

Radiation and the electromagnetic regulation level of the human body

By N. Westerman

Resume

Research into the risks of radiation has thus far been limited to its thermal and ionizing effects. Radiation used by telecommunication has no ionizing effects. Its thermal effects are small, so small they can hardly explain the worldwide deluge of claims that such radiation does bring health risks and complaints. However, if one assumes that biological systems have access to an electromagnetic regulation level, it becomes easy to explain that even weak radiation can have negative biological effects. Shielding off from radiation appears to be hardly effective. An interesting development is a technology by which radiation is transformed into an electromagnetic field which affects biological systems positively and enhances their ability to deal with external radiation.

Protection from radiation

Since the beginning of time, long before physics discovered the existence of electromagnetism and other forms of radiation, there has been an awareness that certain rays exist in nature and that these rays can affect us, both negatively and positively. For a detailed overview of this, reference can be made to the Dutch geologist and parapsychologist Erik Kasteleyn.¹⁾ Until the last century this awareness mainly concerned 'earth rays', in fact nothing more than the naturally existing electromagnetic fields coming from the earth and the cosmos. In the 20th century, mankind itself has become a major producer of environmental electromagnetism. Nuclear catastrophes aside, the radiation level we are currently exposed to is higher than it has ever been in the history of mankind: GSM (Groupe Spécial Mobile, the global standard for mobile telephone communications), UMTS (Universal Mobile Telecommunications System, the third standard for mobile telephone communications) and soon their much more powerful and faster successors, LTE (Long Term Evolution) 3.9G and 4G, DECT-phones (wireless home telephones), Wi-Fi (wireless networks), microwaves, C2000 (the communication network for emergency services), and so on.

To our knowledge, the first scientist to conduct systematic epidemiological research into the harmful effects of radiation on health, was the German scientist Gustav Freiherr von Pohl (1873-1937). This was at the end of the nineteen twenties in the German town of Vilsbiburg.²⁾ Von Pohl found clear relationships between the radiation level and the incidence of cancer. In the Netherlands too, this led to an extensive boom in press coverage of ambient radiation and even caused some panic among the general public.³⁾ Although the shielding off of radiation has probably been an issue of all times, (amongst others the advice to move the bed) the supply of protective materials has never been as great as in those days. These varied from all sorts of boxes, often with totally unclear operating principles, to claims that certain materials were able to deflect or deter radiation (such as madder, tea lead – the thin lead plates with which tea chests were covered - and plywood). This tradition (together with the essential 'folkloristic' elements) has continued into the present time. Nowadays there is still a wide choice of indistinct shielding devices available to the public, as well as more rationally founded aids with which a Faraday cage can be formed. For example, foil shield that can be

attached to windows, wall paint containing lead and mosquito nets with metal woven into them, which can be hung around the bed.

Interaction instead of unilateral negative influence

The major drawback of such shielding methods is that positive radiation is also blocked, including radiation that can be considered essential to our health. There are strong indications that, for example, Schumann waves (which arise in the ionosphere) and the geomagnetic field have very beneficial effects on biological systems. One could almost regard them as a condition for life. In this respect consider the publications of Bosman e.g.^{4, 5)}

Furthermore, it has become clear that by the indiscriminate shielding off of electromagnetism, various essential aspects of environmental electromagnetism are being ignored. Thus, in recent years there have been several new approaches that consider environmental radiation as 'living energy'. The Austrian researcher Purner⁶⁾ and the American naturopathic Linn⁷⁾ have, amongst others, played a major role in this. In the Netherlands, Kasteleyn¹⁾ especially made a strong case for this new approach.

The first development was that people are no longer seen as unresisting victims of external radiation, but are now assumed to, partly, determine to what extent natural radiation and technical environment radiation affect their health negatively. It has long been known that not everyone who is exposed to radiation reacts in the same way. For instance, it can happen that of a couple who sleeps in the same bed, only one has serious health problems related to radiation exposure, while the other has no problems at all. It is fascinating that from the practice of the 'environmental biologists' many indications emerge that not only the physical state, but also the psychological and even the spiritual condition of a person is decisive to the effect that radiation can have. A negative mental attitude could make the effects of radiation on the living and working environment much more damaging.

The second development is closely linked to the renewed attention that the Chinese philosophy of Feng Shui has received in the Western world. Its central vision is not only that the surrounding space influences a human being in all its aspects, but also that there is an energetic-informational interaction between man and environment. One that is, quite unlike the previous approaches, not only negative, but positive too. In this approach, the shielding off of radiation receives much less attention. The emphasis is rather on making changes in the home and office which influence the energy of the living and working environment in such a positive way that radiation is stripped of its negative effects. Incidentally, this is an approach that, even at this time, is still prevalent in Chinese culture and which has also had plenty of following in the Netherlands. The intriguing thing about this approach is that it assumes an actual interaction between man and his environment. So not only: the more positive the environment is, the healthier the people. But also: the more positive a person is, the healthier his environment becomes.

Floww products

Parallel to this new perspective on the phenomenon of radiation, an almost revolutionary new approach has in recent years been developed by the Dutchman Jim Wagenaar. It concerns the so-called Floww products, a series of devices and appliances which are worn on the body or placed in homes and offices. The principle of these products - and this is what makes them revolutionary - is that, influenced by the radiation present in the living and working environment, they generate an electromagnetic field that counteracts the negative effects of radiation on biological systems.

The devices comprise an electronic circuit of which the core consists of an induction coil and a capacitor.



