

VIBRATIONS AND THEIR INDICATION IN SPORT-INJURIES

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Actual therapeutic bases from new physics and cell biology

It is the progressive knowledge of the last decades, that focus on medical diagnostics and therapy by new branches of science, (cybernetics, synergetics, nonlinear thermodynamics of irreversible processes, chaos theory) again towards the cellbiological basis of life: [34, 7, 8, 18, 13, 33]

Cell biology teaches that all cells of the body are embedded into the extracellular matrix and its function and efficiency is depending on its condition. The extracellular liquid washes around the cells of the body like the growth medium the cells of a cell culture. Not only any en and disposal (metabolism) take place over it, but also those, for performance required differently proportioned physico-chemical and neurohumoral control signals.

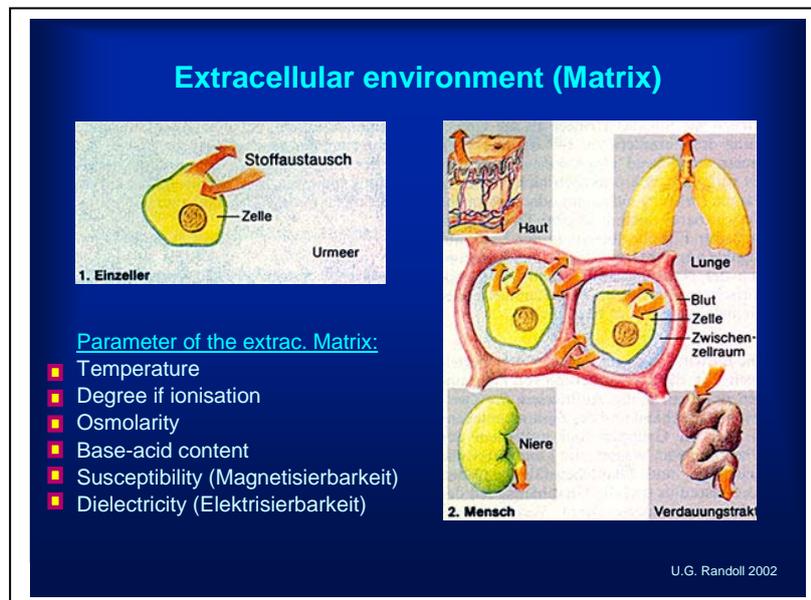


Fig. 1: Homeostasis of the extracellular matrix is guaranteed in single cell systems through the parameters of the "water" around and in addition with the detoxification organs in higher organisms.

Cell biology in the context of new physics brings the terms "time structure and time base" to new validity, whereby the life shows two time qualities: First the linear expiration of time (linear time of the lifetime) and secondly the cyclic time (rhythmically, spiral and/or in a circle itself repeating time) into which lifetime runs off as for example the heart minute volume, lung minute volume and also the neuromuscular signal transduction, those via rhythmic sensing rate steers the muscle movements. [16, 17, 2]

If a body is not able any more to produce "cyclic time" i.e. rhythms such as heart -, brain -, breath rhythm, this means medically that death occurred, because without rhythms physiological processes are visibly stopped for everyone, which is followed by death. Linear time and cyclic time are coupled and regarding sport injuries the question arises how far an optimised cyclic time work against "material exhaustion" and so the linear time e.g. survival period of a tissue can maybe be extended with optimal life quality at the same time? [12]

Physiological processes develop biological structures with the three "ingredients of life", energy, matter and information and is keeping them alive by a processive metabolism outside of the thermodynamic equilibrium. Time coupled processes of life is therefore inseparably coupled to the space structures, so that humans are to be regarded in principle as a space-time structure. Each living person's structure keeps thereby an inevitable corresponding time base.

