cuban Journal of General and Integral Medicine, in its March-April issue, outlined a group of prominent people in the study of pyramid power: Laureano Orbera Hernández, geologist; Ulises Sosa Salinas and Juan Daniel Zayas Guillot, MDs, and Maria Isabel Mestre de la Cruz, dentist [Pyramid Energy (d) 2003]. However, it was not possible to find in the name of these people a single positive clinical trial report and in accordance with the internationally established rules for those trials.

Because of the impulse received by the authorities, apparently excited by what some said was a way of providing satisfactory medical attention to the population with minimal expenditure of resources, at one point pyramid therapy reached great strength in some stomatology and medical circles.



El Consejo Científico del Centro Nacional de Medicina Natural y Tradicional (CENAMENT), considera válidas las evidencias clínicas presentadas sobre el valor terapéutico del EFECTO PIRAMIDAL en una amplia gama de dolencias ortopédicas. Aun cuando se recomienda continuar el desarrollo de investigaciones que permitan ampliar la muestra y aportar nuevas evidencias en Ortopedia y en otras especialidades médicas, el resultado de las investigaciones demuestra su capacidad como:

- a- Anti-inflamatorio
- b- Analgésico
- c- Bacteriostático
- d- Miorelajante
- e- Sedante

Por lo que, en uso de las facultades que le son inherentes, este Consejo Científico aprueba por unanimidad el empleo del EFECTO PIRAMIDAL en aquellas patologías donde se justifique como tratamiento de algunos de los síntomas y signos antes mencionados y recomienda generalizar esta terapéutica en el Sistema Nacional de Salud.

Dar a conocer éste resultado a todos los posibles interesados y publicar el presente dictamen en el Sitio WEB de Medicina Natural y Tradicional.

Dado en La Ciudad de La Habana, a los 7 días del mes de Diciembre del 2005.  
"Año de la Alternativa Bolivariana para Las Américas"

  
Dr. Leoncio Padrón-Cáceres  
Presidente Consejo Científico



*Figure 2.4. CENAMENT's guarantee in favor of pyramidal therapies (2005).*

It was not an inconvenience the absence of something even similar to clinical trials, neither in Cuba nor abroad, so that both professionals and unprepared persons joined the propaganda in favor of pyramidal therapies [Pyramidal Energy (e) 2003; Peña Monogramas.com; Sosa Pyramidal Energy; Díaz 2007; Marshall 2006; Socal 2007; Ameneiro

2003]. A document signed by Dr. Leoncio Padrón Cáceres, President of the Scientific Council of the National Center for Natural and Traditional Medicine (CENAMENT), dated December 7, 2005, attests that the Council "unanimously approves the use of the pyramidal effect (...) and recommends generalizing this therapy in the National Health System"(figure 2.4).

The warranty expresses that such therapy has anti-inflammatory, analgesic, bacteriostatic, muscle relaxant and sedative effects. A list of countless additional benefits 'discovered' after the preparation of the document, applicable to both people and crops and breeding of birds, can be consulted on the personal site of the doctor Montenegro Diaz, or the engineer Montenegro Lara [Montenegro 2003], where the sale of energy pyramids is also announced.

Many journalists quickly echoed these "wonderful" results, accepting how many good statements were made in the name of the pyramids and showing total ignorance about clinical trials and the functioning of contemporary medical sciences [Atienza 2001]. The intense propaganda also had its reflection in the foreign press (figure 2.5).



**Figure 2.5** (Left). *Pyramids become popular as a home remedy in Cuba. Taken from <http://www2.todito.com/paginas/noticias/index.html>, 10/14/03, 12:27 (Mexico City Time). (Right). ARNOLDO COBO, a 72-year-old retired employee, with his wife Maura Oliva, using pyramids on their heads. Taken from <http://www.miami.com/mld/elnuevo/news/world/cuba/>, Posted on Fri, Oct. 17, 2003.*

Given the proliferation of alleged advantages and benefits not demonstrated, the deformations of basic concepts of physics and other scienc-

es, plus the consequent danger of harm to patients, some people with scientific training were given the task of publicly denouncing the absurdity or organized various experiments and appropriate trials. Of these, none provided results in favor of any of the multiple pyramid properties advocated by those who advertised them [Desdín 2004, Álvarez 2007a, Hernández 2007; Álvarez 2007b; Rebollido 2006; González 2007].

Shortly after, from December 17 to 19, 2007, the first Workshop on Rational Thought and Pseudoscience took place at the University of Havana, where the illusory character and lack of scientific foundation of pyramid therapies were denounced. A summary of the activities carried out was published in the Cuban Journal of Physics [Álvarez 2008; Melo 2008]. However, according to testimony of Dr. Carlos J. Delgado Díaz, Professor at the University of Havana, by the end of 2011 it was forbidden on Cuban television...”to make any mention of the pyramids and other things (pseudoscientific) that they are a field of discussion”[Delgado 2011].

Although the pyramidal 'phenomenon' has already passed through its moment of greatest splendor, unlike urine therapy, another pseudoscience highly promoted by the NTM and which had its peak in the summer of 1997, it is still possible to find sporadic apologies in the press about beneficial effect of the pyramids [González 2012]. The urine therapy did not prosper because, when it was massively applied to an outbreak of viral conjunctivitis on the island prescribing eyewash with urine, bacterial conjunctivitis was added to the existing viral outbreak. In some cases, ocular gonorrhoea appeared, with consequences that led to corneal perforations and loss of vision, which forced the Ministry of Public Health to intervene radically in the matter [Bruno 2001]. Similar disasters have not occurred in the case of pyramid therapy. Its main demerit is the deceit of the patient and the loss of time, efforts and resources, together with the lack of evidence of its effectiveness and the possible damage it can cause.

#### **2.4. Tell me whom you join with...**

Despite the diffusion that this modality reached within the so-called Natural and Traditional Medicine, a recent summary favorable to the NTM, which aims to collect aspects of the history of its development, does not even mention pyramidal energy (much less the urine therapy). It only refers to two or three of the twenty or more modalities usually recognized by the NTM, the majority not related to each other. However, the document describes the 'Bioenergetic and Naturalist Medicine' as

important and state that these modalities: “contribute to the development of the work of the new National Society of Bioenergetic and Naturalist Medicine”, (which include the pyramid therapy among them, point 9 in the folding segment of figure 2.6). That is, in 2012 pyramid therapy was still the object of attention by supporters of alternative therapies.

## **BIONAT – 2012**

*JUNIO 2012*

### **CUARTA Convención Nacional de la Sociedad Cubana de Medicina Bioenergética y Naturalista**

- 1.- Docencia de pre y postgrado para médicos, estomatólogos, psicólogos, enfermeros y paramédicos de medicina.
- 2.- Medicina Oriental (acupuntura, moxibustión, ventosas, microsistemas y otros procedimientos asiáticos); modalidades afines, tales como Tuina, Shiatsu, QiGong, TaiJiQuan, Yoga terapéutico, Medicina Tradicional Interna (herbolaria tradicional asiática), Láser y Magnetoterapia sobre puntos acupunturales, farmacopuntura, implantación de catgut, analgesia acupuntural quirúrgica, estimulación transcutánea eléctrica o con el empleo de medicamentos, Cromopuntura, troloterapia, cronoterapia, etc.
- 3.- El empleo de sustancias naturales en sustitución de medicamentos sintéticos con un enfoque esencialmente de la Medicina occidental convencional.
- 4.- Homeopatía y Terapia Floral.
- 5.- Medicina Naturopática
- 6.- Quiropráctica
- 7.- Osteopatía
- 8.- Homotoxicología
- 9.- Magnetoterapia y Efecto Piramidal
- 10.- Termalismo, Fangos Medicinales y Aguas Mineromedicinales
- 11.- Aromoterapia, Micro dosis, Iridodiagnóstico
- 12.- Electro miografía computarizada y Medicina Bioenergética, biomagnetismo, complejidad

*Figure 2.6. Modalities of bioenergetic and naturist medicine in 2012. At point nine, the pyramidal effect.*

Among other reasons, pyramidal therapy and similar ones thrive because their supporters apply them without having adequate scientific training and without taking into account essential aspects of scientific research. They never submit 'their' therapy to valid clinical trials and do not even do statistical monitoring. They do not report negative results and consider positive those in which the patient stops attending the consultation (whatever the cause, i.e. that the person discovers that the procedure does not affect him at all, that he prefers to consult another doc-

tor, or simply medical condition remitted due to natural causes). An additional aspect is that it is impossible to find a single writing by a supporter of alternative therapies in Cuba that takes into account, or even mentions, the placebo effect. The same happens in the field of the written press, radio or television; for those who favor these therapies at the national level, the placebo effect does not exist (note 7) [Finnis 2010].

Not knowingly applying what is scientifically established for many years and even guided by the World Health Organization to conduct clinical trials, more than pseudoscience is anti-science. Finally, the most important thing: the promotion and sale of products or procedures not demonstrated by the corresponding clinical trials is a consumer hoax. However, the application of those same products and procedures to the unsuspecting patient, based on the protection of a professional degree, is not just deception; it is an abuse of their trust, which can also cause damage because of its ineffectiveness. It is regrettable that, unlike other countries, Cuban laws do not consider these practices as reprehensible and punishable.

*What has not been studied impartially is not well studied; skepticism is the first step towards the truth.*

*Denis Diderot*

## **CHAPTER III MAGNETIC AND ELECTROMAGNETIC THERAPIES (NOTE 8)**

### **3.1 Various alternative therapies associated with magnetism**

Many designate magnetic and electromagnetic therapies in the same way, although magnetic and electromagnetic fields interact very differently with tissues. Magnetic therapies are based on applying to people the fields generated by permanent magnets or electromagnets fed with direct current, and that really corresponds to the term magnet therapy. The fields that are applied are static; do not change over time.

The theoretical and experimental evidence accumulated on magneto-therapy over hundreds of years shows that these therapies are sterile; there are no benefits or damages, except perhaps for the loss of time, efforts and resources, plus the imprudence that the patient does not receive some effective treatment for his condition, which in the end can cause greater harm.

Electromagnetic therapies use coils powered by low frequency alternating current, from the commercial network at either 60 hertz or using alternate or pulsating sources of up to several hundred hertz. In these therapies, the magnetic fields vary from zero to a maximum value, or they reverse their direction continuously over time. However, something that many supporters of these therapies do not know is that a well-known physical law, the Faraday Induction Law, (note 9) states that time-varying magnetic fields generate electric fields. Hence, whenever there are alternating or pulsating currents involved in the generation of the magnetic field, electric fields will also be present, impossible to separate from the magnetic ones. Since the interaction of the electric fields with the substance differs markedly from the interaction of the magnetic fields, what might be valid for one type of 'therapy' does not have to be for the other.

***Electric therapies.*** In the national medical literature, there is widespread confusion in the use of the terms 'electric', 'magnetic' and 'electromagnetic'. Therapies with externally applied electric fields were long discarded, since in order to establish a significant field value inside the body it is necessary to apply very high potential differences and place

the part of the body that you want to treat between two electrodes without direct contact with the skin, as a condenser or capacitor. Since the air and the skin are good insulators of electricity, the necessary potential differences became so high that there was always the possibility that a spark would jump and cause burns.

Something very different from the above is what has been called electrotherapy, based on establishing low intensity electric currents on the surface of the skin (surface conductivity) and not inside the body (volumetric conductivity), which we only mentioned for avoid confusions. In the superficial case, the electrical conductivity is determined by the contact of the external part of the skin with the water of the atmosphere and the possible electrolytes from the perspiration. The electric field is also largely superficial, in the same direction and direction as the current, as expressed by Ohm's law in its microscopic version (note 10). In order to establish currents through the skin, potential differences of greater intensity are necessary, which cause a sensation of 'currents' and could be dangerous.

***Magnetic and electromagnetic therapies.*** On the contrary, the skin and other tissues are highly permeable to magnetic fields. When a variable magnetic field of sufficient intensity is applied near the skin, variable electric fields are generated within the organism, and not only in the region of the body to be treated, but also in all its surroundings, in a wide region. For example, applying a variable field in the nose also entails its application in the eyes, the brain, the inner ear, etc., which is ignored by most supporters of electromagnetic therapies, who think illusively that the effect focuses only on the organ they wish to treat. It will be very unimportant how many centimeters closer or further away is the source of the patient's head; all of it will be affected in a high percent, even if the application is in the shoulder, the thorax or other nearby parts. There is no basis to express, as some claim, that the procedure is not invasive. On the contrary, the treatment will be extended uncontrollably to regions where it is not supposed to arrive, without knowing its possible consequences.

As for its effectiveness, so far there is only evidence of poor or doubtful benefits, and only in very specific cases. There are also indications that its application may be in some cases not beneficial, but harmful (iatrogenic, note 11).

Radiation-based therapies of the highest frequency, of the order of kilohertz or megahertz, are used for very specific purposes and their effectiveness, adequate doses, contraindications and possible damages are

well known. When their properties are known, they are rarely associated with pseudoscientific therapies.

### **3.2 Magnetotherapy**

***International background.*** The first attempts to cure with magnets are lost in the haze of time. When reviewing the literature, very old anecdotal references come from the Egyptians, Greeks and Romans. Mentions are also reported on the supposed healing virtues of magnetite mineral in ancient Persian, Arab and Byzantine writings.

More reliable references appear in the sixteenth century, when the Swiss physician, philosopher and alchemist Theophrastus Bombastus von Hohenheim (1493-1541), better known as Paracelsus, used permanent magnets to treat epilepsy, diarrhea and hemorrhages, procedures that were subsequently found without foundation. He considered that diseases were attracted to the magnet in the same way that steel and iron are attracted, and that one of the poles was able to attract, and the other to repel the sufferings. In the following centuries, supporters and detractors of magnetic therapies multiplied throughout Europe. It is possible to find references from the 18th century on the application of permanent magnets to relieve dental pains, hysteria, tremors and torticollis. Also mentioned is the improvement in the regularity of menstruations and the attenuation of pain in general.

Magnetic therapy with permanent magnets reached its climax at the end of the 18th century in France thanks to Franz Anton Mesmer, an Austrian physician precursor in the field of hypnotism. On the eve of the French Revolution, and from the fame acquired in supposed successes in his country, Mesmer inaugurated in Paris a healing room that attended to the nobility and included magnetic treatments. Healings were achieved by treating the "... undesirable deviations from innate animal magnetism to human beings." Over time, Mesmer discovered that he obtained the same results without using the magnets and postulated "animal magnetism", inherent in everything alive, allowed him to correct the anomalies of the "magnetic flux" in the sick.

In 1785, King Louis XVI, at the request of prominent doctors in Paris who questioned Mesmer's therapies, appointed a commission to evaluate his cures. The commission included personalities that are still remembered: astronomer Jean Sylvain Bailly, a member of the Academy, first president of the National Assembly during the French Revolution and later Mayor of Paris; the chemist Antoine Lavoisier, discoverer of the



Law of Conservation of the Mass, member of the Academy, also known as the Father of Modern Chemistry; the doctor Joseph Ignace Guillotin, of somber celebrity today, but a doctor recognized in his time and deputy to the National Assembly and Benjamin Franklin, revolutionary, diplomat and expert in American electricity, inventor of the lightning rod and bifocals. The report prepared by the commission, unfavorable to Mesmer's theories and cures, caused him to quickly lose his prestige and spend the rest of his life in oblivion [Macklis 1993; Makay 1852].

For a long time, magnetic therapies survived in one way or another among medical practitioners until the mid-19th century. A review article by EJ Engstrom reveals that between 1780 and 1830 the doctors of La Charité, one of the main hospitals in Berlin, conducted clinical trials to verify the therapeutic effectiveness of magnetotherapy. Based on the medical reports and medical records, Engstrom concludes that...

”While in 1790 the plausibility of the therapeutic claims of animal magnetism demanded the attention of the medical body, in 1830 the accumulated evidence on which those claims were based had lost their power of persuasion and were relegated to the dark world of fakers and charlatans”[Engstrom 2006].

However, magnetic therapy never completely disappeared. It went from the field of medical practitioners to healers and unscrupulous merchants. At the end of the 19th century, it was possible to find catalogs of large American stores offering clothes and magnetic hats (some with more than 700 magnets) for mail delivery. The ads promised ”... magnetism, properly applied, will cure any curable disease, regardless of its cause” (Figure 3.1). At present, it is possible to find multiple offers of permanent magnets integrated in various therapeutic attachments, but clinical trials that support its effectiveness never appear. In April 2011, the newspaper El País alerted Spaniards about possible fraudulent uses of magneto therapy. According to the Agency for Medicines and Health Products, you can find all kinds of products, from neoprene belts, masks, pads, bracelets or jugs that make water magnetic and that promise to cure hypertension, AIDS or cancer [García 2011; Jackson 2006].

From the theoretical point of view, there are no clues of what could be the possible mechanism of action of these devices, since the magnetostatic field, typical of permanent magnets, is unable to deliver energy continuously as does, for example, a battery. Magnets do not “discharge” when interacting with the substance, so they are not able to deliver net ”beneficial energy” as some claim (note 12).

There are many more arguments that demonstrate the falseness of commercial promotions on permanent magnet based attachments. For example, when calculating the numerical value of the possible magnetic energies that could be involved in the interaction with organic cells or molecules, it is found that they are much smaller than the usual energy exchanges in the organism at the microscopic level. Nevertheless, there is other more immediate and incontrovertible evidence: Modern Magnetic Resonance Imaging (MRI) equipment works by exposing the patient to static fields hundreds or thousands of times more intense than any permanent magnet can provide. However, collateral effects of some kind have never been detected in patients undergoing such intense fields in large regions of the body, even for prolonged periods of time [González 2003].



*Figure 3.1. Magnetic corsets patented in 1891 by Cornelius Bennet, for women of all ages. In the fan you may read "They cure weak back."*

**National reports.** There are no references in Cuba before 1950 from

doctors or healers who would use magnets to heal. If someone could resemble them was Miguel Alfonso Pozo (a) Clavelito, who in that decade and for several years participated in a program of the radio station Unión Radio. Clavelito did not use magnets, but claimed to 'magnetize' the water in a glass if it was placed on top of the radio during its program. The water thus magnetized, according to its promoter, was able to cure the sick, prevent diseases... and also to solve a job or find a husband or wife. This author remembers listening to the program's motto as a child, sung with peasant tune music. It prayed more or less like this:

”Put your thoughts about on me,  
and you will see at this moment,  
that my truly force of thought  
will exert a good on you.”

By placing the glass on top of the radio (which worked with vacuum tubes and the upper part became quite hot during the broadcast), after a reasonable time small bubbles would appear, which somehow justified the magnetizing illusion before Clavelito's followers. Of course, bubbles also appeared when tuning in at any other time.

Despite the historical and scientific background on the ineffectiveness of magnet therapies, invitations to foreign magneto therapists to teach courses and conferences in our medical schools began before 2000. Perhaps one of the first was the Mexican Shaya Michan, invited to Cuba in the framework of a day of Natural, Traditional and Bioenergetic Medicine, owner of a company that sold all types of magnetotherapy instruments, but without scientific articles published on the subject (neither on that nor any other subject) [Torres, *Magnetismo Cubano*].

Other speakers, such as Mr. Isaac Goiz Dur, have also been invited with the same goals. This person presented himself on the Internet with a doctorate in 'Bioenergetic Medicine' or 'Medical Biomagnetism' of the Oxford International University. The Medical College of Costa Rica had previously denounced him for fraud and illegal exercise of Medicine. Subsequently, his Dr. degree was publicly denied by the University of Oxford [Medical Biomagnetism (a)]. His preaching is unscientific, contrary to what is very well established for a long time in physics and chemistry. Some are even manifest falsehoods that contradict bibliographic reviews in medical journals [Medical Biomagnetism (b)]. However, none of this prevented some national medical circles, or related to natural and traditional medicine, from inviting him to Cuba to teach a

course at the expense of the public treasury, as if Goiz were an international scientific personality. Obviously, there was not even the precaution of carrying out an elementary verification about the professional qualification of this person.

It is regrettable that despite the calls to the medical authorities by specialists and university professors, these cases have been repeated on a recurring basis (and not only with regard to magnetotherapy; has it occurred in similar pseudosciences). The last known invitation, from the end of 2012, involved the owner of the 'Biomagnética Salas' website, which is not a doctor, but a psychologist who proclaims himself with more than 30 years of experience in “new methods concerning the balance and health of integral way” [Biomagnetic Rooms]. In one of the pages of the mentioned site it appears that he is a founding member of the College of Medical Biomagnetism; later it is alleged that he has a master's degree... in Medical Biomagnetism. That is, this person founded the school... and in the process awarded himself master's degree. Of course, there are no references to any university about these courses. Since psychologists are not doctors, they cannot diagnose or prescribe medications, except with a few exceptions. However, in one of the pages of the Biomagnetic Salas site you can read:

“... in his practice in Biomagnetics, (Salas) has worked with his model that allows both direct and remote healing, and can work with patients in other countries making diagnosis and treatments for multiple diseases” (sic).

That is, this psychologist openly recognizes the practice of something for which he is neither empowered nor authorized, what is known as intrusion in many countries. For a description of what biomagnetism really consists of, see” Biomagnetism: don't be fooled by false prophets” in Digital Technical Youth, February 4 2013, accessible on the WEB [González 2013].

Together with the invitation to all types of tricksters, the imposition of permanent magnets supposedly alleviate multiple conditions was extended to polyclinics and other care centers throughout the country, all at the expense of the public treasury. These practices were stimulated at the time by the agreement of the Executive Committee of the Council of Ministers regarding Natural and Traditional Medicine already mentioned, which proposed “... to promote natural and traditional medicine (...) without rejecting any of its modalities”.

The most usual has been to prescribe magnetotherapy to try to relieve joint pain, although many other applications also appeared, such as sitting on a magnet to relieve prostate problems or attaching it to the face to lessen myofascial pain [Rodriguez 2011]. All these 'therapies' were essentially based on the recommendations of the HL Bansal book and other similar, plagued by false claims but widely disseminated in various medical and dental circles. Bansal's book, for example, does not cite references from arbitrated scientific journals or mention controlled experiments or the placebo effect, does not report valid statistics, control groups or actual contraindications. Only reports isolated and favorable cases. Given the number of absurdities that appear and the lack of adequate references, this book can only be described as unscientific as a whole (figure 3.2). The creation of stores to raise foreign exchange contributed to the dissemination of these false therapies, since bracelets and magnetic earrings were also on sale. The first, at a cost of USD 11, boasted of controlling hypertension.



**Figure 3.2.** *One of the so many antiscientific recommendations of Bansal. To put a north pole of a magnet in the right hand and the south pole in the left one. Recommended for disorders in the upper part of the body, injures in the upper members, thorax, dorsal spine and skull. It is not clear what happens if you mistake the polarities.*

In 2006, a judge from the United States sanctioned the seller of a magnetic bracelet similar to that commercialized in Cuba the payback to 100 000 buyers the money spent because of misleading publicity. During the public trial, the judge Morton Delow cited a study of the Mayo Clinic attributing the alleged efficacy referred by some patients to the placebo effect, a well-known phenomenon off suggestions that make the symptoms stated by the patient might get better with a false treatment. The magistrate put forward the argument that the supposed properties of

the bracelet were “more fiction than science” (figure 3.3) [Perancho 2006].



*Figure 3.3. Magnetic bracelet. From [www.elmundo.es](http://www.elmundo.es), supplement 16/9/2006, number 676.*

This is not the only case of sanctions to magnetotherapy by US courts of law. A similar ruling in 2002 sanctioned the company Techno Brands Inc. for the promotion of *biomagnets* *that* allegedly reduced pain and muscular damages without using painkillers or another therapy. Biomagnets were promoted as effective for pain in the back and waist, tennis elbow, carpien tunnel syndrome, pain in hands, shoulders, ankles, neck, and others [Clark 2002].

Dated September 9, 2002, the general DA of California, Bill Lockyer, filed a complaint against European Health Concepts, Inc. for commercialize magnetic mattress able to improve health in a ‘preventive and therapeutic’ way, suitable for a number of conditions, among them fibromyalgia, asthma, bronchitis, colitis, diverticulitis, multiple sclerosis, insomnia, heart problems and mental disorders. The number of listed conditions were over forty. The promoted action represented fines and restitutions to consumers for more than a million and half dollars [Botwin 2002].

**Magnetized water.** This subject deserves a particular comment. In September 1999 the US Federal Trade Commission (FTC) presented a complaint against the corporation ‘Pain Stops Here’ due to the promotion of ‘magnetized water’, allegedly with benefits for a large number of conditions, such as urine infections, gastric ulcers, diarrhea, renal stones, and even to normalize the blood system and reduce the amount of cholesterol [Clark 1999].

Water cannot be magnetized. Magnetization is a property of solids, not of liquids. Besides, the water is *diamagnetic*, and is not attracted by the magnetic field, but weakly repelled. On the other side, carbonates dissolved in water are sensitive to its action when water runs a given velocity through a pipe immersed in a magnetic field. This magnetic treatment do not reduce the salt content, but brings about its precipitation in the liquid instead of the pipe walls, the salt staying in suspension and reducing drastically the formation of hard crusts when the treatment is applied correctly. The material of which the pipe is built also has effects in the result; it is not the same and iron pipe or a polyvinyl one; in this, latter crusts are almost not formed [González 2008]. The magnetic treatment of water has been recommended by the US Federal Government as an effective way of energy saving, by reducing the necessity of remove the crusts regularly, and favoring the thermal interchange en boilers and cooling pipes. [Fed. Tech. Alerts].



**Figure 3.4.** Water ‘magnetizing’ purification plant of Mexican technology, sited in Cuba 555, between 5 and 6, Vista Alegre, Ciego de Avila (March 2012).

Up to here the reality. There is no evidence about many other properties attributed to water for those who promote magnetotherapy. However, it is possible to find Cuban medical journals that report treatments to patients with chest angina and varicose veins using water or other magnetized liquids, with ‘satisfactory responses’ in all the treated patients [Espinosa 1997; 1998].

