

MICROWAVE RESONANCE THERAPY: NEW POSSIBILITIES

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INTRODUCTION

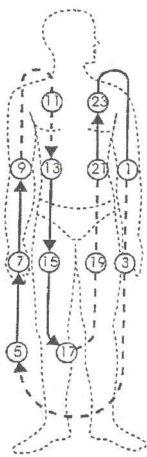
The acupuncture teaching on yin-yang as a network of energy and information processes of the body originating in embryonic development is one of most specific and useful areas of famous traditional Chinese medicine (1-3). Western science accepted acupuncture through the World Health Organization, but without its archaic philosophy.

By the definition of present-day acupuncture medicine, acupuncture deals with somatotrophic representation of organs and tissues on the skin surface. Biophysical stimulation of extra-bioactive (trigger) acupuncture points of the skin can produce effects which occur as responses of peripheral, autonomous and central nervous systems and of the endocrine system due to interaction and integration of sensory stimuli. Of multiple effects of acupuncture stimulation, most important in prevention, therapy and rehabilitation are analgesia, broncho-vasodilation and immune response.

Traditional Chinese medicine (TCM) defines acupuncture (acus; needle) as needle insertion into specific skin points, or acupuncture points, which regulate the flow of Qi within energy pathways (meridians) connecting acupuncture points. According to TCM, meridians are integrated into two somatic energy-information circuits (networks) which are independent and symmetrically located on the two sides of the body.

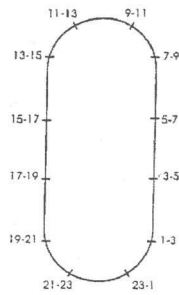
Each network consists of 12 meridians which corresponds to 12 viscera; six fu (yang) cavitory organs (the large intestine, triple warmer, small intestine, stomach, gallbladder, urinary bladder) which transform food into energy and blood; and six zhang (yin) solid organs (lungs, the pericardium, heart, spleen, liver, kidneys) which receive blood from fu (yin) organs and clear and distribute energy in the body.

Qi circulates simultaneously and in equal amounts on both sides of the body. The time of the maximum Qi activity in each meridian is two hours, which provides for 24-hour Qi circulation in all 12 meridians. Each organ has its time of Qi tide, which starts the two-hour activity peak, and ebb, which is the subsequent two-hour period of the minimum activity of the organ. Therefore, acupuncture stimulation during the maximum organ activity is most effective in reduction if it, while sedation should be timed with the minimum activity spell. The time of the minimum activity is best for organ activation, i.e., tone-enhancing treatment should be timed with the low activity phase. Figure 1 presents the traditional depiction of Qi circulation: its 24-hour pattern (a) and maximum activity (b) in coupled yin-yin and yang-yang organs. Each side of the body has independent Qi circulation.



— YANG
- - - YIN

(a)



(b)

- 11-13 HEART
- 9-11 SPLEEN
- 7-9 STOMACH
- 5-7 LARGE INTESTINE
- 3-5 LUNGS
- 1-3 LIVER
- 23-1 GALLBLADDER
- 21-23 TRIPLE WARMER
- 19-21 PERICARDIUM
- 17-19 KIDNEYS
- 15-17 URINARY BLADDER
- 13-15 SMALL INTESTINE

Fig.1. Traditional Chinese concept of Qi circulation in the human body

Apart from 12 coupled meridians which serve systemic double circulation of Qi, TCM describes two median meridians (anterior and posterior) which are not related with double Qi circulation. The median meridians do not correspond to organs, but do influence their function. They are stimulated when organ meridians are unresponsive to stimulation.

The body has 794 (397 + 397) extra-bioactive (acupuncture) points. The points can be stimulated with needles, heat, pressure, magnetic fields, low-intensive laser beam, ultralow frequency currents, microwaves, air ions and biostimulation (1-3).

Traditional Indian medicine, in particular its famed swara yoga, cites an energy system similar to the Chinese acupuncture system. The Indian term for the Qi phenomenon is prana, and meridians are known as nadis. Like in acupuncture, Indian medicine defines 14 major meridians, including three (ida, pingala and shushumuna) of special medical and spiritual importance.

Biophysical Mechanisms of Acupuncture Regulation

Its medical aspects apart, traditional Chinese medicine is heavily imbued with mysticism, and this was one of reasons for bad acceptance of Oriental tradition with Western science. Another reason was that 12 viscera corresponding to 12 meridians do not include the brain and endocrine glands. However, it has been found out over recent decades that the acupuncture system has a close functional relationship with the central nervous system, the endocrine systems, and with peripheral and autonomous nervous systems (1-3). Yet another reason for which TCM was rejected was a lack of its clear anatomical basis. However, recent studies of gap junctions (specific intercellular channels) have shown their high concentration within acupuncture points and meridians (5).