Figure 1. *The electronic circuit of Floww products*

In electronics such a circuit is referred to as a *resonant circuit*, because it can be used to generate an electromagnetic field. The metal casing of the Floww products acts as an antenna and is connected to the resonant circuit. This antenna is sensitive to a broad spectrum of frequencies. Radiation from the environment in this frequency range is collected and, as a reception antenna does, transformed into an alternating electric current. This current activates the circuit in which the inductor and capacitor are included. As a result, an electromagnetic field is generated which is emitted by the antenna. The frequency of the emitted electromagnetic field is determined by the properties of the coil and the capacitor, not by the frequency of the electromagnetic signals picked up.

Floww products generate a very low frequency electromagnetic field, called the Floww field by the manufacturer.

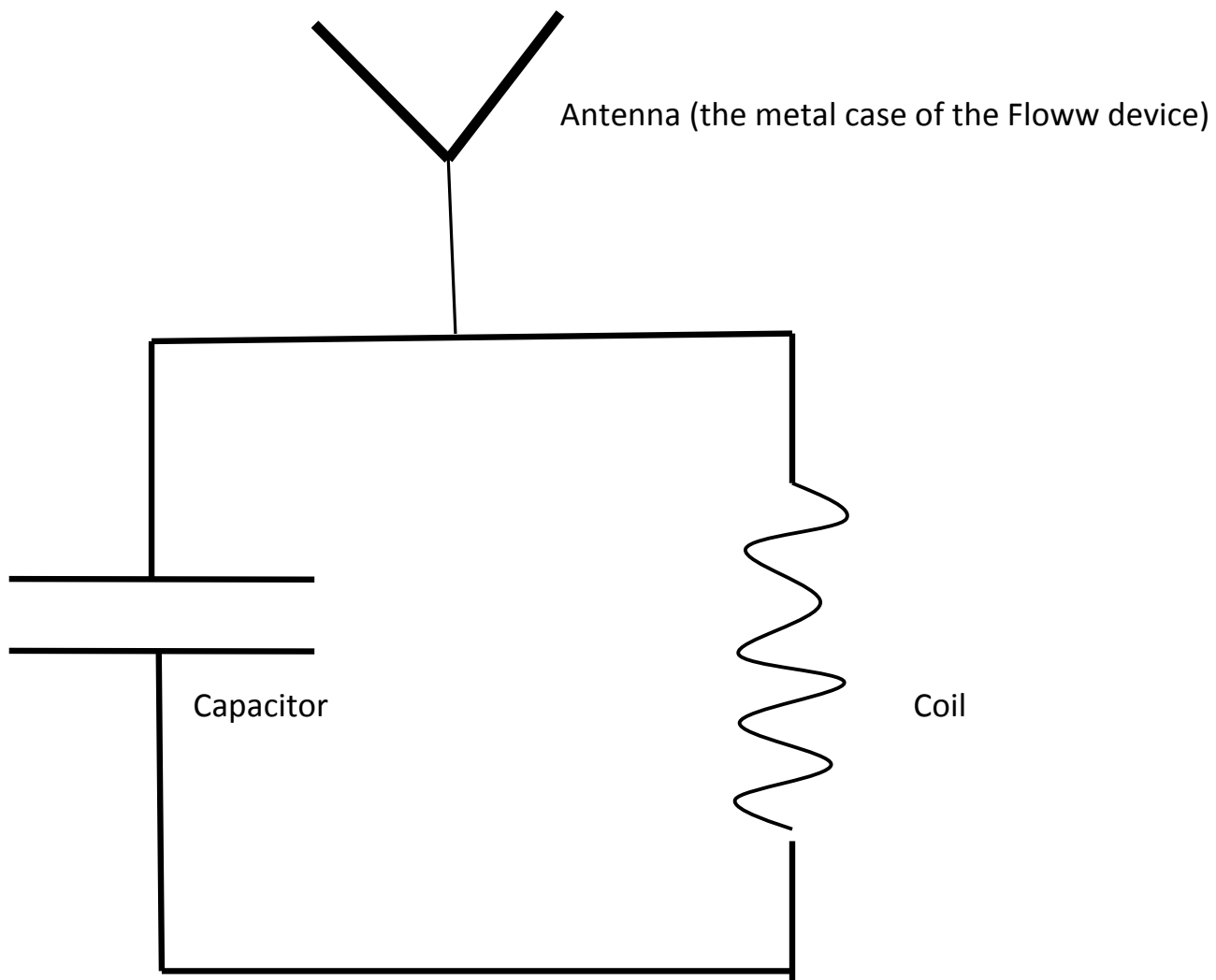


Figure 2. A schematic representation of the core of the electronic circuit in Floww products.

To summarize, the working of Floww can most easily be understood as that of an electronic transformer. External radiation in a wide wavelength range is transformed by the circuit into a specific and consistent electromagnetic field. The energy required for the generation of this field is completely supplied by the radiation present in the environment. There is a dose-response relationship between the intensity of the environmental radiation and the strength of the Floww field. Thus, the stronger the radiation, the higher the intensity of the field produced by the Floww equipment. An approach similar to that used by judo and other Asian sports: the strength of the opponent is used to make him harmless.

