

COUNTERACTING AGING WITH BASIC PHYSICS

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Mechanism behind successful anti aging

Successful anti aging by the use of antioxydants and specific electromagnetic fields are based on the same principles in physics - electronic activity. Specific electromagnetic fields seem to be superior by far in certain health disorders.

Specific induced electromagnetic fields can be very effective in inflammation, disease, and anti aging by electron donation , by wave mechanics, and by external stimuli – epigenetics. To re-integrate the free radicals seems to be at the core of restoring health.

The core of anti aging

Specific low frequency electromagnetic fields can counteract destructive properties of free radicals by inducing electronic activity

Prototype: osteoporosis

In 1989 Professor Cyril Smith, at Salford University/England, published his research on “The Electromagnetic Man”. It is all about the hydrogen magnetism of the human body. Hydrogen is the main magnetic dipole since it is abundant in the human body. He also found out that there is a dualism between infectious agent and frequency. In other words, you can kill a virus, bacteria, or parasite by em frequencies. However, each germ is only responding to it’s specific frequency.

We take advantage of the laws of nuclear physics when we use electromagnetic fields. Nuclear magnetic resonance property is used in the medical community since 1970.

Could we use the magnetic momentum for anti aging? The answer is yes. Magnetism is a life force

Life depends upon magnetism. Life depends upon electromagnetic fields. Specific electromagnetic fields are most powerful anti aging tools.

Specific electromagnetic frequencies and their fields cause a dramatic pain relief in patients with severe osteoporosis (Kessler et al., 2006) 12

After a few applications, patients who could not move on their own will become motile again. There is evidence that the bone density is increasing.

There are case studies with specific electromagnetic fields (S. Lieberman et al., 2007) 12 on a variety of other health disorders that indicate clear improvements in otherwise helpless patients.

The physical laws for these improvements are based on hydrogen and electron properties. Anti aging must boost electronic activity. Electronic activity could be largely improved by specific em fields.

Specific em fields counteract aging by boosting electronic activity. Aging means: "loosing electrons" to free radicals. The energy deficit in ailing tissues is due to destructive interferences.

In 1995, Sisken & Walker listed some of the healing frequencies being tested in medical research laboratories and the types of tissues they affect. Frequencies are specific for:

2 Hz	nerve regeneration, neurite outgrowth from cultured anglia
7 Hz	bone growth
10 Hz	ligament healing
15, 20 and 72 Hz	decreased skin necrosis, stimulation of capillary formation and fibroblast proliferation
25 and 50 Hz	synergistic effects with nerve growth factor

Why must electromagnetic fields be specific? Unspecific fields would not resonate with 1H (hydrogen) nuclei of the tissues.

Electromagnetic fields are used to manipulate the magnetization of specific types of hydrogen atoms. Hydrogen atoms are put into resonance. Nuclear magnetic resonance (NMR) is a physical phenomenon based upon the quantum mechanical magnetic properties of an atom's nucleus.

Subatomic particles such as protons have the quantum mechanical property of spin. Certain nuclei such as 1H (protons), 2H, 3He, 23Na or 31P, have a non-zero spin and therefore a magnetic moment. In the case of the so-called spin-1/2 nuclei, such as 1H, there are two spin states, sometimes referred to as "up" and "down". The spin that protons carry is a truly intrinsic physical property, akin to a particle's electric charge and mass.

Precession of a gyroscope



Which quality must em waves have in order to use them for anti aging?

Low frequency and specific.

You will learn: Which is the secret behind pain relief in osteoporosis?

By putting the hydrogen atoms of the bone tissue into resonance, electronic energy is potentiated many times over. Electronic activity is increased. Electrons activate other proteins / cells / structures on the basis of semiconducting. The overall energy in the tissue increases. Stagnant metabolism converts into dynamic metabolism.

The manipulation of *nuclear spins* by radiofrequency waves (nuclear magnetic resonance is important in chemical spectroscopy and medical imaging .

Manipulation of nuclear spins by low frequency electromagnetic waves is an important tool for ailing tissues by boosting the potential of the repair field. It is the anti aging tool „par excellence“.

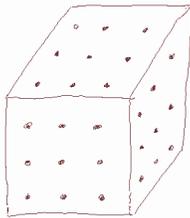
You will learn: What is the secret for finding areas in the body which speed up aging?