Figure 2 shows a spatial model of a gap junction channel elucidated in a roentgen diffraction study (5). Each cell opposite the junction contributes half of the channel (hemi-channel) which is called connexon. Each connexon is about 1.5 nm in diameter and is formed by hexagonally oriented 7.5 nm-long protein substructures, connexins. Cells are separated in the gap junction only 3.5 nm, as compared to their normal 20 nm spacing.

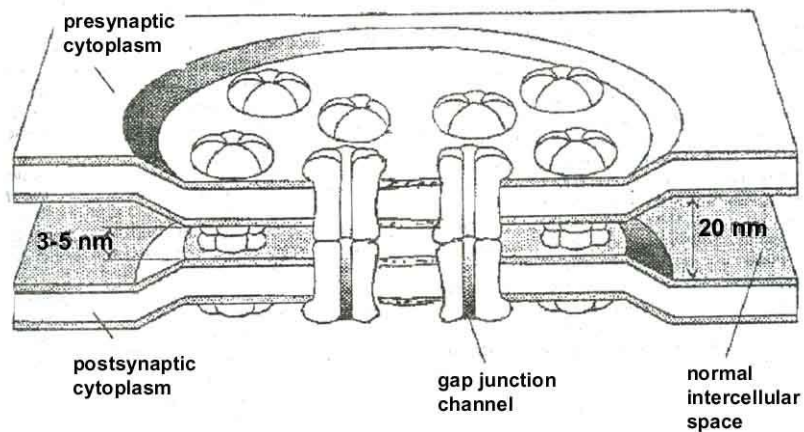


Fig.2. Spatial model of a gap junction

Cell membranes are known to have a crucial role in cell-cell contacts. This type of intercellular communications is evolutionally old. The communications run through gap junctions which transport metabolites and regulating molecules between non-stimulated cells. This is also a pathway of ionic electrical signals between stimulated cells (in heart muscle, smooth muscle, epithelial liver cells, neurons with electrical synapses, acupuncture points and meridians). An evolutionally younger pattern of intercellular communications is mediated by neurochemical transmitters through neurons separated by gaps.

Figure 2 shows that the normal intercellular space of about 20 nm decreases to 3.5 nm at gap junctions of stimulated cells, allowing direct transmission of signals of ionic currents which flow through such channels (electrical synapses). All gap junctions consist of pairs of cylinders (connexons), with one located in a presynaptic and the other in a postsynaptic cell. The cylinders fuse in the gap between two membranes and contact in hemophilic cell-specific interactions, forming a 1.5 nm-wide communication channel between the cytoplasm of the two cells. Each cylindrical connexon is 7.5-nm long and made up of six identical protein substructures which are able to organize into a connexon hemi-channel and recognize their counterpart, thereby producing a transmission channel. In general, this process is very flexible and dependent on the milieu around the cell (5). The transmission capacity of the gap junction can be modulated by intercellular pH, calcium ions, neuromediators, secondary signals and even by tension which alters the conformational state of the connexon like the shutter in a photo camera.

The best organization of cellular structures and ions in terms of chi and acupuncture occurs when electrical conduction of acupuncture points is ten times lower than in adjacent tissues and air ion absorption is higher at acupuncture points.

Ionic acupuncture currents and related electromagnetic fields have ultralow-frequency (ULF) and microwave (ultrahigh-frequency) components, with UHF components modulated by ULF (6,7). The ULF nature of ionic currents in acupuncture channels is suggested by an endorphin mechanism of acupuncture analgesia seen in resonance ULF (4 Hz) stimulation (8). On the other hand, the presence of the UHF component of acupuncture current has been confirmed by efficacy of microwave resonance therapy (50 to 80 GHz frequencies) seen even in very serious diseases (9-11).

A theoretically predicted biophysical model of altered states of consciousness also suggests the ionic nature of acupuncture system QI and the likelihood of its partial displacement from the skin surface in these states. In this context, the displaced part of the ionic acupuncture system would have the function of an "optical" UHF in the neural circuit. This circuit would be modulated by introspective information of brainwave ULF or by visual sensory information perceived in the altered states of consciousness.

With this model, the Qi phenomenon has an ionic interpretation suggesting that positive ions, which have an activating (catabolic, yang) effect, flow mostly in the right circulatory circuit of the acupuncture system, while negative ions, whose effects are inhibitory (anabolic, yin), move mostly in the left circulatory circuit.

