Application electric current of high-frequency in physiotherapy

Methods of physiotherapy in which a high-frequency current is used

Spectrum	LW	MW	SW	USW			
				m	dm	sm	mm
λ	1000m and ≥	1000-100 m	100 -10 m	10-1 m	1-0,1m	10-1 sm	10-1 mm
v	100KHz and ≥	100KHz -3MHz	3 -30 MHz	30-300 MHz	0,3-3 GHz	3-30 GHz	30-300 GHz
The FT methods	Ultra tontherapy	Darsonvalization	Inductotermia	UHF-therapy	DMW-therapy	SMW-therapy	THF-therapy

Darsonvalization

Method of electrotherapy, which is based on application of alternating current of high-frequency, high tension and small strength of current

- **Frequency - 160-400 kHz**
- ***Tension - 10-100 kW***
- ***Strength of current - 10-15 mA***

Darsonvalization

Operating factors:

- **quiet electric digit (discharge)**
- **sparking electric digit**

A leading effect is an oscillator

Darsonvalization

Therapeutic effects:

- vessels tone is normalized
- vein stagnation diminishes
- tissues trofic gets better
- bactericidal and bacteriostatical actions increases
- anaesthetic effects is activated

Darsonvalization

Indications:

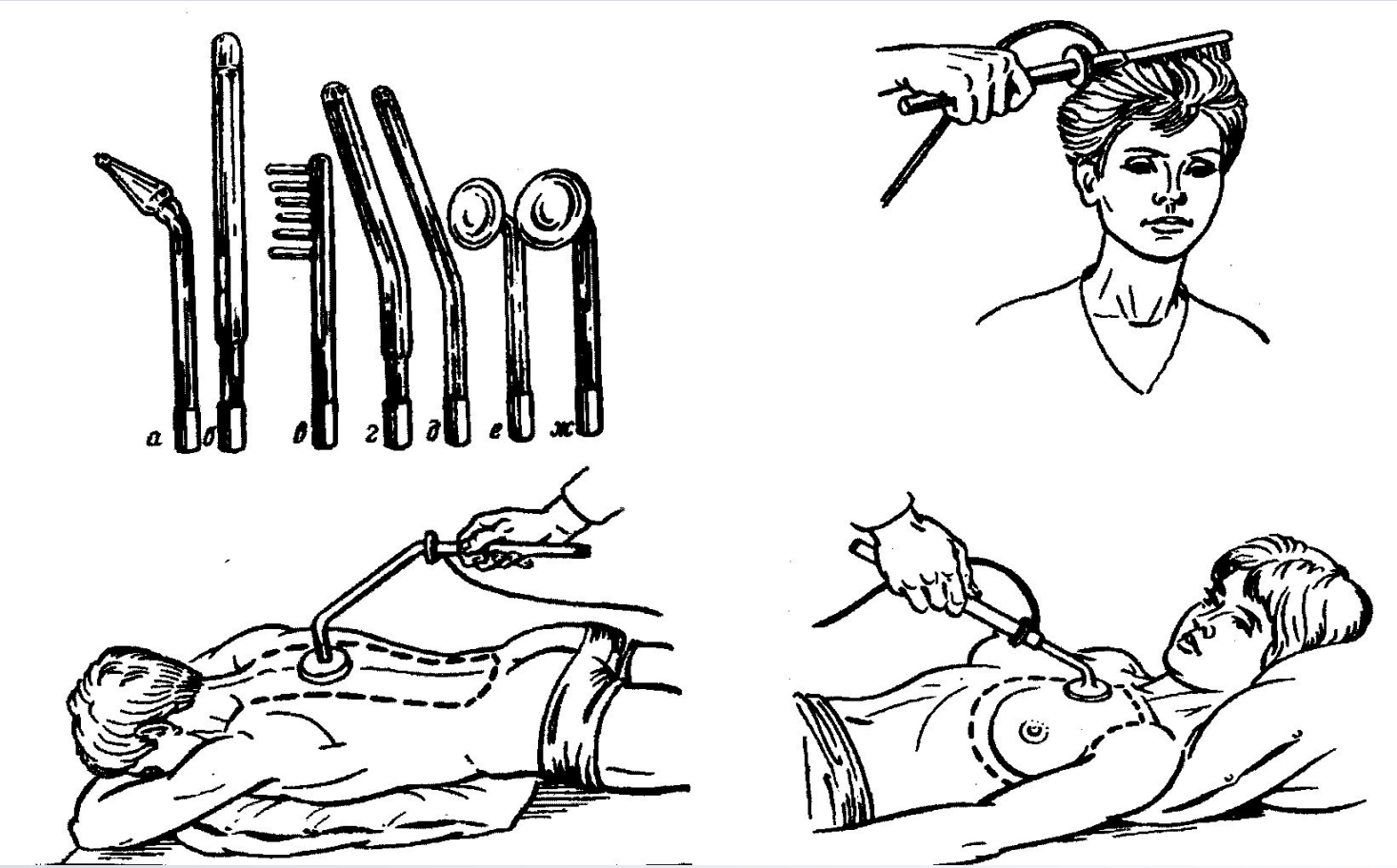
- skins trofic violation, hairs fall;
- parodontosis, gingivitis, glosalgia;
- vasomotorial rinitis, the Reino illness, initial stage of obliterial endarteriitis;
- varicose veins, haemorrhoidal veins dilated;
- paraestesia, migraine;
- wounds which heal over slowly.

