

QUANTUM INFORMATION, THE LAST BORDER OF MODERN MEDICINE

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This article shows that despite its great successes, modern medicine fails to deal with chronic diseases, that affect more than half of the population of humanity and which causes many complications, many serious emergencies and many serious disabilities. And all this is due to the fact that modern medicine does not know the primary cause of these diseases. In chronic diseases there are a number of risk factors that sometimes produce, and sometimes do not produce the disease. That is why the author points out that behind the molecular changes, on which modern medicine is based, there are in fact some informational changes, which can better explain the occurrence and evolution of chronic diseases. In this respect, the author describes the importance of information for the regulation processes, the particularities of information, the role of genetic information, molecular information, nervous information, but especially of quantum information, in the process of regulation on which the human organs health depends. In conclusion, the author describes how information processes can be disturbed, ultimately leading to a real informational pathology. That is why addressing the information aspect and especially the quantum information, is the last frontier of contemporary medicine. Because beyond the quantum information there is only the soul that God has given us.

Key words: quantum, information, chronic diseases, genetic, epigenetic, molecular.

INTRODUCTION

As can be seen, from the tumultuous history of mankind, people have always sought to find the best causes and the best treatments in order to combat the diseases they were fighting. Thus, in 1750, after the dissection of several hundred corpses, Giovanni Battista Morgagni discovered that there were some organic changes behind the clinical manifestations. So he laid the foundation for a real organic pathology. After 100 years, analyzing the affected organs, at the microscope, Rudolf Virchow discovered that there are actually some cellular changes behind organic changes. So he set up a real cellular pathology. And after another 100 years, using chemical analysis, Linus Pauling discovered that there are actually some molecular changes behind cellular changes. So he laid the foundation for a real molecular pathology, with which some extraordinary progress has been made. But despite all the progress that has been made, today's medicine can not even combat chronic diseases that affect more than half of humanity and are steadily rising because we do not know the primary causes of these diseases.

In the occurrence of chronic diseases have been accused of a whole range of genes and risk factors that sometimes produce, and sometimes do not produce the disease. The phenomena occur as if there were other causes that would interfere with the occurrence and evolution of these diseases besides the molecular causes. In this regard, we have shown that behind the molecular pathology there is actually an informational pathology¹.

Quantum physics shows us that the world is not what it seems, because behind it, is a series of extremely complicated and subtle phenomena. And among these extremely subtle aspects is the information, and especially quantum information, which although it can only be seen with the eye of the mind, it is a hidden parameter of human pathology². We have shown that information plays a particular role in human pathology because it is absolutely necessary to ensure the effectiveness of the many regulatory processes on which our health depends. That's why our body needs a lot of information so it can keep its health in a very variable and often very hostile world, just like this wonderful world we live in. And the disturbance of informational processes can lead to certain illnesses³.

Just because information plays a special role in the functioning of biological systems, our body receives, from the moment of fecundation, in a very small amount of substance, a very large amount of information. As has been found, in the infinitesimal amount of substance, only 7 millionth of a gram of DNA, that we receive from our parents, there is a very large amount of information, estimated at about 2 GB of genetic information⁴. And in order to maintain its health in a highly variable and often even hostile environment, our body continues to receive a great deal of information through internal and external environment. But all this information needs some communication channels to get from the source to the appropriate adjustment mechanisms. That is why the human body has become an extremely complicated communication system, in which each cell and each molecule participates in either the construction of the system or the transmission of information through this system⁵. And some organs, such as the immune system and the brain, have specialized in the superior processing of information. That is why behind all the disorders, which are the basis of human pathology, there will eventually be some informational disorders⁶.

THE NEED FOR INFORMATION

As Norbert Wiener, the founder of cybernetics, our body is an island of order and organization in an entropic universe⁷. Because we actually live in an environment dominated by the second principle of thermodynamics, which postulates the growth of entropy, that is the disorder. And diseases are actually an expression of disorder, which is ultimately the result of the second principle of thermodynamics. That is why, in order to preserve its order and organization, our body must carry out a whole series of regulatory processes that can be opposed to the second principle of thermodynamics, which aims to increase entropy. And so he can preserve the homeostasis of all his parameters, such as temperature, glycemia, lipemia and blood pressure⁸.

Obviously, in order to achieve this, regulatory mechanisms need certain substances and energy. But to be able to maintain the stability of the body in an entropic environment, the mechanisms of regulation also need some information. Because the information is the one that ensures the efficiency of the adjustment processes. For example, genetic information is the one that tells ribosomes how to arrange the 20 types of amino acids in over 100,000 types of proteins from which

the human body is composed. Also the molecular information that makes it possible for enzymes to recognize the substrate they need to process. Also, the information received from the arterial wall is the one that indicates the adjustment centers of brain, the higher the blood pressure or the lower the blood pressure, so that it can be kept between some normal limits. Also the optical information, coming from the eyes, tells the brain how to regulate the movements of the body in order to achieve the intended purpose.

In the absence of the necessary information, the control mechanisms could not preserve the homeostasis of the internal parameters and could not achieve the intended purpose. He also could not regulate his behavior according to the many variations of the external environment. That is why the human body seeks to receive as much information as possible, which it seeks to process as properly as possible and to send it as soon as possible to all the organs and cells involved in the regulation process. That is why the human body has become an extremely complicated communication system, along which both genetic information and information received from internal and external receptors is transmitted. All these informational processes are necessary to maintain our order and organization, in the entropic universe. And the disorder of these information processes can lead to certain illnesses, which will obviously have an informational substrate³.

THE PARTICULARITIES OF THE INFORMATION

As early as 1948, Norbert Wiener showed that information is neither substance nor energy⁷. Information differs both in terms of substance and energy. And in 1980, we have shown that although it is often confused with the substance and energy that generates and transports it, information is another aspect of reality, which has other laws of conservation and transformation⁹.