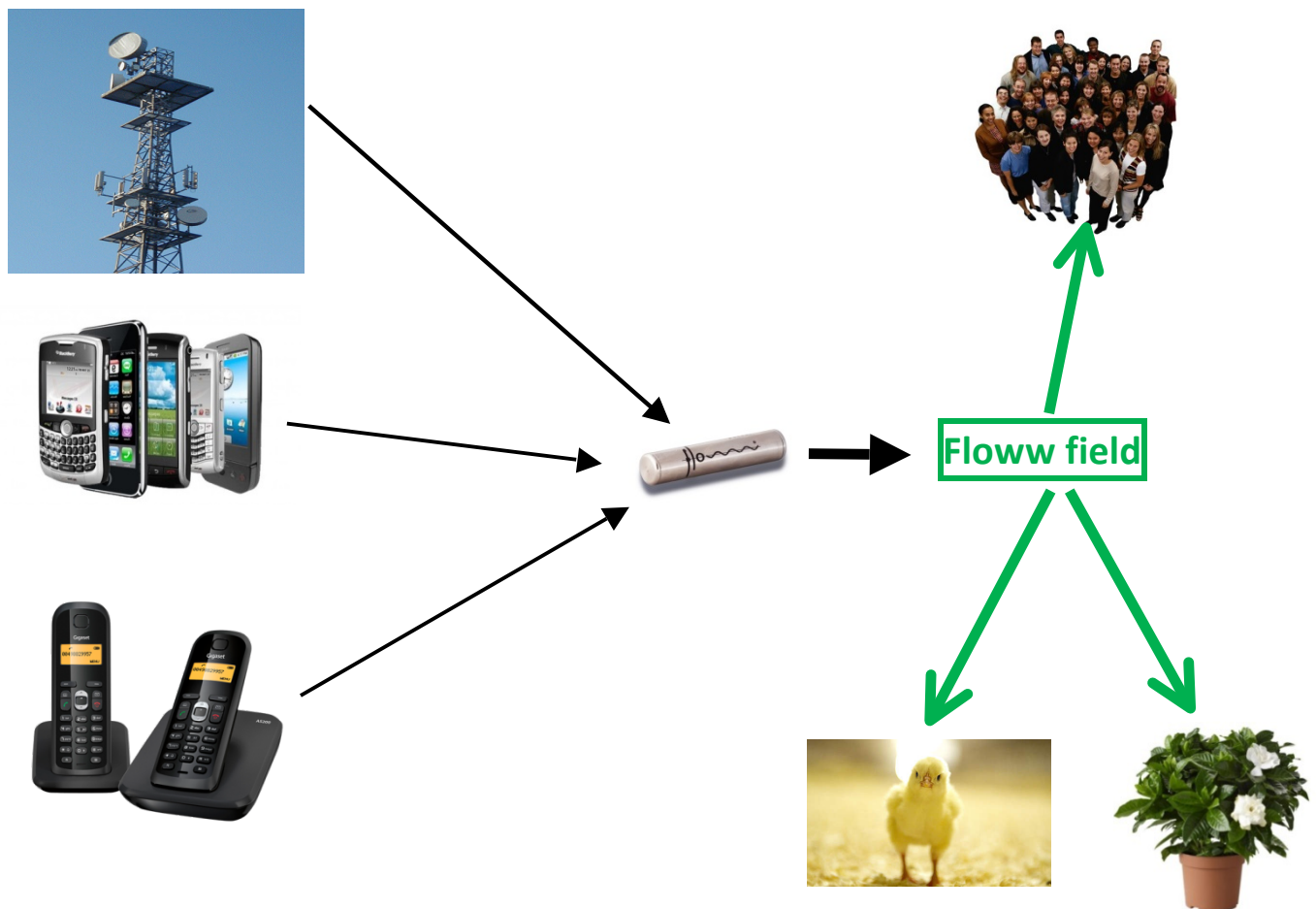


Figure 3.

Radiation from different sources and with different wavelengths is transformed into a consistent field with one specific frequency (the Floww field). The premise is that this field has a positive effect on biological systems.

The characteristics of the electronic circuit used in the Floww devices have been achieved experimentally. After it was proved possible to manufacture circuits that generate a consistent field under a variety of external radiation conditions, Wagenaar experimented for many years to determine the effect of the radiation of different circuits on plants and animals and, later, on humans. During this evaluation, test methods of complementary medicine were used too. In the following there will be further reference to this. The circuit that Floww products now use, is the one that, in practice, has been proved to have the most optimal effects.

There have been numerous case reports of the beneficial effects of the application of Floww products. Retrospective research into the effectiveness of Floww products has been done in The Netherlands, and at this moment a prospective study is being conducted globally (Soffos). Both show remarkably positive results.⁸⁾

Questions about the working of Floww technology

Floww devices produce an electromagnetic field that is found to provide protection against external radiation. The explanation of this, however, raises several dilemmas. After all, how are we to conceive the assertion that the negative effects of radiation exposure are offset by the Floww field? Floww equipment does not shield off from harmful radiation and does not eliminate radiation at all. For the production of the electromagnetic field generated by the

devices, environmental radiation is transformed. But this is only a tiny part of the total radiation present. For example, if a powerful UMTS transmitter is erected somewhere, the field that the Floww products generate will increase in intensity. However, the overall intensity of the UMTS radiation will not decrease measurably. So how can a Floww field ensure that biological systems incur less damage from negative effects of environmental radiation, when it leaves the radiation itself virtually untouched?

The explanation given by Wagenaar, is that the Floww field has a positive effect on biological systems. In such a way, that the negative effects of natural and technical radiation can be ruled out, or can be greatly reduced. Even when the amount of radiation to which someone is exposed is not changed by Floww products, the working hypothesis is that the integrity of the biological system will increase in such a way that radiation cannot cause any damage.