Aging foci resonate to specific em fields. Resonance can be felt by a simple pulse reaction.

Different tissues do not age with the same speed. Some areas/organs age faster due to infection, inflammation, and toxins.

Cellular structures collapse after loosing electrons through free radicals. Vital electronic activity in tissues is largely impaired by destructive interference. Accumulated adverse substances take away repair energy by their adverse atomic spin. Destructive interference results in a low energy state of the aging tissue.

Constructive Interference: ideal, harmonious vibration of regularly arranged atoms maximizes energy.



Destructive interference: In unhealthy tissue there is a chaotic vibration due to different accumulated particles such as heavy metals, viruses, bacteria, fungi, inflammatory debris, etc. This is causing an energy drain by interferences.

The key to convert destructive interference into constructive interference is resonance.

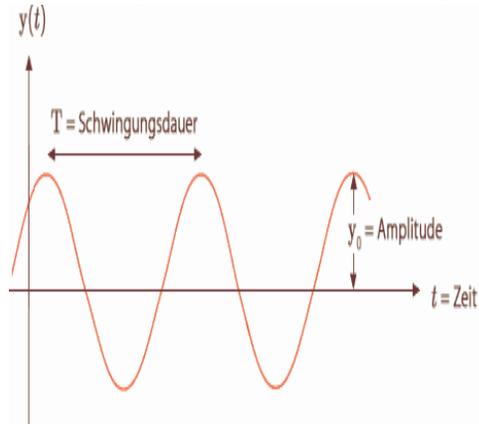
The dominant aging area in the body is the Main Focus. The Main Focus is the area which perturbs all other tissues most. It is draining other organs, areas, tissues from energy by destructive interference. There you jump start healing and anti aging by manipulating electronic activity using the laws of resonance.

Main Focus is affecting the whole body. The parabel with a crowded and stuffed dancing hall: All couples are dancing waltz harmoniously. If one drunken couple is going crazy in that hall, all other couples will get out of tune. If you re-tune the drunken couple, all other couples may continue dancing harmoniously. Through interference the Main Focus is

interconnected with other tissues of the body. Other tissues are perturbed by destructive interferences.

The trick to find the Main Focus is also based on resonance. Resonance can also be used to increase the energy of the aging *Focus* by increasing its electronic activity.

AMPLITUDE = REPAIR ENERGY



THERE ARE TWO ROADS FOR TISSUE REPAIR

Electron donators (Antioxydants)
Specific electromagnetic vibrational fields

Specific electromagnetic fields:

Specific electromagnetic fields provide electronic activity, neutralize free radicals by electron donation, and re-tune aging tissues by the laws of wave mechanics. They revitalize the tissues electronically. They abolish the low energy state by electron activation.

Resonance increases amplitude and energy. In wave mechanics, two identical resonating waves would triple the energy would triple the amplitude.

Resonance finds unhealthy tissue.

Resonance also distinguishes between healthy and unhealthy tissues.

Resonance differentiates between different organs.

Nuclear physics of resonance:

For resonance we need two partners. There is interaction between the static hydrogen field in the tissue and the external perpendicular field. If we apply a specific electromagnetic field, our partner is the static magnetic field of the tissue which is composed mainly of hydrogen atoms (protons). The magnetic moments of the hydrogen

atoms and their electron then precess about the external electromagnetic field axis with an angular momentum frequency known as Larmor frequency.

Hydrogens align in two spin states – one low-energy, and one high-energy eigenstate. The energy difference between the two nuclear spin states corresponds to the external electromagnetic frequency. The low-energy state aligns longitudinally to the external em field. The high-energy state aligns transversally to the external em field. Resonant absorption of energy by the protons due to the external electromagnetic field will occur at the Larmor frequency for the particular nucleus. When the em pulse is turned off, the transverse vector component produces an oscillating magnetic field which induces a small current. This signal is called the free induction decay (FID). The FID decays approximately exponentially with a time constant T2. This time constant is the relaxation time of the loss of the hydrogen coherence in the transversal plane. However, this time constant varies widely between different tissues because of small differences in the static magnetic field at different spatial locations (inhomogeneities).