In our journals and newspapers it is possible to find advertisements and random references to non-legitimate magnetic treatments of all types, coming from health personnel as well from private dealers. For instance, in a newspaper from Ciego de Avila reporting the selling of ‘purified’ water by magnetic means, you could read that the treatment reduces the calcium and chlorine content and the hardness of water, which is a consumer’s fraud. Roberto Jorge Sánchez, investor and owner of the plant, stated that in March 2012 the demand was increasing *due to the prescription of several MD of the province*. The water is recommended for patients with gastric and kidney problems, cholesterol and diabetes mellitus [Fajardo 2012]. It is worth of notice the amazing credulity of these MDs, who without looking for more sound information took for good the recommendations of a person who is only motivated for commercial reasons and have nothing to do with medical sciences, or any other.

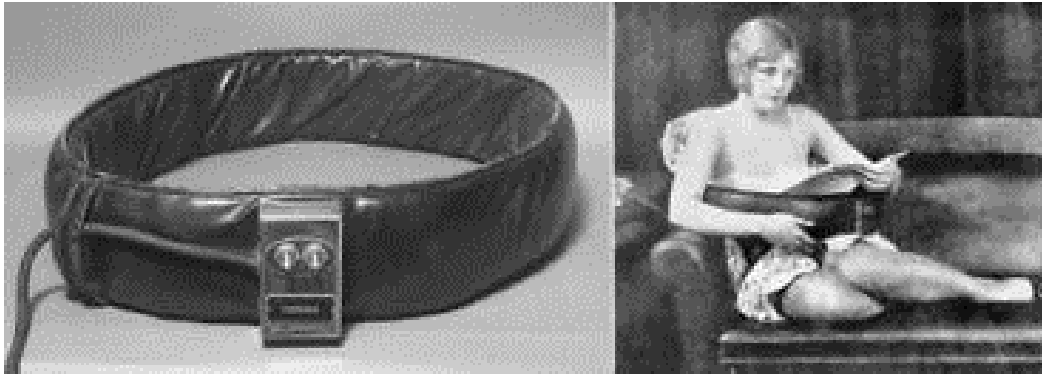
### **3.3. Therapies with electromagnets at low frequency**

***International background.*** The treatment with induction fields at low frequency, reputed for some as a novelty, is not. Figure 3.5 show a poster of the Theronoid, sold in the US in 1928.

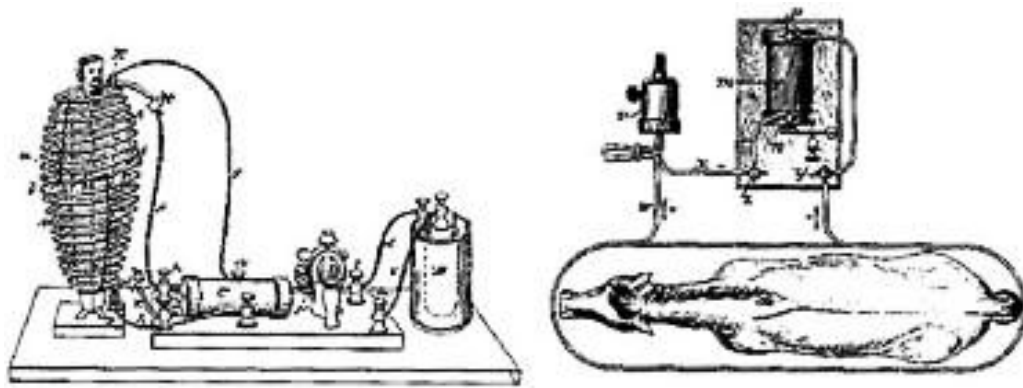
It was made from a toroid coil of conducting wire of about 50 cm in diameter and two switches: one for on/off and the other for high/low to regulate intensity. Devised for the home, the client could connect it with a common plug and apply daily treatments from three to 5 minutes [*Theronoid*].

Previously, other devices had been patented to apply electromagnetic fields to persons and animals (figure 3.6). As usually happens with these ‘marvelous’ therapies, the suppliers stated that the device could cure almost any ailment, from constipation to paralysis. In 1922, the US FTC forbade the announcements of the Theronoid as a healing device, due to the lack of evidence that it could provide any benefits to health.





**Figure 3.5.** *The Theronoid from 1928, banned in the US in 1933.*



**Figure 3.6.** *Electromagnetic therapy for persons and equines. (Patent from the 20's of the past century)*

Much more recently, in February 2017, in a combined action with Mexico and Canada, the FTC filled a complaint against the Canadian company 'Zoetron therapy', alleging the non-effectiveness of its electromagnetic therapy against cancer. It was based in the application of pulsing magnetic fields to suppress the cancerous cells. The Zoetron charged from 15 000 to 20 000 dollars to American patients, that should go by their own means to Mexico. When the combined action took place, Mexican authorities shut down the clinic in Tijuana where the treatments took place. Finally the Zoetron reached an agreement with the FTC, where the company agreed not to try again a similar 'business' in change of the FTC withdrawing the \$ 7 650 000 fine, based essentially in its inability to pay it.

Recent scientific papers about electromagnetic treatments, published in known peer review journals, report doubtful or null effectiveness in

many cases. One example is the treatment of osteoarthritic pain in the knee, a result of a review of published articles between 1966 and 2005 [McCarthy 2006]. Other one do not reach well-defined conclusions, and only recommend more study [Wilson 2007]. In connections with possible heart effects, another paper concludes that, if any effect is present, is small and harmful [McNamee 2009]. A review paper from 2008, with more than 400 references, show that several types of detected effects appear at cell level when applying electromagnetic field of low frequency, but the authors refrain themselves to reach any conclusions about its benefic o harmful quality [Funk 2009].

The more studied therapy is the one applied to bone fractures, in persons an animals as well. If in 2001, the mechanism was not completely clear; its efficacy had been proved without doubts [Chao 2003]. With that purpose were used frequencies between 20 and 100 hertz, with intensities of the applied field very small, between 0.5 and 8 mT for up to 30 minutes. Several authors report that those fields enhance the process associated to bone formation and implants assimilation. However, others think that the benefits do not justify their relative high clinic use in some places. In addition, there are evidences that bone regeneration may take place in a not desired way. The 2003 paper concludes that

“...without knowing with precision the cellular mechanism associated to tissue response in these interventions, it would be difficult and non-effective the establishment of an appropriate therapy in accord to a precise clinical prescription”

Later on in the paper appears:

“...an effort in this sense in required for achieving sufficiency in the clinical application”

Moreover, at the end, in a debate with the referees, the authors advise:

“...to use this technology in an indiscriminate way (without prescription and proper supervision) may cause non desirable secondary effects, even damaging”

A later metanalysis appeared in 2008 reports that, at that moment still was much uncertainty about the effectiveness of the magnetic stimulation when applied to fractures [Mollon 2008].

***National experiences.*** In national orthopedic science meetings, several papers have been presented about electromagnetic treatments in bone fractures. They report a faster osteoplastic activity and that the bone

callus evolves more rapidly, coincident with international reports. However, the extension of this procedure for trying to solve other conditions that has nothing to do with bone fractures, and without applying adequate clinical trials lead to treat the electromagnetic therapies as pseudoscience in most of their applications. In this case, like in other pseudosciences, the non-scientific way of thinking seems to have been the following. ¿It is good for this ailment?... ¡So, let us try this another one!, even there is not any rational justification for the attempt, and the clinical trials are completely disregarded, in the scientific aspects as well as in the ethics, with a frank situations of abuse to patients.



**Figure 3.7.** Picture taken at the Ameijeiras Bros. hospital. La Habana, June 2013. Legend: Magnetic Field. To all patients receiving magnetotherapy. Do not use earrings. Do not use watch. Do not use rings. Do not use chains. Do not use belts. No coins in pockets. Put off the cell phones. Once finished the treatment, avoid contact with water for one hour.

It is possible to find in the local literature reviews about the application of pulsing or low electromagnetic fields, which in a confusing way they are designated as magnetotherapy. Besides, the role of the electric component of the field – without doubt the more important- usually is not even mentioned. Nor are mentioned the induced currents at the microscopic cell level or the Ohm's law, nor any possible healing or deleterious mechanism to explain the possible curative or damaging effects.

References from peer review international journals are scarce and no actualized; for instance, the only cite of and international paper referred to bone fractures in one of these review is 20 years old, in spite that the cites of fake results about magnetotherapy are abundant. Besides, sometimes patents –and not the scientific papers- are considered as a measure of the state of the art (note 4) [Zayas 2002]. One of these papers simply exposes a bunch of not proved statements, without one single reference to a scientific paper (which also is a demerit for the corresponding medical review who published it) [Pérez 2002]. Much less, those investigations appear inscribed in the Cuban Register of Clinical Trials, with public access in <[http://rpcec.sld.cu/tipo\\_intervencion](http://rpcec.sld.cu/tipo_intervencion)>, so they are carried out without the criticism of the corresponding specialized departments, and lack the elemental ethics to take into account in any research involving people.

Low electromagnetic field therapies have been used in the national hospitals for trying to heal very different conditions, among them fibromyalgia [Lena 2002], psoriasis [Pérez 2011], knee conditions [Sosa 1996] (nota 15), cervical arthrosis [Niubó 2010] traumatisms [Espinosa 2007] y some kidney diseases [Betancourt 2011] (figure 3.7).

Many times these reports lack the critical and exhaustive revision of the international bibliography on the subject, without making distinctions in the different effects caused when applying different frequencies. Usually the word *placebo* does not appear in the report. [Seymour 2002]. In addition, when these reports mention the action on individual cells it is always assumed that they are benefic and cannot be harmful, in spite of the lack of evidence in one or another sense. Neither appear attempts in determining the adequate dosage in intensity, length, number of treatments and the form of the applied signal, since the supposed benefic effects could be turned into harmful when changing the dose or the number of applications, as it is usual in many medications.

Another characteristic also disregarded in these papers is that electromagnetic fields, by its own nature, have a tendency to spread in a broad region around the emitter. A treatment directed, let us say, to a kidney, will equally affect the bowel, spleen, liver, pancreas, ovary or prostate, or any other near organ. It is curious that the poster in figure 7 warn the patients not to use watches, rings or chains, showing that among therapists there are notions about the great dispersion of the magnetic and electromagnetic fields. However, it seems that they do not take into account that the dispersion also takes place inside the body, affecting indiscriminately organs different to the wished one.

As a general rule, these reports do not mentions the results obtained in the different previous steps to accomplish any clinical trial, being this and index that they do not fulfill the norms established by the Centro Nacional Coordinador de Ensayos Clínicos (CENCEC, National Coordination Center for Clinical Trials) and the Centro para el Control Estatal de la Calidad de los Medicamentos, Dispositivos y Equipos Médicos (CECMED, Center for Quality State Control of Drugs, Devices and Medical Equipment).

The road to ride for a therapy before its application is approved begins by establishing its biological characteristic, and a study in animals follows. The development of the clinical stage, the last one to evaluate the product, is structured in cycles, known as the 4 phases of the clinical trial. En the first three ones pharmacological aspects are studied, and the research about security begins; the demonstration of the therapeutic, prophylactic or diagnostic effect is planned, and the foreseen dosage scheme of the product is determined. Some diseases of low incidence need multinational clinical trials to obtain representative samples. The lack of methodology according to national and international know standards for clinical trials infringe the patient's rights and the ethics norms recommended by the World Health Organization to assay medical treatments.

There are reports that mix the alternative electromagnetic therapies with others also non-proved ones, like ozone therapy; in this case, the possibility of damage to the patient is multiplied. Ozone therapy is banned in the US, England, and other countries with strong sanctions. There are many references alerting about its possible deleterious effects; in this alternative therapy is particularly noticeable the lack of clinical trial, in the national as well as in the international (chapter 8). In the case we are referring, joint treatments were applied to patients with senile dementia [Llibre 1995] and glaucoma [Ferrer 2004], without reporting ear-

lier trials in cells or animal. As explained before, low field electromagnetic radiation has a big dispersion and penetration power, so in both cases all organs in the patient's head also were exposed to the treatment, with the same intensity.

A broad 2004 report of the Washington University, signed by H. Lai and N.P. Singh reports that "... the rats exposed to sinusoidal 60 Hz field for 2 hours, with intensities of 0.1-0,5 mT, showed an increase in breaks of single and double DNA chains in brain cells" [Lai 2004]. This result should indicate to contemporary magnetic therapists' not applying indiscriminately low electromagnetic fields to patients near the head, up to get more information on the subject. Should this effect appear also in another type of cells (very probable), exposing the ovaries or the testicles to these radiations in a 'magnetic bed' could damage DNA in ovaules and spermatozoids. Since they are single cell entities, the probability of the patient having babies with some abnormality would increase.

*Academic freedom only refers to the search and teaching of truth. It is not a license to say bullshit.*

*Mario Bunge*

## **CHAPTER IV BIOENERGETIC THERAPIES**

### **4.1 Semantic misrepresentations**

From the last decade of the last century, in our country the application of alternative therapies of all kinds was generalized. The denominations 'natural and traditional' or 'bioenergetic' were diffused instead of 'alternative', a word used internationally to designate these therapies. The Cuban Society of Natural and Bioenergetic Medicine and the National Center for Natural and Traditional Medicine (CENAMENT) also showed up.

Alternative medicine is not recognized as effective in most countries and some modalities, such as homeopathy or naturism, have been - and are - widely criticized by the international scientific community and even by some political party (note 17). With few exceptions, these practices associated are not endorsed by the ministries of health of each country; only their exercise in the field of private medicine is tolerated. Some have been sanctioned by the courts or rejected by regulatory agencies in the US and elsewhere (note 18).

However, supporters of these practices often claim that many have been endorsed by the World Health Organization (WHO), but the documents consulted in this regard only recognize their widespread dissemination, something very different from declaring their support. On the contrary, what does appear in these documents is a call to the need to evaluate the efficacy of naturism and traditional medicines through the corresponding clinical trials [WHO Strategy 2006; General Guidelines 2000]. More recent metanalysis, summarizing the results of a large number of clinical trials conducted in many different places, have been unable to find conclusive evidence about the universal effectiveness attributed to some of them, but rather the opposite [Vested 2009, Shang 2005].,

In an article following these documents, a former vice president of WHO has stated:

“...the so-called alternative, parallel, natural or holistic medicines (...) are systematized practices of therapies not verified by the med-

ical scientific community. In medicine, all therapy must be subordinated to scientific trials. Alternative medicines do not admit this type of evidence and base their performance on historical beliefs and testimonies that demonstrate, according to them (their promoters), the effectiveness of these pseudotherapies.”

The usual thing is that in these therapies, being alien to the recognized conventional medicine, introduces scientific terms with a little precise or misrepresented meaning, trying to justify theoretically what really lacks justification. This is the case of bioenergetics and bioenergy, starting with the title of the already mentioned bioenergetic society.

As these concepts refer to disciplines with a certain dose of complexity, before showing local examples it seems essential to illustrate the reader about the real meaning of these concepts and their various misleading interpretations. These can be found in many different places: in pseudo-scientific events and courses, in commercial or esoteric websites, in the press, in non-scientific books and even in some apparently scientific journals. That is why at the beginning a brief explanation about bioenergetics and its different deformations is introduced (section 4.2). The same is done with bioenergy (section 4.3), to finish with the description of how deformed concepts have been used in our country, associating them arbitrarily with various alternative therapies (section 4.4).

## **4.2. Bioenergetics and science**

In contemporary science, bioenergetics is understood as a specialty dedicated to studying the chemical reactions that provide muscular strength and heat in the body from energy coming from food. These reactions are part of the metabolism, a set of chemical processes that take place in the cells and warrant their functioning, preservation and reproduction. Knowing the metabolic processes is part of the basic preparation of any medical student; his study deepens in endocrinology, nutrition or bromatology.

The energy stored in different types of food is well known; it is obtained experimentally by direct route from calorimetric measurements [González 2008]. The values do not show much difference from one type of food to another; expressed in kilojoule/gram they are: carbohydrates  $\approx 17$  kJ/g; proteins  $\approx 17.5$  kJ/g; fats  $\approx 39$  kJ/g (note 19).

Bioenergetics is a complex specialty, which requires the management of the basic laws of thermodynamics together with knowledge of advanced biochemical matters. Energy exchanges can be determined quantitative-



ly from the experiment; one way to do this is from the determination of oxygen consumption at the cellular level. This specialty meets the indispensable requirement of any experimental science; that is, the quantities measured to have reproducible numerical values within the uncertainty range of measurement. Several international refereed journals that regularly publish a large number of articles are dedicated to it; two of those journals are shown in figure 4.1 [J. of Bioen. and Biom; J. of Bioen; BBA Bioenergetics].



*Figure 4.1. Science journals about bioenergetics.*

Despite the clarity of the definitions, the reproducible numerical values from experiments and the high number of scientific articles that appear annually on the subject, bioenergetics has been deformed and misrepresented more than once by supporters of various alternative therapies. It is possible to differentiate at least three false interpretations of the term; the psychological, the energy-electromagnetic and the acupuncturist.

Before describing each of them in detail it is important to highlight that these interpretations are designated as falsified not because they are given the same name as real bioenergetics, but because they are not real energies. They are only empty names, with an undefined meaning. They lack the support of experimental evidence; there are no associated numbers - and if there are any, they are invented - so they do not meet, nor can they comply with, the universal principle of energy conservation. As a rule, the misrepresented use of the term only attempts to cover up

the pseudoscientific, sometimes even religious, background of the alleged therapy.

### **4.3 Pseudoscientific acceptances of bioenergetics**

*The psychological meaning.* The introduction of the Bioenergetic or Bioenergetic Analysis is attributed, as this deformed concept in the field of psychology was also called, to the American psychotherapist Alexander Lowen (1910-2008) [Alexander Lowen], who wrote several books separated from the universal consensus that already existed on energy for over 100 years. For 20 years Lowen was a student of the also psychologist Wilhem Reich, who had proposed the control of the non-existent ‘orgone’ energy as a therapeutic method, with a strong base on sexuality. Reich died in prison in 1957, convicted of fraud. In prison he was diagnosed ”Paranoia manifested in delusions of greatness and persecution...” (Sic) [García 2008].

The energy associated with Lowen's ”bioenergetics” is undefined. Apparently, the term is related to the popular meaning of the word, not to the scientific one. In everyday language, it is usual to comment that a person has a lot or little energy to indicate a mood associated with their greater or lesser willpower. If it is lively, daring or hardworking, we say the person has a lot of energy. If it is nicknamed, vague, or whirlpool, we qualify it as a person who has little or no energy. However, this popular meaning cannot be used as a scientific concept, since experiments, measurements and numerical values are essential in the natural sciences in order to compare magnitudes and do science with them. The well-known statement ”energy is not created or destroyed, only transformed” is not a philosophical concept as some think; it is a generalized result of the experimental evidence obtained over hundreds of years [González 2012]. It is concluded that Lowen's bioenergetics is not really an energy. It is only a misused term, detached from contemporary scientific consensus, which tends to confuse rather than illustrate.

Now, what is Lowen's bioenergetic therapy? The fundamental idea behind Lowenian practices is that there are ”blocks” of emotional expression that are revealed and expressed in the body as chronic muscular tensions that are often subconscious (which is only an assumption as any other can be without the backing of experimental evidence). Lowen's therapy treats these ”blocks” by combining exercises with emotional expressions in a loud voice and palpation of muscle tensions.

An example of Lowen's techniques can be found in chapter 12 of Mi-

chael M. Weber's book ' Psychological techniques: the new seducers', where the author qualifies Lowen's bioenergetics as doubtful, and not precisely because of the energetic semantic aspect [Weber Téc. Psicol.]. According to Weber, Lowen's method is to direct attention to the negative feelings people have (mainly towards their parents) and express them aloud. In Lowen's book ' Bioenergetic Exercises', one of them consists in giving the patient (female) a towel that can be rolled up in the form of a sausage. The towel represents a man, who could be the father, the current couple, or another representative of the hated male sex. While the woman is folding the towel, she must say everything she would have wanted to say to her father, her partner, or any other male:

"You are a bastard! I hate you. You have humiliated me and I despise you. I would like to twist your neck. Then you could no longer cast your impure glances on me."

It seems logical to Weber that the towel can also represent the penis.

Weber also describes that during the international congress The Evolution of Psychotherapy held in Hamburg in the summer of 1994, Lowen presented his bioenergetic therapy in one of the working groups. During the presentation, an adult male took off all his clothes except the underpants and lay on a bench, being extremely flexed. The man shouted loudly and Lowen gave the following "diagnosis": the patient has a tendency to suppress his feelings. When asked that he could reveal his childhood about that trend, he talked about the close relationship he had with his mother. She had been prudish and Catholic, and in her case, it led to confusion in the sexual field. Again the patient lay on the bench screaming in pain, while on a large screen his contortions were projected so that everyone present, more than a thousand, could see him up close. Lowen's comment: "Good! Painful, but good!"

According to one of Lowen's followers,

"... one of the fundamental conceptual bases of Bioenergetics is rooting, link to earth, or grounding. It means to energetically link people's legs and feet with the ground."

Nevertheless, since there is no clear definition of what is considered energy, the meaning of 'energy linkage' is not clear either. Later appears:

"With the grounding exercise, we join with the most neglected part of our body, (from the waist down) which connects us with the animal becoming."

Similar statements whose sole basis is the unfounded preaching of Lowen flood the aforementioned brief [Calcagno Anal. Bioenerg.]. Others claim that the emphasis on sexual realization is even greater than in the psychology of their teacher Reich [Bioenerg. Anal.]. There are many other bioenergetic sites on the WEB with similar characteristics, but nowhere is it possible to find a precise definition of what energy is the controlled one, or how it is measured [Bioenergetics-Chile; What is bio-energy?]. In short, for Lowen and his followers, bioenergetics is just an attractive word and suitable for the purposes pursued; a supposedly theoretical justification with scientific appearance, but without real content.

***The energy-electromagnetic meaning.*** A website defines bioenergetic therapy as a method based on the transmission of energy from one organism to another in order to improve the condition of the individual. It does not specify how that transmission is carried out, how the amount of energy is measured and transmitted, or what type of energy is actually being referred to [Energy Healing]. That same site defines bioenergy as "the energy of life" in the body of humans and animals, without further details. (Apparently, for the promoters of the site the plants are not living things).

On another website you can read:

“Bioenergetic medicine is the study of the human body and animals as electromagnetic fields that exist in an electromagnetic environment. Based on Einstein's theories about quantum physics, these energy concepts have been integrated into medicine for a comprehensive approach to the diagnosis of diseases, their prevention, and treatment” [Reality Check 1998].

Of course, it is impossible to find experiments, measurements or numerical values, nor Einstein's role in all this.

There are also sites that although they do not define bioenergetics, consider that there are three layers of bioenergetic fields: internal, medium and external, and they manage to offer for sale 'bioenergetic' harmonizers' at the 'modest' price of 1,295.00 USD [The Skeptic's Dictionary]. In these sites, there are never indications of how harmonization, energy transmission, integration of electromagnetic fields or divine transfer takes place. In some alternative medicine sites, it is usual to interpret bioenergetics as the 'science' that studies the properties of bioenergy, where the latter term also appears misrepresented (see section 4.3).

Another website committed to alternative medicines defines bioenergy as “the bio-electromagnetic energy that surrounds us”, without specifying its properties, how it is measured or how it is transformed; later he talks about positive and negative bioenergies, stating that the first is a 'pure healing' energy that comes from God [Nudel Bioenergy Healing].

This supposed bioenergy has been associated with the presence of 'auras' around the human body, detectable by the also spurious 'Kirlian photos'. Semion Davidovich Kirlian, a Russian electrician who died in 1980, accidentally discovered that by placing a photographic film next to any object near a high frequency source, the image of an aura around the object would appear. He thought that the blurry contour of the objects (both animated and inanimate) was the image of a certain invisible 'aura' of supernatural characteristics, and not the phenomenon of 'crown discharge' already well known and studied by science at that time [Kirlian photos; González 2009]. It has been shown undoubtedly that the results of Kirlian's photos in people depend on factors such as the type of film used, the applied voltage and the electrical resistance of the skin, which is affected by sweat and pressure on the contact surface. Also, influence the best or worst grounding, the humidity of the enclosure and the exposure time. Up to 22 different physicochemical and photographic characteristics that may affect the halo have been recorded.

However, some contemporary 'bioenergetic' claim they can detect countless diseases and emotional states from those photos. The energy healers mention them as justification for the non-existent 'bioenergetic aura', using as a rule a magical-esoteric or religious language, very intricate and alien to science.

#### **4.4. Bioenergy and science**

There are no less than six refereed scientific journals dedicated to the subject of bioenergy as energy obtained from renewable biomass. That is the meaning accepted by the international scientific community. The Journal of Biomass and Bioenergy (Elsevier Pub. Co.) publish articles on "biological resources, chemical processes... and biomass products for new renewable sources of energy" [J. of Biomass and Bioenergy].

The Journal of Biobased Materials and Bioenergy is edited by the American Scientific Publishers has similar purposes [J. of Biobased. Mat. and...]. Other journals with similar content are shown in Figure 4.2 [Bioenergy research; International J. of Env. and...; J. of Sustainable Bioenergy...; Global Change Biology...; The American J. of Biomass and...]. At present, most of the bioenergy is obtained from ethanol that comes

from corn starch and sugarcane, although it is also extracted from other very diverse natural products, including industrial waste and animal detritus to produce biogas.

Bioenergy as a synonym for biofuel is the universally recognized meaning of the term. As an example, a 2003 article entitled Self-sufficient and Profitable Bioenergy was written jointly by the president of the United Nations Foundation Timothy E. Wirth, a counselor to former President George W. Bush, and a former chief of staff to the president Bill Clinton [Wirth Bioenerg: self-sufficient and...]. On the other hand, as mentioned earlier, the experimental values of bioenergy from biological products have been well known for many years and their use is common in the natural, technical and medical sciences.



*Figure 4.2. International Science Journals about bioenergy.*

Sometimes the term 'bioenergetic techniques' is used in the technological context to describe the various technologies used to produce renewable fuels; however, in this case there is no possibility of confusion with the bioenergetics that studies the metabolism and biochemical processes in the organism, since both terms are very well defined. In science, when in doubt, it is always possible to refer to the description of the process or experiment considered. This is not the case with the pseudoscientific meanings of bioenergy, since there are no experiments or real numerical values that allow them to be differentiated.