This of course immediately raises questions. The first is: How can a weak electromagnetic signal, such as these devices generate, a priori have any effect on biological systems at all? In mainstream medical and biological thinking it is assumed that weak radiation has no effect on humans, animals and plants whatsoever. And if an adequate model can be provided to explain how the human body is able to interact with the Floww field, then the second very relevant question is: In what way does the electromagnetic field that Floww devices produce, increase the resistance of the body against radiation?

To answer these questions, we need to involve a mechanism by which radiation exerts influence on biological systems. A mechanism to which so far, in the research undertaken into the harmful effects of radiation, virtually no attention has been paid.

A completely different mechanism by which radiation affects biological systems

The well-known and extensively studied mechanism by which electromagnetic radiation affects biological systems, is that of the direct effect on tissue. On the one hand, this concerns thermal effects, the heating and possible destruction of tissue by the supplied energy, when heated. Thermal influences occur in every electromagnetic frequency to which the body is exposed. The effect depends on the intensity and the wavelength of the radiation. On the other hand, it concerns the ionizing effect that high frequency electromagnetic radiation has. This is popularly called 'radioactive' radiation. Only this term does not cover the load, because 'radioactive' only says that 'radiation has been emitted actively'. The correct term is 'ionizing' radiation. This is electromagnetic radiation with enough energy to drive an electron in the outer shell of an atom from its orbit. By this, the atom becomes positively charged, instead of neutrally, as it is normal. A charged atom is referred to as *an ion*. This ionization of tissue is responsible for the negative effects (including cancer) of high frequency radiation on living creatures. The energy required to ionize an atom is different for each type of atom. Hydrogen, for example, can already be ionized by the energy of ultraviolet light, and is thus responsible for the negative effects of excessive exposure of the skin to sunlight.

But there is also another, very different mechanism by which radiation affects biological systems. This is the intervention of radiation *within the body's own electromagnetism*. Mainstream biology and medicine hardly pay any attention to this. Nor is it taken into account in the usual research into the biological effects and risks of exposure to electromagnetic radiation. The reason for this is that biological electromagnetism, despite its indisputable existence, and the more than 50 years of extensive scientific research that has been done, has still barely penetrated the field of biology and medicine. The notion that the body has its own physiological electromagnetic regulation level, is still kept outside the current scientific paradigm. But because of its unique properties, this regulation level forms an extensive matrix for interaction with external electromagnetism, and is therefore of vital importance for the understanding of the effect of environmental radiation on the human body.

To gain insight into this mechanism of the effects of radiation on living organisms, a brief overview of the physiology and pathophysiology of biologic electromagnetism is indispensable.

Organic electromagnetism and its material basis

In the mid-sixties of the last century Russian researchers were the first to prove that cells emit light. After 1975, research into this matter commenced in the West. In first instance the German physicist Popp played a central role in this. The name *bio photons* came from him.⁹
¹⁰⁾ By now, tens of thousands of scientific publications have appeared about this organic light. It turns out that all types of cells emit light and that all light frequencies are present. The intensity of cellular light is extremely small - a factor of 10^{16} less than daylight. It is noteworthy that this light shows a high degree of coherence, thus having laser features. Besides, it is emitted in pulses, flashes as it were. The most powerful light source is probably the DNA. In addition, the mitochondria – where the production of energy takes place – also emit light, as well as a number of other cell organelles. Whenever the cell's metabolism becomes more active, and there is more cell growth, the intensity of the emission of the bio photons increases. Apart from these organic light frequencies, it has been discovered that natural electromagnetic signals in the lower frequency range also play a physiological role within the body. Under the skin, but presumably also at the organ level, an intensive transmission of electromagnetic signals with extremely low intensity takes place, with frequencies of less than 1 Hz unto the infrared light range ($3 \cdot 10^{13}$ Hz).¹¹⁾

Although electromagnetic signals themselves are, of course, immaterial, a material basis is required to generate them and to enable them to affect the body. This basis is made up of vibratory systems, called *resonance systems* or *resonators*. These function not unlike the transmission of radio and television broadcasts. The transmitter generates a signal, and the receiver is brought into vibration by this signal. Resonance systems are mechanical vibration systems with their own frequency. This means that a vibration system can only be started by vibrations with specific vibration frequencies. Other frequencies have no effect. Well-known examples from everyday life are a wine glass, a violin string and a loudspeaker. For example, only when a singer hits the exact right tone the glass will vibrate.

The literal meaning of resonance is: to set into vibration, to resound. The term is used to indicate that a resonance system is vibrated by an external source. Resonance is based on corresponding frequencies. The interaction between matter and electromagnetic signals is based entirely on vibration systems and the phenomenon of resonance. When a vibration system is vibrating, it transmits the vibration too. In the case of electromagnetic vibration systems this is, of course, an electromagnetic frequency. This allows other vibration systems with the same natural frequency, which are at a smaller or larger distance, to be vibrated too. When a vibration system is vibrating and then also receives vibrations of the same frequency from another source, the intensity (amplitude) of vibration increases. The resonance becomes more powerful.