Darsonvalization

Contra-indications:

- general;
- acute infectious diseases;
- pregnancy on the second half;
- infarct myocardium (to 6 months);
- hysterical neurosis;
- sensitivity of current.

Darsonvalization



Vacuum glass electrods

Ultratontherapy

Application alternating sinusoidic current of high-frequency, high tension with initial power to 10 WT with the medical purpose

- *Frequency - by 22 kHz*
- *Tension - 4-5 kW*

Ultratontherapy

Operating factor:

- **quiet electric digit**

A leading effect is thermal

Ultratontherapy

Indication:

- acute and chronic inflammatory processes in a nonactive phase;
- pain syndromes (except for contra-indications);
- scars, solders.

Ultratontherapy

Contra-indication:

The same as for darsonvalization

Differences between darsonvalization and ultratontherapy

№	Criteria	Name of method	
		darsonvalization	ultratontherapy
1	Peculiarity of electric current	current of small strength (0,02-15 mA)	Large power (to 10 WT)
2	Currents mode	Impulsive (50 Hz)	Continuous
3	Electric digit types	Quiet electr.digit Sparking electr. digit	Quiet electr. digit
4	Effect in tissues	Mainly oscillator	Mainly thermal
5	Method	Contact, controlled from distance	Contact

Differences between darsonvalization and ultratontherapy

№	Criteria	Name of method	
		darsonvalization	ultratontherapy
6	Peculiarity of action on a skin	Causes the sickly skin irritation (large frequency and tension)	Does not cause the sickly skin irritations (less frequency and tension)
7	Peculiarity of hyperemia	Weak (through the weak current thermal effect)	Strong (through the considerable current thermal effect)
8	Thermal effect in tissues	Weak	Considerable
9	Electrodes amount	8	6

Differences between darsonvalization and ultratontherapy

№	Criteria	Name of method	
		darsonvalization	ultratontherapy
10	Patients	Children after 7 years (it is painfulness method)	Children from the first years of life (absence of painfulness)
11	Indication to application	Illnesses in basis of which lie vascular diseases (the Reino illness, cardialgia, head pain), and also wounds, trophic ulcers	Acute and chronic inflammatory processes, scars, pain syndromes

Inductotermia

inductio is mean to product;

therme – warmly

It is high-frequency variable magnetic field action, which caused warmly production in tissues

Frequency - 13,56 mHz

Inductotermia

A leading effect is thermal

$$Q = K \cdot f^2 \cdot H^2 \cdot g$$

Q – is amount of heat;
K – is the coefficient of proportion;
f – is frequency of current;
H – is tension;
g – is specific conductivity

Inductotermia

Indication:

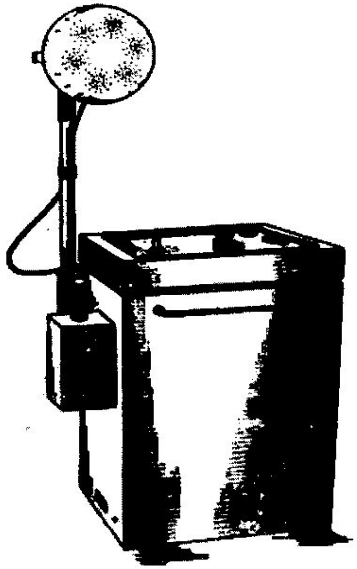
- acute and chronic inflammatory diseases
- breaks of bones
- sclerodermia

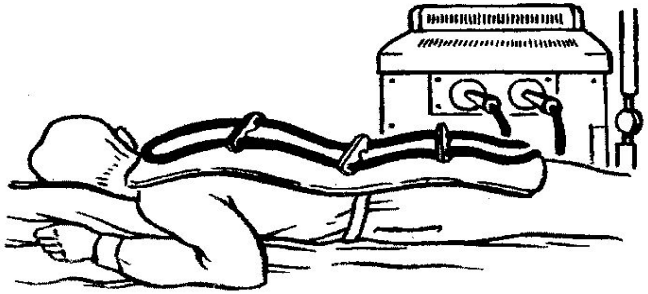
Inductotermia

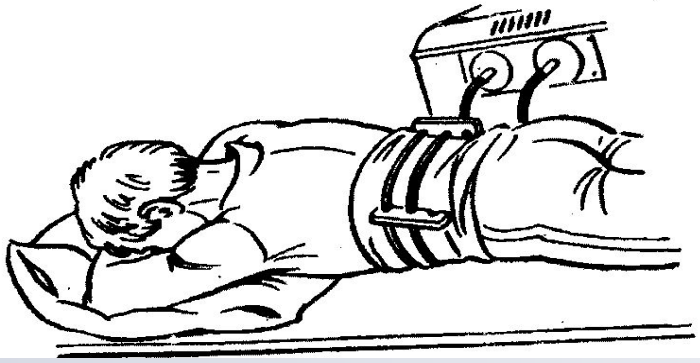
Contra-indication:

- general
- purulent processes
- during 6 months after infarct myocardium
- thyreotocsicosis
- presence of electrostimulators or metallic object in the field of inductor localization

Inductotermia







Inductor-disc, Inductor-cabel

Inductotermia

- Local
- Reflex-segmentary
- General (inductopyrrexia)

UHF-Inductotermia

Influence by the magnetic field of ultra high frequency on patients tissues

- *Frequency - 40,68 Mhz.*
- *The EBC-1 Electrode is an inductor with the adjusted contour.*

UHF-Inductotermia

Indication:

Acute and sub-acute inflammatory diseases, especially, in the face area (antritis, otitis, neuritis of facial nerve)

UHF-Inductotermia

Contra-indication:

The same as for inductotermia

UHF-therapy

Influence by the variable electric field (in a less measure magnetic) of ultrahigh frequency on the patients organism

- *A leading effect is an oscillator*
- *Frequency - 40,68 Mhz*

UHF-therapy

Basic effects:

- activates formation of connecting tissue;
- activates fagocitosis;
- diminishes the tissues edema;
- extends vessels;
- activates the metabolism;
- diminishes pain;
- multiplies the Ca^{++} level in a blood;
- takes off the musculature spasm.

UHF-therapy

Indication:

Acute and chronic inflammatory diseases of internal organs which are accompanied by the edema

UHF-therapy

Contra-indication:

- general
- processes which are accompanied by grow up of connecting tissues (chronic inflammatory processes, pneumosclerosis, pneumofibrosis and other)
- ischemia of the heart with rhythm violation
- hypotensia
- presence of electrostimulators or metallic object in the field of plates localization
- pregnancy

UHF-therapy

Apparats classification after its initial power :

- small power (to 5W) is the ENT apparat (for ENT-organs diseases treatment, panariciy);
- middle power (60-80W) are the UHF -30, UHF -62, UHF -66 apparats(for treatment of thorax, abdominal organs, medium-sized joints diseases);
- large power (350W) are the UHF -300, "Экран-1", "Экран-2" apparats (for treatment of big sized joints diseases)