#### **4.5. Pseudoscientific acceptances of bioenergy**

In addition to the energy-electromagnetic meaning of bioenergy described in the previous section, which is confused with bioenergetics, there are at least two other meanings, these of a religious nature.

***The Hinduist meaning.*** This meaning is even more tortuous and far from science than false bioenergetic meanings. Some associate it with the vital force or vital energy (prana) and the existence of the chakras, supposed regions of the human body where that energy accumulates (note 20). This meaning is clearly mystical, since chakra is a magical-religious term typical of various oriental cultures. The chakras are six or seven supposed centers of energy, invisible and immeasurable (sic), located in different places of the human body (figure 4.3). The term comes from Sanskrit, means wheel or circle, and is known in various Asian cultures since ancient times. It appears in earlier Yogas and Brahmins texts, in Tibetan Buddhism, in ancient Chinese medicine, in Islamic Sufism and in Jewish Kabbalah. Each chakra has its own characteristic name: muladhará, suadhistana, manipura...

About this subject there is an extensive western literature much more recent, from the late 1800s, where appear details added by writers, such as the colors and various functions of each chakra. Orange (suadhistana), for example, would correspond to the god Vishnu and sexuality; the yellow (manipura) to god Rudra and digestion; the rest belong to other gods, colors and vital functions. Some describe seven chakras instead of six; the seventh would float invisible on the head, associated with Shiva and white or violet. Such associations have nothing to do with science; they are purely religious or simply invented later and alien to the original religion [Chakra; Gonzalez 2013].



***Figure 4.3.*** Chakras in the human body as described by hinduist mitology.

***The Taoist-acupuncturist meaning.*** This meaning is based on concepts that appeared in China more than a thousand years ago to try to explain the effects of acupuncture. They have their origin in the philosophy of Lao Tse, who lived about 2500 years ago; his preaching is included in the Tao Te Chin or Book of the Path of Universal Virtue.

Philosophical Taoism gave way to the religious one a few hundred years later; Taoist religions, Confucianism, Chinese Buddhism and traditional Chinese religion are considered to be derived from this philosophy (figure 4.4) [Stenger 1999; Nogueira 2002]. The fundamental objective of these religions is to achieve immortality, although sometimes this term is not understood as such, but as a way of achieving longevity in fullness.



***Figure 4.4.*** *The taijitsu, emblematic symbol of Taoism, based on the teachings of Lao Tse 2500 ago, later adopted by confucionism, Chinese budism and Chinese traditional religion.*

The characteristics of the Tao (path) are the following:

1. It is neither spiritual nor material from the Western point of view.
2. It defines the existence of three forces, the passive and feminine ying, the active and masculine yang and the tao, the containing or conciliatory force: a ying aspect, a yang aspect, which is the tao.
3. Each school of philosophy - and therefore, each religion - has its own tao or path.

The various Taoist cults that sought to prolong life based on hygiene emerged later, between the third and sixth centuries of our era [Microsoft Encarta 2009]. Superimposed on the basic concepts of ying and yang of Taoist philosophy emerged the 'theories' of the five elements, the one of the main organs, that of the meridians, and that of the basic components. All are related to concepts of ancient Chinese medicine, without a grain of science according to what is recognized as such at



present, because the experiments that support these supposed theories never existed.

In these worldviews, nonexistent energies (Qi or Chi) are introduced, an energy circulatory system formed by meridians that no one has managed to find in thousands of years, despite the current high-resolution microscopes that allow to visualize molecules and even individual atoms, or magnetic resonance imaging equipment capable of checking the inside of the human body in real time.

Note that at that time the physiology of the different organs, metabolism or even the existence of cells was not known. The discovery that the cell is the structural unit common to all living beings dates from 1839; it was the work of botanist Matthias Jakob Schleiden and the physiologist Theodor Schwann, both Germans.

The association of Qi with bioenergy, a term more accessible to Western culture, is apparently something of a contribution exclusively characteristic of our country and not widespread among acupuncture users in other places, who prefer to adhere to traditional Chinese terms. It is also possible to find national writings where the Chinese and Hindu meanings of bioenergy and bioenergetics intermingle, which tends to entangle further the whole issue.

#### **4.6. National bioenergetic practices and publications**

Since the creation of the National Center for Natural and Traditional Medicine (CENAMENT) and the Cuban Society of Bioenergetic and Naturalist Medicine in 1994, the term 'bioenergetic medicine' was used profusely in certain medical and stomatology circles. The diffusion of the term as a theoretical explanation of the supposed effects of numerous alternative therapies is, in all likelihood, one of the darkest and most confusing pages in the history of medicine in Cuba. The propaganda and application of these concepts were not carried out with private funds, as is usual in other places, but by the public treasury. Some examples are the following.

In the book entitled *Ecological Health* written by Jorge Ávila and Pedro Fonte, two graduates in Floral Therapy (note 21) published by the Medical Sciences publisher, it is stated that

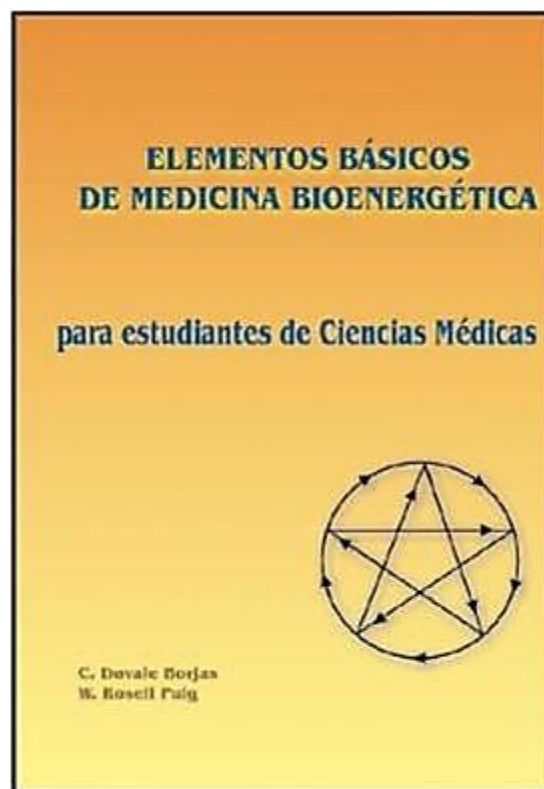
"... as a whole, meridians and acupuncture points are an extensive plot of bioenergetic relationships between all components of the organism and its environment" [Ávila 2004].

There is also advocacy for the need for a paradigm shift in science, re-

ferring to

“... healing systems that have a bioenergetic base such as homeopathy, floral therapy, phytopharmaceuticals, microdoses (...) traditional Chinese medicine, Ayurvedic medicine, Rei-Ki and other procedures with energy emission, pyramidal energy, chromotherapy, holistic kinesiology, and even the points of treatment of Ebbó-adajunché of Cuban Yoruba folklore are shown, indicating in each of the methods its main foundations”.

However, nowhere does the most important thing appear: what the authors understand by energy, bioenergy or bioenergetics. Only in one place, they identify it with the esoteric and non-existent 'life force' (p.106).



**Figure 4.5.** Bioenergetic textbook for medicine students. It do not mention at all metabolism or biochemical reactions in cells. Ecimed, Cuba.

Another book entitled Basic Elements of Bioenergetic Medicine for Medical Sciences Students (C. Dovale and W. Rosell, Ecimed, 2001, Figure 4.5) neither defines what bioenergetic medicine consists of, nor explains in detail what modalities integrate it [Dovale 2001]. It only expresses in the prologue that "it includes a set of unconventional methods", without further details. It never refers to the term alternative

medicine and its content is almost entirely devoted to acupuncture and some of its variants (points of the hand, tongue, and acupressure). Only in the end, there is a brief mention of other alternative therapies, which he also calls bioenergetic, such as magnetotherapy, repudiated for hundreds of years; homeopathy, equally discredited as a science for a long time and with multiple internal contradictions [Carpio 2013]; the mystical floral therapy, coming directly from God according to its own author, and similar ones. Nor does it mention that the Chinese theories that justify acupuncture are much earlier than the discovery of cells, the physiology of different organs, cell biochemistry and metabolic processes in the body. In this book dedicated to students, the Chinese concepts of Qi and meridians are replaced by those of bioenergy and 'bioenergetic channels', with the apparent purpose of providing a 'westernized' explanation to the supposed effects of acupuncture, which constitutes a serious error (see section 7.3).

The 5-point star within the circle that appears on the cover of Figure 4.5 represents the Chen (or Sheng) cycle that relates the 5 elements of Chinese medieval 'theory' (fire, earth, metal, water and wood). Wood spawns fire; fire spawns earth; earth, metal; metal, water; and wood, water. Fire is associated to the heart; stomach and spleen to the ground; the metal to the lung; water to the kidney and bladder; the wood to the liver and the gallbladder. By comparing the meanings - what the authors do not do - you find, for example, that the liver and gallbladder (wood) generate or generate the heart (fire). The book was published by the Ministry of Public Health in 2001.

As a note of interest, the tendency to exalt ancient hypotheses and theories without contact with the advances of science over thousands of years is also reflected in other 'bioenergetic' places. A 2013 brief by the president of the Society of Bioenergetic and Naturalist Medicine entitled "The Thirteen Points for Souls in Grief" presents and tries to interpret - but not critically - some aspects of psychogenic in Chinese medicine 2000 years ago, using terminologies such as 'the heart of the soul in sorrow', a point located "on the palmar face of the tenar eminence, halfway to the crease of the wrist". The document does not mention the location of the remaining points, nor what is done with them (apparently, they are acupuncture points) [Díaz, The thirteen points...].

***Acupuncture points.*** The text in Figure 4.5 defines acupuncture points as

"... biologically active points, which have a low resistance to electric current - low impedance -, so they have greater electrical con-

ductivity - this is used to detect them with electrical equipment."

This misconception also appears in the Avila and Fonte book already mentioned:

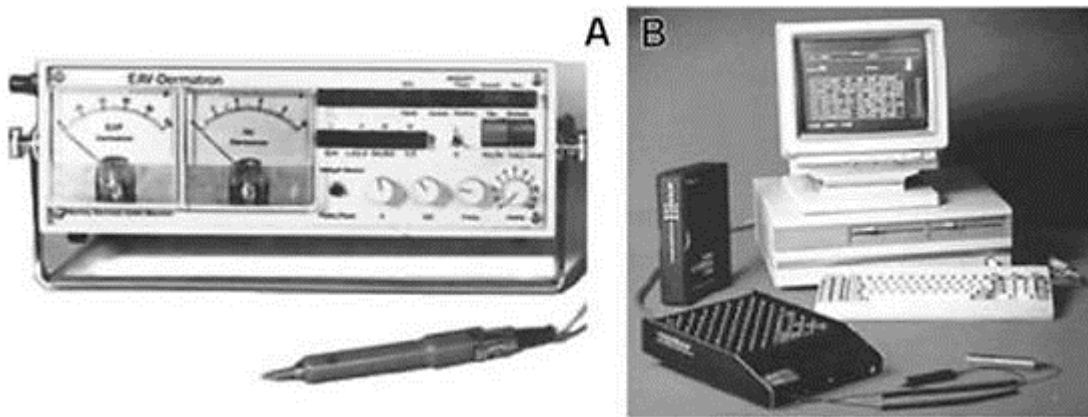
“The acupuncture point has different characteristics to the skin and the surrounding subcutaneous cellular tissue; these are areas of low electrical resistance with high conductivity. The points are sites of memory, formed at the beginning of the creation of the human race, which retain that identity from the moment of the differentiation of the embryonic neural tube”.

Such statements do not reflect reality, since it has never been shown that the electrical properties of these points differ from that of any other on the skin if measured under similar conditions. Moreover, much less that they were formed in the 'beginnings of creation'... (Which one?). If the measurements are made correctly (and anyone can perform them with great precision using the appropriate instruments), the same results are obtained between the acupuncture points as among any others, as has been proven over and over again.

The notion of measuring the potential difference between acupuncture points is original of Reinhold Voll, a doctor from the missing East Germany, who in the 50s of the last century created an electroacupuncture system and manufactured the Dermatron, a device to measure potential differences along the assumed meridians. The data collected was used as a diagnostic method using a system also devised by him. Actually, such equipment was nothing more than a very sensitive electrical meter that measured the potential difference between different skin points using a probe [1]. While trying to reproduce their results, others immediately verified that, in conditions of constant humidity, the only thing that affected the value of the readings was how strongly the probe was pressed against the skin. No relationship was ever found between any specific ailment and what the Voll diagnostic system predicted. More recent versions of the Dermatron use a monitor and a computer to do the calculations, but the foundation and lack of evidence is exactly the same [Barret Quack Electrodiag...].

Today, the commercialization of this equipment are banned in the US, since these instruments are considered a consumer hoax. In the few cases that someone has decided to spend their time conducting full-length clinical trials with any of the many variants of equipment that exist, the results have been negative [Katalaris 1991].

***Other distortions of reality.*** From the ethical point of view, there are two important aspects to consider in these bioenergetic pseudotherapies. One is the possible harm to the patient by the false diagnosis or by employing techniques not demonstrated that, even being harmless, could delay healing because they are not effective. The other negative aspect is that its association with some Eastern religions and philosophies, little known in our environment, is never informed to the patient. The person receiving the treatment does not know that he is receiving a 'therapy' not based on science, but on foreign religious concepts and possibly contrary to his own religion, if he professes any.



**Figure 4.6.** A) The original Dermatron of Reinhold Voll. B) Computer modern version, a fraud the same.

False energy concepts even came to occupy a place in national medical publications. An article published in 2005 in MEDISAN magazine defines bioenergy as...

“The energy of living beings, which forms the structure of cells, organs and systems, allows their internal functioning and interrelation with the world”,

and later the article adds:

“Quantum physics... proves the existence of energy centers or chakras, which absorb vital energy during respiration and, through the nadirs or meridians, transmit it as if it were a network similar to the lymph or blood system”

This extraordinary statement relates bioenergy to the chakras and vital energy, esoteric concepts of Hindu mythology. With a stroke, the au-

thors postulate the existence of an energy circulatory system in the human body, in addition to the blood and lymphatic. This extraordinary 'scientific' article also does not describe what the supposed bioenergetic therapy consisted of. It only says that patients 'received bioenergy', but it does not explain how [Lora 2005].

Obviously, the MEDISAN editors were not well oriented about the difference between a religious and a scientific journal. Apart from the numerous methodological deficiencies, it is impossible to determine from the content of the article what the authors really did; it is not even possible to repeat what is described there to verify its trustworthiness.

Another report, published in the Cuban journal of ophthalmology, associates bioenergetics with magnetic fields, being able to

“Increase the restitution of function of cell membranes at the level of muscle, nerve and improve retinal circulation” [Martínez 2004].

In addition to the fact that the bioenergetic association with magnetic fields is not clear, the author does not mention a single reference that supports his claims. Apologies in the press to bioenergetics applied to disabled children, associated with techniques are not even described in detail [Oría 2007]. Although it is not clearly stated what the 'bioenergetic treatment' consisted of, it is reported that these procedures were approved by Felipe Chao, president of the Scientific Council of the Chinese District and Alberto Naranjo, president of the government of Old Havana, whose academic affiliation is was possible to determine.

Physicist Juana Rassi and engineer Eduardo Delgado promoted a reputed system of its creation that, according to what was published on its website,

“Interprets the biosignals of living organisms, filters them and produces a diagnosis using a mathematical model that indicates which organs have bioelectric dysfunctions and proposes a treatment strategy using the laws of the Five Element Theory of Chinese Acupuncture” [Bimet 2009].

That is, if heart problems appear, the liver should be treated, etc.

The authors affirmed that their method was able to achieve “the patient's dynamic bioenergetic balance” and “diagnose the state of the patient's Bioenergetic System by pointing out the fundamental imbalances that affect health.”

With the support of the Institute of Applied Sciences and High Technol-

ogies (INSTEK) until 2009, they promoted national and international courses with the collaboration of the Spanish acupuncture expert Santiago de la Rosa [de la Rosa medical page]. These courses gave the right to receive a Postgraduate Diploma issued by the INSTEK; you did not have to be a MD to receive it, but a graduate of any university degree (e.g, economics or history). Some of the topics of the course were bioenergetics of the meridians; the difficulties for the energy pass between channels (note 22); computerized model for the study of YING-YANG behavior; theory of the five elements in quantitative form, Sheng Cycle and Quantitative Ko Cycle and other similar [Bimet 2009(a)]. It is also noted that among the factors that affect health are "dominance and counter-dominance in the Ko cycle and blockages and countercurrents in the Chen cycle" (note 23).

The detailed description of the supposed 'bioenergetic dynamic equilibrium' or the meaning of a 'bioelectric dysfunction' does not appear in the consulted bibliography, either how to correct them. What is clear is that the meaning considered here does not coincide with that of the arbitrated journals on bioenergetics described above, nor with that of the psychological Alexander Lowen, since patients were not asked to shout, take off their clothes or imitate sexual movements

However, elsewhere it was stated:

“Bimet also allows you to establish what is the dominant temperament in a given patient and points what you should apply to improve. This is useful especially for psychiatrists and psychologists”,

what is more than enough to confuse anyone about which of the multiple pseudoscientific meanings of bioenergy or bioenergetics their creators were referring to [Bimet 2009 (b)].

*".. Hygienists know of human nature and its ailments more than the abominable healers, who show that bold ignorance is still queen of men, and that in these times of light there are still those who believe in sorcerers and enchanters..."*

*José Martí in 'The National Opinion'*

*Caracas, May 3 1882*

## **CHAPTER V. HOMEOPATHIC REMEDIES AND NOSODES**

### **5. 1 International background**

Today, *sorcery* seems to be a more appropriate word than homeopathy to designate the healing practices introduced by German physician Samuel Hahnemann in the early 19th century. If in the 1800s, there could have been any reasonable doubt about the veracity of their postulates or the effectiveness of those practices, in light of current knowledge there is no justification for considering them more than beliefs of sorcerers and healers.

Hahnemann's curative proposals were first published in "Organon der Heilkunst" in 1810 and in six volumes of "Pure Medical Matter" between 1820 and 1827, more than 10 years before the cell was known to be the common structural unit of all living beings (note 24) [Álvarez 2008]. The biochemical processes that take place at the cellular level, causing the complex physiological or functional relationships of the different organs of the human body, were much less known. Although the foundations of homeopathy remain unchanged, and have not changed in the least since its introduction by Hahnemann, contemporary homeopaths continue to take their preaching as unquestionable truths, without taking into account the advances of natural and medical sciences throughout of almost 200 years.

The amount of articles that denounce the absence of scientific basis and the ineffectiveness of homeopathy from the very beginning is very wide. At present it is still possible to find regularly writings of this kind, both in the press and in specialized scientific journals: [Lewith 2002; Agostinelli Magazine Think; Samarasekera 2007; Gámez 2005; Jarvis Homeopathy; Ramey 2008; Homeopathy your Dr. com; Barret 2007; Wagner 2002; Top British 2002; Sanz 2010; Kupferschmidt 2011; Goldacre Benefits and Risks; Homeopathy and floral therapy; Scott



2010; Vidatox does not cure 2013; Shaw 2013].

However, this fraud is still shared by numerous practitioners and supporters. It has also had the backing of a few governments, although the occasional political party - in this case, from the left - has become aware of the deception, publicly denouncing these practices from an institutional position [Resolution 2012].

Among the countries that have ever adopted homeopathy as an official policy is Adolf Hitler's Germany (figure 5.1). Between 1936 and 1939, the Nazis tried unsuccessfully to demonstrate the effectiveness of homeopathic treatments, arriving to organize a world congress in Berlin in 1937. Minister Rudolf Hess, appointed by Hitler in 1939 third in the political succession of the Nazi party, was a regular observer at that congress [*German Joys*].



**Figure.1.** (L) Samuel Hahnemann. (R) A group of followers in a meeting at Chemnitz, Sajonia, in the thirties of the past century. In 1953, Chemnitz changed its name to Karl-Marx-Stadt, but recovered it in 1990.

The most skeptic doctors in the Third Reich, although they distrusted homeopathic treatments, did not fail to notice their popularity among the population, coupled with the fact that they were extremely cheap. Homeopaths, meanwhile, in payment for the support of their beliefs, widely flattered Nazi officials. Investigations were interrupted when World War II began. Fritz Donner, a homeopath who actively participated in those investigations, after retiring in 1961 wrote a fairly critical report on the whole issue, but was not published in Germany until 1995;

now you can check it on the Internet. Inmates from the Dachau concentration camp were also used in clinical trials, in some cases after being diagnosed by the spurious iridodiagnostic [A total... 2009; Juette 2008].

## **5.2 The basic principles of homeopathy**

It is said that when he translated the work "A Treatise on the Materia Medica" by William Cullins, Hahnemann warned that Cinchona (quina, quinine), from the bark of a Peruvian tree, was effective for the treatment of malaria for being astringent (note 25). Since other substances with these characteristics were not effective against this disease, he decided to investigate himself, noting that, when ingested, this substance produced a symptom very similar to that of malaria. It is very likely that this is the result that led him to postulate: "What can produce a symptomatology in a healthy individual, can be used to treat the patient who suffers the same symptomatology." This is the basis of the so-called "Law of the Like" of homeopaths and the root of the Hahnemann doctrine (homeopathy, of *homoios*, similar, and *pathos*, suffering). The trials in healthy individuals called them 'provings'; they consisted of looking for a product that when supplied to the subject produced the same symptoms caused by the evil that was desired to cure. (Beware: the same symptoms, not the same disease).

In other words, the law of the like states that, if you have a headache, you should eat a product that causes headaches to heal (it does not matter if your pain is caused by hypertension, a brain tumor or a knock). And if you have diarrhea, then take a purgative, regardless of whether the diarrhea was caused by a virus, bacteria or an ulcer in the intestine. The homeopath will tell you that this additional stimulation causes your body to identify the evil that afflicts you (it is not known by what means) and take care of itself to fight the original disease, until it is cured. If the diarrhea continues, then it will tell you that you did not ingest the right product, and that to achieve the cure you have to find another substance that suits your symptoms better.

Before proceeding further, it is necessary to insist that homeopathy is a doctrine, not a science. No one has demonstrated the legitimacy of the law of the like according to what is understood today as a scientific method, a universal rule used in science to verify the truth of any hypothesis [González 2012]. When referring to therapies and medicines, the scientific method is called a clinical trial, a methodology that allows investigating the real effectiveness of the proposed drug or therapy. At the same time, the clinical trial protects the patient from possible harm

when administered substances whose effects on the body in the short, medium, or long term are unknown [Horta 2013].

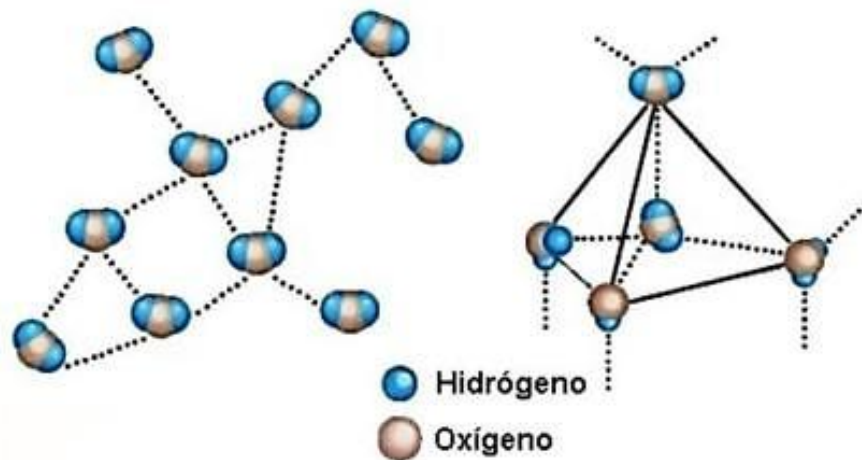
The number of patients damaged by Hahnemann and his followers when trying to cure by applying the "Law of the Like" must have been important, because soon Hahnemann "discovered" another supposed law: in his opinion, the more the drug was diluted greater were its effects. He called it "Law of the Infinitesimals" and postulated that if the dilutions were made according to a technique also created by him (sucusion) the activity of the preparation was enhanced, and even at extreme dilutions could produce the symptoms in the healthy individual or cure the sick.

The sucusion consists in shaking a glass jar with the solution by vigorously applying ten strokes against an elastic object (usually rubber or leather). According to homeopaths, the "energy input" of the operator is of importance in the process. Then a part of the product is taken, dissolved in 10 or 100 parts of water and the process is repeated. And so on. It is easy to verify that a very common solution among homeopaths, obtained from repeating the sucusion procedure 30 times in successive dilutions of 1/100 (30CH solution), contains a single molecule of the original product for every  $10^{60}$  water molecules (1 followed by 60 zeros). The calculations show that a container of about 30 billion times the size of our planet would be needed to find a single molecule of the product swimming in such an immense amount of water. Hence, the probability of finding even a molecule of the original product in an ordinary bottle of any homeopathic remedy is, for all intents and purposes, zero.

With the advance of scientific development, it became clear to all, homeopaths included, that after repeated dilutions there was nothing left of the supposed active principle in the homeopathic preparations. To try to overcome this difficulty, homeopaths introduced the concept of "water memory." The main idea was that, despite the extreme dilutions, the water kept in its structure a "memory" of the original substance, capable of acting favorably on the patient. Of course, no homeopath has been able to demonstrate or even rationally explain how such memorization takes place, nor can it do so in the future because liquid water has a structure that changes continuously as time goes by.

Between the oxygen atoms of the water molecule, the so-called 'hydrogen bridges' forms and disappear continuously (figure 5.2), making bonds that last only a very small fraction of a second. Therefore, there is no possibility of stable structures forming a kind of 'footprint' or

'memory' of what was ever dissolved in it. Research published in 2006, based on nuclear magnetic resonance techniques applied to homeopathic preparations, failed to find the formation of stable clusters of some kind in water [Anick 2004]. The current consensus between chemists and physicists is that, once any compound is extracted from an aqueous solution, any residual disturbance in the water structure will disappear in no more than 0.00001 seconds, due to the continuous and vigorous thermal movement itself of the liquid phase molecules [Gordon 2006]. In summary, the possible existence of such 'water memory' is illusory, and contradicts the experimental evidence that reflects universal laws of physics and chemistry to which all substances are subjected.