Much research has been done into biological resonance systems. This has partly focused on molecular and subatomic vibration systems, and partly on larger composite structures that have the capacity to vibrate. Structures mainly function as vibration systems when they are polar, that is when they contain different charges. Physically speaking, these vibrations are plasma oscillations. Plasma, used in a physical sense, is a charged medium. Considering the basic vibration systems, the atomic vibrations are situated in the infrared range. This also applies to the rotational vibrations that are made by molecules. The vibrations of atomic nuclei are situated in the microwave range. The vibrations of electron shells and those of ions have a very low frequency, up to less than 1 Hz.^{12, 13, 14)}

Biological systems are distinguished from inorganic matter by their much larger, complex vibration systems. These range from fast vibrating composite organic molecule complexes, vibrating subcellular structures and vibrating organized giant molecules, such as DNA, to large multicellular complexes whose cells are in joint vibration.^{13, 15)} Through their vibrations molecules generate an electromagnetic field around themselves. This field expands from the centre at the speed of light (which after all applies to all frequencies of electromagnetism). And wherever it penetrates, other vibration systems with a corresponding frequency are vibrated by it. Basically, this organizing principle comes down to an energy exchange between a central vibrating structure and elements in its electromagnetic field that vibrate along with it.

Biophysical regulation, biophysical pathophysiology and biophysical medicine

Research into biological electromagnetism has produced strong evidence that both organic light, as well as the lower frequency biological spectrum, play a crucial physiological role in the organism. This involves the exchange of information, communication and control. Laser light means maximum effectiveness with optimum efficiency. The most efficient form of information transmission. Laser pulses are the ultimate in effectiveness. Although final evidence is still lacking, it is likely that cellular light is involved in the regulation of the metabolism and in the management of the functional and structural processes of the body. And it is also likely that the lower frequency electromagnetic signals form a communication system within the body.¹⁶⁻¹⁹⁾

Nagl and Popp have developed a communication model for electromagnetic signals within biological systems in which intra- and extra-cellular communication is established by means of generating and absorbing electromagnetic vibrations. This model is based on a correspondence between wavelength and operating range. A principle which is also fully applied in technology. The vibrations with a long wavelength, which are found on the body surface, are related to the long-distance communication within the organism. The signals with shorter wavelengths are related to the regulation and communication at the organ level. And the bio photons, finally, are related to the regulation and communication between the cells and within the cell. The model includes, amongst others, the concept that enzyme reactions, the backbone of our metabolism, are controlled by bio photons.^{18, 19)}

Already in the early phase of research into biological electromagnetism, in the early nineteen eighties, it was established that the coherence of cellular light diminishes with illness. The light then loses its laser properties and becomes chaotic. It starts behaving more and more like incoherent lamplight. This means that the mutual synchronization between photons with corresponding wavelengths is lost. This makes it likely that the coherence of bio photons is a result of active regulation, and that the integrity thereof decreases with illness.

The German physicist Ludwig has conducted research showing that the body's own vibrations, under physiological conditions, permanently experience extremely short-lived fluctuations in intensity and frequency.²⁰⁾ This can be regarded as a continuous physiological adaptation to changing circumstances, but also as a form of protection against electromagnetic influences from outside. These rapid fluctuations of the body's vibrations, make it much harder for external vibrations (which life on earth has always had plenty to do with) to get a grip on the system. A principle similar to the continually changing communication codes in wartime. Ludwig assumes that this too can only be understood as an active process.

In the case of illness these physiological fluctuations appear to decrease. The records then show rigid patterns. Ludwig sees this as a failure of active regulation as a result of the illness. Thus, there is a definable electromagnetic pathophysiology connected with illness, consisting

of loss of coherence and fluctuation of vibrations. In both cases, it is assumed that this is the result of a breakdown of the electromagnetic auto-regulation.

Since the mid seventies, a completely new movement has developed within medicine, based on these discoveries: *biophysical medicine*. In this case *biophysical* stands for biological electromagnetism, and the well-known concept '*bio-energy*' is considered a synonym. Biophysical medicine is completely focused on organic electromagnetism. It regards health as equivalent to effective biophysical regulation and disease is fundamentally seen as a bio-energetic disturbance. Within biophysical medicine the starting point of a therapy is the restoration of the electromagnetic (biophysical) system integrity of the organism.

The intensity of biological electromagnetism

That the human body has its own electromagnetic regulation system, and that it features such a scope, is a startling physiological and medical novelty. It could therefore be expected that further research into this system would immediately have found a central place within medical scientific research. This has however not been the case. Research in this area still finds itself in the peripheral areas of science.

There are several reasons for this. The first is that within the current medical paradigm the molecular level is seen as the deepest regulation level within the body. Illness is fundamentally considered a deregulation of molecular processes and (pharmacological) therapy consists of molecular intervention. Within the prevailing paradigm there is 'nothing under the molecule'. The existing bio-medical paradigm is strictly material in nature. Simply no place is awarded to endogenous electromagnetism.

The second reason why this phenomenon is still in the periphery of medical-biological research, is that the intensity of biological electromagnetism is such a low one. In the lower frequency region, the intensity is actually so minimal that it falls below the physical noise boundary. The noise limit is the background level of the electromagnetic vibrations from natural and technical resources. The thermal vibrations which cause the phenomenon of temperature (infrared), have the main share in this. The sensitivity of most technical detection devices only just reaches the physical noise limit. This means they can only detect vibrations of greater intensity than that of the electromagnetic background noise. Bio-energy thus has an intensity too low to be able to be demonstrated by such measuring devices. Only with advanced equipment such as soliton spectrometry and with specific half conductivity detector technology, it can be measured, but when it is not specifically searched after, bio-energy is not perceptible and will be absorbed, so to speak, into the electromagnetic background noise. In the past this has often led to the conclusion that something with such a low intensity, must therefore also be of little relevance.