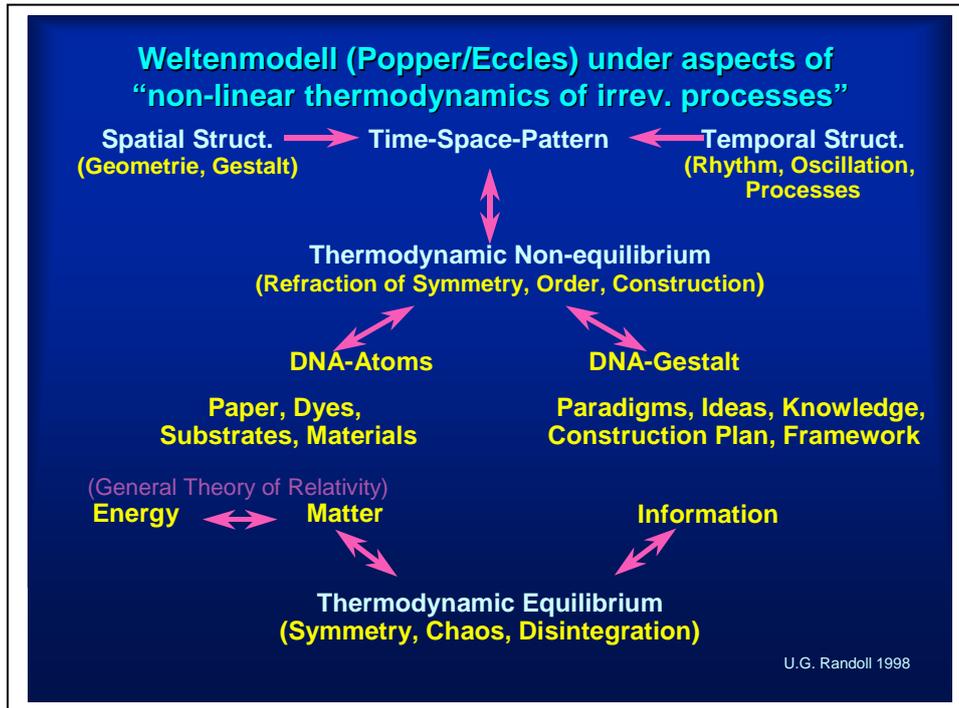


Fig.2
Creation and Destruction of Dynamic, Rhythmic Structures, in regression from and progression toward thermodynamic equilibrium through the "ingredients of life": energy, matter, and information [Modified from the Popper Model of the Cosmos, Eccles 13]

Fröhlich H. predicts coherent and laser-like vibrations (rhythms) in the living matrix and characterizes from this point of view new physics biological systems as followed:

1. They are relatively stable but far away from the thermodynamic equilibrium.
2. They exhibit a non-trivial order
3. They have extraordinary dielectric properties [4, 5, 6]

This macroscopic coherent rhythmic existing in organs can be pursued in video microscopes of living biopsies up to cellular level and is in the sense of the synergetic a total output of individual cells, which are united to an organ. [9, 19, 20, 21, 22, 23]