We have shown that unlike the substance, that represents the mass or volume, and unlike the energy, that represents the force or field, that intervenes in the unfolding of phenomena, information is the order and the organization, or if you want, the novelty that a reorganization can bring. And this novelty can not be isolated, as we isolate the viruses or microbes. It can not be removed from the communication channel in which it appears and in which it acts. When we

isolate a hormone in the blood, we only isolate the signal through which that information is transmitted. The information is only reported by the cellular receiver capable to recognize it, according to a genetically inherited program.

But being another aspect of reality, information has other units of measure. Unlike substance, which can be measured in grams and energy that can be measured in watts, the information is measured in bits. The bit represents the novelty that an experiment can bring with only two possible and achievable results, such as yes or no, white or black, good or bad, girl or boy, etc.

It is worth noting that, unlike classical information, information generated by quantum phenomena is measured in qubits. Unlike a molecule, which can only be in one place, a quantum particle can be found anywhere in the quantum field. This is why quantum processes can bring much greater information than molecular processes.

But although the information is not visible and cannot be isolated, as we isolate, microbes or viruses, it can be measured using mathematical formulas, such as Claude Schanonn's formula, according to which the information is $H = \log_2 N$, where N equals the number of possible results¹⁰.

Unlike substance and energy, information can easily be passed from one signal to another. Within the transmission of information, only one passing of the order of one signal must occur. This is the case with the transfer of genetic information from the DNA molecule to the messenger RNA molecule. That's why information is the most communicable part of reality. This way it can be transmitted through systems with very different structures. For example, acoustic signals are transmitted first in the form of air waves to the inner ear. Here acoustic vibrations are transformed into nerve signals. Then they are transmitted to axon terminations, where they are transformed into synaptic mediators, and so on until they reach the recipient.

But in its novelty, information must not be confused with either the acoustic signals, the nerve signals or the synaptic messengers that carry it. Information is actually the order that is transmitted from one signal to another. In the case of genetic information, the sequence represented by the nitrate bases, in the filamentous DNA molecule, is passed on the order represented by the sequence of amino acids in the protein molecule.

The information ultimately represents the relationship established between the emission source and the recipient. That is, between the

system that issued the acoustic message and the system that received that message. But not only the quantity but also the quality and the significance of the information can vary from one recipient to another. Thus, the same dopamine molecule can bring different information depending on the receptor receiving it. And there are several receptors for dopamine, or for catecholamines, that react differently to the same molecule of dopamine, or adrenaline. And we have shown that the brain has the ability to shift from signal processing to information processing. And then, from processing the information to the discovery of significance of different information¹¹.

As is known for transmitting information, a communication channel is required. That is, a communication support consists of an emission source, a transmission channel and a receiver. The information emitted depends on the entropy of the emission source. And the information received depends on the entropy of the recipient. The received information should decrease the entropy of the recipient. The greater the information it receives, the better the recipient will know how to react. That is, he will know better how to use the substance and energy available to achieve the purpose.

It is important to note that there is an informational causality in the communication system, since the information does not determine, but only declares a certain reaction in the receiving system. And this reaction is done according to the program and with the help of the substance and energy available to the system receiving the information. That is why the brain, which represents only 2% of the body's weight, consumes more than 20% of the body's energy. Because he has to carry out with his energy the processes triggered by the very large amount of information he receives.

Because information has an anti-entropic role, Erwin Schrodinger even said that our body feeds with negentropy, because water and carbon dioxide have a lower order than glucose from metabolism. That is, he retains negentropy from the glucose molecule¹². In this respect, it would be very important to note that all food and all medicines bring, besides the substance and energy from which they are constituted, a certain amount of information¹³.

It is important to note that, unlike material systems, the source does not lose the information it issues, but rather the corresponding information multiplies by the number of recipients. Therefore, unlike substance, the information can be at the

same time in several places. That is, it can be found in all recipients who received that information. Information can be found on the apple that is on the table, but also in the head of those who look at the apple. It is therefore obvious that although the body is regarded as a chemical system, it is also an informational system. And his pathology is actually an informational pathology³.

AT FIRST IT WAS THE INFORMATION

Contrary to all appearances, the information was the first. Physicists claim that it was the energy at first. But we believe that the information was initially¹⁴. In order to understand the importance of the information, it is important to note that at first it was not the corpuscular matter, as we know it today. As physicists claim, there was a great deal of energy at first. They claim that 13.8 billion years ago, this great amount of energy exploded. And matter, or rather, the corpuscular substance, as we know it today, would have appeared only after 10^{-35} seconds from the great explosion, Planck's so-called time. First quarks and electrons appeared. Quarks have unified in protons and neutrons. By connecting the protons to the electrons, the atoms of hydrogen and helium appeared. And then, by the fusion of helium and hydrogen atoms, the other chemical elements in nature have also emerged¹⁵.

But while the physicists claim that it was a great explosion in the beginning, the Bible claims that the universe was created by God, who, after creating heaven and earth, said, "Let it be light" and light (Genesis 1,3-11). Therefore the Apostle John says that "the Word was the beginning and the Word was with God" (John, 1). But the word is an information, that means information was the first. But not only the Bible claim that the information was at first, but some physicists claim that it was the information at first. For example, physicist John Wheeler says it for bit. That is the information was at first. And other physicists, like Stephen Howkings, are talking about a great project, which involves also the information¹⁶.

But the best proof that the information was at first was that during fecundation we received much more information from our parents than the substance. As we know, our story began at the time of fecundation by joining the two filiform molecules of DNA that we received from our parents. But although the two DNA molecules weigh only 7 picograms, ie 7 millionth grams, they

contain a very large amount of information rated at about 2 GB of genetic information⁴.

In order to realize the discrepancy between the very small amount of substance and the very large amount of genetic information, it is enough to note that to write one GB of information on a paper, 4000 volumes of 1000 pages each are required. That is, to represent the information contained in a cell would require two trucks of books. And Francis Collins, who was the leader of one of the two teams that deciphered the human genome, showed that to read without interruption the genetic information, resulting from the three billion nucleotides, we should be 31 years old¹⁷. But all this shows that genetic information is more important than the substance we have received from our parents.

But to be able to maintain his order and organization, in a highly variable and often very hostile environment, our body also needs the information generated by the changes in the environment. That's why he has a series of sensory organs through which he seeks to receive the optical, acoustic, thermal and mechanical information that the environment generates, information valued at over one million bits per second.