Therefore the Larmor frequency varies across the body creating destructive interferences which shortens the FID.

So different spatial locations become associated with different precession frequencies. This can be used to contrast different tissues.

The net magnetization vector has two components. The longitudinal magnetization is due to a tiny excess of protons in the lower energy state. This gives a net polarization parallel to the external field.

The transversal magnetization is due to interferences and coherences between the two energy states.

1H Hydrogen:

Has a single proton and non-zero spin. Has a charge on the surface. There is a small current, and an angular momentum. It's mass generates angular momentum (J) caused by spinning. All nuclei that contain odd numbers of protons or neutrons have an intrinsic magnetic moment and angular momentum. The most commonly measured nuclei are hydrogen-1 (the most receptive isotope at natural abundance) and carbon-13.

In quantum mechanics, **spin** is a fundamental property of atomic nuclei, hadrons, and elementary particles. For particles with non-zero spin, **spin direction** (also called *spin* for short) is an important intrinsic degree of freedom.

As the name indicates, the spin has originally been thought of as a rotation of particles around their own axis. This picture is correct insofar as spins obey the same mathematical laws as do quantized angular momenta. On the other hand, spins have some peculiar properties that distinguish them from orbital angular momenta: spins may have half-integer quantum numbers, and the spin of charged particles is associated with a magnetic dipole moment in a way (g-factor different from 1) that is incompatible with classical physics.

Angular momentum resists the attempt to change the spin orientation.

Resonance Principles:

H-1 has magnetic moment and has angular momentum.

MAGNETIC MOMENT

Quantifies the contribution of the systems internal magnetism to the external dipolar magnetic field. It measures the net magnetic source.

ANGULAR MOMENTUM

Is a vector quantity in relation to the velocity vector of the particle. It stays constant unless an external torque acts on it.

The angular magnetic vector precesses about the external field with an angular frequency known as Larmor frequency.

RESONANCE

Resonant absorption of energy by the protons to an external oscillating magnetic field will occur at the Larmor frequency for the particular nucleus

WHEN YOU APPLY AN EXTERNAL ELECTROMAGNETIC FIELD

The angular magnetic vector of the H (hydrogen) precesses about the external field axis with an angular frequency known as Larmor frequency.

Also: The magnetic moments of the H-1 nuclei align longitudinally and transversally around the external em field.

WHEN YOU TURN OFF THE EXTERNAL EM FIELD

The collapse (relaxation) of the transversal vector induces electronic energy (FID).

NUCLEAR MAGNETIC RESONANCE

Depends on strength of the field, depends on Larmor precession frequency of the nucleus. Larmor frequency is not a constant. It varies between different tissues. Accordingly: different tissues resonate with different frequencies.

^1H absorbs electromagnetic energy when placed in a magnetic field of a strength specific to the identity of its nucleus. When this absorption occurs, the nucleus is described as being *in resonance*. Also different atoms within a molecule *resonate* at different frequencies at a given field strength. The observation of the resonance frequencies of a molecule allows a user to discover structural information about the molecule.

Each tissue resonates differently. Small differences in the static magnetic field at different spatial locations („inhomogeneities“) cause the Larmor frequency to vary across the body creating destructive interference.

Each tissue resonates differently. Relaxation times of H-1 vary widely

between different tissues of the body. This is also used for tissue contrasts in nuclear resonant imaging.

Specific Electromagnetic Fields have three modes of action:

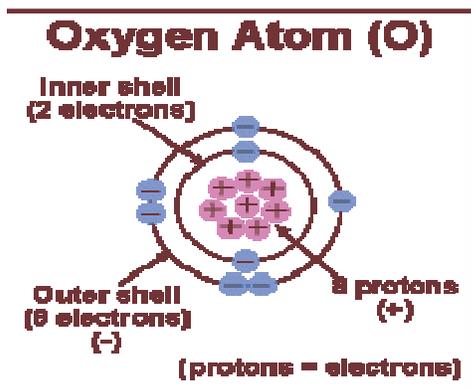
1. Specific electromagnetic fields act as antioxidants and donate electrons to so called **free radicals**. **Free radicals** would otherwise destroy cell structures by stealing their electrons
2. The physical laws of wave mechanics regarding sound, waves and vibration. 10
3. Epigenetics 11