*Figure 5.2. Liquid water (H<sub>2</sub>O) structure*

A very publicized controversy about the memory of water began in 1988 between immunologist Jacques Benveniste from one side and the editors of the prestigious magazine *Nature* on the other [Editorial 1998; Davenas 1988]. The first claimed to have found experimental evidence of its existence, but the magazine agreed to publish its article only on condition that its results were submitted to verification by an independent commission. The documentation, additional arguments and articles published after the work of the commission, with negative results and total loss of prestige for Benveniste and his coworkers, are collected in detail in the book by Rogelio Díaz 'The water, an insoluble controversial by nature', published in Havana in 2012 [Díaz 2012].

On the other hand, from a strictly medical point of view, five statistical metanalysis carried out by independent researchers in recent years, covering a large number of clinical trials with thousands of subjects, have

yielded negative results for homeopaths. After excluding inappropriate trials from a methodological point of view and biased reports with obvious errors, the studies found no significant statistical results in favor of homeopathy [Kleijnen 1991; Boissel 1996; Linde 1998; Cucherat 2000].,,,

In February 2010, the Science and Technology Committee of the House of Commons of the United Kingdom, in a documented report of more than 150 pages, described various aspects of homeopathy with the following attributes: implausible; untenable; theoretically weak; homeopathic products do not work better than placebos. It is not worth doing more controlled clinical studies on placebos, because we would be throwing money; the government should stop the contribution of funds for homeopathy [Evidence Check 2010].

Cornered by criticism and the impossibility of rationally substantiating their proposals neither theoretically nor experimentally, some homeopaths claim that contemporary science lacks effective means to assess the efficacy of homeopathy. According to them, their proposals make up a system that goes beyond science, so they cannot be submitted to scientific criteria. They do not realize that, by rejecting science and its methodology, they deny Hahnemann as a scientist. We would then have to consider Hahnemann as a prophet, comparable to Muhammad or Moses, with the difference that they preached his doctrine on behalf of some god and Hahnemann did it on his own. By rejecting the scientific method, they recognize, perhaps without pretending, that homeopathy is not science, but obscurantist and anti-scientific doctrine, alien to medical sciences and only appropriate for quack healers.

### **5.3 The nosodes**

The introduction of nosodes is attributed to Constantine Hering (1800-1880), who since 1824 maintained friendly relations with Hahnemann and considered himself his disciple. He immigrated to the US in 1833, where he became known as the 'father of American homeopathy' [Constantine Hering]. Hering, most likely influenced by the success of conventional vaccines, created his own homeopathic vaccines or nosodes.

Conventional vaccines are prepared from dead microbes of virulent strains, or live microbes of attenuated strains, to promote the production of antibodies that recognize and attack the infection. Thus, it is possible to immunize the inoculated organism. The first vaccine dates from a little before the development of homeopathy (1798); it was created by Edward Jenner to prevent smallpox. A nosode is the imitation of a vac-

cine, where the usual steps to eliminate or attenuate the virulent strain are not applied. What is done is to take the contaminated fluids of a patient (sputum, cancerous tissues, menstrual blood, or rabid dog saliva) and apply the homeopathic dilution process until there is nothing left of the original fluid. Homeopaths consider - without any theoretical or experimental endorsement that supports their claims - that this procedure is sufficient to achieve the immunity of the healthy subject when supplied orally.

It is usual to try to replace the lack of scientific evidence and the distrust created by these statements by providing extravagant figures of alleged 'immunizations'. Thus, for example, a website called Nosodes reports that in 1950 in Johannesburg, Taylor Smith immunized 82 persons with the anti-polio nosode Lathyrus, with 100% effectiveness. The same writing states that later, in Chicago, one Grimer did the same with 5000 children, with the same result: 100% effective. The site also reports similar results from Heisfelder in 1956-58 with 6,000 children and another in Buenos Aires, which involved 40,000 people [Zacharias 1996]. However, in no case are more details reported or the corresponding references are given in order to verify these results in context.

Actually, it was the American Jonas Edward Salk who developed the first effective polio vaccine in 1952, by mixing three different strains of inactivated viruses; his vaccine was replaced in 1963 with the Sabin oral vaccine, which was more effective. After a worldwide vaccination campaign initiated in 1988, in 2004 there were only 18 countries out of 125 initially affected by the disease. The American continent has been a polio-free region since 1994 (Encarta Encyclopedia 2009). Of course, none of this is due to homeopaths.

The lack of transparency has always been a characteristic present in the homeopaths' actions, which has taken their promoters to court on occasion. Homeopathic French multinational Boiron was forced in 2012 to pay \$ 12 million to avoid a class action lawsuit in the US by deception to consumers. Some of the reported products were Oscilloccinum (against the flu), Arnicare (against pain), Chestal (against cough) and Coldcalm (for a cold in children), none of which was effective for the symptoms he intended to calm [AMR 2012].

Homeopathy has charged a large number of deaths (also in Cuba, as shown below). Some of the most recent are the following.

In May 2002, the Australians Tomas Sam and Manju Sam, of Hindu

origin, were indicted for the negligence that led to the death of their daughter Gloria Thomas, nine months old, when she insisted on treating her with homeopathy after developing eczema at the age of 4 months. In the end, the disease became so severe that the girl's skin cracked whenever she changed her diapers. He died from malnutrition because he had to fight continuous infections caused by wounds on his skin, which caused bleeding in his lungs and respiratory tract [Respectful Ins.].

In September 2010, the Japanese government initiated an investigation for various deaths caused by homeopathy, which in recent times has gained some popularity in some sectors. Among the deaths is that of a 2-month-old girl who was born with vitamin K deficiency. The girl died of bleeding in the crown of the head because she was only given homeopathic medicines instead of the necessary vitamin injection that would have solved the problem. [Wanjeck 2010].

In 2012, an Italian judge accused Marcello Monsellato of the death of his 3-year-old son Lucas, who suffered from pneumonia and who was only given homeopathic remedies. The father said he entered the child because he had choked on taking a homeopathic tea, and denounced the three doctors who treated him in the emergency room due to negligence. But they said they could not do anything because the child came to his hands "dead and cold." Luca's autopsy determined that the cause of death was respiratory failure due to his illness. According to the columnist who reported the news,

"...die of pneumonia, a disease in which most patients are cured without the need for hospitalization, and with a simple treatment of antibiotics and some rest, it is somewhat difficult to believe in full XXI century... unless you have a father who rejects modern medicine and treats you with homeopathy" [Peláez Imputan...; Wikinews Parents...]

#### **5.4. Homeopathy and nosodes in Cuba**

The first known attempts of applying homeopathy in Cuba date from 1854. During a yellow fever epidemic, a doctor who called himself Guillermo Lambert de Humboldt appeared in Havana. He claimed to be Alejandro de Humboldt's nephew, well known for his studies on Cuba. Dr. Lambert claimed to be able to prevent the disease through a vaccine developed by him following the principles of homeopathy. To prepare the vaccine, he used the venom of a viper that produced symptoms similar to those of the disease, in accordance with the provisions of the Similar Law.

The colonial authorities, frightened by the epidemic that affected the troops and seamen staying in the city, often with deadly results, agreed with expectation to Mr. Lambert's request. However, they had the good judgment to do so using control groups to compare the results, all supervised by a commission of doctors in the yard, among them the Dr. Nicolás J. Gutiérrez, later President of the Academy of Sciences of Havana. The results of the trial were clear and conclusive: the percentage of patients among those who received the homeopathic 'vaccine' was the same as among those who did not receive it, so the head of the island's military health, Dr. Fernando Bastarache, immediately put an end to inoculation [Pruna 2011].

About ten years later, in 1866, the Royal Academy of Medical, Physical and Natural Sciences of Havana pronounced firmly against homeopathic doctrine. In the document, the Academy rejects the homeopathic doctrine as contrary to reason and experience considering that "... (the Academy) should not descend to criticism of any work that is based on the principles of that doctrine" (sic).

Such conclusion was based on experimental results both native and foreign. The scientific rigor and evidence collected by Cuban doctors in the mid-nineteenth century can be described as remarkable, since the document mentions Andral's experiments at the hospital of the Pieta in Paris; those of Dr. Bally in his Hôtel-Dieu clinic; those of Broussais in Val-de-Grâce; those of Dr. Pointe in a hospital in Lyon. He also mentions the results of other trials promoted by the government of Naples and conducted by Dr. de Horatiis; the attempts of Professor Nathalis Guillot in his rooms of the Salpêtrière, where all the patients died very quickly; those of Dr. Charge in the cholera epidemic of 1855 in Marseille, who for eight days found that more sick people treated with homeopathy died than those undergoing conventional care. And there was no lack of reports of experiments in Cuba, such as Dr. José Lletor Castro Verde's attempts to cure cholera invaders with homeopathy in 1850, where "deaths were higher than the entries... of 14 patients died 15; the explanation is very simple; the poor male nurse joined the deceased" (sic) [Drafting 1866].

From this moment, homeopathy disappeared from the national scene, totally ignored during the end of the colonial era, the independence wars and the republican era.

According to a local newspaper, his reappearance took place in 1992, when the Ministry of Public Health decided to incorporate homeopathy



as an alternative therapy, ignoring the contrary evidence that already existed at that time, including that of the 19th-century Cuban academic doctors themselves. In 1993, 10 prescribers of homeopathic medicines and 10 pharmacists were authorized for the first time to dispense; homeopathic products were produced in Finlay laboratories, in the capital of the country [Presa 2008]. From that moment, and thanks to the official support, homeopathy was booming throughout the national territory and postgraduate courses and degrees of that 'specialty' were instituted in various medical universities. Praises of all kinds proliferated in the national press and even articles in Cuban medical journals, all in favor of homeopathy, but all also characterized by the absence of scientific methodology. Some did not even contemplate the control groups already introduced by Cuban doctors in the mid-1800s, or the comparison with recognized conventional treatments [Fernández 2012; Fruits 2013; Hernández 2006; Riverón 2012; Hernández 2012; Naples 2008; Massive... 2007]. Nor were the critical articles, although with very limited access to the press, which with few exceptions preferred to follow official guidelines rather than promote exchange and scientific criticism [Homeopathy... 2012; González 2008; Silva 2002; González 2007; Álvarez 2008]. Homeopathy was greatly stimulated in 2002 by the aforementioned agreement of the council of ministers on natural and traditional medicine.

In the beginning of 2013, the propaganda in favor of homeopathy had not yet declined. In the pharmacies, you could find homeopathic products that supposedly were used for very different ailments -including cancer- promoted by state centers such as the natural resources section of the Finlay Institute and Labiofam laboratories in Havana, plus some satellite centers in other provinces [Falcón 2013]. Homeopathic products were sold without a prescription, and the population was even encouraged to self-medicate, against an official policy of more than 50 years in which the population was oriented not to do so to avoid unnecessary damage or complications. Engineer Roselyn Martínez Rivera, vice president of the Finlay Institute, told reporters in early 2013:

“Homeopathic drugs have already been incorporated into the basic medication schedule and do not necessarily have to be prescribed by a medical professional.”

Recommended doses? Five drops under the tongue, whatever was the promoted product or the disease it intended to cure.

Following the homeopathic tradition of lack of transparency, none of these preparations specified the content of active ingredients. Other-

wise, they should have reported that there is only water, perhaps with some flavoring. Nor it was explained how the product preparation was carried out. If contraindications appeared, they were not endorsed by the corresponding clinical trials. These guidelines, essential in any non-homeopathic medication, were also not presented in the enthusiastic reports and announcements that appeared regularly in the official press. The lack of effective information to the patient was replaced by an inconsistent string of praises for the effectiveness of the product, vague statements about 'improvements in the quality of life' or the manipulation of statistics, which usually reported figures of 'treated' patients (no the percent of cured or deceased).

For example, the figures provided during 2011 and 2012 by Labiofam specialists on the number of patients treated using Vidatox®30CH "with extraordinary results" vary chaotically. Some of them are 10 thousand, 65 thousand, 100 thousand and 250 thousand [Roque 2011; Martín 2012; Bustamante 2011; Armas 2011]. The remarkable lack of seriousness implied in these inconsistencies speaks for itself of the lack of rigor of the promoters of this homeopathic preparation [Rojas 2013]. It is also possible to find on the internet complaints about the publication of false scientific articles referring to this product and the lack of ethics associated with its advertising [Vidatox 2012; Rojas 2012].

Actually, Vidatox was the continuation of the failed attempt of the Labiofam company to pass the scorpion venom as an anticancer drug called Escozul. In 2004, in an article published by the oncologist Ricardo Cubedo in the doubts and questions section of the elmundo.es newspaper, the author stated: 'There is not a single medical publication regarding treatment with Escozul'; ' There is no objective report on the effectiveness of Escozul, even on the product's own website'; 'No one should try Escozul or anything similar in place of surgery, chemotherapy or radiotherapy' [Cubedo 2004]. When the alleged drug was rejected by the authorities of the Cuban Ministry of Public Health, Vidatox emerged, whose concentration 30CH indicated a quantity of active product void for all purposes; the calculations show that after 30 successive centesimal dilutions, the poison content is much lower than the concentration of impurities that can appear in double-distilled or deionized water, which the promoters kept very well from reporting in their writings.

An additional argument that demonstrates the multiple deceptions associated with Vidatox is that, according to homeopaths, the appropriate

substance to treat the patient is some very dilute that causes the same symptoms that his disease displays. However, scorpion venom was initially a supposed cure, and not something that causes the same symptoms as cancer. (In fact, the poison would have to cause the symptoms of all types of cancer that are known to be consistent with the principles of homeopathy, which is an absurdity more in addition to the previous ones, given the great difference that exists between various types of cancer). In short, although the foundations of homeopathy are false, Vidatox did not even comply with them; actually contradicted them.

**Nosodes** The nosodes have not escaped the attention of homeopaths in our courtyard. In the Cuban medical journals its use has been exalted in epidemic outbreaks of scabies, chickenpox, dengue, pediculosis, hepatitis, leptospirosis, influenza and polyneuropathy [Riverón 1997; Pérez Integration of...; Riverón 2013; Colin 2012; Riverón 1997]. In a report by Didi Ananda Ruchira, director of the Abha Light Foundation (a homeopathic and naturopathic organization of a private nature), the following can be read [Ananda Cuba uses...].

“An historic and inspiring event took place on December 10-12 in Havana, Cuba, which I had the honor of attending. There, the Carlos J. Finlay Institute, under the guidance of its general director, Dr. Concepción Campa Huergo, Dr. Gustavo Bravo and others, hosted NOSODES 2008, an International Meeting on Homeoprophylaxis, Homeopathic Immunization and Nosodes against Epidemics.”

According to the author,

“... the Finlay Institute is first and foremost the Cuban research institute that produces allopathic vaccines for that country (note 26). (...) The general director herself is very pro-homeopath (besides being a macrobiotic vegetarian). (...) Until August 2007, the Finlay Institute had been distributing its own leptospirosis vaccine. (...) But in August 2007, it put about 2,200,000 people (Yes! 2 million) in two provinces under nosedic prophylaxis, at a cost of only \$ 200,000 USD. The figure represents the entire population of the 2 provinces” (sic).

And later she adds:

“This massive treatment of 2 million people with homeopathy seems no to be carried out anywhere else in the world, not even in India, where homeopathy enjoys government support”

Didi Ananda Ruchira's report does not comment that quite possibly not

one of the 'vaccinated' had the slightest idea of what they were giving him, or how the vaccine had been prepared. Not having made detailed warnings about the characteristics of the product, everyone thought they received a conventional vaccine, similar to others previously applied in the country. There was not enough information for citizens to choose whether they wanted to receive the homeopathic product; they were simply administered. Didi Ananda's article also reports that there were thousands affected before the vaccine, even after being vaccinated with the conventional vaccine, and that their number was reduced to less than 10 monthly in 2008 (they would be more than 100 per year, a figure not negligible).

It has not been possible to find official reports of this result, nor comparative figures with control groups or with those infected in provinces where the 'vaccine' was not administered. The press simply did not talk about it anymore.

A newspaper in the province of Las Tunas reflected nosedic vaccination as follows:

“The vaccine is applied orally, in two doses of five milliliters each and a difference between one and another seven days. It has no adverse reactions, but for it to have the desired effect, 30 minutes before and after absorbing the medication, the person must avoid smoking, drinking coffee, eating food and brushing, actions that can interfere and even erase the immunological memory of the product” [Perez Vaccine against...].

Clinical trials that show that coffee, tobacco, and food affect the product, but not the enzymes, ptyalin, or potassium and bicarbonate ions present in saliva are yet to be seen. And it is obvious that unsuspecting readers would have no idea what it meant to 'erase the immunological memory of water' (section 5.2). In addition, these instructions were an excellent excuse to justify the cases in which the vaccine was not effective: the subject simply drank coffee, or smoked, ate something or brushed his teeth before the stipulated interval, and therefore were not immunized. Thus, the responsibility for failure could be attributed to the patient and not to who provided the medication.

## **5.5 Goodbye to the Century of Lights**

As much as science advances, there will always be people who continue to believe in the recommendations of sorcerers and healers. In that case, the most that can be done is to promote the spreading of science and

scientific criticism by all possible means; Do not block it, as it has ever happened. On more than one occasion, the national press has preferred to disclose the fantasies of an illusionist than the rational arguments of a group of doctors and academics. Within that framework, an unusual step backwards, never seen before in Cuba, was to adopt some healing practices as an official, non-transparent and forced health policy throughout the country.

On January 28, 2012, the Cuban societies of mathematics and computing, physics and chemistry presented a formal statement about the need to promote the scientific method. Subsequently, the Cuban bioengineering society and that of oncology, radiotherapy and nuclear medicine joined it. There it was clear the rejection of these societies to the official support of all kinds of pseudoscientific and anti-scientific practices. In one of its paragraphs, it states:

"The signatory scientific societies maintain that, although every person can use the means they deem appropriate to improve their health and well-being, official institutions should only sponsor, finance, invest state resources or in any way support the reproduction on a social scale of knowledge, behaviors and habits, if and only if, it becomes clear that they are based on the scientific method." [Statement of... 2012].

However, although it was sent to various press bodies, it was never published by the national press.

In the light of current science, there is no reason to continue adopting the obscurantist practices of Hahnemann and his followers. Those who have the responsibility of ensuring the health of the population should not ignore this deception at the expense of supposed benefits never demonstrated (in reality, non-demonstrable). It is essential to demand transparency in the information of the products offered to the population, whether they are homeopathic, naturopathic, or of any other kind, to respect the integrity and rights of patients according to the rules of the World Organization of Health and the standards in force in the Republic of Cuba. In the case of the so-called 'natural and traditional medicines', these norms have been ignored or manipulated by their supporters and by the official press on multiple occasions, promoting scientific censorship and obscurantism to more than three centuries of the Century of Lights to which Martí alluded in 1882.

*Do not say that for which you do not have suitable evidence.*

*Herbert Paul Grice (note 27)*

## **CHAPTER VI FLORAL THERAPIES, DOWSING AND NATURISM**

### **6. 1. Floral therapy. International background**

Conceived around the 30s of the last century, floral remedies are based on the preaching of British doctor Edward Bach on the origin of diseases, and how cure them. His criteria were published in full in the first of his books: 'Heal yourself: an explanation of the real cause and cure of diseases', much more similar to a religious text than to a medical treatise. It is not surprising that his healing proposals are permeated with religion and not contain any science at all [Bach 1931].

Apparently, Bach once practiced homeopathy, but his proposals have little to do with it; he used very dilute solutions of floral extracts, but without reaching the homeopathic end, where the degree of dissolution is such that there is nothing left in the final product but pure water. It also has nothing to do with the false "law of the like" of Hahnemann. In his book, Bach lists the five 'fundamental truths' that make up the core of his healing doctrine (figure 6.1):

- The souls, invincible and immortal sparks of the almighty, are the real superior entities of humans.
- The purpose of humanity is to develop virtues and sweep all intrapersonal mistakes. Souls know what circumstances lead to the perfection of human nature.
- A person's life is a tiny part of their evolution.
- When the soul and personality meet in harmony one is happy and healthy. The misleading personality of the dictates of the soul is the root of diseases and unhappiness.
- Love is the creator of all things, and everything that humans are aware of manifests the Creator.

It is very possible that in those preaching had influenced his retirement to country life after knowing that he suffered from cancer, since he died in 1936, a few years after he began to spread his doctrine. Unlike science, whose claims are essentially based on the scientific method, a doctrine is essentially an act of faith. There are no demonstrations, experiments or clinical trials, confirmed hypotheses and almost never nu-

merical or statistical values. The main characteristics of the scientific method can be found in the literature.



*Figure 6.1. Heal Thyself; Edward Bach.*

Bach, perhaps based on his own experiences, said that diseases were essentially... beneficial!

They were designated "to subject the personality to the divine will of the soul." With these ideas in his head, he 'discovered' the supposed healing effects of 38 wild flowers, although he acknowledged that he had not done it himself, but had celestial help. Referring to his floral system, he wrote:

“No science or prior knowledge is required... without science, without theories, because everything in nature is simple. This healing system... has been revealed to us divinely.”

The above is not figurative language. Bach said that it was enough for

him to test the petal of a flower to know what its healing properties were. According to him, the vital force (quality of the soul or energy wavelength) of each of these flowers was transferable to water and from there to humans. In that way, each floral remedy was a liquid that contained a supposed quality of the soul with affinity with some other quality of the human soul, and the ability to harmonize with its counterpart. (The energy wavelength is a spurious term, unknown in the physical sciences).

That is why those who today want to make floral therapy go through science lie to their patients shamelessly, by not informing them in detail the purely divine and non-scientific nature of these remedies.

Initially, Bach took the dewdrops that covered the flowers in the early hours, which were supposed to be so impregnated with the floral spirit. Mixed the dew with brandy to form a mother tincture that later diluted. As the collection of dewdrops is a very unproductive method, it soon replaced it with a more expeditious one: put the flowers in water and expose them for a while to the sun. In the absence of sun, they could also be boiled in water [Bach flower essences...]. The final product contained an infinitesimal amount of floral substance in a 50% solution of water and brandy. To diagnose Bach he used conversation and intuition; the remedy could be administered both orally and externally.

The extreme dilution used in Bach flower remedies is such that the smell and characteristic flavor of each plant disappears completely; however, floral therapists ensure that the remedy contains the plant's energy signature, which is transmitted to the patient for healing. As is often the case in the field of pseudoscience, when there is no concrete evidence of what is claimed, what was referred only to the flowers of the British countryside within reach of Bach, were quickly imitated by others. Thus, for example, in California was 'discovered' that the flower known as forget-me-not is good for raising awareness of karmic relationships beyond the threshold (note 28) [Bach flower therap...].

Despite the overtly religious nature of floral therapies and the total absence of scientific basis or rational hypotheses that justify them, for various reasons there are those who have devised clinical trials with all the requirements of current science to assess their effectiveness (control groups, double blind, etc.). Results always have been negative for the floral proposals [Wallach 2001; Pintov 2005; Ernst 2002; Oliff 2000; Bergado 2009]. Some exceptions showing seemingly positive results, and the causes of those results, are described below.



## 6.2 Flower therapy in Cuba

It is quite possible that Cuba was the first country - and the only one to date - to formalize the 'divine' floral therapy in early 1999. In January 2002, its validity was explicitly endorsed by the agreement already cited other times. Among the therapies mentioned in point one, third agreement, floral therapy appears.

The first courses were taught by Argentine "experts" (apparently they were not even MD) and the initial training included the First Floral Therapy Diploma, from which 104 professionals graduated [Lahera 2008]. From the very beginning, to describe Bach's preaching, the national reports used language that lends itself to confusion. As a rule, their religious character was not clearly specified, trying to make floral therapy appear as the science that it is not. Thus, for example, one of these articles states that Edward Bach performed experiments that he tested on plants, animals and men. (Which is not true, he simply applied his beliefs as they were inspired by God). Or that in 1976 the World Health Organization (WHO) recognized his therapy as a form of alternative medicine, ambiguously expressing what actually happened: that WHO took note of its existence and not that it approved it as a valid therapy. WHO's most up-to-date criteria on alternative medicine can be found in various documents, where floral therapy is not even mentioned [General guidelines...].

In the aforementioned Cubaweb article, it is stated that the biotherapeutic department of the Finlay Institute, in Havana, assumed the duplication of the original dyes to locate them in different pharmacies in the country and extend the services in the Natural and Traditional Medicine clinics. With that objective, the Ministry of Public Health bought significant quantities of flowers. The specialist Alina Campos told the journalist:

"... we already have clinical experiences with the Topes de Colantes orchids and work in the botanical research phase to determine the effects of our flowers and shape the Cuban Floral System."

But it may have been somewhat more difficult to find the right person who was able to talk to God, as Bach did, to get to know with divine accuracy which Cuban flowers were suitable for therapy.

When reviewing the national medical literature, numerous articles regarding floral therapy appear. However, unlike the clinical trials cited above, which included control groups using the double-blind method, as

a general rule national articles reported trials with methodological deficiencies that invalidate them [Campos 2004; Padilla 2006; Yanges 2005; France 2003]. Or lacked control groups, or were not performed double blind, or test groups were not chosen properly, so that they did not meet the minimum standards currently established by international organizations, and by Cuban agencies, for the correct conduct of clinical trials.

Books with a similar tonic also appeared. In the Manual of Natural Therapies in Stomatology published in 2011, a whole chapter dedicated to floral therapy appears, where its religious origin is completely omitted and, on the contrary, fanciful terms other than science and religion appear as an 'energy structure' and 'energy field of the living being' [Hernández 2011]. In its entirety, the book is a good example of an obscurantist way of thinking quite widespread in Cuba in some professional circles since the fall of the Berlin Wall. They are given by certain propositions that have never been scientifically proven, and not even a single experimental article or clinical trial of an arbitrated scientific journal that endorses any of the claims that appear there is cited. The books cited - most of acupuncture - are similar in tone; there are many texts published in Cuba and not one published by an international editor with a recognized scientific or university career.