Therefore, the effect of acupuncture stimulation may lie in induction of a balanced activity of positive and negative ions in the body as it occurs in health. Another implication of it is importance of the air ion balance (7, 12) and of rhythmical nasal breathing. According to Indian swara yoga (4), it is especially important to inhale a maximum amount of air ions into the two major nadis (the left ida and right pingala), whose entries are in left and right nostrils. This is recommended to be done in the clean fresh air whose certain excess of negative ions (yin) has a beneficial relaxing effect on the body. By implication, the indoor use of air ionizers producing higher amounts of negative ions is recommendable.

Biophysical and Technical Aspects of Microwave Resonance Therapy

Research evidence of Frolich and experimental findings of Nedzvetsky and Cherkasov have prompted designers of microwave resonance therapy (Sitko, Andreyev, Bely and Zhukovsky, the scientists of the former Soviet Union), a hypothesis that the acupuncture system is a dynamic structure with differently located peaks of three-dimensional standing waves which form because of reflection of coherent extremely high frequency (EHF) radiation (about 100 GHz) and Frolich stimulation of molecular substructures in cell membranes and proteins (13). The hypothesis was corroborated by studies which showed that differentiated gap junctions (high density at acupuncture points and meridians) are low-responsive to tension (5).

Based on this evidence, Sitko and co-workers developed the methodology of microwave resonance therapy (MRT) and published it in 1989. They were awarded a gold medal at an international exhibition in Brussels in the same year, and the therapy soon made its worldwide advent (9).

An explanation of efficacy of MRT as a noninvasive and nonmedical modality lies in that some abnormalities cause deformations in the three-dimensional structure of standing waves of electric fields in the extremely high frequency range, which in turn impairs the spatial pattern of the acupuncture system and a shift in its resonance frequency, resulting in disease onset (7).

In the process of therapy, exposure of an acupuncture point to noise radiation EHF returns the stimulated acupuncture system of the patient to the initial normal state by selecting a normal resonance frequency from the broad noise EHF band, and the body biochemically copes with disease (1-3).

Coherent (narrow-band) and broad-band noise EHF generators can be used in therapy (9). Coherent EHF generators with narrow-band frequency modulation are less convenient in the clinical practice, as they require time for resonance frequency selection which should be individualized if therapeutic errors and overdosage are to be avoided. Broad-band UHF generators allow simultaneous stimulation of all possible resonance frequencies, with the body mounting a constant resonance response to a current with a suitable frequency which is varied in the process of therapy.

It has been experimentally shown that in the range of 52 to 78 GHz, the body is resonantly responsive to a frequency change as small as one percent, which presents as changes in EEG and ECG, the heart rate, arterial blood pressure and the respiratory rate (9,10). For EHF generators with a low output power of about 10 mWt, output power density is 0.2 to 5 mWt/sq.cm, which is much below the biologically permissible daily exposure of 10 mWt/sq.cm over eight hours prescribed by standards of the U.S. National Bureau, or 10 mWt/sq.cm. over eight hours stipulated by Russian and Ukrainian national standards (9).

Output power density and the treatment duration much influence the absorbed dose of EHF radiation and MRT effects. Effects of a recommended low therapeutic dosage, usually 20-minute daily treatments which cause a local temperature increase to 38 degree Celsius, are rapid and stimulating. Higher dosages, which induce far higher and harmful temperature elevations, have relaxing and even biodestructive effects (9).

Measurements of succinate dehydrogenase in mitochondria of peripheral lymphocytes have been proposed as a guide in EHF dosage individualization (9,10), given that lymphocyte metabolism may be used as an index in disease grading. It has been proved that the lymphatic system "remembers" the previous health condition, carries information on the current condition and signals abnormalities which can occur with disease progress.

Portability of MRT devices (except for stationary generators) allows their use in settings from households visited by a physician to urgent care to cardiology, orthopedics, surgery and neurology centers and health resorts.

Medical Aspects of MRT

Clinical and cost effectiveness of MRT in 17 clinics of the former Soviet Union has been surveyed in over 10,000 patients with different diseases. Its high effectiveness has been found in 60 to 95 percent of patients, depending on diseases and individual responses (9). The number of microwave resonance treatments varied from five to 20, and was ten in most cases, except for severe conditions requiring a longer therapy. The recovery period was curtailed 1.5- to twofold, and no adverse effects were seen, all suggesting a high clinical and cost effectiveness of MRT.

Experience with MRT shows that the procedure of resonance frequency setting can be associated with local and systemic sensory responses of patients. Only few patients have been reported to lack the responses: 1-3 percent, 4-6 percent, and 0.2 per cent in Kiev, Moscow and Belgrade studies respectively (9-11).