The Q-factor

Such an extremely low signal intensity, unable to activate conventional devices, raises the very fair question, of how biological electromagnetism possibly can have any effect at all within the body. The answer to this is that biological systems seem to be able to detect vibrations specifically, until well below the noise limit. Unlike technical systems, the noise limit does not count as an extreme limit of effectiveness.

What determines the sensitivity of vibration systems? The physical measure of this is the so-called quality factor, also called the *Q-factor*. This factor is based on the ability of a resonator to hold on to a vibration. In the physical formula of the *Q-factor* the numerator ('above the line') is the duration of the wave in the resonator. The denominator ('below the line') is the time the wave needs to go back and forth once in the resonator. Because time is used in both

the numerator and the denominator, the quality factor has no physical unit, so nothing like a meter or Hz, but: 10^2 or 10^4 .

There is a proportional relationship between the quality factor and the conductivity of a resonator. The better the conductivity, the less energy a vibration loses. Also, the better the conductivity, the longer the time that the resonator can hold on to a vibration. The quality factor is inversely proportional to the amount of energy required to bring the resonance system into vibration. So the higher the quality factor, the more sensitive the resonator. Furthermore, the specificity, being the extent to which a vibration has to correspond with the natural frequency of the resonator in order to make it vibrate, is directly linked to the Q-factor. A resonance system with a high specificity that has an own frequency of 10,000 Hz, can for example only be vibrated by vibrations from 9999 Hz until 10,001 Hz. While a resonance system with the same natural frequency that is not specific, still resonates with vibrations of e.g. 8000 Hz or 12,000 Hz.

So, the higher the quality factor, the more sensitive, but also the more specific, the resonator. On the one hand, a vibration with a low intensity can make a resonator vibrate. But on the other hand, in order to achieve this, the vibration has to be sharply corresponding to the natural frequency of the resonator.

The quality factor of biological systems

The quality factor of a vibration system can be determined by stimulating the system with a signal and then measuring how long the vibration is retained. Within technology, the maximum quality factor of vibration systems that can be constructed is now about 10^8 . To achieve this, use is made of the principle that conductivity increases as temperature decreases. Cooling reduces the intensity of thermal molecular vibrations. This means that the friction in the system decreases. Less kinetic energy is converted into heat. Thus, the system remains in resonance through the vibration for a longer period. Using the most advanced equipment for the detection of electromagnetism, this has been taken to the extreme by cooling down near to zero. This principle is known as *superconductivity*. It was discovered in 1911 by the Leiden physicist H. Kamerlingh - Onnes, who received a Nobel Prize for this.

Extensive research has been done by Fröhlich and Kremer into the quality factor of biological systems. This was done (inter alia) by radiating cell cultures with light and the measuring the time before this light is emitted. The found Q-factors were in the amazing order of 10^{18} . This has been found in various biological systems. Also within a variety of human tissue.²¹⁾ With this the quality factor of biological resonators surpasses that of the most advanced technical systems based on superconductivity by a factor of up to 10^{10} . And all of this at body temperature! Thus, in biological resonance systems, there has to be a form of conductivity that is still completely unknown to technology.

In physics the idea has long been that superconductivity is only possible at extremely low temperatures. But in 1987, J. G. Bednorz and K. A. Müller received the Nobel Prize for the discovery that certain crystals exhibit superconductivity at relatively high temperatures. Science has thus closely approached superconductivity at room temperature and is about to discover a principle that has already been applied by nature for billions of years.

Nature's information system

The preceding information helps to colour the contours of biophysical regulation's information system. It has a physiological frequency range that extends continuously from less than 1 Hz to over 10^{16} Hz. It is not unlikely that it works with coherent pulsed laser signals over this whole frequency range, while technical lasers usually only have one, or at

most a few, wavelengths. The biological information system is equipped with resonance systems with a quality factor of 10^{18} . So ten billion times more sensitive and specific (selective) than the most advanced technical measuring device based on superconductivity. Needless to say, the transfer of information within the biophysical regulation takes place at the speed of light. But maybe this is less startling because such a speed is inherent to electromagnetism.

In terms of information technology, the body thus possesses an information system with a capacity and an ability to transfer that is almost impossible to imagine. One which surpasses the abilities of contemporary technical systems many times billion fold. These inconceivable properties enable the body to work with signals with an intensity that is much lower than the noise limit. The system can therefore easily interact with external vibrations with a very low signal intensity.

Non-thermal, non-ionizing radiation effects on biological systems

It has already been mentioned that in mainstream biology and medicine no account is taken of the body's own electromagnetic level and of the notion that intervention within that system by external radiation could occur. Research into the effects and risks of radiation has therefore so far only focused on thermal and ionizing radiation effects. Electromagnetism has no ionizing effect up to the frequency of UV light. Technical research into the risks of telecommunications with GSM, UMTS, etc., which are in a frequency far below it, has therefore focused on thermal effects. And these have been proved to be minimal. On that basis, it is generally believed that radiation used in telecommunications is completely harmless.