On several occasions, the press and some MDs in the courtyard echoed the floral inconsistencies, adding fantasies of their own harvest such as associating floral therapy with astrology or Hindu religion. In one case it could be read: "Depending on the zodiac sign where the Moon is located, a basic error corresponds that can be corrected with a specific flower"[Díaz 2008], while in the other, a professional awarded at the V Provincial Meeting of the Creative Woman, in Pinar del Río, stated that "... there is nothing magic in floral therapy... Its topical use stimulates the chakras of the body, that is, the points of greater energy thus achieving greater harmony and a better functioning of this one"[Gilling 2008]. However, according to Hindu mythology, the imaginary points are actually invisible and immeasurable sites where different non-existent energies are concentrated, located in different parts of the body and associated with various organs, colors and mythological gods. Consequently, the word magic it is quite appropriate.

Obviously, there was a lot of confusion about what science is and what is not in both sides, in the winner side and among the members of the bench who awarded the prize.

### **6.3. Dowsing. International background**

It is not arbitrary or accidental that dowsing (also known as rhabdomy-  
cia) is added here after floral therapy, since it is common that in the  
field of pseudomedicine the first is used for diagnosis and the second  
for treatment, despite there is no relationship between them, unless their  
lack of scientific basis. One is 'divine'; the other has been repudiated  
by Catholics and Protestants. As a rule, in international literature both  
apologists and detractors consider dowsing as an alleged paranormal  
phenomenon, oblivious to science and scientific explanation.



*Figure 6.2. Dowsers with dowsing rod and pendulum.*

In its origins, dowsing was used to try to find water, minerals, burials  
or hidden objects with the help of a pendulum or a fork (figure 6.2). The  
operator of the instrument is called a dowser, a word that comes from  
Arabic and means 'diviner of hidden things'. The practice of divination  
using hairpins and pendulums may be traced back thousands of years in  
China, Egypt, and Etruria, the latter on the northwestern coast of the  
Italian peninsula, at a time before the predominance of Rome. Later its  
use passed to all the territories of the Roman Empire.

Criticisms of the church, both Catholics and Protestants, already had  
appeared in the Middle Ages. Martin Luther, in the 1554 edition of his  
work *Decem Praecepta* considered the use of the dowsing rod as an act  
of witchcraft that violated the first commandment of God's law. In 1634  
Armand Jean du Plessis, Cardinal de Richelieu, imprisoned in the Bas-  
tille the Belgian engineer and director of mining services in Austria  
Jean du Chatelet, Baron de Beausoleil, for magic and witchcraft associ-

ated with dowsing. He imprisoned his wife Martine Bertereau in the Vincennes Castle with his eldest daughter. It is assumed that husband and wife died in prison, because nothing else was heard from them since that time [Chatelet Jean; Martine B.]. It is documented that Jesuit priest Gaspar Schott considered it a satanic superstition, although he later noted that he was not sure if the devil was always responsible for the rod movement [Chevreul 1854].

From that time until the beginning of the twentieth century appear papers advocating both for and against dowsing, but always referred to their relationship with the search for water, minerals or lost objects and not for medical diagnosis. Favorable results usually appear in books or brochures of little-known publishers, written by dowsing practitioners without academic training [Bassler 1995; Kersaint 1997; Benavides 1990]. One of the most used hypotheses in these writings to explain the divinatory properties of dowsers was that groundwater currents could generate very weak electromagnetic fields. Those fields would be able to modify the Earth's magnetic field near the surface, which the dowsers would be able to detect. Designing an experiment today to measure the alleged changes in the field should not bring greater difficulties; the current pocket magnetometers have sensitivity capable of detecting the presence of magnetic minerals at great depth, and contemporary ground penetration radars can 'see' and photograph images of what exists underground. However, serious experiments that demonstrate such skill never appear.

Well-documented negative reports have appeared in scientific journals, such as the one referring to a study conducted in 1948 in New Zealand, which contradicted the supposed ability of 58 dowsers to detect water [Ongley 1948]. A 1979 summary article examined a good number of controlled studies, with the result that none showed evidence of coincidences superior to statistical chance [Vogt 1979]. Another article, summarizing 14 published studies on the use of dowsing in human burials, resulted in none of the dowser participating in predict correctly the location of the remains [Whittaker 2013].

In 1986, the German Federal Ministry of Science allocated a fund of USD 250,000 to physicists at the University of Munich to research dowsing. Initially, the most promising dowsers were chosen among some 500 candidates, of which only 43 remained. Dowsers were also allowed to participate in the design of the experiments, and even the research conductors themselves were people who recognized dowsing as a

genuine phenomenon. Over a period of 2 years, a total of 843 double-blind experiments were carried out in a controlled enclosure, grouped into 104 series, where each dowser had 5 to 10 opportunities to locate water in randomly buried pipes, with a certain margin of error.

In their report to the ministry, the organizers of the experiment concluded: "Some few dowsers, in specific tasks, showed an extraordinary great amount of successes, which can hardly be explained only by chance... it can be considered empirically proven that there is a real nucleus of radiesthesia phenomena... [Wagner 1990]. However, in a subsequent analysis of the data it was found that the 'extraordinary results' of those few dowsers (6 individuals) had not been reproducible. That is, only the best accidental results of a series had been taken; in the remaining series, the results of these individuals had been similar to those of the other participants, including the initial 500, without any statistical significance [Enright 1999].

Finally, the author of that analysis concluded:

"On the basis of these results (...) the Munich experiments constitute the most complete and decisive failure that one can imagine that the dowsers do what they claim to be able to do (...) they are not only the most extensive scientific studies and careful about dowsing that have never been attempted, but - if the reason prevails - they probably represent the last major study of this kind ever performed [Enright 1995].

A year later, in 1996, the authors of the original study published additional arguments in favor of their criteria [Betz 1996]. However, the data, documented with German precision, are there for those who want to review them. There is no better argument than that.

In 2004 the Society for the Scientific Research of the Parasciences (GWUP, Gesellschaft zur Wissenschaftlichen Untersuchung von Parawissenschaften), reproduced to a much smaller scale an experiment similar to the one of Munich. Thirty dowsers participated during three days trying in this case to determine whether there was a flow of water through underground pipes 50 cm below ground; the position of the pipes was known and indicated on the surface. The results agreed perfectly with those expected according to chance and statistical chance; that is, any group of people would have obtained similar results [GWUP 2004].

It is fair to recognize that there are people who live convinced of having paranormal powers that allow them to use rods and pendulums to

'amplify' their sensitivity. That way they explain their ability for finding water, minerals, and hidden objects or, in people, detect altered states that indicate some disease. However, there is a scientific explanation for these supposed paranormal powers: the ideomotor effect, a psychological phenomenon that gives rise to muscle movements unconsciously due to autosuggestion or expectation. The self-deception it generates is extremely powerful, to the point that many subjects cannot be convinced that the displacements originate exclusively in their minds.

Since 1852, William B. Carpenter suggested that muscle movement could be caused by the brain involuntarily, regardless of the emotions and desires of the subject. Although we may not notice it, the mind can be suggested by others or by the subject's own observations or expectations and perform muscle movements, without the latter having conscious control of what he does. In this way, Carpenter concluded that dowsing is nothing more than the result of the subject thinking that there are external forces acting on him, when in fact he deceives himself because of his subconscious desire to see what he wants and expects to see. All subsequent scientific tests, designed and conducted by William James, Michel Chevreul, Ray Hyman and Michael Faraday, showed that some phenomena, attributed to paranormal forces, are actually due to the ideomotor effect [Randi Ideomotor effect; Randi 1994]. A 1986 article published in the journal *Nature* concluded that the supposed dowser abilities could be explained in terms of sensory clues, prior knowledge of the dowser, and effects of expectations and probability [Marks 1986].

***Medical dowsing*** . Concerning medical diagnosis, experimental evidence on dowsing is much scarcer than in geological applications; it is practically null.

It has not been possible to elucidate at which point the dowsing became something proper for geologists in a medical diagnostic system. A report on a local website reported that the first application of the pendulum in medicine as a diagnostic instrument took place at the Austrian University of Salzburg, at the end of the 18th century, but does not cite references [Orbera 2009]. That page is a personal page where the procedure is praised, but no single concrete evidence is presented in its favor, and those who ask for demonstrations of its effectiveness are accused of 'unbelievers'. It is not until 1934 that some point to the creation of the International Association of Dowsing Doctors and the section of Medical Dowsing at the Paris Academy of Sciences, but when doing a search

on the Internet looking for the corresponding official site, what appears are websites private repeating the appointment, some frankly esoteric [Morel Radiesthesia; Dowsing The origins...; Dowsing. Therapy...]. Contemporary official sites of some medical or academic association do not appear. Nor has it been possible to elucidate whether the medical aspect mentioned in these sites had to do with the diagnosis or rather with the study of the supposed paranormal or divinatory abilities of the dowzers.

It would be very simple to design an experiment to compare the diagnosis of a dowser (or many) with that of conventional medicine using the clinical method and modern means of analysis. But those who use dowsing are very careful not to organize these experiments: it is easier to make fantastic statements than to try to prove them.

An article published in 2002 in the Journal of the Royal Society of Medicine states that research into the medical use of dowsing has been limited only to veterinary practice, and cites two references in this regard [Mc Carney 2002; Craige 1983; Elliot 2001]. The article describes the "wholly negative" result of an experiment that was not diagnostic, and otherwise absurd: it was intended to demonstrate the effectiveness of dowsing to try to differentiate a homeopathic preparation from pure water. To this end, a much more concentrated solution than the usual ones in homeopathy was used (approximately 1 million times); even so, the dilution degree was such that the presence of more than one solute molecule in each bottle of the product was not expected. To achieve some result, the dowzers who participated in the experiment would have had to have a much greater 'sensitivity' than those expected in the participants of the failed Munich experiment.

#### **6.4 Dowsing in Cuba**

There are some anecdotes about the presence of dowzers in our country, although not documented. The cases of the parish priest of Corralillo, in the province of Villa Clara, who made use of dowsing until the 1960s, and a later one of a peasant named Urquiza, who 'invented' a radiesthesia device to search for water, oil and minerals. The 'official' introduction in our country is attributed to Czech and Soviet geologists and geophysicists who arrived as advisors during the development of the revolutionary process and the increase in collaboration with socialist countries.

A website dedicated to dowsing, pyramidal energy and natural medicine among others, [Lufriu 2008] describes that in 1993 a group of researchers asked the Academy of Sciences to create a scientific society to study

dowsing, a request that was transferred to the Cuban Physical Society, for analysis. In the beginning, it was thought that within the main objectives of such a society would be geological mapping, prospecting of water and solid minerals and various geological investigations. A year later, in November 1994, the engineer Leodegario Lufriu Díaz presented a seminar on the physical evidence of dowsing at the Higher Institute of Nuclear Sciences and Technologies before a group of specialists, which led a month later to the recommendation of accept the constitution of the Cuban Society of Dowsing. However, it was not possible to find any report on the official constitution of such society; instead, Lufriu Diaz himself reported the existence of a 1997 circular from the Cuban Society of Geology creating the Dowsing Division as part of that society [Soc. Cub. Geology 1997]. A much more recent report by the same author (May 2009) refers to the Cuban School of Physical Dowsing, where the following paragraphs appear:

"In our country, thanks to the systematic work of many people who investigate dowsing, (...) progress has been made in the knowledge of the electrical system of living beings",

where it is not clear if with 'electrical system' the author refers to the transmission of nerve impulses or to something else, because that terminology is not usually used to describe the particularities of the nervous system.

Further on, engineer Lufriu continues:

"Through experiments designed by the author today we know the relationship between the biopotential of human beings and the density of rocks in the natural environment. In addition, we can explain the effect of electromagnetic fields and static magnetic fields, on the health of human beings from a biophysical perspective" [Lufriu Escuela Cubana de...]

The author does not cite a single publication where the experiments designed by him (performed?) and their conclusions were set out in detail. Nor does it refer to other authors about articles in recognized refereed journals, or the explanation of the aforementioned interrelation between magnetic and electromagnetic fields with people's health. However, he reports having taught courses on this 'discipline' in various institutions, including teaching and research centers.

Apparently, these courses were officially recognized at the José Antonio Echeverría Higher Polytechnic Institute. That is because in the same



place appears that in the Faculty of Civil Engineering, during the academic year 2008-2009, one of these courses was taught in the Civil Engineering careers and Hydraulics, with the participation of foreign students, where it was set as a requirement to have previously approved another similar course. According to the author, 30 students passed the course and the grades received were incorporated into their respective academic records.

***Medical Dowsing.*** In the most common medical alternative, the practitioner swings a pendulum on a paper where different conditions are written (figure 6.2). By some unknown means, the pendulum will oscillate more broadly when placed on top of the name that matches the correct ailment, which allows the operator to guess the patient's condition.

On its page 32, the book *Ecological Health* already mentioned refers to dowsing as follows:

“It can also be used for medical diagnosis; with the pendulum on a photograph or on the diagram of a human figure, you can know the organic, emotional, biochemical or energetic conditions that this person presents, with very little margin of error”.

It also appears on the same page: “These approaches seem to be very valid, especially when using teleradiaesthesia, i.e, distance dowsing.” That is, the patient does not even have to be present to be diagnosed.

On the website <http://radiestesiaencuba.blogspot.com/> appeared, on December 23, 2009, the following note from Carlos Rafael Dieguez, reporting the use of dowsing in the Latin American medical school.

“It was successfully introduced for the fundamentally emotional treatment of students of the Latin American School of Medical Students (ELAM), the combined use of the technique of dowsing and flower therapy. Raysa Araujo, teacher of that institution, presented the first results at the VI congress (...) in the province of Holguín. Araujo stressed that the dowsing (...) allows the rapid and effective diagnosis of the patient, and is applied with the use of a pendulum of short thread, a mass or weight of 30 to 40 grams, spherical and tip of neutral material, preferably wood (...) the patient already diagnosed receives therapy with any of the 38 flower essences of the Bach system (...) useful to solve various physical, mental and emotional problems, of particular benefit to the teaching performance of the students, without contraindications or side effects.”

It was not possible to find any comment on the ideomotor effect. The

title and summary of a single article entitled: 'Geobiology, dowsing and human health: A triad of life or death' appears on the Infomed site of the Cuban health network. It is indicated that it was published in April 2005, but the author and the corresponding medical journal are not mentioned. In its place appears: First Cuban Convention of Earth Sciences. Source: Cuban Literature (sic) [Infomed].

It is appropriate to reproduce in full the brief summary, which apparently tries to relate diseases to geology, without further comment.

“The diseases have diverse causes, but they also originate when people are located for a long time in geopathogenic areas of the earth's surface, exposed to radiation from the interior of the planet, the cosmos and technological-industrial development, without patients or doctors understanding the real causes of their diseases.”

In our country, a curious symbiosis was established between the divine floral therapy and the diabolical dowsing, execrated in the middle ages by both Catholics and Protestants. Colligating God and the devil according to their personal beliefs, some circles of doctors and psychologists dedicated themselves to using the infernal dowsing to diagnose (guess) conditions, which were then prescribed by celestial floral therapy in state clinics, always at the expense of the public treasury and in flagrant violation of patients' rights.

The author witnessed that at least until 2010 this procedure was applied in various polyclinics and hospitals in the city of Havana. It is very possible that it still exists in some places.

### **6.5. Naturism and phytotherapy**

In Cuba, naturism is usually promoted under terms such as 'natural remedies' or 'green medicine' following the criterion that natural products of traditional use in the population are beneficial and cannot be harmful (note 29). Naturism has also been invoked to try to justify floral remedies and to argue in favor of other spurious medications, such as homeopathic preparations or supposed nutritional supplements.

Although it originated in ancestral knowledge and the experience of trial and error inherited from past generations, modern phytotherapy is based on knowledge of pharmacology, and take into account the pharmacodynamics and pharmacokinetic aspects of medicinal products based on medicinal plants and preclinical and clinical studies. Natural remedies, considered by some beneficial for or several ailments, can actually seriously harm people in other aspects. Just check the Infomed site

<http://www.sld.cu/fitomed/index.htm>, where the results of studies on the toxicity of various plants, some supposedly curative and widespread use among the population. Moreover, there are many natural poisons, both mineral and animal or vegetable origin, some of them known since ancient times. Examples are belladonna, ivy, yew, oleander, glycine, aconite, henbane, hemlock, and arsenic, not to mention those of the animal kingdom.

Naturism is not recognized as a science; it is a doctrine, as can neoliberalism or any other political ideology be, or any religion. A science must fulfill a series of essential characteristics among which are: to study real entities, possess a system of values based on clarity, accuracy, depth, coherence and the search for truth. Be based on theories, hypotheses and updated and verifiable data by means of scrutable, controllable, analyzable, criticizable and explainable or justifiable procedures, first by the scientific method [Bunge 2010]. It is easily proven that naturopathic remedies, perhaps with some exception, do not meet these essential characteristics. First, they never undergo clinical trials, a universal requirement indispensable today to protect the patient and approve the use of any medication.

Any natural product may actually cause some improvement for a specific condition; nevertheless, the analysis in the light of the modern knowledge of many of them, considered as effective by popular tradition, has shown that they do not really bring any benefit. It may also happen that the product has components that eventually cause serious damage and initiate or worsen any other condition; A product apparently beneficial to one organ may be harmful to another. And the most usual is that those who prescribe them have no idea of the damage they could cause in the medium or short term, simply because their effects have not been studied in detail. They prescribe or employ them because others use them, or someone told them they are 'good' for such or such a thing, or they read it on the Internet or in a pseudoscientific book, without looking for more evidence and not even having an idea of what is the supposed active principle. Paradoxically, those who like to apply natural remedies almost always insist that the patient must be treated 'as a whole', with a 'holistic' point of view, etc. However, they close their eyes to the fact that all the components of a natural product will act on the patient, not just the unknown and supposed beneficial agent. They will also act harmful in the medium or long term, if any.

A notable example is that of plants of the genus *Aristolochia* used in traditional Chinese medicine to lower fever and to cause the period; in

high doses is abortive. A study published in the *Science Translational Medicine* and reviewed in 2013 in the newspaper *El País*, shows the result of a search of the genetic footprint of the plant in sick people. When the DNA was analyzed, typical mutations of the cells exposed to aristolochia were found which, according to the authors, enough to cause cancer. Carcinomas attributed to tobacco actually had the imprint of the plant, which is associated with tumors in the urinary tract, kidneys and liver [Aristolochia and cancer; Aristolochia; Plant... 2013].

In Cuba, there are reports of various patients who stopped attending their regular dialysis treatments, replacing them with the ingestion of natural products promoted by a healer, with fatal results [Bacallao 2008].

The international medical community has long preached the need to identify the active components of any medicinal plant to prove its effectiveness and to separate the beneficial components, if any, from the harmful ones. Only in this way is it possible to extract and administer the first in the appropriate doses so that its effectiveness is greater and avoid possible damage. Once the beneficial components have been identified, they can be obtained synthetically and produced in large quantities, which has long since ceased to be a problem for modern chemistry. Two well-known examples of natural products that passed through the fine sieve of clinical trials are aspirin, which comes from the willow bark and penicillin, produced by a mold, both long synthesized and with their well-known contraindications. The promoters of naturism and floral therapies always ignore these realities, which prefer to expose people to harm rather than give up their unfounded beliefs.

At the time of writing these lines, naturism was still very much alive in our country. An article published in 2014 in the *Granma* newspaper about the experimental station Dr. Juan Tomás Roig, the only one of its kind in the country, describes the production of dozens of varieties of medicinal plants on some 13 hectares of the 17 that the station has, with the purpose of "providing the population with natural products that favor their health and contribute to the scientific work of the country"(sic). One of the examples mentioned is that of *Artemisia annua*, "with which a fever formulation is being made" [Romero 2014]. However, a quick review of the literature that exists in this regard yielded the following result.

Although there are about 180 species, with not necessarily identical properties, and from many of them are reported a number of medicinal

properties, the active substances of the typical extracts from the mugwort genus are usually the tujonas  $\alpha$  and  $\beta$ , with stimulating and convulsant action and high toxicity. They are able to inhibit the receptors that activate neurons, triggering muscle spasms and seizures. In some cases, as in the case of artemisia, its concentration in the plant has been determined with great precision by gas chromatography. Extract from its essential oil contain 68% of tujonas plus at least 11 other components, reported as typical extracts of the genus mugwort [*Artemisia* (plant)].

Some species of sagebrush were used in the Middle Ages in Europe as a magical protective herb, because it was said to induce lucid dreams and astral travels. It was supposed that smoking, or consuming the plant before sleeping, would increase the intensity of sleep, the level of control over it, and that it would help to remember it upon waking. Given its aromatic smell, it was used mixed with other herbs as a substitute for tobacco or marijuana, because it is capable of inducing evocative dreams in a state of consciousness. With wormwood species, wormwood or absinthe was prepared, a popular spirit drink in France in the late nineteenth and early twentieth centuries, until its production was banned in 1915 for causing hallucinations. Now the absinthe is prohibited in some countries and allowed in others, but establishing a maximum limit to the content of tujonas in the liquor.

Granma's article also makes specific mention of the pumpkin seed, from which an alleged medication for inflammation of the prostate was obtained, "currently under clinical study in the urology office of the San Antonio de los Baños hospital". But a review produced the following result: pumpkin seed oil is a traditional German alternative remedy for the prostate, not a conventional medicine recognized by German science. The press article does not mention the pharmacological and toxicity studies that would have been necessary to protect the patient and identify the supposed active principle of pumpkin seed. Nor does indicate in which of the phases of the clinical trial the project is found, or the results obtained in the event that one of them had successfully passed (see chapter 1). The theoretical basis for this supposed medication seems to be that someone heard or read somewhere that was 'good for inflammation of the prostate' - there, in Germany, or somewhere else - and that was enough to start producing it.

The reference to "clinical studies" "conducted in a single consultation in a single hospital, without specifying periods or mentioning rates of patients with favorable and unfavorable results, does not justify the 'good results' mentioned.

In clinical trials conducted according to internationally recognized rules, it is usual for hundreds or thousands of patients to be involved in the different phases. Also, 10 or more years pass before a reliable verdict can be issued based on statistical comparisons with control groups. Serious doubts arise about the contribution of the experimental station to the scientific work of the country when verifying that there are also homeopathic drops, completely oblivious to contemporary science and whose inefficiency has been proven repeatedly in multiple clinical trials (see chapter 5). All of the above also raises doubts about the effectiveness of the remaining medications that are produced in that research center.

Apparently, those who at the time proposed to eliminate point 158 of the Economic and Social Policy Guidelines of the Party and the Revolution agreed in 2011, were not very far-off, foreseeing the possibility of distorted interpretations that could lead to unnecessary expenses and damages to the population [Carpio 2013]. Guideline 158 speaks in favor of “paying the greatest attention to the development of natural and traditional medicine”, which should be interpreted exclusively as a call to scientific rigor of research in the field of natural remedies, in order to guarantee Maximum patient protection.

[1] By measuring the current, you can calculate the resistance and conductance, or the impedance.

*It is true what passes the test of experience.*

*Albert Einstein*

## CHAPTER VII IRIDOLOGY, ACUPUNCTURE, AND OTHERS

Acupuncture has been a widespread therapy in our country, along with others with a similar 'theoretical foundation' such as acupressure and moxibustion. To these must be added other curative and diagnostic methods much less significant, such as iridology and Feng Shui.

### 7.1. Iridology

Some iridologists affirm that this supposed diagnostic technique has its origin in ancient Egypt and Greece, at a time before our era. His resurrection in modern times is attributed to the homeopathic physician Ignatz von Peczely (1826-1911). Similar to von Peczely, other promoters of this 'science' are also related to alternative therapies such as homeopathy or naturism. Apparently, one thing calls the other; the practice of a fantasy outside the scientific method serves as a gateway to other equally illusory practices.

As is a general rule, in the universe of unproven therapies accessible literature rarely comes from refereed journals or publishing houses with tradition of publishing scientific literature. The usual thing is that citations come from books written by people who practice and promote the corresponding therapy - which in turn lack valid scientific references - and have been published by publishers detached from universities or known research centers [Verdones 2007; Jensen 2006].

It is usual that in Google and other search engines many references appear on alternative therapies (up to hundreds of thousands) referred to websites where anyone writes what they deem appropriate on a private page; however, very rarely appear favorable references in the Google Scholar (<http://scholar.google.com.cu/>) that specializes in the search for articles published in refereed scientific journals.

***Theoretical foundation.*** Iridologists consider that the human eye, having a common embryological origin with the central nervous system, is a projection of that system on the surface. So, according to them, the iris constitutes a microsystem that reflects the state of the various tissues of the organism. Nobody has demonstrated that, and it is almost certain that it will never be demonstrated, because there is no experimental evidence to support that guess. The followers of this false theory affirm that the imbalances that alter the organic tissues are reflected in

the iris through specific marks; these marks allow us to recognize 'early signs of tissue dysfunctions to prevent the appearance of structural damage in the body' (sic).

**Experimental evidence.** There is no minimum evidence that iridology has any value as a diagnostic test. If the Cochrane database is reviewed, there are no publications on the subject (note 30). Everything stays in words and nothing else; not a single experimental validation through clinical trials carried out according to the requirements of contemporary medical sciences. On the other hand, such tests would not be very difficult to carry out; it would be enough for various iridologists to diagnose patients whose medical condition is already well determined and to check if the diagnoses coincide with each other and with the actual diagnosis. What simply happens is that such essays are not of interest to supporters of iridology: the falseness of the method would be immediately evident.

## **7.2. Feng shui**

Feng Shui - wind and water - is an ancient Chinese health system, rather preventive than curative, related to aesthetics. It proclaims the existence of a 'vital breath' or Qi whose flow is modified by the shape and arrangement of the free spaces, the orientation of the objects and the evolution over time. Feng Shui schools usually put the emphasis on the study of shapes: mountains, rivers, the structure of the home or workplace, the location of the bathroom, kitchen, room and furniture placement. It belongs to a more general group of pseudosciences, the geomancy, which considers that cosmoteluric energy flows - from heaven to earth - influence one way or another on people and their health.