REASON BEHIND AGING

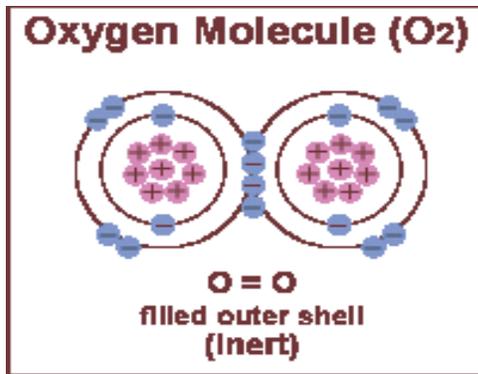
Free Radicals. Today, free-radicals are being implicated in virtually all of the diseases of aging and in the aging process itself. Electrons play a major role in degeneration, aging and anti-aging. They antidote free radicals. The free radical is an atom, ion or molecule with one or more unpaired electron. When such electrons move about in an atom, they create both electrical and magnetic fields that attract them to nearby molecules. They combine with them readily. In other words, they steal electrons from other molecules. If these molecules belong to cell structures such as membranes etc., the cell function will eventually collapse. Loss of electrons, loss of energy, causes degeneration and aging.

The Core Of Aging – Free Radicals.

Because the free radical has one or more unpaired electrons, it has charge and magnetic properties that make it highly reactive. It is very unstable. Many free radicals are so unstable that they can exist for only a fleeting moment, a microsecond or less. Look at the unpaired electron of (O) oxygen on the outer shell:



O₂ would be inert because it does not have the unpaired electron on the outer shell.



In 1900 Moses Gomberg discovered the first persistent free radical.



ANTIOXYDANTS

According to Norman Hollenberg, professor of medicine at Harvard Medical School, epicatechin, an antioxidant in green tea can reduce the risk of four of the major health problems: stroke, heart failure, cancer and diabetes.

Antioxidants = donate electrons.

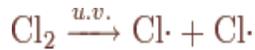
In May 2008 - a green tea and Alzheimer's disease study, conducted by a German team, discovered how it makes deadly brain plague harmless.

Researchers of the Max Delbrueck Center for Molecular Medicine (MDC) Berlin-Buch, a national research laboratory of the Helmholtz Association in Germany have made this discovery in the test tube and in cell models.

The substance ECGC (Epigallocatechin-3-gallate) from green tea can redirect the deadly process which leads to the accumulation of protein aggregates in Parkinson's and Alzheimer's disease. ECGC modulates a cascade of protein misfolding in such a way that the formation of deadly plaques is interrupted, and harmless protein structures emerge instead.

A study published in the December 2006 issue of *Brain Research* suggests that it might help.⁹ to decrease the oxidative stress that plays an important part in the degeneration of the retina. Age related macular degeneration can be improved by green tea.

Over decades antioxidants have been the answer of the medical community for aging. Antioxidants such as vitamin C and E would donate electrons and thus stabilize the greedy free radicals. Thereby the stability of the macromolecules of inflamed or aging tissues and their structures remain unharmed. In written chemical equations, free radicals are frequently denoted by a dot placed immediately to the right of the atomic symbol or molecular formula as follows:



Chlorine gas can be broken down by ultraviolet light to form atomic chlorine radicals.

In 1954 Denham Harman MD, PhD, FACP became the “father of the free radical theory of aging”. The concept that free radicals were involved with the deterioration of human biochemistry was the biggest advance since the discovery of germs.



In 1954 Dr. Harman became a research associate at the Donner Laboratory of Medical Physics at UC Berkeley, where he pursued the puzzle of the cause of aging. After four months of frustration he hit upon the idea that free radicals damage macromolecules and that this is the fundamental cause of aging. While many were reluctant to accept this theory, in 1956 Harman published an article in the *Journal of Gerontology* that is now widely cited.³

In 1995 Denham Harman was nominated for the Nobel Prize in medicine. Of all the theories of aging, Harman's has the most consistent experimental support.