HOMUNCULUS ENCODED IN THE GENES

After Antoni van Leeuwenhoek discovered the spermatozoid, in 1673, he believed that in sperm is actually a very small homunculus, which during gestation will give birth to a man. After 100 years, La Mettrie described the man as a machine. Rene Descartes also believed that man was a machine to which he added a soul. But the soul, he said, belonged to religion. Therefore we continue to look at man today as a machine, without a soul, although information, and especially quantum information, draws us ever closer to the soul¹⁸.

Obviously, further research has shown that there is no homunculus in the spermatozoid. But we have today discovered that this homunculus nevertheless exist. But it is encoded in the succession of the three billion nucleotides of which the filamentous DNA molecule is composed, in which the genetic program of the future organism lies. But if he is a machine, then we believe that he is an information machine, in which the soul occupies the highest place. And the genetic information in which our program is written comes from our parents, who also received it from our grandparents, who actually come from Eden, that

is, from Heaven, as the famous geneticist Richard Dawkins says.¹⁹

As we know, the DNA we received from our parents is not just the genes that will depend on skin color, eye color or hair color, but also so-called Homeobox genes that control the development of different parts of our body. Thus, for example, it has been found that the development of various parts of the body of the drosophila is controlled by eight Hox genes. If we remove a Hox gene, the drosophila will not have wings. And if we remove another Hox gene, the drosophila will not have any more legs. And if the DNA molecules of a mammal will not have the Pax6 gene, the future organism will be born without eyes. All this shows that in our genome is actually a homunculus, but it is coded in the succession sequence of the three bases of nitrogenous bases. That is, in the genetic information we received from our parents.

THE CELL AS A TURING MACHINE

But if behind DNA are, as we have seen, a very large amount of information, estimated at 2 GB, then the epigenome that should manage this information is not only a chemical machine, but also an informational Turing machine²⁰. As it is known, the Turing machine was designed in 1936 by the well-known English mathematician Alan Turing²¹. It is made up of a band, along which they are enrolled their data and processing instructions. We have shown that this band could be likened to the filiform DNA molecule along which the 20,000 genes are aligned.

But besides the band, in which the data is entered, the Turing machine also has a reader who can read the data recorded on the tape and can fulfill or change them. And this reader could be likened to epigenetic mechanisms that regulate gene activity. That is why we could compare the genome with the hardware of a computer disk, in which the genetic information received from our parents is stored. And the epigenome would be the software, that is, the program that needs to regulate the activity of genes according to the demands of the environment.

And the diseases we are confronted with will be, on the one hand, diseases of the genetic hardware, that is genetic diseases, as is the case in monogenic diseases, and on the other hand, epigenetic diseases, that is, diseases of the

epigenetic software, as is the case with chronic diseases²².

EXPANDING OF GENETIC INFORMATION

Since the discovery of the filiform structure the DNA molecule, it has been assumed that the genetic information on which the synthesis of the proteins, from which we are constituted, is encoded in the succession of the three billion nucleotides. But it was not possible to make a correspondence between a nucleotide and an amino acid, because DNA is made up of four types of nucleotides and proteins are made up of 20 types of amino acids. As is known, the DNA filiform molecule consists of four types of nucleotides, namely two types of purine bases, such as adenine and guanine, and two types of pyrimidine bases, such as thymine and cytosine.

That is, the number of amino acid types is much higher than the number of nitrogen bases. Because mathematician George Gamow showed that for the coding of the 20 types of amino acids three nucleotides would be needed. And in 1960, Marshall Nirenberg demonstrated that the uracil-uracil-uracil triplet encodes the phenylalanine amino acid²³. Gradually, the entire genetic code was found, which is common to all living systems on earth. And this was virtually the greatest discovery of contemporary science, because it attracted the attention of the importance of information in the biological processes.

But the genetic information, which is inscribed in the sequence of the three billion nucleotides, that make up the DNA filiform molecule, has a two-dimensional arrangement, ie in 2D. And the molecular information that proteins carry, has a three-dimensional structure, ie in 3D. As is known, the cell initially copies genetic information from the DNA filiform molecule, to the protein filiform molecule, which is also in 2D. But protein synthesis does not stop at the amino acid sequence, but continues with the formation of three-dimensional protein structures. Because depending on the sequence of amino acids, protein molecules will fold in different ways and give rise to three-dimensional structures. In this way, genetic information is indirectly passed from 2D to 3D. And this is very important because by their three-dimensional structure, the proteins will be able to recognize each other and will be able to react selectively, as is the case with enzymes, hormones and antibodies²⁴.

THE MAIN BIOLOGICAL INFORMATION TYPES

Although substance, energy and information are three different aspects of reality, they are inextricably linked to each other. It is known that there can be no substance without energy or no energy without substance. That is why the substance can turn into energy, which actually happens in the case of atomic energy. But if information is the way of distributing matter and energy in space and time, it means there can be no sustenance without information or information without substance and energy.

That is, although information is another aspect of reality, it is inextricably linked to the substance and energy that generates and transports it. But as we can talk about different kinds of substances and energy, such as chemical energy or caloric energy, we can talk about different kinds of information, such as genetic information, molecular information, nervous information and quantum information. But these are in fact only different kinds of information transport, which can easily pass from one substrate to another. So, for example, genetic information can move from the DNA molecule to the protein molecule that will actually transport the genetic information throughout the body.

But because information is the most communicable part of reality, it will be able to pass at a certain point on the molecular substrate on the undulating substrate. And this transition represents the basic activity of the nervous system, starting from some nervous signals and from some chemical mediators, reaching our minds, our feelings and our consciousness, which have an undulating nature.

But usually the three aspects of reality are not distributed equally. Thus, for example, a stone predominates in a substantial way. Oil is predominant in energy. And in a book the informational aspect prevails. The higher the order and organization of the systems, the higher the amount of information they have. That is why biological systems, which have a very high degree of order and organization, contain much information.