In all rational circles, Feng Shui is considered a pseudoscience, because there is no scientific evidence to support even one of its considerations [Randi Feng Shui, Smith Pseudoscience and...]. Some describe it as "a complete nonsense, nothing more than ancient Chinese superstitions" [Shermer The skeptic enc..., Skeptics SA...]. The popular science writer James Randi, a professional magician and critic of pseudoscience, considers it as "an ancient form of deception." Randi sponsors an educational foundation created to examine the veracity of paranormal claims (site accessible on the WEB; <http://www.randi.org>). For almost 40 years, he was offering \$ 1 million, with all the necessary legal support, to whom he would show valid evidence of some paranormal or supernatural event. Also who for will find a way to differentiate pure water from orthodox homeopathic preparations. No one managed to collect the



million.

### 7.3. Acupuncture

This therapy is based on the excitation of specific points of the skin, supposedly related to various organs, although it does not specify how the anatomical or physiological relationship between points and organs is. It simply states that the point has to do with the organ or the medical condition more than anything does, without something to justify it, and nothing else. Relationships were established many centuries before the functioning, anatomical, and physiological dependencies between the various organs and systems in the human body were known in detail. As excitation elements needles are used, and in some variants the fingers or other devices.

According to knowledge of contemporary natural and medical sciences, the main characteristics of acupuncture are the following:

- Theoretical basis: none.
- Experimental evidence: almost completely negative when referring to randomized clinical trials performed correctly.



**Figure 7.1** Points and meridians from acupuncture. It is not possible to differentiate them from another points or skin regions through modern microscopy, electrical measurements, or any other method.

***Theoretical foundation.*** Acupuncture is based on ancient Chinese traditions that mention the Qi (or vital breath) that some have attempted to misrepresent or mislead as bioenergy or vital energy. The concept of energy and its conservation principle date back to the 18th century and it was not known when Qi was introduced thousands of years ago in ancient China.

Vital energy is not a term recognized by the natural sciences, but a religious concept of Hinduism. As seen in section 4.3, bioenergy is a synonym of renewable source of energy from biomass; associates numerical values, and sometimes is used as a synonym of biofuel. It has nothing to do with the Qi.

According to acupuncture theory, the invisible and non-measurable Qi travels through certain channels or meridians in the skin. Traditional Chinese medicine recognizes 365 points within 14 meridians and 12 main channels that are associated with vital organs of the human body: lungs, large intestine, small intestine, spleen-pancreas, heart, kidneys, bladder, cardiovascular system, gallbladder, liver, conception vessel, ruling vessel and triple heater (figure 7.1).

To consider that energy of some kind can flow through the meridians is also wrong. Energy is not a liquid or a gas that can be sent by pipes from one place to another; Energy is the ability or ability of a body or system to generate forces on other systems or on its own subsystems. It is transmitted at the time and place where these forces act, and their forms of transmission are well known (heat by conduction, convection, radiation; mechanical, electrical work, etc.)

In the body, energy is generated just where is needed, during the metabolic processes in which complex biochemical reactions are involved at the cellular level, a thing very well studied and known by contemporary science, but of which there were not even notions a little more than a hundred years ago. Therefore, this Qi, somehow associated with a certain 'vital breath' that cannot be detected or measured and lacks numerical values, is a concept totally divorced from contemporary science. It is only an assumption of the ancient Chinese that no one has been able to verify. Neither there is evidence of the existence of the meridians that are postulated in the theory of acupuncture or of the functions attributed to them. Modern microscopes allow obtaining very clear images of the interior of cells, of molecules, and even of individual atoms. Even so, no one has ever been able to observe in the skin or in subcutaneous regions something that even resembles such 'meridians' using the

latest generation microscopy instruments. Nor has any indication have been detected on the skin that suggests 'points' or regions with distinct characteristics where ancient Chinese engravings indicate them. The claim that there is a lower electrical conductivity between acupuncture points than among other points on the skin is also contrary to experimental evidence, as discussed in section 4.3.

In summary, there is no evidence that there are special points associated with various organs on the skin or the meridians on which the acupuncture theory developed over 2000 years ago. But even if the meridians existed, it would also not be possible to consider that some type of energy is transmitted through them. So the supposed theoretical foundation of acupuncture is nothing more than a series of statements offside science, with no real basis, and established much before the functioning and physiology of the different organs were known, or the existence of cells and its fundamental role in the metabolism and development of life in general. It can be affirmed without fear of being wrong that the theory of acupuncture is nothing more than, as the saying goes, an ancient and picturesque 'Chinese tale'.

As explained in Chapter 1, lacking a solid theory supported by experimental evidence, acupuncture cannot move forward. It will remain forever tied to recipes made in ancient China without any possibility of development, assuming that there is indeed some validity in its proposals.

## **Experimental evidence**

***International Background.*** To understand clearly the results of the accumulated experimental evidence on acupuncture and other alternative therapies, it is necessary to know in some detail what the placebo effect is.

Nowadays it is well known that when people receive some simulated treatment against pain, the brain reacts by releasing substances called endorphins. Endorphins are capable of binding to the so-called mu-opioid receptors of brain cells to cancel the transmission of pain signals; heroin, morphine, methadone and other narcotics calm the pain by acting in a similar way. The phenomenon has been well known since the 1950s as a placebo effect thanks to the anesthesiologist Henry Knowles Beecher, who was the first to verify it by performing specific tests for that purpose. In a study carried out in 1000 patients in 1955, positive results were found in 35% of patients who were given an inert placebo; that is, the imitation of some medication without real therapeutic prop-

erties. At present, it is obligatory to consider this effect when conducting clinical trials with new therapies or medications to avoid assigning properties that they do not have [Eippert 2009; Madsen 2007; Benedetti 2005; Schweindhart 2009; Zubieta 2005; Scott 2007].

Many pseudotherapies that claim to "heal" or cure some medical condition, what they actually do is activating these chemical processes in the brain to reassure the patient and sedate the pain. In that way, the supposed "therapy" provides temporary relief, or perhaps a brief sense of well-being, similar to that produced by some drugs. The mechanism does not work in the same way in all people; many do not affect them at all, and others make them feel worse (nocebo effect). It is considered that this last effect has its origin in the pessimistic expectations of the subject, thinking that the supposed drug or therapy will cause harmful, painful or unpleasant effects.

Research on nocebos is scarce. Essentially, the reason is due to ethical limitations, since administering a nocebo to the patient implies the induction of negative expectations.

Of course, pseudotherapies may relieve the pain of some by stimulating the placebo effect, but they will be unable to cure the disease. The latter represents a serious risk to the patient's health when the condition is progressive and is not identified in time for attributing false benefits to what has not.

A particularity of acupuncture, which coincides with that of other pseudotherapies such as homeopathy, is that its supporters promote its validity for almost anything; from a headache to hypertension, asthma or the urge to vomit, even to 'cure' homosexuality. They thrive because not all investigators who criticize them are willing to spend their time, efforts and money in demonstrating the falsity of others' claims; They prefer to invest their resources in more promising directions. Also because, for various reasons beyond the science and welfare of patients (economic, commercial, political reasons), at times medical authorities 'turn a blind eye', thinking that these procedures, if they are not effective, at least they are inoffensive and cannot cause harm.

From the moment the international scientific community became aware of the importance of the placebo effect, the number of reports favorable to acupuncture was drastically reduced, since previously what was caused by the placebo was attributed to therapy. There are very critical and well-documented reports on the absence of evidence in favor of the

efficacy of acupuncture [Barret Be wary of...]. Currently, clinical trials contemplate various procedures to take into account the placebo effect; for example, in the parallel control groups the needles are placed in points that are not those indicated by the theory, or their placement is simulated with some attachment (pseudoacupuncture) without getting to penetrate the skin, then compare results.

Even some practitioners of alternative therapies recognize - reluctantly and with unclear language - that it is difficult to find differences between the effects of acupuncture and the placebo effect. Prof. A. Campbell of the Royal Homeopathic Hospital in London, a student of these issues, has expressed (when referring to therapeutic effect, obviously he refers to the placebo effect, but avoid saying it explicitly).

"In summary, three of four well-designed studies found that it is easy to demonstrate that needle insertion has a therapeutic effect, but there are no demonstrable differences between actual acupuncture and pseudoacupuncture"[Campbell 2006].

Some recent examples of negative reports on the efficacy of acupuncture are as follows.

A study with 131 patients for a duration of 9 months on chronic pain in the lumbar region concluded that it was impossible to differentiate the effect of acupuncture from the placebo effect [Leibing 2002]. Similar results have been found for the treatment of epilepsy [Cheuk 2006], lateral elbow pain [Green 2002], hypertension [Macklin 2006; Robinson 2004], and other ailments [Kaptchuk 2002; Mayer 2000; Linde 2005].

In 2009, a research group carried out a very complete review of scientific publications related to acupuncture to relieve pain. The databases of the Cochrane Library, Medline, Embase, Biological Abstracts and PsycLIT were reviewed. The last search included all the works published before January 1, 2008. Those where electrical stimulation or acupressure were applied, or where there were manifest methodological errors such as, for example, those in which the test groups and Control initially showed obvious differences. Subsequently, a statistical meta-analysis of thirteen clinical trials that met the required requirements was carried out, with 3025 patients. The conclusions read:

"It is not clear whether putting needles in acupuncture points, or anywhere else, reduces pain independently of the psychological impact of the treatment ritual."

However, apparently this report will not end the controversy, since a

later article, from September 2012, referring to another extensive statistical meta-analysis, describes having found differences, although modest, between the results of acupuncture and those caused by a placebo exclusively when referring to relieving chronic pain, so they recommend acupuncture as a reasonable option in those specific cases. However, the article also recognizes the non-null possibility that there have been biases affecting the results [Vickers 2012]. As the research was funded by the US National Center for Complementary and Alternative Medicine, whose objective is precisely to seek evidence on the effectiveness of these unproven therapies, the vagueness of the research findings raises questions about the impartiality of at least some of the participants. Regarding the meaning of biases, see note 1 at the end.

***National reports on acupuncture.*** In an article published in *Ecured* in 2013, the doctor Francisco Pérez Carballás is credited with having established the first acupuncture consultation in the Asclepius polyclinic in Havana in 1970 [Bosch 2013]. The article also reports that between 1974 and 1984 some 30 acupuncture courses were taught throughout the country and from the 1980s doctors were sent to China, Vietnam, Sri Lanka, the USSR and other countries to train in the technique. The Acupuncture Section of the Cuban Society of Anesthesiology was also created and a program to promote Pain Clinics throughout the country.

A review conducted in August 2013 of the list of Cuban journals that appears in *Infomed*, the Cuban Health Network, resulted in a total of 25 experimental articles dedicated to acupuncture published as of December 1995, plus some summaries, in subjects as diverse as analgesia in labor [Gutiérrez 1995], gynecological diseases [Collado 1999], stomatology [Acosta 2012; Brave 1997], sacrolumbagia [González 2011; Bosch 2001], cervical osteoarthritis [Lussón 2011], glaucoma surgery [Martínez 2012], pediatric ambulatory surgery [Salazar 2011], minor surgery [Álvarez 2000], thyroid gland surgery [Luzardo 2011], hemorrhoids [Lobaina 2012], breastfeeding [Stop 1999], osteoarthritis in the lumbar region, hypertensive and asthmatic emergencies [Chaveco 2011; Ferrer 2007; Patricio 2002], dental extractions [Abreu 1997], stuttering children [Figueras 2000], renal extracorporeal lithotripsy [Ferriol 2009], bronchial asthma in adults and children [Veitía 2002; Bango 1999; Solórzano 2000], oncology [Infante 2006] and spring finger [Álvarez 2003]. Most refer to the study of analgesic effects, although some such as those dedicated to bronchial asthma obviously pursued another purpose.

As a rule, these studies attribute entirely the observed effects to the placement of the needles, ignoring recent results published in international journals and without even mentioning the placebo effect. If mentioned, the different sensitivity of people to it is not taken into account. There are no references to the extensive international literature on the subject, or the references are very scarce and outdated. Some combine acupuncture with conventional local anesthesia, so it is not possible to discern its real effectiveness. In other cases, the trials have been performed by people who obviously do not have scientific training (e.g. graduates in nursing) without mentioning any other advice. Nor do most of these articles show signs of having honored the scientific and ethical requirements established by national and international organizations to validate clinical trials and protect the patient.

Hence, the conclusions and proposals that appear are very doubtful when compared with international literature. In addition, since there is no minimum reference to biases, it is highly probable that these studies have been affected by poor selection of study groups, evaluation of results by experimenters or poor manipulation of statistical data (see note 1 at the end).

That this alternative practice was declared by UNESCO in 2010 as Intangible Cultural Heritage of Humanity, brings absolutely nothing about its clinical or scientific validity, but rather some confusion in international organizations to confuse science (which is also culture) with other cultural expressions. But perhaps the most disconcerting thing about acupuncture is that post-graduate courses and master's degrees are organized in supposedly scientific universities on the basis of a curative technique that;

- a) has not been definitively demonstrated experimentally, despite the large number of clinical trials carried out and;
- b) is based on a theory founded on illusory points and channels that no one has ever found, unable to provide explanatory mechanisms of its functioning, without any possibility of advancing in its development and completely oblivious to contemporary medical science.

### **7.5 Acupressure and moxibustion**

Digitpuncture is a technique that follows principles similar to acupuncture, with the provision that here, instead of needles, thumbs, hands, fingers and elbows are used to apply pressure on acupuncture points. It is used both for disease prevention and for its treatment. The main reasons to consult a digitpuncture therapist are usually: insomnia, cramps

or contractures, digestive discomfort, depression, skin problems and stress. Digit puncture is confused with acupressure, recommended by its practitioners to reduce the anxiety of eating and lose weight. It is also used to try to improve metabolism, relieve all kinds of ailments and improve digestion.



*Figure 7.2. Artemisia vulgaris*

Moxibustion is another variant of acupuncture. In this case, regions around the acupuncture points are slightly heated to stimulate the circulatory system and improve the flow of Qi. To this end, the root of the artemisia (*artemisia vulgaris*) already mentioned in section 6.5 was originally used for its toxicity, pressed in the form of a pure cigar called moxa and burned on the patient's skin (figure 7.2).

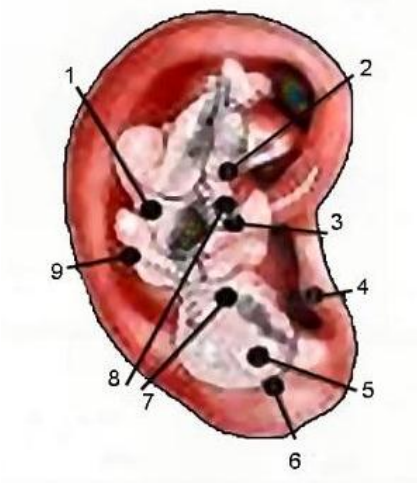
The lack of theoretical foundation of these two variants of traditional Chinese medicine is the same as in acupuncture, while the absence of experimental evidence is even greater.

## **7.6 Auriculotherapy**

Practitioners of this therapy assume that in the ear there is a reflex point for each area of the body, which is only noticeable or identifiable in the case of illness. Only when a region of the human body loses physiological balance, can the altered points be detected in the ear. That is why this technique can be used as a diagnostic method. However, they also consider that once these points are detected, the body can be



rebalanced by stimulating them with needles. According to this supposed 'theory', an image similar to that of a fetus in the uterus, oriented head down, at the level of its lobe, is reflected in the ear, in the manner of a "mirror" of the whole body (figure 7.3). Therefore, it is not necessary to introduce needles in other places of the skin, only in the ear. The figure shows only a few points of the many registered by supporters of auriculotherapy, who consider it effective in conditions such as hiccups, hyperacidity and constipation, in all types of pain, psychic disorders, allergies and insomnia. Also for the control of excess appetite, tobacco addiction and anesthesia in surgical operations. There are several variants; sometimes, instead of needles, small seeds such as cardamom are used to hold down the corresponding notable points on the ear. As in acupuncture and moxibustion, the absence of theoretical basis and experimental evidence is absolute.



*Figure 7.3. Some significant points in auriculotherapy.*

### **7.7 Dietary therapies or trophotherapy**

Conventional diets promote a balanced intake of food according to the needs of the body, in order to maintain a healthy life. Alternative or pseudoscientific therapeutic diets also have the ability to cure diseases, without the existence of clinical trials that support this presumption. An example of this type of diet is the one proposed by a pharmaceutical chemist at the University of San Marcos in Peru, Dr. Nancy Chavez, who dedicates her knowledge to the creation of diets and vitamin and mineral regimens, designed for symptoms and diseases specific. According to her: "Trophotherapy uses knowledge of the functions of organic beings to explore ways to vary a patient's nutrition and achieve a specific therapeutic effect." She considers this technique applicable to diseas-

es such as gastritis, cholesterol, triglycerides, diabetes, hypertension, obesity, constipation, kidney, circulatory and skin diseases [Food that...].

A second example of trophotherapy that had some promotion in our country is that of the macrobiotic diet. Although the name given to think of any biological or medical specialty, macrobiotics is not science but a philosophical doctrine created by the late Yukikazu Sakurazawa, alias George Ohsawa, but remains in force thanks to the preaching of multiple followers. It is not a way to focus food to live better, as some people sometimes say forgetting to mention the philosophical background, but rather a whole doctrine about how the universe, matter and consciousness works. Ohsawa's doctrine tries to renew the ancient Taoist principles of ying and yang to adapt them to views that are more contemporary. It is summed up in 7 'laws' or principles and 12 'theorems' that regulate everything: the cosmos, conscience, health and food. According to Ohsawa:

“The Order of the Universe is governed by seven principles that constitute universal logic. These principles are, above all, dynamic; that is why they are contrary to formal logic, which is static. They can be applied to any domain, at any level of life and to all things existing in the universe of relativity” [Macrobiotic]. The principles are:

1. What has a beginning has an end.
2. What has in front has back.
3. There is nothing identical.
  - . The larger the front, the larger the back.
5. All antagonisms are complementary.
6. Ying and Yang are the classifications of all polarization; They are antagonistic and complementary.
7. Ying and Yang are the two arms of the infinite One.

The twelve theorems extend and punctuate these principles. So that the reader has an idea of its structure, we mention four of them.

- Ying attracts Yang and Yang attracts Ying.
- The force of attraction is proportional to the difference of the Ying and Yang components.
- Ying repels Ying and Yang repels Yang. The repulsion is inversely proportional to the difference of the Ying and Yang forces.

- Ying is centrifugal, Yang is centripetal. Ying and Yang produce the energy.

Note that, although in these concepts usual terms of contemporary physics appear, they really have nothing to do with it, since they refer to 'forces' of attraction or repulsion between subjective and immaterial concepts and not between real objects.

The macrobiotic diet is the logical consequence of Ohsawa's principles and theorems applied to the subject of nutrition, in order to “make the organism reach the ability to successfully cross the vicissitudes that are presented to it.” It aims to feed the subject in the most appropriate way possible, without deficiencies or excesses, so that it can develop freely according to the philosophical criteria of Ying and Yang (not contemporary scientific concepts about nutrition). Consider diseases as an imbalance, along with the body's natural reaction to rebalance. It is assumed that during this process the organism eliminates harmful excesses and, to support it, the macrobiotic does not openly deny medications, but preaches giving maximum confidence to natural processes, intervening as little as possible to favor the elimination of the harmful. Broadly speaking, the curative regime that he proposes consists in eating in a rather strict manner (according to a certain Ying-Yang balance) in order not to feed the disease and allow the “cleansing” of the organism to be carried out naturally.

However, by denying the advances of contemporary medicine in favor of a diet poor in food as appropriate for any disease, the macrobiotic falls fully into obscurantism: its principles are nothing more than archaic criteria disguised with new clothing.

After the death of Ohsawa, macrobiotics has been promoted mostly as a method to obtain good health based on a balanced diet. The current main driver of these criteria is Michio Kuchi, one of his disciples. Kuchi distinguishes between the 'classic' diet and the 'curative' regime, applicable in case of illness. Macrobiotic philosophy is not vegetarian, as it does not preach food prohibitions, but an adaptation to each particular case according to the age or objectives of each person. But in reality, there are no studies that recognize the classic macrobiotic regimen as superior, or even similar, to any other balanced nutrition regimen.

On the other hand, at least two American organizations related to food and nutrition, The Council of Foods and Nutrition of the American Medical Association as well as the Committee on Nutrition of the American Academy of Pediatrics, have condemned the most restrictive version of

the diet Macrobiotic due to its nutritional deficiencies. They mention in their studies that

“Strict monitoring of the diet can cause scurvy, anemia, hypoproteinemia, hypocalcemia or loss of kidney function due to poor fluid intake, as well as other forms of malnutrition, and even death.”

(<http://www.bccancer.bc.ca/PPI/UnconventionalTherapies/MacrobioticDietsZenMacrobiotics.htm>)

*You can fool everyone some time, you can fool some all the time, but you cannot fool everyone all the time.*

*Abraham Lincoln*

## **CHAPTER VIII OZONE THERAPIES**

### **1. Ozone in the stratosphere and the troposphere**

Ozone is an inorganic compound, gaseous at room temperature, composed of three oxygen atoms ( $O_3$ ). It is formed in the recombination of atmospheric oxygen ( $O_2$ ) molecules under the action of sunlight. Its smell is reminiscent of chlorine and there are people with the ability to detect it in concentrations as small as  $0.01 \mu\text{mol} = \text{mol}$  ( $1 \text{ mole} = 6.023 \times 10^{23}$  particles). However, the smell is not a reliable index of its atmospheric concentration, because of the olfactory fatigue that develops rapidly. In the following results of a bibliographic review are shown, which, in addition to the subject of this section, includes the following sections:

2. Ozone as a pollutant of the environment;
3. Obtaining, storage, measurement and disinfectant capacity of ozone;
4. Evidence-based medicine and ozone therapies and
5. Ozone in Mexico and Cuba.

#### ***Stratospheric ozone***

The stratospheric ozone found in the ozone layer, at a height of 20-30 km and a concentration of 2 to 8 parts per million, is formed by the absorption of solar radiation with a wavelength  $\lambda$  between 200-240 nm, in a multi-stage process that can be represented as:



The range of absorbed wavelengths belongs to the ultraviolet (UV) region of high energy, harmful to people and plants. The reverse reaction also takes place, since the less energetic UV radiation with  $\lambda$  up to 280 nanometers, is able to disintegrate the ozone molecules turning it into the original oxygen. This radiation, also harmful to living organisms, is also absorbed during the process. This creates a beneficial balance for people, where ozone is created and destroyed continuously while the damaging UV radiation is absorbed before it reaches the ground [1]. In recent years, the fine balance between the formation and decomposition

of stratospheric ozone was broken by the presence of pollutants, mostly by carbon fluorides used in refrigeration, with a direct threat to human health. International conventions to prevent the proliferation of this disease have been able to limit and to some extent begin to reverse the process [2]. The concentration of ozone in the stratosphere is measured with spectrophotometers that can determine its concentration from the earth's surface. The first one was designed by GMB Dobson in 1920 [3].

### ***Ozone in the troposphere***

Ozone formation occurs in another way in the troposphere, close to the earth's surface. Here the ozone is generated under the action of visible sunlight, corresponding to a region with greater wavelengths and less energy than the previous ones, but capable of activating the reaction of the oxygen in the air with the hydrocarbons and nitrogen oxides that come from the burning of fuels. The total process can be expressed as:



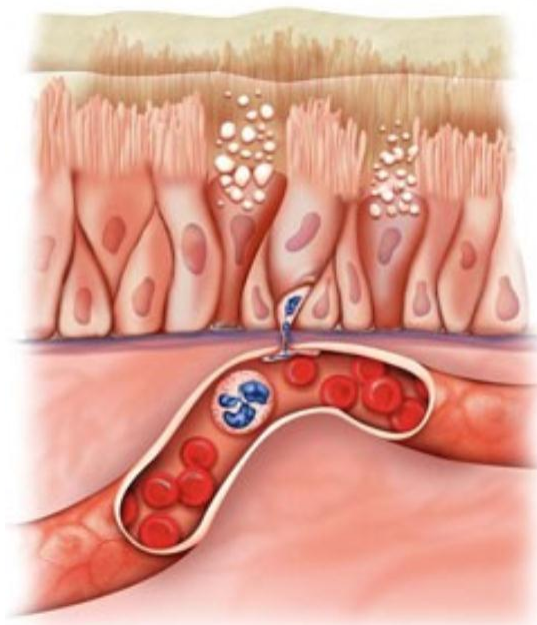
Also, sources of environmental ozone are arc-welding workshops, other areas where ozone is used as a disinfectant, any source of UV radiation, faxes, laser printers and photocopiers. Modern printers and photocopiers are equipped with ozone filters, which must be changed regularly. Since electric sparks are also capable of generating ozone from oxygen, it is estimated that the rays produce annually in the troposphere an amount equivalent to 10% of the ozone of the stratospheric layer.