Harman drew inspiration from two sources: 1) the rate of living theory, which held that lifespan was an inverse function of metabolic rate and oxygen consumption. 2) Rebecca Gershman's observation that hyperbaric oxygen toxicity and radiation toxicity could be explained by the same underlying phenomenon: oxygen free radicals. In 1954, in collaboration with Daniel Gilbert, Gershman developed a free radical theory of disease in which highly reactive oxygen species (ROS) damage living tissue. Their discovery was the result of a search for the cause of a serious disease called retrolental

fibroplasia. The condition was traced to the elevated oxygen concentrations that had been routinely used in incubators for premature newborns. Gershman and Gilbert, linked the development of the disease to oxygen free radicals. It is interesting that Joseph Priestly, the English chemist who discovered oxygen in 1774, had questioned whether the gas, which is so essential to life, might also in some way be harmful.

Modern research has revealed that oxygen is actually a very toxic material, and that the body has a number of antioxidant defense systems that act continuously to keep tissue oxygen levels from getting too high. One of the built-in systems that accomplishes this is the enzyme, superoxide dismutase, discovered by Irwin Fridovich and Joe McCord. Noting that radiation causes "mutation, cancer and aging" Harman argued that oxygenfree radicals produced during normal respiration might also cause cumulative damage which would eventually cause the organism to lose functionality, and ultimately lead to death.

Today, the National Library Database has 80.000 articles on free radical induced inflammation and disease 5000 on relationship between free radicals and aging Recognition of the free electron as the ideal antioxidant⁸ has led to an explanation of why a number of devices that introduce or induced microcurrents into tissues can produce profound anti-aging effects.

FOR ANTI AGING YOU MUST :

1. Reduce collateral damage of free radicals which perturb harmonious vibration of the repair field by destructive interferences. Free radicals take away energy from repair field
2. Find the area of the body where electron donation is needed. Find the Main Focus.

Direct application of specific electromagnetic fields to non functional tissues is anti aging:

Since pain is the cry of the tissue for energy, the application of specific em fields will magnify the amplitude of the repair field through the transversal Hall Effect. ¹² Pain will cease. According to Robert Becker, 1995, the direct current (the current of injury) of the perineurium, perivasculum, periosteum and perilymphaticum is providing the repair of degenerating or inflamed tissue. ¹² .

Healing effects of specific frequencies (frequency window of specificity) (from Sisken & Walker 1995) in Energy Medicine by JL Oschman, 1988 ¹³, have been mentioned above.

In osteoporosis we see a dramatic decrease of pain after one or two applications of specific em fields ¹². There are over 1,5 million fractures per year. One out of two women over 50 are linked to osteoporosis in the US.

Each tissue is emitting a specific electromagnetic emission as published by the MIT in Boston in 1997. Each tissue also needs specific frequencies to regenerate as shown by Sisken and Walker in numerous studies. Consequently, we need to induce specific

electromagnetic fields in order to boost and amplify the energy of the repair field. Both the lack of healing power and the process of degeneration/aging can be attributed to insufficient elimination of free radicals in diseased tissues.

The Repair Field

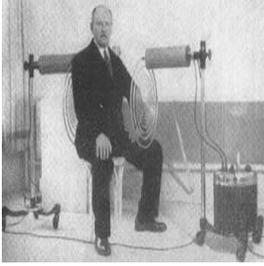
Robert Becker et al. , (1995), discovered the dual nervous system. The nerve system consists of two parts: There is the axon which works with digital shots in the all-or-nothing mode. Around the axon there are, regularly arranged, the perineurial cells. They are the wrapping material around the nerves. They produce a direct current which is called 'current of injury'. In any case of inflammation, trauma, or repair need in an area, this current of injury will be the repair field.

It's electromagnetic field is based on the electronic activity of the perineurial cells. More electronic activity means higher amplitude and more energy to repair. Less activity means lower amplitude, less energy, and pain. Aging and degeneration correlate with lacking energy, poor electronic activity. If we specifically amplify electronic activity in osteoporosis and other issues, degeneration is slowing down – pain ceases – the person feels better.

The idea that energy within a living system may be transported within semiconductive bands of proteins was suggested by SZENT-GYÖRGYI in 1941. ¹⁴ He probably knew about Lakhovsky, the Russian scientist who had already successfully experimented with em fields.