There has been a flood of publications on the risk of getting certain types of brain tumours (the glioma and its highly malignant variant, the glioblastoma) from mobile telephoning. Official sources invariably deny that this relationship could exist. There can be several motives for this. But when one concentrates solely on the thermal effects of radiation, it does indeed become quite hard to imagine that brain tumours can be caused by mobile calls. That there have been so many publications and reports about complaints experienced in relation to radiation, including radiation from telecommunication, does however point out the need to consider more than just thermal effects. For a good overview of this subject, reference may be made to the American orthopaedic surgeon Robert Becker (1923-2008, nominated for the Nobel Prize in Medicine), who devoted years to research into the effects of exposure to electric and electromagnetic fields.²²⁾

Within biophysical medicine it is commonplace that electromagnetic radiation, such as that used in telecommunications, can also have effect *by direct interruption* of the organic electromagnetic system. Thus, by (undesired) stimulation of the body's vibration systems. To determine the external radiation charge, methods have been developed, based on test systems common within complementary medicine, such as electro acupuncture and related techniques (for a discussion of these, see Westerman 2006).²³⁾ Radiation overexposure is a frequently made diagnose within the biophysical medicine. It is noteworthy that electromagnetic overexposure is mainly found in conjunction with other pathology. This involves a wide spectrum of disorders, ranging from fatigue to heart disease, autoimmune processes and cancer. As mentioned before, strong individual differences in sensitivity are found. This frequent observation resulted in the view held in biophysical medicine that radiation exposure (and given the response to the testing methods, this also applies to the radiation used in telecommunications) can on the one hand play a partly-causal pathogenic role with a wide range of disorders. And on the other hand, that the presence of other pathogenic factors can significantly increase the sensitivity to radiation.

The concept of *resonance*, correspondence in frequency, is central to the affecting of the body by external electromagnetic signals. When an external signal has the same frequencies as physiological vibrations, it will be able to activate the vibration systems within the body which have the same frequencies, with all its molecular consequences. In this sense, the body is an open electromagnetic system.

But despite this fact, the organism is certainly not a passive electromagnetic system. There are at least two dynamic mechanisms by which the body (or better: the biophysical control level of the body) can protect itself from undesired external radiation. The first mechanism comprises the so-called *Adey windows*. The second mechanism, which has already been mentioned, comprises the physiological fluctuations of the body's own vibrations.

Why weak stimuli can have effect, when powerful stimuli do not

Research, amongst others of Fröhlich and Kremer²¹⁾ and Ludwig²⁴⁾, has shown that the transmission of electromagnetic signals within the connective tissue runs along elongated protein chains in which electrically charged particles are present. These protein chains are not only a form of wiring, like the antenna system of radio and television, but they are active resonance systems with specific natural frequencies. The interdependence within them appears to be based on weak molecular forces. When an external vibration corresponds with the natural frequency of such a chain, the chain starts to vibrate, and the signal is led forth within the body. This of course requires a certain minimum intensity of the vibration.

However, if the amplitude exceeds a certain intensity, the molecular connections within the chain are broken. The transmission then blocks. Once the signal intensity declines again so that the field strength is again less than the binding forces, the protein chains appear to be easily reconnected. Following research done by the American scientist Adey, where this biophysical principle was shown in the brain cells of chicks, this phenomenon was called *Adey windows*.^{25,26)} The metaphor 'window' means that stimuli only affect the body when they have certain wavelengths, and an intensity above a certain minimum and below a certain maximum. Stimuli that 'cannot pass through this window' remain inert.

Adey windows provide effective protection against external overstimulation. They also explain how it can be that a powerful stimulus does not have any effect on the body, while a very weak stimulus with the same wavelength does. This for example meets the criticism that within homeopathy the more diluted solutions are, the more effective they are deemed, while according to mainstream medicine, something has more power when it is more concentrated. The organization of Adey windows shows that from a physiochemical point of view 'more' can stay inert, while 'less' and 'weaker' can actually be highly effective.

Auto-regulation by adjustment of the Q-factor

The second protective mechanism against external influences, which comprises the fast progressing variations in intensity and wavelength of the body's own vibrations under normal conditions, and the loss of these during illness, also indicates a process of auto-regulation. The underlying principle can really only be based on an active adaptation of the Q-factor of resonance systems. If the biophysical control system is capable of reducing the Q-factor of active resonance systems to 0, and of strongly increasing that of resonators with own frequencies in the same range, the result is a shift in frequency. Elimination of some of the vibration systems that are involved in a signal, will weaken the amplitude of the signal. Decrease of the Q-factor of a group of resonance systems that are in joint vibration has the same effect. When more identical vibration systems are involved in a vibration, this leads to an increase of amplitude. An increase in the Q-factor of the vibration systems in question has

the same result. Although final evidence is still lacking, the tentative hypothesis is that the body is able to optimize the conduction of desired signals and block the conduction of unwanted signals.

The pathogenesis of radiation exposure

If external signals fall within the criteria of an Adey window, in terms of electromagnetic properties, they will vibrate resonance systems within the body and by this they can have a disruptive effect on the biophysical regulation level. Precisely the relatively weak signals used in telecommunications can be expected to fit within the electromagnetic windows of the body and consequently produce undesirable biological effects. However, it will certainly not be the case that every signal to fit into an Adey window will also cause the body to resonate. The body's ability to adjust the Q-factor of resonance systems, so that undesired vibrations can be extinguished, appears to be an extremely effective second line of defence.

Still, as Ludwig has found, the natural fluctuations of the vibration system diminish with illness, and it is obvious that the effectiveness of this second line of defence against external electromagnetic exposure will then decrease and that the sensitivity to external radiation will increase.²⁰⁾ This is consistent with the above mentioned findings of biophysical medicine, that overexposure by external electromagnetism is mainly found with people already ill or weakened, while healthy, vital people show a much lesser extent of electromagnetic load. The complex intertwining of external radiation with other pathogenic factors, and the large individual differences in overexposure, are thus explained.