## **2. Ozone as an Environmental Pollutant**

O<sub>3</sub> is a much more potent oxidant than O<sub>2</sub>, and has the property of attacking and breaking up the carbon bonds of many organic compounds, including plant and animal tissues. It can irritate the respiratory tract causing cough, burning, wheezing, shortness of breath, aggravating asthma and other lung ailments; it is an important part in urban smog. Its effect is greater on hot and sunny days, where it can reach harmful levels. It is transported long distances by wind and, for this reason, even rural areas can experience high levels of ozone from cities. In Europe, the reference value for the dangerous concentration of ozone outdoors is 90 nmol/mol (180 µg/m<sup>3</sup>) [4].

| <b>Table 1.</b> Effects of ozone on people (ref. [4]). 1 µg/m <sup>3</sup> ≈ 0.5 nmol/mol). |                |
|---|----------------|
| <b>Concentration</b><br>(µg/kg)   | <b>Effects</b> |
|   |                |

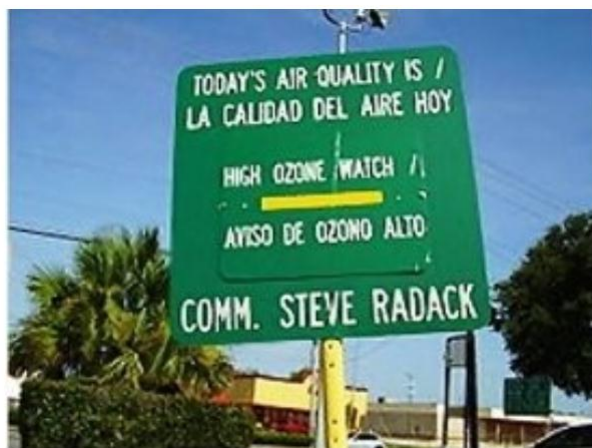
|         |   |
|---------|---|
| 30      | Perceptible to smell, with rapid habituation                          |
| 70      | Irritations in the eye conjunctiva                                    |
| 100     | Probable headache   |
| 160     | Reduction of resistance to bacterial lungs (determined in animals)    |
| 160-200 | Pulmonary dysfunction, mainly when exercising                         |
| 200     | Increase the amount of leukocytes. The immunity system is inactivated |
| 240-300 | Increased frequency of asthma attacks                                 |
| 240-700 | Reduction of physical strength  |
| 400     | Cough, chest pain   |
|         | After 4 hours of exposure hormonal and enzymatic changes appear       |
| 800     | Inflammatory tissue reaction  |
| 1000    | After 6-10 hours of exposure, damage to human chromosomes appears     |



**Figure 8.1.** Along with the airways congestion due to ozone, a white blood cell flow appears, mucus formation and fluid accumulation and retention are increased. This causes death and effusion of cells in the airways. The process is comparable to the inflammation of the skin caused by sunburn. (Taken from ref. [5]).

People with lung problems, older adults, active people outside homes, outdoor workers, and children, are more sensitive to ozone. The latter are particularly sensitive, because their lungs are still developing and are more likely than adults to do outdoor activities. They are also more likely to suffer from asthma [5,6]. Exposure to concentrations as small as 60 nmol/mol is capable of damaging the tissues of the respiratory system and plant tissues. In susceptible people, smaller amounts (40 nmol/mol) can cause chest pain, cough, shortness of breath and throat irritations [7, 8]. It can also worsen chronic respiratory ailments such as asthma and compromise the body's ability to fight infections in the respiratory system (see Table 1). When inhalation is brief, the disappearance of harmful effects usually occurs in a short time. There is less certainty about the persistence of the effects of prolonged inhalation or exposure to high levels. Environmental ozone can decrease lung function and inflame the lung envelope. Repeated exposure can permanently damage lung tissue (Figure 1) [9–11].

A study conducted in the US With 450,000 people with a follow-up of 18 years, resulted that in cities with high concentrations of ozone, the increase in death from lung disease rises by 30% [12,13]. In many countries the concentration of atmospheric ozone is measured regularly together with those of other gases capable of originating it, in places where its formation is more prone, and warnings are raised from the population (figure 2) [14].



**Figure 8.2.** Warning on the local situation of environmental ozone (Houston, Texas). Taken from ref. [one].



As ozone is forming and decaying continuously in the atmosphere, its concentration can vary rapidly, so it is usual to record the data in short time intervals. For example, in Valencia (Spain), the updated data every hour is publicly accessible via the Internet, on the site [www.cma.gva.es/atmosfera](http://www.cma.gva.es/atmosfera). Figure 3 shows the air pollution detection network that exists in the Valencian Community [15].



**Figure 8.3.** Points designate the places of control centers of the Valencian Network for the Monitoring and Control of Atmospheric Pollution, in Spain, 51 in total. Taken from ref. 15].

### 3. Obtaining, Storage, Measurement and Disinfectant Capacity

#### 3.1. Obtaining in the laboratory

There are various methods to obtain ozone in the laboratory, including through corona discharge tubes, by the action of ultraviolet light or from water in an electrochemical cell. The corona discharge causes residues polluting with nitrogen, while the light is very inefficient. That is why the cell is preferable in most applications, as it provides a mixture of oxygen and ozone up to a maximum value of 20-30% of  $O_3$ .

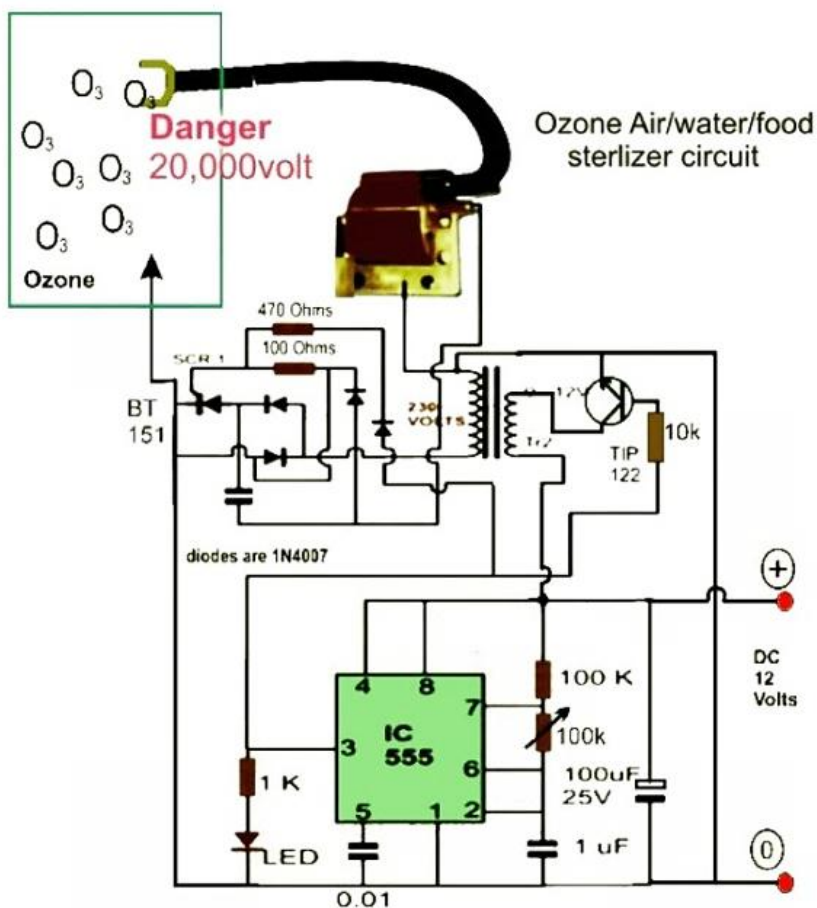


Figure 4. Circuit for an electrochemical ozone cell. Taken from <https://electronicpowersupply.blogspot.com/2014/04/ozone-air-water-sterilizer-circuit.html>.

The optimum ratio requires high voltage values, and can vary significantly depending on the current density in the cell, the impurities present in the water, and the shape, size and materials of the electrodes [16]. A typical circuit to generate  $O_3$  is shown in Figure 4. The applied voltage is about 20,000 volts.

### **Storage**

Although there are theoretical estimates that traces of ozone can last in the atmosphere for up to 22 days [17], the experimental results show their spontaneous decomposition at  $O_2$  with an average lifetime of 1/2 hour, at 25 °C. It means that every 1/2 hour the concentration of ozone is reduced by half, which means an approximate reduction of its concentration by  $(1/2)^{48}$  times after one day (a fraction with 15 zeros after the point). If moisture is present, the average lifetime decreases significant-

ly; for example, dissolved in water at 25 °C its average lifetime is reduced to 1/4 hour [18,19]. Hence, ozone cannot be stored and transported like any other industrial gas; once generated, its concentration will be reduced to ridiculous values in a few hours.

Any product that is promoted as "ozonized" in stores or pharmacies (be it a soap, an oil, an ointment or any other) is a hoax for the consumer, because when the product reaches the retail market there will be no trace of the original ozone in it but, in any case, only the products of their reaction with the other ingredients.

### ***3.2. Measurement of ozone concentration***

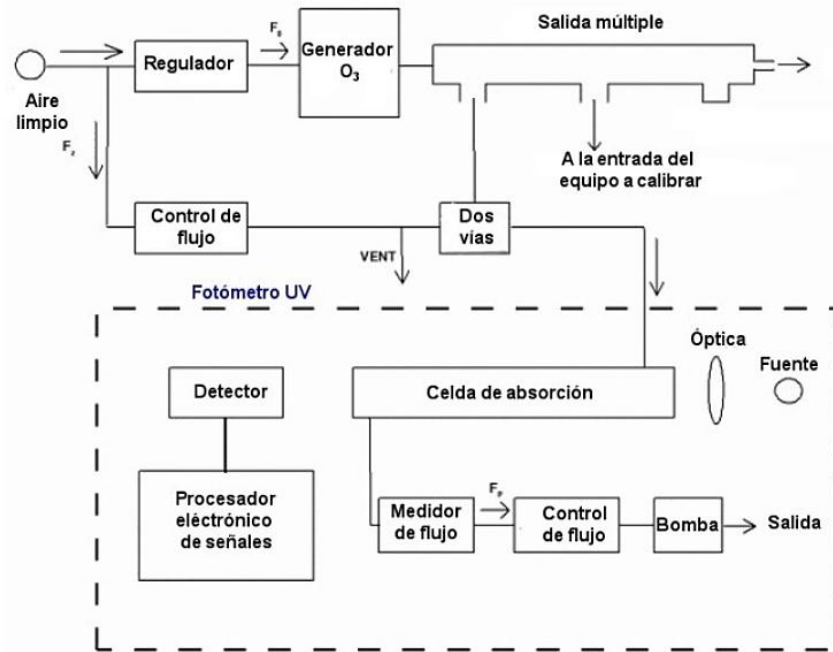
Measuring methods in the troposphere include ultraviolet absorption, differential optical absorption spectroscopy, chemiluminescence, LIDAR (Light Detection and Ranging) and various chemical titration methods such as the colorimetric tube [20,21]. One of these commercial instruments, used to measure concentration in workplaces, is based on indigo blue (indigotine), which in the presence of ozone oxidizes to isatin ( $C_8H_5NO_2$ ) of white color. The air is aspirated through a plunger to a disposable capsule with calibrated ranges of coloration (Figure 5).



***Figure 8.5.*** Local measurement of environmental ozone. Drager ozone detector tubes and Accuro manual suction pump. Taken from ref. [4].

The comparison standard is based on the Reference Standard Photometer of the National Institute of Standards and Technology NIST, endorsed by the International Bureau of Weights and Measures [22]. It is used to calibrate secondary standards, which in turn are used to adjust the measurement systems of numerous environmental ozone monitoring

networks worldwide. Figure 6 shows one of several possible schemes of a typical UV photometric calibration system for ozone concentration [23]. Other systems for automatic measurement by chemiluminescence appear in the same reference.



**Figure 8.6.** Typical photometric UV calibration system for ozone concentration. It measures the remittance at 254 nm with a 3% uncertainty and pressure and temperature controls (see [23] for English).

### ***Disinfectant capacity***

Produced in site it is used as a cleaning agent, disinfectant and deodorizer in a number of applications, (food, water, clothing, instruments, swimming pools and many more) [1]. Also in hospitals to decontaminate operating rooms: after the usual disinfection, the room is sealed and filled with ozone to neutralize the remaining bacteria [24].

## **4. Evidence-based Medicine and Ozone Therapies**

From the 80's of the last century, the concept of "Evidence-Based Medicine" EBM was generalized worldwide, which considered the traditional pathophysiological reasoning insufficient until the moment to make clinical decisions. The published works of Archie Cochrane, John Wennberg, Ivan Ilich and Thomas McKeown from the 1970s [25] are recognized as pioneers in the development of the MBE. The points to consider by the MBE are:

- The search and finding of the original and relevant biomedical literature, its critical reading and correct interpretation to establish its real level of evidence.
- Clinical experience and systematic knowledge of the context of that experience.
- Patient preferences.

The Cochrane Collaboration is a non-lucrative organization. It is made up of around 11,500 researchers from some 90 countries that apply a systematic and rigorous review process of health publications. The results are published regularly in the Cochrane Library [26,27]. Some consider that together with the Nuremberg Code [28] and the Helsinki Declaration [29], the concept of MBE laid the foundations for a true social revolution in the medical field of the last century.

Regarding ozone, favorable Cochrane results do not appear yet. On the contrary, negative results do appear in various places. In 2005, a Committee of Experts of the Ministry of Health of Malaysia concluded that there was no evidence to recommend ozone therapies as an alternative treatment in any of the conditions analyzed (AIDS, ischemia, ophthalmology, otolaryngology, gynecology and obstetrics, orthopedics, cancer and dermatology) [30]. In the US, the federal regulation code dated April 1, 2016, in its section (a) reads: "Ozone is a toxic gas with no known medical applications; specific, adjuvant or preventive" (sic) [31]. In the following paragraphs, the code provides details about its harmful effects and considers ozone generators fraudulent if used in hospitals or other places occupied by patients. Another reference states that there is no credible, peer-reviewed evidence that supports ozone as a type of medical therapy [32].

However, there are many who apply ozone therapies by attributing to this gas all kinds of beneficial effects, without mentioning the possible damages that it can cause. For example, it is argued that ozone is capable of oxygenating tissues beneficially. But a critical report published online in 2001, with 59 references from scientific journals, reports that, when ozone is introduced into the blood, it reacts with water in the red blood cells generating hydrogen peroxide and also bactericidal free radicals that cause membrane damage mobile. A bibliographic search conducted in 1995 in the Medline, Health, Aidsline and Cancerlit databases provided more than 100 articles, from 1966 to that date, reporting adverse effects of ozone or the products of its reaction, in both humans and experimental animals [33]. The report also concludes that the inges-

tion, infusion or injection of hydrogen peroxide cannot reoxygenate the body's tissues because of the following: the metabolism of a 60 kg adult requires 200 to 250 ml of oxygen per minute, a need that is covered by normal breathing [34]. Each liter of blood that leaves the lungs carries about 200 ml of oxygen, of which about 50 ml are absorbed when it passes through the capillaries in the tissues. It has been estimated that during a conventional ozone therapy session the amount of oxygen that comes from the decomposition of ozone does not exceed 4 ml per hour (about 0.7 ml per minute), so the possible contribution to tissue oxygenation is negligible when compared with that of oxygen that comes from breathing [35].

Regarding the possibility of applying it to people as a disinfectant, the US Environmental Protection Agency (EPA) has expressed that there is "... evidence that at concentrations that do not exceed public health standards, ozone is not effective in removing... viruses, bacteria, fungi or others biological contaminants." For ozone to be effective as a germicide, it must be present in a concentration much higher than that safely tolerated by people and animals (ref. [31]). The EPA has also issued repeated warnings about commercial ozone generators sold in order to purify homes and offices. A report published in 2008 warns about the falsehood of an announcement proclaiming that those devices had been approved by the US federal government [36].

Ozone therapies are not allowed in the U.S. for a long time. Already in 1998 a marriage that claimed health benefits when marketing ozone generators, without scientific studies to support them, was sentenced to prison for fraud in a US federal jury. [37]. The Food and Drug Administration (FDA) maintains in that country a permanent surveillance on this type of fraud; a press release from January 2010 reported the performance of the US. Marshalls in the confiscation of 77 ozone generators from a California company, after being previously warned to suspend sales of generators designed for medical applications [38]. Similar prohibitions for the use of ozone generators also apply in Canada, although somewhat less rigorously than in the US. [39,40]. The main international criticisms about ozone therapies essentially cite similar arguments to those alleged by US agencies: the absence of scientific studies that demonstrate the proposals of their supporters [30,31,41].

Another argument used by ozone supporters is that, in some way (not known and much less proven), ozone is able to stimulate the body to provide a curative response to the condition to be treated [42]. This ar-

gument is used to try to justify its application to very dissimilar evils, and it is equivalent to considering that gas is capable of recognizing what does not work correctly, making the body's natural means of defense more efficient in combating this specific condition without affecting other processes and organs. As no one has demonstrated the existence of the supposed mechanism of action, it is usual that in order to validate the proposal some illusory assumption is presented as if it were true (something common in all pseudosciences). Hypotheses abound, but there are no valid theories, although they are sometimes cited as if they were true. Diffuse arguments and vague generalizations proliferate, such as "improves the quality of life" or "increases the body's immune response", without further explanation. The detailed review of the literature shows that it is usual for those who promote ozone therapies to consider valid references that are not scientific; they report research that generally does not meet the minimum requirements established to validate clinical trials, by omitting control groups that would serve to compare results, as is usual in any randomized clinical trial.

Nor do the data on applied ozone concentrations appear; at most, only volumes of gaseous mixtures of ozone and oxygen (of unknown proportion) are discussed. Their therapies are applied indiscriminately to any medical condition, from tooth decay to cancer and AIDS, giving rise to a large number of supposedly scientific articles. Almost never reported side effects or contraindications; there are no negative reports either; they are always positive or "promising." Google Scholar shows more than 4000 entries on ozone therapies from 2016 to February 2017. In view of the above, rather than cite and refute the abundant amount of spurious reports or unproven claims that ozone promoters publish, it seems appropriate to comment some review articles on the subject, written by those who obviously favor these therapies.

#### ***4.1. Review Articles***

In a summary of Elvis and Etko from 2011, mentioning the efficacy of ozone to control infections in people together with its anti-inflammatory properties, cite an article from more than 100 years ago, without mentioning subsequent criticisms [43, 44]. The article refers to the use of "precise therapeutic doses" without specifying what those doses are or how they are measured, which is usual in this type of report. In fact, in the literature review conducted to write this article it was not possible to find even a report that mentioned the method used to measure the concentration or doses of ozone supplied to patients. As with any other medicine, the amount and concentration applied are essential parameters

to evaluate the effectiveness of the treatment and determine the harmless and harmful levels, the possible recommendations, side effects and contraindications. This data is also essential for other researchers to reproduce the treatment and attest to its effectiveness (or deny it).

Figure 1, which appears in the summary of Elvis and Etko [25-27], attempts to represent the mechanisms of action of ozone in the organism. However, reference [26] refers to a website titled *holisticbodyworker*, obviously divorced from science; in its original version, holism is a philosophical current created by the South African Jan Smuts in the first half of the last century, which often deforms to the esoteric [45]. The other two articles cited are, one, on "theoretical considerations" without any experiment; the other is taken from a website of a particular user, not from an arbitrated magazine or known research center. Hence, it is not possible to attribute any truth to that figure, which, in addition, immediately questions the scientific reliability of the authors and the entire content of their review article. Elvis and Etko mention some clinical trials, but not even one that demonstrates the benefits of ozone (references 30-35). However, the "advantages of ozone therapy" (citing their references [36-38, 40]) are discussed below, when in fact only one of these articles mentions supposed benefits for people. The remaining ones refer to animal tests, lung damage, unproven hypotheses, the effect on viruses isolated from AIDS or antibacterial effects, but not in humans.

Another reference worth mentioning corresponds to a statistical meta-analysis of Magalhaes et. al., which reports a comprehensive search on the effects of ozone applied to the spine from 1966 to 2011 [46]. But it is also recognized in the article itself that there is not even a single report where, along with the application of ozone, the effect of a placebo in a control group was taken into account. Therefore, this meta-analysis is carried out based on biased or imperfect data, and is not able to discern whether the therapy provided a benefit greater than that of placebo or if its application actually delayed the natural process of pain improvement or cure of the disease. Given the highly aggressive nature of ozone on tissues, the latter possibility cannot be ruled out. To this we should add the usual ignorance of the doses applied, - by not specifying concentration, the authors cannot know if O<sub>3</sub> was actually applied in amounts of therapeutic significance, or only O<sub>2</sub>. In fact, the only thing that is clear from the authors' own exposition is that their article represents an unquestionable example of the incorrect use of statistics to try to justify



what is not justified. Something similar occurs in another metanalysis, also from 2010, where the authors attest to the effectiveness of ozone treatment for lumbar hernia, but there is talk of the application of 1 to 9 ml of oxygen/ozone mixtures without mentioning proportions, without verifying if they were the same in all cases, and even if there is certainty of the existence of some ozone in the injected mixture [47]. The article states that ozone has analgesic and anti-inflammatory effects, which no one has shown, but does not refer to the fact that it is a potent tissue irritant, which has been widely proven (section 4).

## **5. The Ozone in Mexico and Cuba**

Despite multiple international criticisms and the existing ban in Canada and the US to market ozone generators for medical applications, in neighboring countries such as Mexico and Cuba ozone therapies are applied generously and indiscriminately.

### **5.1. Mexico**

In 2013, Mexico was the second country in Latin America with the highest number of deaths from environmental pollution (15,000 per year, according to statistics from the World Health Organization) [48]. There are currently a total of 29 automatic monitoring stations in Mexico City and in the state of Mexico, and air quality is reported every hour by the site [www.aire.cdmx.gob.mx](http://www.aire.cdmx.gob.mx); ozone is one of the pollutants monitored [49, 50]. However, despite the understanding that exists in Mexico with the environmental problem, and with ozone in particular, the Mexican press reviewed in 2015 the legal efforts of the promoters of ozone therapy to legalize it. As a curious note, the Cuban Society of Ozone Therapy, a foreign entity in Mexico, was also part of the request to the Health Commission of the Mexican state [51]. According to the Mexican press itself, Cuba is the only country, after Russia, which has legalized and regulated the practice of ozone therapy [52].

### **5.2. Cuba**

The literature search on environmental ozone monitoring found only one report from the Interdisciplinary Group of the Institute of Meteorology (INSMET) on tropospheric ozone in February 2014. This report only shows general details in a group of provinces, without reporting local concentrations [53]. In 2016, the official newspaper Granma expressed that atmospheric decontamination is a "priority issue for Cuba," and that there was an INSMET project to monitor gas emissions throughout the country. Carbon, nitrogen and sulfur oxides are mentioned, but not ozone in specific [54]. Contrary to what one might think, the Ozone Re-

search Center, founded in May 1994, is not dedicated to recording information and statistics on stratospheric ozone or the effects of environmental ozone on the population, information not accessible in the country. It is dedicated to producing ozone generators OZOMED, OZONEY and AQOZO brands, electrolytic and by corona discharge, for medical, industrial and social applications in the home, cafeterias, etc. (The same ones that are prohibited in the US and Canada, section 4). It is also dedicated to applying ozone therapy to the population, free of charge, for the treatment of many different ailments [55].

Cuba has been for many years the country of the American continent where there is a greater diffusion of ozone therapies with official support. A 2013 editorial in the Cuban Journal of Pharmacy states, "the world's first ozone research center was founded in Cuba", without further details [56]. Cuban ozone therapy even has the apparent endorsement of the Pan American Health Organization PAHO. On the Cuba page of PAHO, there is a set of therapies not demonstrated under the title of 'Natural and Traditional Medicine' among which is ozone therapy (also homeopathy and others not recognized by conventional medicine) [57]. It seems quite evident that the foregoing contradicts at least one PAHO publication, aimed at the general population, which describes in many details how the treatments should be tested [58] and perhaps with the Helsinki declaration, initially promoted in 1948 by the World Medical Association. In 2013, this association had 102 medical societies and about 10 million members [59]. The WMA is currently developing the "Be Aware" campaign against fake medications and in favor of safe information for colleagues and patients. The WMA believes that counterfeit drugs can cause harmful effects to the patient, including death in the worst case, and harm public health efforts in countries pressured by limited resources [60].

The review of the literature revealed multiple national research reports on ozone therapies although, apparently, these investigations never maintained a close collaboration with the Ministry of Public Health agencies responsible for guiding and controlling clinical trials to ensure their validity and protection. of the patient. The above is inferred from a search conducted in January 2014 in the Cuban Registry of Clinical Trials, which did not yield a single inscription where ozone is mentioned [61, 62]. The mentioned editorial of the pharmacy magazine expresses that the first experimental works with people were carried out in 1998, and refers to what it considers "successes in the treatment of reti-

nitis pigmentosa, glaucoma, retinopathies and conjunctivitis (...) published in Cuba for a group of researchers”, citing the confusing statement that ”an oxidizing agent such as ozone can induce an antioxidant effect”, without even giving indications of the possible mechanism or the supposed redox reactions that would take place to justify that hypothesis [63, 64].

On the INFOMED website of the Ministry of Public Health, you can find a book and no less than 20 articles published on ozone in research on people, reporting improvements in many different ailments [65–83]. The detailed review showed that the usual and common to all of them is that the characteristics described in section 4 are repeated: there are no control groups, no measurements, and no report of the applied concentrations. Assuming that the supposed efficacy of the treatment was true, the lack of basic information prevents the reproducibility and verification of these results by other researchers. In some cases, the application of ozone was carried out in conjunction with other treatments, which further increases the uncertainty of the procedure.

Sometimes misleading reports appear, such as promoting oils or other ”ozonized” products, where ozone is actually one of the reactants involved in the process, and not a reaction product. These products include ozonides, hydroxyhydroperoxides, hydrogen peroxide and aldehydes, according to ref. [60]. However, only four ozonides are known:  $\text{KO}_3$ ,  $\text{CsO}_3$ ,  $\text{NaO}_3$ , and  $\text{LiO}_3$ , unstable and explosive in their pure state and without known therapeutic properties [84]. Given the short half-life of ozone, it is not possible that after a few hours there will even be traces of residual ozone in the supposed ozonized medicine.

The burden on the public treasury motivated by the generalized and free application of this therapy cannot be neglected, because despite the absence of a valid demonstration of its effectiveness, its use was extended by countless healthcare centers throughout the country. Only in one of these centers, in a report covering the years from 1993 to 1997, it appears that 1960 patients were treated rectally, intravenously or muscularly, with an estimated cost of 660,000 pesos [85]. Personal interviews with various patients, conducted by the authors, show that it is common that the elementary ethical standards for clinical trials are not met, where informed consent is paramount [86]. Those who apply the therapy consider it valid, and do not warn the patient that it is not a worldwide-recognized procedure, and has even been declared worthless and banned in other countries. Something similar happens with the supposed ozonized products, which apparently arise from a local initiative (ref. [60]).