But information is not just only the expression of order and organization, it is even generating order and organization. For example, recognizing the different amino acids, the RNA molecule will direct the synthesis of a particular protein to a particular structure within the many possible structures. In this way the genetic information received from our parents is passed from the filamentous DNA molecule to the three-dimensional

protein molecule. And so we will deal with two kinds of information, genetic information stored in the cell nucleus and molecular information represented by the spatial structure of proteins, as well as other molecules in the body, such as hormones. And they will be able to circulate freely, in the form of enzymes, of antibodies or hormone molecule, through the human body. But over molecular information, systems have at some point reached nervous information that makes it possible to process the information generated from the external environment. But over all these types of information, genetic, molecular and nervous information, there is quantum information, represented by a quantum field, determined by the photons emitted by the various molecules in the human body, but especially in our brains.

But in order to transmit all this information, up to the level of regulation mechanisms on which our health depends, the body had to become a very complicated communication system.

THE HUMAN BODY AS A COMMUNICATIONS SYSTEM

If information is indispensable for carrying out numerous regulatory processes, then it should be able to reach all the cells of the body where the processes are taking place. In this sense, the human body has become a very complicated communication system, involving all the cells and all the molecules. They participate either in building the system or in transmitting information through this system. For example, myelin participates in the structure of nerve fibers. And noradrenaline participates to the transmission of signals through these fibers. Even the glucose molecule carries some molecular information that can be recognized by glucosensible receptors in the pancreas.

Obviously, this communication system involving all the cells and molecules of the body is very complicated. But as complicated as it may be, it includes two main ways. That is, a longitudinal way, along which genetic information is transmitted and a transverse way, along which the information received from the internal environment and from the external environment is transmitted⁵.

The main and oldest way of transmission of molecular information through the human body is the circulatory system along which most of the molecular information is transmitted, such as hormones, enzymes, and antibodies. Something later came the nervous path that conveys the

information generated by the changes inside and outside the body.

But at the base of all these pathways there are some optical fibers and a quantum field through which the photons that are emitted by all the cells and molecules of the body can circulate. Some authors even talk about biological lasers used in biological processes.

Obviously, in order to reach that recipient, the information will have to pass from one signal to another. For example, optical information will have to pass to the retina from the light waves on the nerve signals that will be transmitted to the first neuronal synapse. Here information will be passed on to synaptic mediators. But information can also be transmitted through the photons emitted by the cells and molecules of the organism. And the acupuncture meridians are optical fibers through which the quantum signals from the acupuncture points to the organ are transmitted. In any case, in order to be transmitted over the communication system, the information will suffer a series of successive encodings and decodings processes. And when it comes to cellular receptors, the information will be passed on to cellular messengers until it reaches the cellular effectors that will make that decision.

SPECIALIZATION OF DIFFERENT ORGANS

Although all organs have to process both substances, energy and information, some organs have specialized in processing one of the three aspects of reality. Thus, for example, the digestive tract has specialized in the processing of ingested substances. The liver has specialized in the synthesis of the necessary sustenance for the body. The circulatory system has specialized in transporting the necessary substances up to the level of the cells. Muscle specializes in energy processing. The immune system has specialized in the recognition and processing of antigenic information. Sensory organs have specialized in receiving information generated by changes in the external environment. And the brain has specialized in the superior processing of information. Therefore, although the brain consumes a great deal of substance and energy, information is still the raw material of the brain³⁶.

All the information collected by the sense organs comes to the brain. At the receptor level all optical, acoustic, or molecular taste or smell signals are passed on to nerve signals. That is, at

the level of the internal and external receptors, all the signals generated by the internal and external environment are brought to a common denominator, represented by the nerve signals that can be transmitted along the extremely complicated pathways of the nervous system.

The vast majority of signals received by the brain are processed automatically and unconsciously. Only a small part of the information we receive, for which we do not have the necessary algorithms, will reach the level of consciousness. In this sense, it is estimated that of the approximately 1 million bits that the brain receives every second, only 7 bits, it will be able to reach our consciousness level. And at the level of consciousness will especially come the information that poses a particular problem for the existence of the organism²⁷.

It is known that in order to better process the information generated by the environment, the brain is made up of cells that specialize in superior processing of information. In this regard, the neurons have some extensions through which they can bind together to form a network of extraordinary complexity. We have shown that within this network a series of formations were developed capable of processing information in terms of utility value, hedonic value, pleasure, aesthetic value, ethical value, and deontological value, as would be the value of binding, forbidden and indifferent. And with the help of these formations, the brain manages to usually make the most appropriate decisions for the modifications that generated the information. Obviously, that this will depend on both the integrity of the respective formations and the information received²⁸.

THE ADVANTAGES AND DISADVANTAGES OF MOLECULAR INFORMATION

Molecular information plays a very important role in the functioning of the human body, because it is what transforms the genetic program into a concrete reality. That is, the molecular information that the enzymes, hormones and antibodies carry, will be the one that will actually carry out the genetic program.

That is why many authors show that molecular information was the one that made the chemistry step to biochemistry. As it is, with the molecular information they contain, the various molecules can be recognized among themselves. For example, with the help of molecular information an enzyme molecule will recognize the chemical

substance on which it must act. And in this way the various metabolic lines can be born. Then with the help of molecular information, cellular receptors will be able to recognize the different hormones that will interfere with the regulation of the cells.

The molecular information that a chemical substance can bring can be calculated using the formula of H.J. Morowitz. That is, $\log_2 N = M \log_2 M - n_i + n_i \log_2 B_i$. Where N represents the number of possible configurations, M represents the total number of atoms, n_i represents the number of atoms in the class i , and B_i the number of possible bonds between the atoms in the class i .

It has been found that in order to be able to recognize each other, these molecules will have to have a complementary spatial structure. This will enable contact on the surface to be large enough for very weak electrochemical forces, such as the van der Waals forces, which have a very short range of action. An evidence that molecular information plays the most important role is that molecules with a very different chemical structure can act on the same cellular receptors if they have spatially similar spatial structures. In this regard, it is known that many drugs act because they have a spatial structure partially similar to internal ligands, such as opioids or beta-blockers.