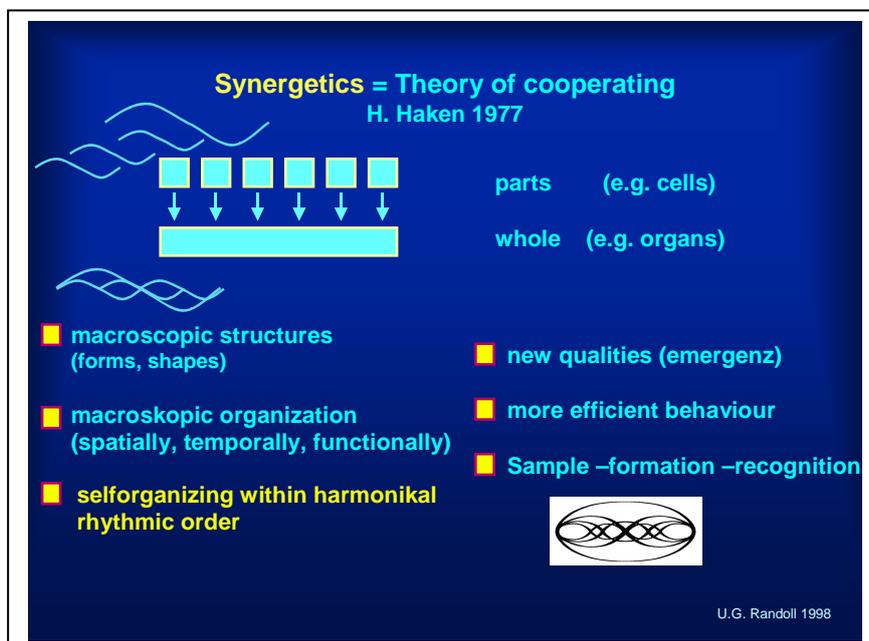


Fig. 3: *Organization of mass is not linear. Threshold values accompany different levels of organisation in time and space.*

To such coherent rhythms coming from fractal dimensions, the physiological processes (e.g. pulse wave) are coupled inseparably. They can be measured in different qualities (electrically, magnetically, mechanically, optically, acoustically). In the medical diagnostics from today the meaning of rhythms for most different organ-specific diseases was recognized - not so however for the medical therapy. [24]

Sport injury as a loss of rhythm, process degeneration or illness of the structure

If structures of the space are diseased, for example caused by an acute trauma, they are supplied by surgery (structure management). Implicit presupposed on the way of healing, underlying micro processes being linked to the time structure, begin to structure filigran micro areas and come from itself (self organizing) again into course.

If micro-processes however do not readapt automatically (selfintacting), i.e. if the time base of the micro area itself remains disturbed, then it comes to the well-known most different symptom formations of the macro range (diseases) like chronic pain, circulation disturbances, movement restrictions, neurological losses, wound healing disturbances etc..

Physical therapy as cellbiological process management

If such disease pictures are understood as "expression of the moment" and cutouts of a decompensised cellbiological process, which made itself successivly visible also in structures, it is meaningful to work against these pathophysiological processes in time and to readapt it.

For the re-adaptation of a functional and structural "Restitutio ad integrum", historically seen, natural, physical or manual-therapeutic measures prove to as useful at all times. The goal was and still is to revive the micro-rhythmicity and readapt the micro circulation coupled to it by more or less specific stimulation-therapies and, in order to again-arouse the physico-chemical processes coupled to it (process management).

Sport injuries for example can be of different genesis, need however on the way of the healing a feedback of the rhythms, processes and structures on all levels into the harmonious starting situation.

From the chaos theory it can be concluded that the more purposefully (harmoniously) micro rhythms are applied, they directly become effective as geometrical order and preformed pictures already in "water" (later replaced and condensed by tissue specific molecules) on molecular level and couple at the same time to existing micro processes of most different physiological qualities. (entrainment). [1, 3, 11, 32]

With integration of physiological attractors the physical medicine becomes effective.

Purposeful Readaptation with the MaRhyThe with sport injuries

If tissue with rhythms and/or vibrations is to be subjected in the context of physical therapy, which should be process-optimizing effectivly, preferably those are of importance, that the tissues are themselves able to produce under physiological circumstances. Of central importance the rhythm is in the range 8 - 12 cycles per second. It corresponds to the alpha rhythm of the brain and also in space medicine it was recognized as gravitation-strength-dependent resting beat frequency for the entire organism. How H. Rohrer (neuropsychiatrist, Vienna) already determined 1959, and in recent research to be confirmed, there are no rhythmic skeleton muscle movements at humans, which are larger than 18 cycles per second. [31]

Research results show that from these quiescent vibrations the skeletal musculature is in the situation in this frequency range to synchronize, whereby during increasing muscle strain first

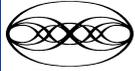
an amplitude reinforcement occurs (muscle tremors), which changes then sliding into an exhaustion condition of the musculature. [15]

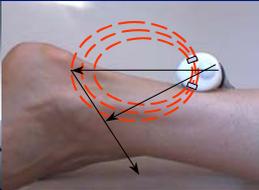
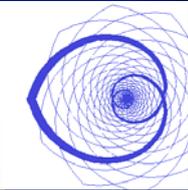
Therefore therapeutically this frequency window is focussed by the matrix rhythm therapy, a specific vibration-therapy. Linking is effected via a particularly developed resonator, which produces coherent mechano magnetic waves. (Fig. 4)

**What does the Matrix-Rhythm-Therapy ?
(MaRhyThe)**

A special resonator activates physiological resonances mecano-magnetially in a coherent way, especially of the sceletal muscle and the nervous system.