GEORGE LAKHOVSKY in 1930: "each living being is simultaneously an emitter and receptor of electromagnetic radiation." The above statement was justified by this researcher in the following manner: in every living system, and particularly within the cell (and its nucleus), we have the components of an electrical oscillator. ¹⁵



2. Anti aging by wave mechanics

Sound and standing waves are responsible for regular aggregation of atoms. Arrangement of atoms in regular order is called “crystalline” structure. According to Itzhak Bentov, such an atomic formation vibrates in harmony and provides a maximum of healthy coherence and energy. This stability may be undermined by other deposited elements such as viruses, bacteria, fungi, parasites, environmental factors that exert their own vibration and consequently produce a chaotic interference wave pattern in the prior harmonious tissue.

By their specific sound and wave property, specific low frequency electromagnetic fields can detect those spots by resonance and re-establish a harmonious vibration of the weakened tissue. The harmonious entrainment of atomic and molecular vibration is considered to be the key for healing.

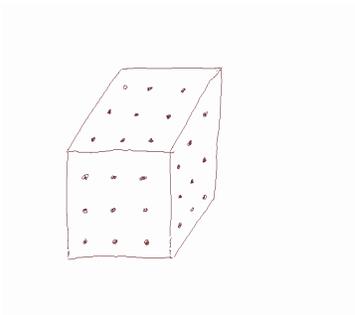
HOW DO SPECIFIC EM WAVES DETECT DISEASED TISSUE?

The nuclear magnetic property of 1H (hydrogen) atoms in that tissue absorbs resonance energy at Larmor frequencies. The energy level in that tissue shows a sudden increase. This impacts the vascular system by interference and causes a little shock in the pulse wave. This is palpated easily.

TISSUE SPECIFICITY

Each tissue proton resonates at different Larmor frequencies because of the spatial differences and inhomogeneities of the tissues. The angular momentum varies because of interferences in each tissue. This is because diseased and aging tissues have more destructive interferences by spins of toxins, free radicals etc. Once this tissue's atoms are resonating, the harmonious vibration increases the energy and is spreading throughout the body evoking a pulse reaction.

Aggregated lumps represent atoms of a tissue aggregated in a crystal like structure. This is an energy-rich state (Itzhak Bentov).



HOW DO I FIND THE AILING FOCUS?

The basics in physics are the same as in nuclear magnetic resonance imaging: *Resonance with nuclear spins.*

THE ELECTRONIC CAR KEY

Induces specific em waves into the lock's mechanism. It induces resonance with nuclear spins.

FACTORS CONTRIBUTING TO ELECTROMAGNETIC RESONANCE

Quantum properties of nuclear spins

Frequency excitation properties

Tissue relaxation properties

HYDROGEN ATOMS ARE DOMINANT

Is the most abundant atom in the body. The atom has an odd number of protons (H-1) and has spin.

The magnetic properties of some atomic nuclei are tuned to particular electromagnetic frequencies. This is why tissues react/resonate to different em frequencies.

Anti aging by epigenetics (Bruce Lipton PhD)

External electromagnetic fields are read by the cellular membrane and consequently program the genes in the nucleus of the cell. According to his pioneering research on cellular biology, Bruce Lipton 11 visaged the revolutionary field of epigenetics, a new science of how the environment and perception control genes. Former belief that each protein has an own gene as a producer is obsolete. Also David Baltimore, one of the world's preeminent geneticists and a Nobel Price winner states that there must be other ideas about how life is controlled than by the genes.

Fact is that we have only 25,000 genes, about the same number as *Caenorhabditis elegans*, a primitive worm comprised of exactly 969 cells and a simple brain of about 302 cells.

Lipton's research at Stanford University revealed that cell cultures of the same cell, in three different Petri dishes, would grow into different tissues depending on the environment they were put in. Thence each gene would produce very different proteins if programmed differently by external stimuli. The bottom line is: the environment controls genes. The cellular membrane is reading electromagnetic fields and programs the nucleus, which is the blueprint for building cellular structures. As shown already by Siskin and Walker, specific em fields would support specific tissue growth.

Clinical applications

These discoveries have profound clinical implications. The electrical and magnetic properties of free radicals bring energy medicine to the forefront of the most active area of biomedical research today: the investigation of inflammation, cell death and aging. Energy medicine, in turn, paints much clearer pictures of the physical interactions taking place in aging.