This means that almost all molecules of the human body are actually information-bearing signals. But in order to be able to fulfill their signal role, they will have to be able to reach the recipient. That is why the human body actually becomes a true communication system.

But although molecular information is a great asset in the functioning of our body, it still has some disadvantages. A fluid communication channel, like blood, is required to transmit it. That is why all living systems are in fact marine systems, carrying with them the liquid environment in which life unfolds. In any case, molecular information must be disseminated in this liquid system and will be much more difficult for the receiver. That is why biological systems have sought a much safer and faster way of transmitting information to the receiver. And this pathway is represented by the nervous system.

THE IMPORTANCE OF NERVOUS INFORMATION

As is well known, the signals received by the different sensory organs are taken up by some sensitive neurons. If these signals exceed a certain

threshold, they will cause electrical signals to be transmitted from almost near to the next neuron until the brain can recognize the state of the source that issued the signals. Note that the nervous system transforms all optical, acoustic, or olfactory signals into electrical signals, that can be transmitted and combined with each other much more easily than molecular signals. We have shown that the recognition of received signals is accomplished through a superization process, that is to pass the information received from lower signals onto a higher signal. So, for example, a neuron will convert the input signals received from two letters into a syllable. The next neuron will turn the respective syllables into a word. Other neurons will convert the signals received from some points into some lines that they send to neurons that will turn them into figures and so on. Thus, the brain can come from the processing of signals to the processing of information and then the meanings it has the signals received for the human body. And decisions can be sent more quickly and more directly to the most appropriate receiver, which may be a muscle or a gland²⁹.

But it should be noted that all this activity of the brain is accompanied by an important electrical activity, which gives birth to an electromagnetic field, which is the substrate of our thoughts, feelings and consciousness.²⁵ But to emphasize the complexity of phenomena that occur in the human body, it should be noted that although it is very important, the electromagnetic field of the brain is smaller than the electromagnetic field of the heart.

THE IMPORTANCE OF QUANTUM INFORMATION

But at the basis of genetic information, molecular information, and nervous information are actually a quantum information, which derives from the agitation of the elementary particles from which all the molecules and all the cells that make up our body. Quantum physics has shown that in this quantum agitation, the atomic particles, which we imagine as corpuscles, they can be transformed into electromagnetic waves, which can again become particles and so on. And once they become waves, the particles can be found anywhere in the quantum field. Then they can communicate no matter what distance they are. And this mysterious quantum reality, ultimately depends on our health.³⁰ Because it relies on all the cells and all the molecules from which we are constituted. That is

why, we believe that quantum reality and quantum information, in particular, is the ultimate frontier of contemporary medicine.

One of the first observations on the quantum aspect of biological phenomena was made in 1920, when Alexander Gurewitsch showed that our cells can emit some photons. In 1970, Fritz Albert Popp showed that all our cells and molecules emit very poor biophotons with wavelengths ranging from 200 to 800 nm³¹. In fact, since 1924, Nobel laureate of quantum physics, Luis de Broglie has shown that each particle has a pilot wave attached to it through the world.

In this way, besides chemical messengers and besides the nerve signals, there are some biophotons, through which the cells and molecules can communicate with each other. And for this, the body no longer needs preformed communication paths, as is the case with molecular information, because the photons emitted by some cells can move at the speed of light through the structures of the body and interact with other cells, producing a series of physiological effects. In fact, as physicists see, reality is ultimately only a lot of quantum fields interacting with each other.³²

That is, the development of quantum physics has radically changed our conception of world and life. But quantum physics started from the study of light. As shown in the Bible, after creating heaven and earth, God created light (Genesis 1,3). But the one who studied the first light from scientific point of view was Isack Newton, who in 1704 published an optical treaty in which he supported the corpuscular theory of light. But even in Newton's day, Cristian Hyugens supported the waving nature conception of light. In 1805, Thomas Young experimentally demonstrated that the light is of waving nature. But in 1905, studying the photoelectric effect, Albert Einstein showed that light is transmitted in the form of particles, which the American physicist Gilbert Lewis called photons.³³ In this very controversial situation, Niels Bohr elaborates the principle of complementarity, which states that light can be both wave and corpuscular.³⁴ By 1956, E. Schrodinger elaborated the equation describing the probability of a corpuscle collapsing, that is, transforming it from wave to corpuscular, depending on the square of the probability of the wave function¹².

But as if this strange waveform transformation in the corpuscle was not sufficiently mysterious, Werner Heisenberg, the Nobel prize winner for quantum physics, has shown that waveform transformation into the corpuscle only occurs when the photon or electron interacts with something³⁵.

As is the case with the photoelectric effect when the light touches a photosensitive substance. That is, the light beam carrying the photon will circulate through the universe until it hits something. And some say it will circulate until someone is notified.

Also, Paul Dirac, the Nobel prize winner for quantum physics, has shown that a quantum particle does not manifest its properties unless it is apprehended by something or by someone. (36) In any case, we can not know exactly what properties will be updated, because quantum phenomena are probable. In quantum physics there is no causality of phenomena, as is the case in classical physics. Hence, in order to explain the collapse of the wave function, H. Everett conceived, in 1950, the idea of multiple universes, according to which certain properties are updated in an universe.

But as this would not be enough, some physicists, like Eugen Wigner³⁷, awarded the Nobel Prize for Quantum Physics and the well-known mathematician John Neumann, who contributed to the development of the mathematical bases of quantum physics, showed that the photon does not collapse, that is, it does not turn from the wave into the corpuscle, unless it is observed by a conscious observer. In this way they introduced consciousness into science, contrary to Rene Descartes's advice, which said that soul and consciousness belong to philosophy and theology.

But in this situation, Albert Einstein, who believed in an objective reality, wondered if the moon is still there when no one looks at it. Or what noise produces a tree that falls into a forest in which there is no living being. But John Wheeler speaks of a participatory universe, in which we actually partake in the formation of reality.³⁸ Therefore, it is no wonder that in this participatory universe, our consciousness can cause some molecular changes. For example, it is known that psychological stress can stimulate the secretion of endothelial growth factor in ovarian cancer³⁹. And dopamine, which is thought to be a hormone of pleasure, can reduce ovarian cancer growth⁴⁰. And this is most likely to occur through quantum processes.