Result: Normalization (Readaptation) of the cellular rhythmicity as well as the flux-density of the nutrients in the extracellular matrix.



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Fig.4: Left: MaRhyThe-apparatus; Middle: Magnetic field ;Right: Specific harmonic waveform from the resonator, mechanically linked into the tissue.

The therapist obtains a holistic resonance spectral tuning through the skin and the skeletal musculature with accompanying fasciae, by frequency and amplitude-modulating. This unfolds its relaxing effect even in finest single structures in the inner body. As a result of the therapy the resonator quality of the total body is subjectively noticeable and objectively visible.

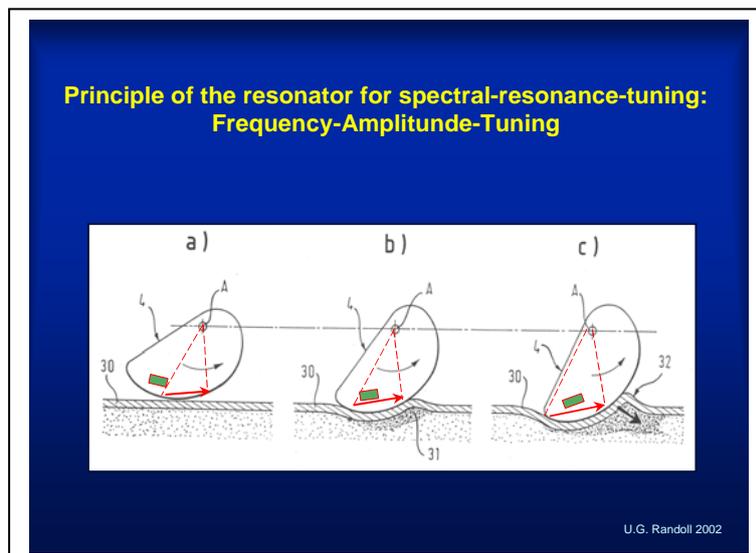


Fig.5: The Archimed' spiral produces different path speeds with same angular speed on the skin-surface. From this resulting pulling moments, stretch probably-proportioned, underlying tissues e.g. fasciae on their origin length and stimulate at the same time the stretch-sensitive feeling organs (spindle receptors) being dependent on dL/dT as well as absolute length increase (PD sensor). By stimulation of the tension-sensitive feelers (PD feelers) in the Golgi-tendon apparatus, the α motoneurone of the concerned muscles become restrained,

whereby one works against to the tension development in the muscle (autogenous inhibition).

It is to make sure that the total resonator quality of the tissue is repaired including the proprioceptors (muscle spindles, Golgi tendon apparatus).

A healthy organism needs by body movements in peace (vagus), as well as with max. demand (sympathicus) the full vibration spectrum.