As a field of investigation, energy medicine brings the discoveries of physics and biophysics into clinical practice. Recognition of the free electron as the ideal antioxidant has led to an explanation of why a number of devices that induce em fields in tissues, when combined with appropriate nutritional supplementation (Orthomolecular medicine) can produce profound anti-aging effects. Above all, using specific electromagnetic fields to find the main responsible focus of a health disorder has opened up a new dimension in healing 12

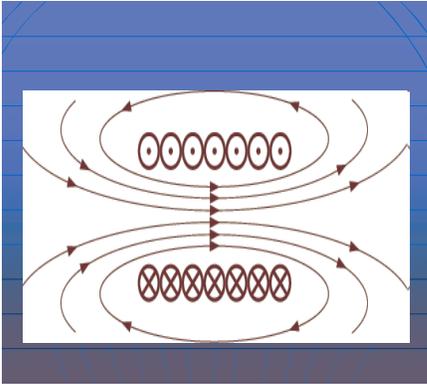
ANTI AGING

FIND MAIN FOCUS

REDUCE CHRONIC INFLAMMATION
REDUCE FOCI

CURE MAIN FOCUS BY ELECTRONIC SEMICONDUCTION

Magnetic moment refers to a system's internal contribution to its external magnetic dipole moment.



Resonance and relaxation

In the static magnetic fields commonly used in nuclear magnetic imaging, the energy difference between the nuclear spin states corresponds to a [photon](#) at [radio frequency](#) (rf) wavelengths. Resonant absorption of energy by the protons due to an external oscillating magnetic field will occur at the [Larmor frequency](#) for the particular nucleus.

When these spins are placed in an external magnetic field they [precess](#) around an axis along the direction of the field. Protons align in two energy eigenstates ([Zeeman effect](#)) one low-energy, and one high-energy, which are separated by a certain splitting energy.

The transverse magnetization is due to [coherences](#) forming between the two proton energy states following an rf pulse typically of 90° . This gives a net polarization perpendicular to the external field in the transverse plane. The recovery of longitudinal magnetization is called longitudinal or $T1$ [relaxation](#) and occurs exponentially with a time constant $T1$. The loss of phase coherence in the transverse plane is called transverse or $T2$ relaxation. $T1$ is thus associated with the [enthalpy](#) of the spin system while $T2$ is associated with its [entropy](#).

In thermodynamics and molecular chemistry, the enthalpy (denoted as H , h , or rarely as χ) is a quotient or description of thermodynamic potential of a system, which can be used to calculate the "useful" work obtainable from a closed thermodynamic system under constant pressure and entropy.

a classic [example](#) of *entropy increasing* described in 1862 by [Rudolf Clausius](#) as an increase in the [disgregation](#) of the molecules of the body of ice.



In nuclear magnetic imaging, the static magnetic field is caused to vary across the body (a field gradient), so that different spatial locations become associated with different precession frequencies.

In [nuclear magnetic resonance \(NMR\)](#) the term **relaxation** describes several processes by which nuclear [magnetization](#) prepared in a non-equilibrium state return to the equilibrium distribution. In other words, relaxation describes how fast [spins](#) "forget" the direction in which they are oriented. The rates of this spin relaxation can be measured in both spectroscopy and imaging applications.

However, decoherence because of magnetic field inhomogeneity is not a true "relaxation" process; it is not random, but dependent on the location of the molecule in the magnet.

Common relaxation time constants in human tissues

Following is a table of the approximate values of the two relaxation time constants for nonpathological human tissues, just for simple reference.

At a main field of 1.5 T

Tissue Type **Approximate T1 value in ms**

Approximate T2 value in ms

[Adipose tissues](#) 240-250 60-80

[Whole blood](#) (O)1350 50

[Whole blood \(oxygenated\)](#)1350 200

[Cerebrospinal fluid](#) (similar to pure [water](#))2200-2400 500-1400

[Gray matter of cerebrum](#) 920 100

[White matter of cerebrum](#) 780 90

[Liver](#) 490 40

[Kidneys](#) 650 60-75

[Muscles](#) 860-900 50

Footnotes:

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