For a long time it has been thought that the principle of wave-corpuscular dualism applies only to subatomic bodies, that is below 10⁻¹³ cm, such as the photon, which is extremely small and does not have a resting mass. But then it was found that the principle of dualism also applies to larger bodies, such as the electron. And Anton Zeillinger has experimentally demonstrated that larger bodies, such as fluerena, which is made up of eight carbon

atoms and phthalocyanine, which has more than 100 atoms, can be in the superposition state, that is, both in the waveform and in the corpuscle state⁴¹.

But as if the principle of complementarity was not strangely enough, it was revealed that quantum elements are nonlocal. That is, after they have turned into waves, they diffuse into space and can be found all over the quantum field. That is wherever we are, the carrier wave, as Luis de Broglie tells her, can be found, or better, she finds us. What happens clearly when we have a mobile phone⁴².

But besides the principle of duality and non-localization, quantum physics also interferes with the principle of quantum entanglement, which states that two quantum particles can communicate with each other no matter what distance they are⁴³. That is, two molecules or two cells in our body can communicate, through the quantum fields, without the need for special communication channels. That is why our body is a hyperintegrated system in which all the organs are inextricably linked and the suffering of a cell can be communicated through photons to other cells that will resonate²⁵.

All this shows that, as E. Schrodinger said, our body is not only formed of a lot of molecules, but also from a packet of waves. And these waves may suffer the interference phenomenon, which can lead to the amplification of some waves, or to their cancellation, depending on the frequency and the phase of the waves being encountered. This may suggest how the quantum field of some cells can influence the activity of other cells. That is why it is probably not by chance that the Oriental conceptions described a lot of etheric and astral bodies, which play a very important role in the functioning of our organism.

As it is known, all cells and all organs have an electrical activity and so they emit same quantum fields. But we have shown that, unlike the quantum fields emitted by the internal organs, the quantum fields of the brain are much more coherent quantum fields. It is precisely through these very coherent quantum fields, that the brain manages to pass from the level of chemical messengers to the level of consciousness, which, as some authors point out, has a quantum nature⁴⁴.

We have shown that when they reach a critical mass, the nerve signals and chemicals in the brain, which determine an electromagnetic field, will emit a coherent set of biophotons that will determine a quantum field corresponding to the respective thoughts and emotions. It is known, for example, that in romantic love, as S. Ortigue, F. Bianchi-Demicheli and N. Patel⁴⁵ show, there

are many brain regions, such as the caudate nucleus, the thalamus, the hypothalamus, the island, the chorus, anterior cingulate cortex, hippocampus, angular gyrus, ventral tegmental area, frontal lobe and amygdala. Research has shown that some brain areas, such as the hypothalamus, hippocampus and ventral tegmental area, which is a dopaminergic area, involved in the sensation of pleasure, are activated. And others area, such as the amygdala and the frontal lobe, which are the most advanced part of the brain, in which our decisions are actually made, are inhibited.

Also A. Boer, E.M., Buel and G.J. Horst⁴⁶ showed that in love, which is a complex process, many chemical messengers, such as dopamine, oxytocine, vasopressin, serotonin, endogenous opioids, sex hormones and stress hormones, are involved. Research has shown that some hormones, such as dopamine, sex hormones and stress hormones, increase. And other hormones, such as serotonin, decrease. If love is prolonged, stress hormones, ie cortisone decreases, and serotonin, which is considered the hormone of happiness, increases.

But in 2012, I. Scheeinderman, O. Zagoory, and J. F. Lekman⁴⁷ showed that oxytocin grows in love and because oxytocin has been called the love hormone. But from this mixture of hormones, to the sentimental love is a very long way.

It is why we have shown that the transition from this mixture of molecules to the sentimental love is made through the quantum field produced by the photons that the respective molecules emit. Thus, for example, when this mixture of molecules reaches a critical mass, it will emit biophotons that will determine a coherent quantum field, which will represent the material substrate of love. Then this quantum field, which appears during love, will be able to influence the internal organs, which will determine the clinical picture to fall in love with, and so on. And this is also supported by the fact that, as S. Ortigue⁴⁵ shows, there is a very intense electrical communication between the brain areas involved in the sentimental love. And an electrical activity always determines, as Michael Farady pointed out, an electromagnetic field, which is actually a quantum field.

As is known, the ghrelin that is secreted by the stomach, leads to the appearance of hunger. And leptin secreted by adipose tissue leads to a feeling of satiety⁴⁸. But the feeling of hunger is a conscious sensation, perhaps even more conscious than love. And consciousness is, as we have seen,

quantum in nature. Which means that the ghrelin, or hypothalamus on which it acts, will have to emit biophotons, which will enter the quantum field of consciousness, which will influence human behavior. Because it will somehow show the quantum field of consciousness to a satiated man and otherwise to a hungry man. And our inner life, with its joys and sufferings, will ultimately be the expression of the interaction between the various quantum fields⁴⁹.

And all these quantum fields have a huge influence on our body. In this regard, research has found that men who feel the love of their wives do rarer pectoris angina, even if all the risk factors for angina pectoris are present. Psycho-neuroendrinology seeks to explain how the nervous system affects our internal organs through neurohormones that can act on receptors, such as serotonin and endorphin receptors, present in various somatic cells. But communication through quantum field, can be much faster, much farther and more nuanced, than communicating through chemical messengers.

Quantum information can better explain how the invisible phenomena of the human body are developing, such as thinking, feelings and consciousness, as well as remote communication between different organisms. Quantum information can better explain how psychic stress, through the quantum field it produces, can shorten the telomere on which the aging process depends⁵⁰. It can also explain how meditation and prayer, ie, thinking and consciousness, which have a quantum nature, can act on blood pressure⁵¹, diabetes⁵², cancer⁵³ and other diseases⁵⁴.