It is necessary to specify the apparatus trade-mark at procedure setting

Differences between inductotermia and UHF -therapy

№	Criteria of estimation	Inductotermia	UHF- therapy
1.	Operating factor	Variable magnetic field HF(13,56 mHz)	Variable electric field UHF (40,68 mHz)
2.	Effect in tissues	Mainly thermal	Mainly oscillator
3.	Category of illnesses	Chronic inflammatory processes	Acute inflammatory processes with the edema
4.	Amount of plates	1 inductor disk or inductor cable	2 condensators plates

Differences between inductotermia and UHF -therapy

№	Criteria of estimation	Inductotermia	UHF- therapy
5.	Depth of field penetration	5 – 8 sm	15 – 20 sm
6.	Plates placing	Contactive through lightly dress	Distancive on a bald body
7.	Duration of procedure	15-30 min	Not more than 15 min
8.	Initial of apparatus power	250±50 W	Portable 1-100 W, movable ("Экран") 300-400 W

Microwave therapy

Method of electrotherapy, which is based on influencing of high-frequency electromagnetic vibrations with a wave-length from 1 mm to 1 m

- *Frequency - 300-30000 mHz*

Microwave therapy

Indication:

- *joints degenerative-distrophy diseases of extremities and spine*
- *chronic and subacute inflammatory processes*
- *stomach ulcerous illness without propensity to bleeding*
- *obliterial diseases of extremities vessels*
- *infiltrate after operation*

Microwave therapy

Contra-indication:

- general
- thyreotoxicosis
- pregnancy
- tissues edema, caused by local disorders of blood circulation
- metallic objects in tissues
- infarct myocardium and state during 6 months after
- not more than 2 weeks after the renthentherapy course

Differences between DMW, SMW and THF therapies

№	Criteria of estimation	Waves type		
		DMW	SMW	MMW
1.	Name of method	DMW -therapy	SMW -therapy	THF-therapy
2.	Frequency of el.-mag. vibrations	300-3000 mHz	3-30 gHz	30-300 gHz
3.	Length of waves	1-10 dm	1-10 sm	1-10 mm
4.	Absorption by tissues	Weak	Strong	Very strong
5.	Waves fading in tissues	Weak	Strong (in 2 times quickly, than DMW)	Very strong (in 3 quickly, than DMW and SMW)
6.	Depth of penetration in tissues	10-12 sm	5-6 sm	0,2-0,6 mm

Differences between DMW, SMW and THF therapies

№	Criteria of estimation	Waves type		
		DMW	SMW	MMW
7.	Level of waves penetration in tissues	Deep tissues	Skin, subskin and adjoining tissues	Epidermis and reticular layers of skin
8.	Approaching of el-mag. frequency vibrations to frequency of light waves	Weak	Strong	Very strong

Differences between DMW, SMW and THF therapies

№	Criteria of estimation	Waves type		
		DMW	SMW	MMW
9.	Acquisition of light properties (reflection and others like that)	Weak	Strong	Very strong
10.	Level of reflection from tissues	From a skin (to 60 %)	From the border of subskin fat and muscles (to 75 %)	From the superficial layers of skin

Differences between DMW, SMW and THF therapies

№	Criteria of estimation	Waves type		
		DMW	SMW	MMW
11	Formation of standing waves	Not characteristically	Characteristically	Not characteristically
12	Place of heat formation	Evenly in upper and deep tissues	Upper layers of tissues	Skin and adjoining tissues

Differences between DMW, SMW and THF therapies

№	Criteria of estimation	Waves type		
		DMW	SMW	MMW
13	Change of tissues temperature	+4˚ - +6˚ C	+2˚ - +5˚ C	+0,1˚ C
14	Irritation of receptors	The skin receptors do not get irritated, only interoreceptors of muscles, vessels and internal organs	Skin termoreceptors, contact and pain receptors	The skin receptors

Differences between DMW, SMW and THF therapies

№	Criteria of estimation	Waves type		
		DMW	SMW	MMW
15.	Accordance of frequency of el-mag. vibrations with the biorhythms of biological substanses	Strong with amino acid, proteins, linked water	More weak with amino acid, proteins, linked water	Strong with molecules, atoms, DNA
16.	Biophysical and biochemical changes in tissues	Strong	Not strong	Considerable