The working of Floww products

In the preceding text, the focus has mainly been on the negative health aspects of external radiation. But it has also been stated that radiation has powerful, health-promoting effects too. In this respect Schumann waves and the geomagnetic field have been mentioned. Apparently, it depends on the properties of the radiation what the effect on the body is. The frequency, intensity and form (radiation can show different graphical displays, such as a sine or a block form) will determine whether radiation causes disease or is actually beneficial to health. As described, the electronic circuit of the Floww devices is brought into resonance by external radiation and then generates a subtle, consistent electromagnetic field which has health-promoting effects and reduces the susceptibility to adverse effects of external radiation. As was mentioned too, during the development of the Floww devices, the electronic circuit has over time been adjusted to the found effects of the field that it generated. Ultimately, it was through this process of trial-and-error, that the circuit which is now being used, was found.

The two remaining questions about the physical dilemmas in the working of Floww technology can now be answered. The first was: How can such a weak electromagnetic signal have an effect on biological systems? This can be explained by the extreme sensitivity of the resonant system that the organism possesses. The Q-factor of the body's own vibration systems, no less than a factor 10^{10} higher than what technical systems under superconductivity are capable of, is easily adapted to intensities such as those of the Floww field.

Then the second question: How can it be that the negative effects of external radiation exposure are wiped out, while the Floww products do not shield off harmful radiation at all? Basically, the proven positive effect of the Floww field on biological systems already tells us that the properties of Floww vibrations fall within the physiological Adey windows. If this were not so, the Floww field would not be able to have any effect. That the Floww field reduces negative effects of radiation can be explained when its vibrations have a harmonizing and vitalizing effect on the body's biophysical auto-regulation. This could be possible if the

Floww field promotes the coherence within the body and reduces the rigidity of vibrations. When this happens, the integrity of the biophysical system will increase, and it is then imaginable that the lines of defence against external effects by radiation are strengthened. It is then also conceivable that recovery and immune processes become activated, causing the negative effects of radiation on the body to be nullified. This is of course a tentative explanatory model which in itself calls for further and deeper research into the physiological mechanisms. Such research could also provide further insights into the electromagnetic regulation level of biological systems and contribute to the cognition of biophysical medicine. So far, the indication for Floww has mainly been radiation overexposure. However, the working model suggests that this indication could also be widened. If Floww works through an actual improvement of the integrity of the biophysical system, it is conceivable that a wide range of chronic conditions will also be considered as an indication, even when there is no apparent radiation overexposure. Of course, research will have to show whether this is actually so.

Regarding the effectiveness of Floww, it is worth noting that the Teesside University in Middlesbrough, England, will start a double-blind study of Floww technology this year. A *Harmony Fellowship* was set up to achieve this. The previously mentioned global research, conducted by Soffos, has a permanent character, so that over time the results can be based on an increasing number of patients.

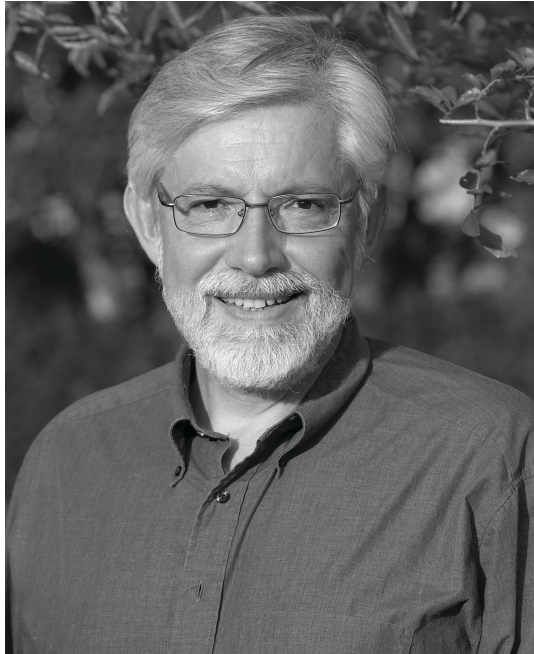
The amount of radiation we are exposed to has increased significantly. And despite that this will probably more clearly become associated with serious medical risks, this trend will almost inevitably continue into the foreseeable future. A method whereby, instead of shielding radiation off, the radiation itself is transformed into a positive, health-promoting bio-energetic spectrum, is a welcome addition to the options to reduce health risks from radiation.

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The Author



Nico Westerman has been a GP for almost 20 years. In addition to his general practice, he has also had a consultative practice in acupuncture, electro-acupuncture and bio-information therapy for 15 years. Since 1998 he works exclusively on a consultative basis in his hometown Dordrecht.

From 1990 on, Westerman published various works on the scientific basis of non-mainstream medicine. He is not only the writer of many articles in various magazines and a regular speaker at conferences, but also the author of three books.

Of these, 'The Chinese Wrist' was published in 1997. This book deals, amongst other things, with the biophysical (electromagnetic) principles on which traditional Chinese pulse diagnosis is based. 'Bioenergy en Biophysical medicine' (2006), has the electromagnetic control level of the human body as its subject and discusses the role of biological electromagnetism within the principles and applications of complementary medicine, as well as the immense importance of biophysical processes in sickness and in health.