PARTICULARITIES OF QUANTUM INFORMATION

Whether it's genetic information, molecular information, or quantum information, the nature of the information is the same. Because information is always the expression of order and organization, or the novelty that a reorganization can bring, irrespective of the substrate which generates it and the signals carrying it⁹. In the case of genetic information, the phenomena that generate it are represented by the variability of the sequence of nucleotides in the filiform molecule of DNA. And the means of transmission is represented by messenger RNA molecules. Although it should be noted that the DNA molecule emits too many photons and that genetic processes have a quantum basis⁵⁵. In the case of nervous information, the phenomena that generate it are represented by the

physical and chemical variations of the internal and external environment. And transmission means are nervous signals and synaptic messengers. Although it is known that in any electrical phenomenon some electrons are emitted, which determine an electromagnetic field. And when electrons are excited, they can emit photons, as Niels Bohr pointed out³⁴. In the case of quantum information, the phenomena that generate it are represented by the extreme strange phenomena that occur in the atomic particles. And the means of transmission are represented by the photons and the electrons, which the respective structures emit⁵⁶. But in all cases, information is the measure of order and organization, or the novelty that a reorganization can bring. That is why the particularities of the quantum information are determined by the particularities, we would say about the strangeness of the subatomic particles, which ultimately reflect up to the macromolecular structures of which we are composed⁵⁷.

Due to the fact that a quantum particle can be both particle and waveform at the same time because the particle can be found anywhere in the quantum field as well as the fact that quantum particles can communicate with each other no matter what distance it is, the quantum level can emit a very large amount of information. We know that a molecule that can not be in two places at the same time can emit a bit of molecular information. But a quantum particle can be anywhere in the quantum field. That is why she will issue a very large amount of information. Due to this quantum information is measured in qubits, the quantum is equal to the probability that the quantum particle is in a certain place⁵⁸.

Quantum information, on the other hand, can be transmitted instantly at great distances without the need for a particular communication system, as required for the transmission of molecular information. The difference between quantum information and molecular information would be similar to a mobile phone and a postman. And the difference between quantum information and nervous information would be similar to a cell phone and a wired telephone. For the wired phone, a very complicated installation is required. But no special installation is required for the mobile phone and we can receive the information wherever we are.

INFORMATIONAL METABOLISM

Although there is talk about a carbohydrate metabolism, a protein metabolism and a lipid metabolism, in reality the three metabolites are

inextricably linked to each other. But if the carbohydrates, lipids and proteins involved in these metabolisms are the carriers of molecular information, it means that some information metabolism will be behind them. As we have seen, genetic information can go from the DNA molecule to protein molecules, which can be some enzymes. They will be able to act on chemicals that generate new molecular information. Then through the emission of bio-photons, molecular information can be transformed into quantum information. And quantum information will also be able to act on molecular information, as is the case with oxidative stress and the inflammatory process, that interferes with many chronic diseases⁵⁹. Or in the case of psychic depression, which has a quantum basis and can also influence the immune system, as claimed by psycho-neuroimmunology research⁶⁰.

THE MECHANISMS OF INFORMATION PROTECTION

Due to the fact that the organisms need some information and that information can sometimes be a pathogenic factor, the human organ has a number of mechanisms for selection and information protection. At the level of genetic information, our body has some mechanisms for repairing the errors suffered by AND⁶¹. At the molecular level, the body has an immune system that eliminates foreign molecular information⁶². And at the level of nerve information, the brain has a number of mechanisms of filtering, inhibition, and attention. Through attention, the brain selects from the multitude of information that the external environment can provide, just the information it needs³. In this way, our body is able to defend itself from unnecessary and harmful information and maintain a certain informational homestay⁶³.

We have shown that through our attention, our body is evolving to update quantum reality, which according to quantum physics is a quantum field, as a kind of fog. If Niels Bohr said that reality is not where you do not look, it means that reality is where you look. That is why we have shown that through the attention, the brain will receive some coherent quantum information that will create or activate some internal models of the surrounding world.

INFORMATIONAL SUBSTRATUM OF HUMAN PATHOLOGY

Given the unequal distribution of the three aspects of reality, some diseases may have a

substantial predominant basis, as may be the case for some food shortages. Others will have a predominantly energetic basis, as is the case with some trauma. But if our whole story began with a great deal of genetic information, and if behind a lot of chemical changes it's hiding, in fact, molecular information, it means that all human pathology can have an informational substrate⁶. And this substrate will be able to interest both the structure of the communications system and the information that is transmitted through this system. Not to mention the disturbance of the information received from outside that can influence our health.

In this sense, we may have some diseases caused by the communication system disorder, such as diseases that affect nerve pathways, or diseases affecting cellular receptors⁶⁴, which will no longer be able to recognize the chemical messengers needed to regulate cell processes. As it happens in insulin receptor alterations. Then we can have illnesses that troubles the signals that circulate through the communication system, such as the growth or decrease of some hormones, antibodies, or enzymes. Then we may have some illnesses caused by the informational input disorder, as it would be lacking, or diminutive information overload, as happens in informational stress, and so forth⁶⁵.

GENETIC HARDWARE DISEASES

As we have already shown, our cells are actually Turing informational machines, in which the genome is the hardware in which genetic information is stored. And the epigenome is the software that regulates genome activity. That is why there will be some diseases, in which genes are affected, as is the case in monogenic diseases, but also software diseases in which gene regulation is affected, as happens in chronic diseases that affect more than half of mankind²².

For example, in 1975 it was discovered that at the base of the falciform anemia there is a genetic mutation, which determines the synthesis of a modified globine, which is the molecular base of the falciform anemia. But after the discovery of the genetic substrate of the falciform anemia, several thousand genetic mutations have been identified that produce a lot of moneogenic diseases such as mucoviscidosis, Huntington's disease, Marfan syndrome, Gaucher disease, drepanocytosis, pigmentary retinopathy, hemophilia, galacozemia, homocysteinuria, and many other monogenic diseases that, although very rare, affect several tens of millions of people around the world.