Local responses occurred on 74 percent of patients as warm, heavy, biting, creepy or chilly sensations at the treated point (10). Systemic responses were seen in 97 percent of patients (10). Systemic responses presented as comfort or discomfort in 32 percent of patients. Comfortable responses occurred as tender green and blue color sensations, warmth, somnolence, pleasurable muscle relaxation, lightness in the body, all identifiable as changes in blood pressure, the heart rate and respiratory rate, EEG and ECG. Discomfortable responses were a lack of color sensations or too vivid color sensations and shortness of breath. Discomfort warrants an immediate stop to a microwave resonance treatment or its later resumption with a lower dosage of EHF radiation.

In some patients, positive responses may be followed by transient adverse events seen as the worsening of symptoms. The transient deterioration may be seen at the start of therapy, after two-three treatments or even in the middle of the course. Nevertheless, most of patients report general emotional and physical elation after two or three treatments.

The list of diseases which can be treated with MRT is incomplete and constantly expanding. At present, MRT is used in surgery, traumatology, gastroenterology and orthopedics, in cardiovascular disorders, urology, gynecology, dermatology, pulmonology, upper respiratory diseases, cardiology, neurology and oncology. MRT is contraindicated in the presence of acute abdominal pain associated with surgery-requiring conditions, and during pregnancy and the menstrual cycle. A recommended duration of treating one acupuncture point is ten minutes, and of one daily or alternate-day treatment 20 minutes. An average duration of the MRT course is ten treatments. An interval between repeat courses should make 21 days or better one month. Preventive courses are carried out every six months.

Table 1 sums up our four-year (1993-96) clinical experience with MRT in 497 patients (11). Results are encouraging and confirming the high efficacy of MRT.

Table 1.

Four-year results of MRT in 497 patients in LAW private clinic, Belgrade: 1993-96

Applications	No. of patients	Clinical effects		
		No response	Improvement (under 70%)	Satisfactory (over 70%)
Traumatology	22	-	7	15
Muscle and orthopedic	95	6	11	78
rheumatology	18	-	-	18
knee arthrosis	23	2	-	21
coxarthrosis	8	-	5	3
lumbago	23	4	2	17
spondylosis	13	-	-	5
myalgia	5	-	2	3
pericarditis	5	-	2	3
Urology	5	-	-	5
chronic cystitis	5	-	-	5
Gynecology	2	-	2	-
uterine myoma	2	-	2 ⁺	-
Dermatology	6	-	4	2
neurodermitis	5	-	1	-
alopecia	1	-	1	-
Gastroenterology	24	-	1	23
ulcer	12	-	-	11
gastritis	12	-	-	12
Pulmonology	22	2	3	17
asthma	22	2	3	17
Allergology	4	-	2	2
eczema	2	-	-	-
chronic conjunctivitis	2	-	-	2
Upper respiratory conditions	36	2	4	30
persistent cough	3	-	3	-
chronic sinusitis	21	2	1	18
vasomotor rhinitis	2	-	-	2
chronic tonsillitis	10	-	-	10
Immunodeficiency	8	-	1	7
Angiopathy	7	-	-	7
Neurology	144	7	30	107
infantile cerebral palsy (2 to 5 yr)	4	-	2	2 ⁺⁺
infantile cerebral palsy (7 to 10 yr)	2	-	2 ⁺⁺⁺	-
Neural pain:	138	7	26	105
cephalgia	57	-	13	44
migraine	6	2	1	3
dizziness	3	-	-	3
trigeminal neuritis	3	-	2	1
brachial neuritis	2	-	2	-
basilar artery syndrome	8	-	1	7
cervicobrachial syndrome	4	-	2	2
lumbago and sciatica	28	-	1	27
radiculitis	23	4	2	17
posterior hemiparesis at CVI level	4	-	3	1
Psychiatry	83	-	8	75

Oncology	2	-	2 ^{****}	1
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Notes:

+ Myoma size reduction in both patients

** Patients could walk after ten treatments

*** Patients cannot walk, but muscle spasticity decreased

**** Pain-free for three days

CONCLUSIONS

This paper presents biophysical principles and technical aspects of, and indications and contraindications for microwave resonance therapy, a new modality which is a synthesis of ancient Chinese medical knowledge (reflex therapy, acupressure, acupuncture) and recent major discoveries in biophysics. Treatment of acupuncture points using microwave (extremely high frequency) radiation in the range of 52 to 78 GHz has yielded prominent clinical results in surgery, orthopedics, traumatology, cardiovascular disorders, urology, gynecology, dermatology, gastroenterology, pulmonology, upper respiratory diseases, cardiology, neurology and oncology over the past ten years. MRT is contraindicated only in acute abdominal pain associated with conditions requiring surgery and during pregnancy and the menstrual cycle. The high efficacy of MRT has been confirmed in our clinic. MRT produced a significant improvement in 81.4 percent and moderate improvement in 15.1 per cent of patients. A lack of clinical response was seen only in 3.4 per cent (Table 1).

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