It is impossible to reconcile the evidence that is reported on the effect of environmental ozone with the claims of ozone therapists, which report benefits on tissues by insufflation directly into the skin, eyes, ears, or within the body: in the spine, vagina, rectum... the airways! or by bubbling ozone into extracted blood and then re-injecting it. Since something as essential as the figures for concentrations applied to patients is never reported, the recurrent absence of pharmacodynamic and pharmacokinetic studies becomes visible, as can be inferred from various review articles where these data are never mentioned.

## **Conclusions**

Stratospheric ozone protects plant and animal life from harmful ultraviolet radiation, while tropospheric is a polluting asset that damages health, and its emission is subject to regulations in many countries. Until today, there are no systematic local reports in Cuba of the tropospheric ozone concentration or other pollutants.

According to the procedures recommended by WHO and other agencies such as the Cochrane collaboration or the US FDA, there is no evidence that validates the effectiveness of ozone as a medicine. Nor is there any theory that justifies its supposed curative effects; everything remains in hypotheses or assumptions not endorsed by the experiment, difficult to accept when referring to such dissimilar ailments.

A vision that clearly reflects the clinical, scientific, academic, ethical and patient protection concerns of contemporary ozone therapists is obtained by comparing the definition of a drug that appears in the multiple editions of the well-known text of Goodman and Gilman "Basis of Pharmacology Therapeutics" with those of a notorious contemporary therapist. According to the text, a drug is "... any substance that produces measurable or sensitive effects on living organisms and that is absorbed, can be transformed, stored or disposed of." But for A. Schwartz, gynecologist and president of the Spanish Association of Medical Professionals in Ozone Therapy, also president of the International Medical Ozone Federation and director of an ozone clinic in Honduras: "... ozone is not a drug and as such does not cause side effects" (sic) [87].

## **Addendum**

As a curious detail, it is worth mentioning that ozone therapists were not the first to apply pseudoscientific rectal treatments. Other variants

had already been proposed almost 100 years ago, before ozone supporters could think of blowing the gas in that way. Figure 8.4 shows Dr. Young's rectal dilators that, apparently, managed to stimulate a favorable placebo effect in many people. They were provided in four sizes and three different materials, gutta-percha, glass and aluminum. According to the author, all organs could be positively affected by their application.



*Figure 8.6. Dr. Young's rectal dilators. An earlier version of the pseudoscientific rectal therapy with ozone.*

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*It is easier to cheat people than  
convince them they have been cheated.*

*Mark Twain*

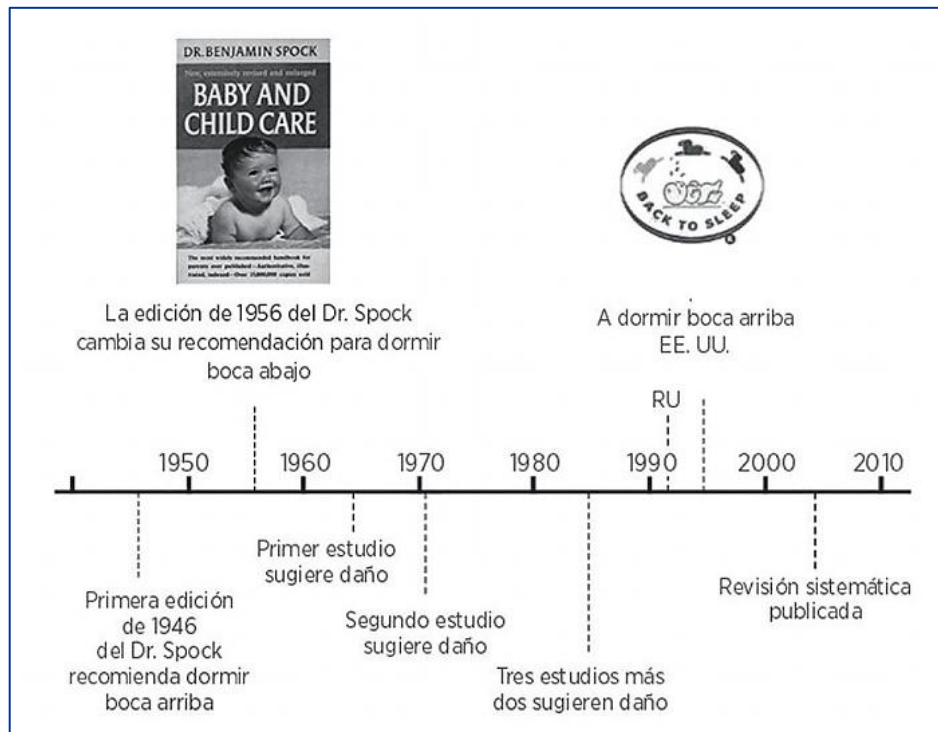
## **CHAPTER IX AYURVEDA AND NON-SCIENTIFIC MEDICINE**

### **1. Scientific and non-scientific medicine**

There are two main types of medical care in the world: scientific (or evidence-based) and non-scientific. The scientific medicine is what we all hope to find when we go to the doctor. It is based on procedures and medications proven by rigorous clinical trials and meta-analyses, performed over a period of time, in which hundreds or thousands of people have participated, including doctors, patients, biochemists, pharmacists and other specialists. This way of acting includes laboratory analysis of all kinds, medical images and other techniques, to get to know what procedures are effective, the doses that should be administered and their contraindications, side effects and the interaction with other medications. To non-scientific medicine other names are usually associated to hide the absence of all the above: alternative, natural, traditional, bio-energetic, or some other, although it should be clarified that there are scientific expressions of natural and traditional medicine, such as the contrasted use of medicinal plants in the Management of not a few discomforts.

But that non-scientific medicine (or without evidence) is essentially based on the well-known fallacy of the *argument ad antiquitatem*, which can be summarized as “This is correct because it has always been done in this way.”[\*] Such an argument ignores the progress of science, considering that what might seem appropriate hundreds of years ago does not have to remain so in the light of current knowledge. On the other hand, poisons abound in nature. Being natural is not synonymous with safety. Many examples of toxic plants can be found under that title on the Web (see, for example, wikipedia.org). Also on the WEB there are reports that for a long time it was thought that star anise was very beneficial, and it was given to young children and even newborns, but recent studies determined that in large quantities it can be fatal, and that is why Withdrew from the market in 2001. Another example of non-scientific medicine, although not related to natural products, is as fol-

lows. From the 1956 edition of Benjamin Spock's book 'Baby and Child Care', which had a great sales success, it was thought that laying babies on their backs could cause their vomiting drowning, although such a criterion was not supported by clinical research. Putting babies on their stomachs for sleeping grew into a widespread routine in hospitals in many countries, and was adopted by millions of parents at home. However, there was a drastic reduction in the sudden death of babies (sudden infant death syndrome) when the advice was put to put babies to sleep on their backs, after a series of scientific studies that began in 1965 and ended with a systematic review in 2005 (figure 1).[†]



**Figure 9.1.** How criteria about babies should sleep changed when applying scientific medicine (ref. 2). From left to right: first 1946 Dr. Spock's edition recommends sleeping on the back; in 1956 change it to sleep on the belly. First study suggests damage. Second study suggests damage. Three more studies suggest damage. To sleep on the back US. Systematic review published.

Other variants of the so-called natural or traditional medicine are even worse, because they do not even have the tradition. Sometimes they are very recent and have a religious origin, such as floral therapy,[†] or are based on absurd recommendations that contradict basic principles of

various basic sciences and that throw negative clinical trials over and over again, as is the case with homeopathy, - although this is not why their stubborn followers stop recommending it to their patients.[§],[\*\*]

In reference [2], in relation to the so-called alternative medicines and by way of summary, the following appear as key points (p.20):

Neither theory nor professional opinion is a reliable guide to safe and effective treatments.

Just because a treatment is "established" does not mean that it is more beneficial than harmful.

Even if patients do not suffer from receiving treatments that have not been properly tested, their use can be a waste of individual and community resources.

No one can deny that, in our country, any citizen has access to primary and specialized care regardless of his or her geographic location or any other personal characteristic. The medical culture of our population has been scientific for many years because, even the most convinced believers, even if they offer offerings to gods or saints to request their own healing or that of a similar one, do not cease to look for, or recommend, medical assistance or follow their directions. There is much confidence among the population that our health system will apply scientific medicine, although unfortunately, this is not always the case. There are still those who indiscriminately apply 'other' medicine, without giving the patients adequate information - i.e., without communicating the degree to which such procedures or medications have a scientific basis. Luckily, they seem to be less and less.

Given these experiences it is not very disconcerting that foreign healers remedies are praised and promoted without giving detailed explanations, which could derive from an eagerness to make medical science go through what is clearly not, to the detriment of the confidence that the population deposits in our public health. It is not the first time it happens; previously unproven remedies have been promoted, 'good for everything', which have proved illusory.[††],[‡‡] The usual thing in these cases is to use complimentary qualifications, but without revealing the real basis of these 'novel' procedures, and without providing data or consulting well-conducted clinical trials that support its effectiveness.

A few weeks ago, medical staff of the Natural and Traditional Medicine (NTM) group of the Ministry of Public Health, described "Ayurvedic medicine" very favorably in a television space of wide audience; This

modality was described as “great.” This is why it seems appropriate to analyze in detail what is Ayurvedic medicine .

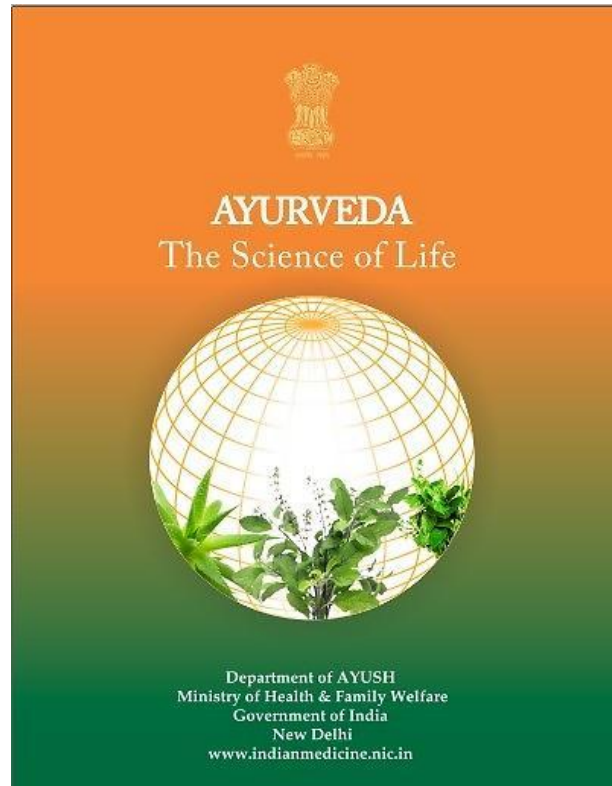
## 2. Ayurvedic medicine in India

Universal health care refers to the medical care of all residents of a country, geographic or political region, regardless of their economic capacity, race, belief, age or some other particularity. It is a right widely recognized by most countries of the European continent, but it is not so in other countries. In 2015, in the Americas, in addition to Cuba, there was only universal assistance in Canada, Argentina, Costa Rica, Venezuela and Ecuador [§§],[\*\*\*]. In the rest of the world, countries of European tradition such as Australia and New Zealand have universal assistance, but it is practically non-existent in Africa and Asia, with the exception of Botswana, Japan and Thailand.[†††] India is not among the exceptions.

In 2015, 24 countries were reported trying to develop reforms in their health systems to provide effective and universal healthcare.[‡]

An official text about Ayurveda, Ayurveda, the Science of Life, published by the department AYUSH[§] of the Ministry of Health of India, (figure 2)[\*] is not only pseudoscientific; It is also unscientific, because despite having the word science in the title, it considers this practice to be valid on the exclusive basis of religious criteria.

The material emphasizes that Ayurveda is based on Vedic documents that began five thousand years ago and its holistic nature[†], which recognizes the integrality of mind, body and soul.[‡] These concepts have to do with religious beliefs, and nothing to do with science (figure 3). In fact, they are contrary to scientific knowledge. In addition, there is not a single scientific result in the text of the Ministry of Health of India, not even the words clinical trial. There, two basic books of mystical character are recognized as fundamental, without some kind of critical evaluation: the Súsruta-samjita, from the fifth (or III) BC century, and the subsequent Cháraka-samjita, from the 2nd century AD.

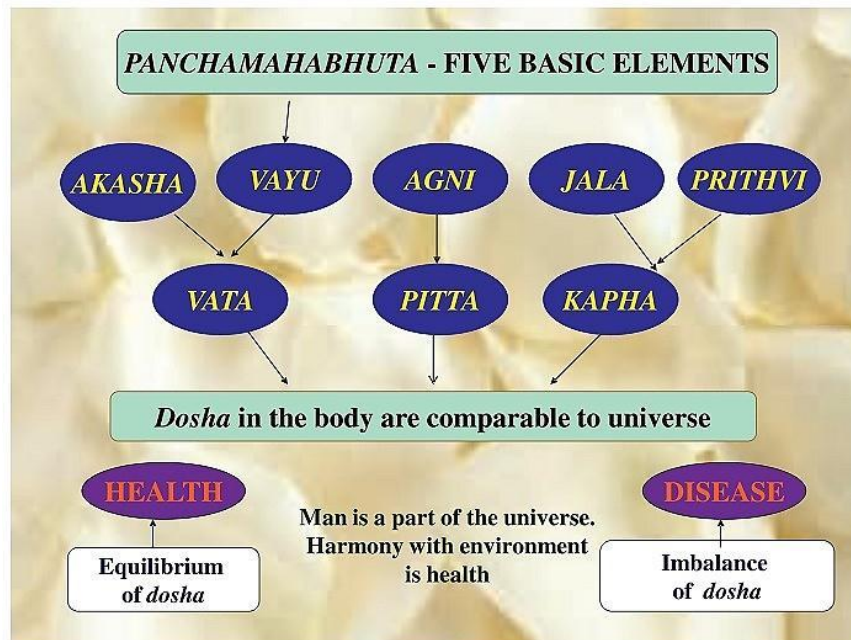


**Figure 9.2.** Official text of the Ministry of Health and Family Welfare of India. 'Ayurveda, the Science of Life'.

Súsruta, founder of Ayurvedic medicine, who claimed to be a descendant of the god Dhanu Antari, recommended taking donkey urine to neutralize poisons and camel urine for leprosy and hemorrhoids, among other ailments. Also, that a scratch with rat semen should be avoided, as they can cause anemia, joint pain, epileptic seizures or cancerous tumors. In relation to leprosy, he argued that a man can be cursed by this disease because of killing a priest (Brahman), and that he would attack him again at his next birth (sic). A leper would eliminate his illness by observing a proper diet, impeccable behavior, and practicing all kinds of atoning penances, (such as giving money to Brahmin priests) (sic).[§§§§]

On p. 13, the text of the Ministry of Health and Family Welfare of India also explains how the Indian government supports this false science through the marketing of Ayurvedic medicines in other countries, the translation of literature for this purpose, the dissemination of information in Indian embassies and cultural missions around the world, and the granting of scholarships to foreigners in order to receive Ayurveda

courses in India.



**Figure 9.3.** Composition of the human body according to Ayurveda religious philosophy: ethereal element (AKASHA); gaseous element (VAYU); thermal element (AGNI); Earth element (PRITHVI). These elements make up three dosha (VATA, PITTA and KAPHA). If DOSHAS are balanced there is health (HEALTH); its imbalance gives rise to diseases (DISEASE) (from the text in figure 2).

Although the number of scientific publications increases dramatically year after year, an academic Google search showed a single scientific article on Ayurveda in the last 15 years. This, referring only to the possibility of using Ayurvedic remedies to find valid medications in the light of scientific medicine.[\*\*\*\*\*] On the contrary, criticisms of all kinds abound in the international press.[†††††], [‡‡‡‡‡], [§§§§§], [\*\*\*\*\*]

Studies conducted in the USA and India concluded that up to 20 percent of the Ayurvedic preparations examined contained toxic levels of lead, mercury or arsenic. These analyzes also warned of the non-existent quality controls or the use of herbs that contain other harmful substances. The concentrations were dangerous enough to cause damage to the tissues of the brain, kidney and nervous and reproductive systems, mainly in pregnant women. Frequent cases of hepatotoxicity have been described by the use of various Ayurvedic herbal products.[†††††]

### 3. A necessary conclusion

If we refer to our country, among other indicators that speak in favor of our medical care, we have that in Cuba there are 82 doctors for every ten thousand inhabitants. [††††††] In India there were only 4.8 in 2017. [§§§§§§], [\*\*\*\*\*] According to the World Health Organization, 900,000 Indians die each year from drinking bad water and inhaling contaminated air. Is this the model of medical care that NTM staff want to imitate in Cuba? Or just choose Ayurvedic treatments that prove to be effective and not harmful? But... how to determine these treatments, if clinical trials are nonexistent? Will the scientific literature be consulted, will they design and conduct well-founded clinical trials, or will patients begin to prescribe Ayurvedic procedures “to see what happens”, as has happened in the aforementioned homeopathy and floral therapy?

It would be of great interest to have serious information about this and other “alternative” therapies, which still exist in our health system despite criticism and lack of scientific basis.

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**Note :** On Wednesday, November 6, 2019, months after this article was published, the Ministry of Public Health opened an international Ayurveda center in collaboration with the Ayush Ministry of India. According to the president of the Cuban Soc. of Natural and Traditional Medicine, the center will attend patients with pathologies that include “oncological problems, degenerative diseases of the central nervous system, digestive disorders, among others”, as it is “a complete medical system that it comes from a philosophical basis of its own”(that is, based on a foreign philosophy and not on the international medical criteria for patient protection with clinical trials, pharmacokinetics, pharmacodynamics, biochemistry, genetics, etc.).

(<http://www.cubadebate.cu/noticias/2019/11/06/inauguran-primer-centro-de-medicina-ayurvedica-en-cuba-fotos/>)

According to the Indian advisory professor - whose specialty was not published, Srinivas Hejmadi Asharya, ”These will gradually expand to other hospitals in the country and other Ayurveda specialties will be put at the service of the population,” while according to the director of the center International, Cristina Valdivia,” your institution will be in charge of training specialists, with a view to extending these treatments to other units of the national health system.”





**Figure 9.4.** Entrance of the first center of the country of Ayurvedic medicine. Photo: María del Carmen Ramón/Cubadebate.

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[†††] <http://www.bbc.com/mundo/noticias-37691220>

[†††] ↑

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[§§§] AYUSH: Ayurveda, yoga, naturopathy, unani, siddha and homeopathy. The Unani medicine has its origin in medieval European medicine based on the Four Temperaments: black bile, bile (yellow bile), phlegm and blood. Siddha is a stricter variant of yoga, which makes rituals, meditation and austerity to get the 'spiritual enlightenment'.

[\*\*\*\*] Ayurveda, The Science of Life. Dept. of AYUSH, Ministry of Health and Family Welfare, Government of India, New Delhi, [www.indianmedicine.nic.in](http://www.indianmedicine.nic.in)

[††††] See [www.geocities.ws/rationalis/aqui-alla/educacion/holismo/holismo.htm](http://www.geocities.ws/rationalis/aqui-alla/educacion/holismo/holismo.htm)

[††††] Soul refers to an immaterial entity, according to the statements and beliefs of different traditions and philosophical and religious perspectives, that living beings possess. The description of its properties and characteristics vary according to each of these traditions and perspectives.

[§§§§] Súsruta-samjita, chap. 2,6,22,26,45. See Susruta-samhita at [www.wikipedia.org](http://www.wikipedia.org)

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## Notes

*Note 1.* Paquita Armas Fonseca.” Eleuterio Páez: Whatever another man does, I can do it too." Accessible at <http://www.cubadebate.cu/opinion/2014/02/14/eleuterio-paez-lo-que-haga-otro-hombre-yo-tambien-lo-puedo-hacer/#.Uv4rgEon1xA>.

*Note 2.* Allopathic medicine is the pejorative way in which homeopaths refer to scientific medicine.

*Note 3.* Ethologist, zoologist, evolutionary theorist and British scientific popularizer. Ethology studies the guidelines that guide the innate or learned activity of different animal species, including humans.

*Note 4.* Fighting anti-science in the new Russia, February 1 2002, <http://www.iheu.org/node/1161>.

*Note 5.* Version of the original published in the Annals Magazine of the Academy of Sciences of Cuba. Vol. 3, No.1, Year 2013.

*Note 6.* Humidity in the middle of the desert? Cairo receives only 25 mm of rain a year and in many places in the Egyptian desert it only rains once in several years.

*Note 7.* The placebo effect is that a significant percentage of patients report feeling better when they are given an inert substance because it is an effective medication. The main characteristics and foundations of the effect are quite well known today.

*Note 8.* Version of the original published in the Annals Magazine of the Academy of Sciences of Cuba. Vol. 3, No.2, Year 2013.

*Note 9.* Also one of the four members of the Maxwell Equations, which fully describe the relationships between electric and magnetic fields in a unified way.

*Note 10.* Unlike other laws of electricity and magnetism, it has a very simple analytical expression:  $j = \sigma E$ , where  $j$  : current density;  $\sigma$  : medium conductivity and  $E$  : electric field strength.

*Note 11.* Harmful effects caused by medical action or medication action.

*Note 12.* Magnets may lose their magnetization over time, but for other reasons such as temperature rise or mechanical vibrations. In both cases, the microscopic internal order of the intrinsically magnetic atoms is dismantled, which is reflected in the disappearance of magnetism at the macroscopic level.

*Note 13.* Water hardness is produced by calcium and magnesium salts, and to a lesser extent by iron, aluminum and other metals. The magnetic treatment does not alter the content of ingested salts (in any case, it increases it, since

it is not deposited in the pipes). There is no evidence that it contributes to any health benefit.

*Note 14.* A patent does not give scientific endorsements. To request it, it is not necessary to demonstrate the effectiveness of the patented device or procedure.

*Note 15.* See the in ref. [69] the summary of international articles that affirm the ineffectiveness of electromagnetic therapies for knee conditions.

*Note 16.* Mario Bunge. Pseudosciences, what a fraud! Editorial Laetoli, Pamplona, November 2010, p.189

*Note 17.* Resolution of the United Left party, Spain (Dec. 2012). Taken from <http://www.eparquiodelgado.com/index.php/cronica-de-la-razon-practica/>

1. United Left bets on the defense of health based on evidence-based treatments and the promotion of people's physical, mental and social well-being.

2. Izquierda Unida rejects those therapeutic proposals that have not proven to be effective for different diseases or disorders until there is solid evidence to prove this efficacy, as is the case with homeopathy, acupuncture and other pseudoscientific therapies.

3. United Left proposes that the public authorities promote the education and training of consumers in health, and effectively regulate the deceptive publicity of any supposedly therapeutic procedure that does not have sufficient evidence about its effectiveness.

4. Izquierda Unida rejects the inclusion in the public health system of any medical practice or medicine that has not demonstrated its efficacy according to exclusively scientific criteria. Likewise, it rejects the financing of public funds to institutions that promote the dissemination and dissemination of pseudoscientific therapeutic procedures that confuse citizens and endanger their health.

*Note 18.* The Federal Trade Commission (FTC) and the Food and Drug Administration (FDA).

*Note 19.* The old calorie of the calorimetric tables equals 4,184 joule. The thermodynamic calorie, meanwhile, is equivalent to 4.1868 joule.

*Note 20.* Do not confuse with the vital capacity, maximum amount of air that a person can expel from the lungs after a maximum inhalation. It is measured with the spirometer.

*Note 21.* When consulting the original source in the Health Thyself book of (1931) by Edward Bach, creator of floral therapy, the following paragraph appears:” No science is required, no previous knowledge (...) without science, without theories, because everything in nature is simple. This healing system (...) has been revealed to us divinely.”

*Note 22.* Here again the erroneous concept of energy appears as a fluid that is transmitted through some conduit.

*Note 23.* Law of dominance or Ko cycle: wood covers earth, fire melts metal, earth absorbs water, metal cuts wood, and water extinguishes fire.

*Note 24.* The existence of the cells was known long before, but not their importance. It was not known, for example, that they originated only by reproduction.

*Note 25.* Any substance, such as alum, that is used for medical or industrial purposes to contract tissues and reduce various secretions.

*Note 26.* Homeopaths, pejoratively suggesting a harmful character, call non-homoeopathic conventional medicine allopathic medicine.

*Note 27.* Philosopher of the theory of communication who died in 1988; according to Grice: Make your contribution as informative as necessary; make it true; do not say something that is not relevant; Be brief, tidy and avoid ambiguity.

*Endnote 28.* In Indian philosophy, karmic relationships are the set of personal actions that are linked to the soul while it transmigrates. Each new body is determined by previous karma.

*Note 29.* The meaning of naturism is not considered here as a synonym for 'nudist movement', extended in Europe and elsewhere.

*Note 30.* The Cochrane Library is a collection of databases on clinical trials: the most important are: 1. Systematic Reviews Database; 2. Summaries of Effectiveness Reviews; 3. Methodology reviews and 4. Central Registry of Controlled Trials.

*Note 31.* US billion, equal to one billion.  $1 \text{ ppb} = 1.96 \mu\text{g}/\text{m}^3$

*Note 32.* E1 National Coordinating Center for Clinical Trials (CENCEC) was created in 1991 to ensure the clinical evaluation is required for registration and marketing of medical-pharmaceutical or biotechnology products and medical equipment.

*Note 33.* Responsible for ensuring the safety, protection, rights and benefits to all subjects who are involved in biomedical research.

*Note 34.* Biases are various influences and factors that, in clinical trials, can lead to conclusions that differ from the truth systematically and not by chance. The most important to take into account are:

Those caused by inequalities between the people in the test group and the control group. It is essential to choose the test groups properly so that there are no initial discrepancies that alter the results (for example, some medications do not have the same effect on different sexes or ethnic groups)

Those due to differences in the way the effects of treatment are evaluated. Biases caused by a biased selection of data are eliminated using the double-masking (or double blind) method. It consists of guaranteeing that both the patients and the doctors who evaluate them do not know who actually received the medication studied.

Those caused by a tendentious selection or manipulation of the data obtained, not necessarily conscious. The statistical treatment of the results must be carried out by experts, since it is easy to introduce biases when the one who analyzes them is not properly trained in the particularities of the clinical trials.

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