DISEASES OF EPIGENETIC SOFTWARE

But looking for genes that cause chronic diseases, ie high blood pressure, diabetes, Alzheimer's disease and cancer, which affects more than half of mankind, there have been many suspected genes and many risk factors, which sometimes produce and sometimes do not produce the disease. Thus, for example, while some authors have shown that the polymorphism of the AGT gene encoding angiotensinogen may interfere with the occurrence of essential hypertension, other authors have shown that polymorphism of the AGT gene does not interfere with the onset and evolution of essential hypertension. The same has happened in the case of the ACE gene, which encodes the angiotensin converting enzyme, of the gene coding for angiotensin receptors. That is, in the case of essential hypertension, many suspicious genes have been discovered that sometimes produce and sometimes do not cause disease²².

All this suggests that in the pathogenesis of essential hypertension, besides genetic changes, that is to say, of the hardware, very numerous and very variable, there are also some epigenetic changes, ie the epigenetic software that regulates the activity of the genes⁶⁶. And the most important involvement of epigenetic mechanisms in essential arterial hypertension is the existence of a general hypo-methylation of the genome, that makes it possible to activate many genes that should normally be blocked. And genome hypo-methylation occurs in many very serious diseases, such as cancer, schizophrenia and autism⁶⁷.

Obviously, in addition to general hypo-methylation, chronic local illnesses and demethylations are also occurring, as is the case in cancer, in which not only are oncogenic genes activated but suppressor genes are blocked that can prevent cancer⁶⁸. That's why some authors rightly claim that all chronic diseases have, in fact, an epigenetic etiopathogenicity, in which, we say it, the processes of regulating genetic information are disturbed²².

DISEASES CAUSED BY DISORDER OF INFORMATIONAL INPUT

Although information is absolutely necessary to carry out the regulatory processes on which the preserving of the body's health, it can be in certain circumstances a pathogen factor, both of its quantity and quality⁶⁹. In this regard, it has been found that decreasing information input can cause a number of disorders, such as anxiety, body

disorders and hallucinations. But the information overload is not too well borne by the human body, which has a limited capacity to information processing. For example, we have shown that information overload can lead to information stress, manifested by fatigue, irritability, anxiety, insomnia, headaches, palpitations, abdominal pain, dizziness, sweating, and others⁶⁵. On the other hand, all psychological traumas are of informational nature. This is why, besides diseases caused by genetic disorder or epigenetic software, there are many mental and psychosomatic illnesses caused by outside information. And these diseases are of great importance in the information society characterized by the vertiginous growth of information production and mass media⁷⁰. It would be sufficient to point out that contemporary man gives over 9 hours a day television, mobile phone, computer and internet, which have a great influence on his health.⁷¹ In this regard, it is important to note that the information demand determines the increase of the synthesis of endorphins, which leads to the occurrence of an addiction of television, internet and mobile phone. And deprivation of them leads to a true abstinence syndrome⁷².

But not only optical, acoustic or molecular information, but also quantum information, often invisible, can cause certain diseases. In this sense, it is known that X-rays, mobile phone radiation, but also solar radiation, can cause certain diseases, such as cancer⁷³. Which means that the genetic changes that underlie cancer can be quantum in nature⁷⁴.

CONCLUSIONS

Although the information is not visible and cannot be isolated in the test tube, as we isolate the other pathologic factors, it is still a hidden parameter of human pathology². This is why we can speak of a true pathological information³, in which both the genetic hardware and the epigenetic software of the Turing informational machine, that manages genetic information²⁰, can be affected. At the same time, we can talk about an impairment of the communication system of the human body and of the information circulating through this system, as well as the input of information that the body receives from outside⁶⁹.

But although all these have a very important role in maintaining the health of our body, we still do not know very well how these phenomena unfold. Thus, for example, although we know the genetic code, we still do not know the epigenetic

code, in which the working program of the epigenetic mechanisms, which regulates the functioning of the genes, is written²². Until recently it was believed that the genes we inherited depend on our pathological destiny. That's why Richard Dawkins said that the body dances as its genes sing¹⁹. Later it was found that our destiny also depends on the epigenetic mechanisms that regulate the functioning of the genes. That is, the genes propose, and the epigenome decides⁷⁵.

That is why we compared our genome with a piano consisting of 20 thousand keys, represented by our 20 thousand genes. And the epigenome with a piano player, which plays to the 20 thousand genes. We know that the genetic information, contained in the 20 thousand genes, we received from our parents, who also received it from their parents. But where the epigenetic information comes from, after which the epigenetic piano player sings, is very difficult to establish⁷⁶.

Obviously, as Kurt Godel and Werner Heisenberg show, talking about the limits of knowledge, there will always be something that will not be demonstrated. But there is still a long way to go. That is why we will need to know better how carcinogens produce quantum DNA changes. The way in which psychic stress, ie information, influences the regulation mechanisms of blood pressure. How risk factors influence insulin receptors, leading to insulin resistance, which is the basis of many chronic diseases. The way in which prayer manages to increase the telomerase upon which our youth depends. Will we have to determine when neurons start to think? When oxytocin starts to love. When does serotonin start to make us happy? Or how does the love of the wife influence our health?

For now, we know that both neurons and dopamine, oxytocin, serotonin, as well as all other molecules in our body, emit biophotons. And when serotonin, for example, will make a more coherent quantum field, we will be happier. And if serotonin drops, we be sadder. In this case we administer antidepressant substances, which inhibit serotonin reabsorption, to maintain our mental state within normal limits. But it has been found that psychotherapy can produce the same effects on brain structure as antidepressant substances. That is, information can have the same effects as the molecules, we are obsessed with⁷⁷. But in this way we come from the struggle with the molecules, to the fight with the waves, on which depend not only our thoughts, feelings and consciousness, but also the activity of the internal organs²⁵.

But since happiness is very difficult to achieve and love is very capricious, we will have to look further into the particularities of quantum information, which is the basis of human pathology. We will have to discover the secrets of the invisible phenomena that lie behind human pathology. That is why quantum information is, in our opinion, the last frontier that contemporary medicine should overcome in order to be able to solve the extremely complicated and subtle, problems it faces. Because beyond quantum information there is only the soul that God has given us.

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