Effect mechanisms of the MaRhyThe with sport injuries

1. Normal presenting of the swinging resonator produces a wave sample, which spreads more circular in the whole body. (Fig 4 right)
2. The depth effect is strengthened by increasing of the pressure as well as by rotation of the resonator, since the stroke becomes larger due to the longer radius. Depth effect means pressure on the tissue and the vein- and lymphatic vessels which are under it, whereby over the anatomical construction (flap mechanism) within the tissues a "milking effect" results, i.e. intravascular suction at the capillary bed of all tissues develops. Acidotic, swollen tissue is pH-normalized, vessel membranes repolarise, sealing again and a vessel internal pressure with normal flow rebuilds itself, so pain disappears.
3. From rotation results an acceleration and a longitudinal load, to be individually dosed at the musculature, which permits a purposeful linking into the alpha-gamma motoric (spindle organ) on the one hand as well as to Golgi tendon apparatus on the other hand. By a subliminal sympatholytic and/or vagotone stimulation over the proprioception, restremanences solve themselves also in the fasciae whereby itself the tonus of the tissue is generally normalized and the resonator quality increased. The "sensors" are brought back into the "zero-position" given by the gravitational field. By cutivisceral links, internal organs show parallel sympatholytic and/or vagotone effects.
4. The rhythmically released piezoelectric effect at all kollagen fibrills including the tendon and nerve tissue lead together with their pyroelectric characteristics to a re-establishment of the longitudinal electrical polarization. This affects arranging already the individual tropokollagenmoleculs and is a condition for the scar-free restructuring e.g. from tendon tissue and all other tissues made of kollagen.
5. Phasesynchronously to the mechanically reciprocating alternating field a magnetic field links inductively into the tissue, whereby in the compartments of the body being rich of electrolyte an alternating voltage develops. In particular it works on the blood, Lymph and secretion systems as well as in the nerve and muscle system.
6. The MaRhyThe opens passively the entire vibration spectrum, which actively under flexible demand nerves-, support -, and movement apparatus develops.

Symptoms with sport injuries show up in the entire spectrum from structure destruction to functional often only gropable or individually noticeable existential orientation failure.

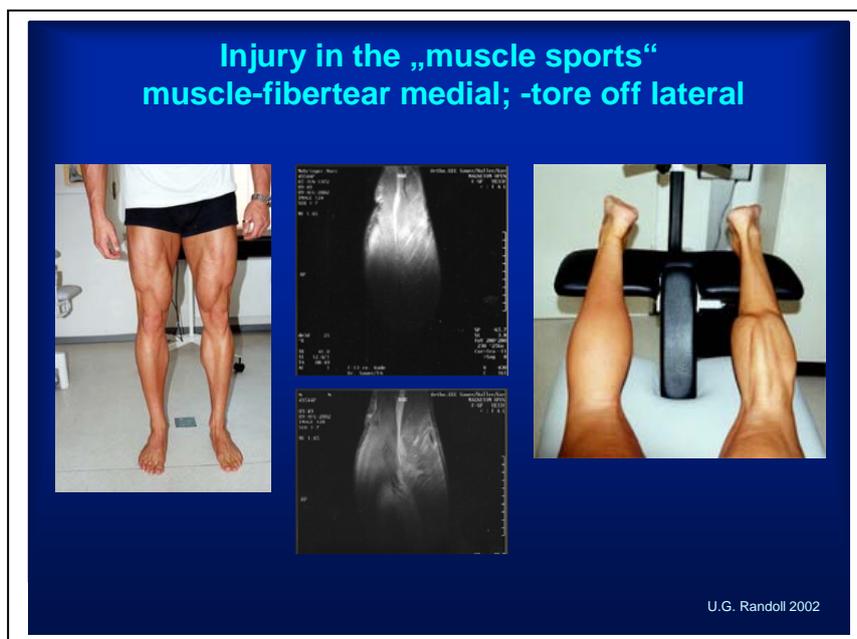


Abb. 6: *With calf training at the leg press the calf muscle tore. Left: Musculature in the actively not contracted condition. In the middle: Leg rh. NMR cuts of the calf musculature with clear findings. Right: Relaxed one, homogeneous swinging musculature after therapy. After altogether 5 applications over three weeks training was already again taken up.*

Tissues with myogeloses, fibroses, skleroses, scars or contraction arrears are mobilized and find again entrance to the "master clock frequency" (8-12 cycles per second)

The matrix rhythm therapy was tested in over five years since its systematic development at the Erlangen University clinic particularly in the rehabilitation range, successfully in the high speed sport and in the veterinary medicine. "With conventional procedures therapy-resistant cases" succeeded, which shows how meaning full rhythms in humans, even if they are used therapeutically purposefully. [14]

Their application is expressed meaningful both with the prevention and in the rehabilitation after overloads, injuries, accidents - and operations as well as the pain therapy. [10, 25 - 30]

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