



Therapy with Stereodynamic Interferential Current – STEREODYNATOR

Remarks and applications

Contents

	Page
What is interference?	2
Why interferential current?	3
Improved effect by means of stereodynamic interferential current	
Medium-frequency stimulation	
Indications	4
Remarks and contraindications	
Application of the electrodes	4/5
Current qualities - therapy programs	6
The strength of the current (intensity)	
Remarks on the treatment of diseases of the musculo-skeletal system - circulatory disorders	7/10

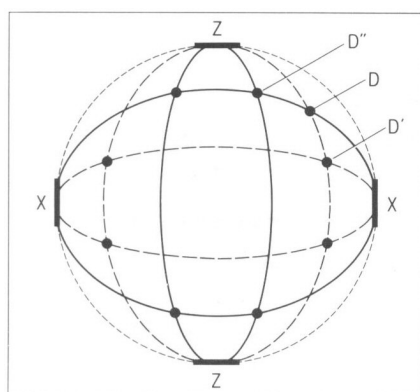


Figure 1 Schematic representation of the two "crossing" electric fields of the classical interferential current technique

Electric fields X

Electric fields Z

At D, the field lines produced by the two currents cross

Shift of the site of stimulation from D to D' or D''

What is interference?

If two electric fields of different frequencies, or out-of-phase medium frequencies cross, the superimposition of the amplitudes in the points of the crossing results in a new frequency -the interference frequency. With the

aid of suitable equipment, this interference frequency can be "located" in the biologically effective range of between 0 and 200 Hz.

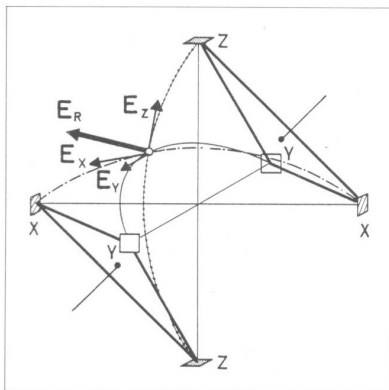


Figure 2 Resulting field strength vector E_R . Complete freedom of movement in and between the planes X, Y, Z.

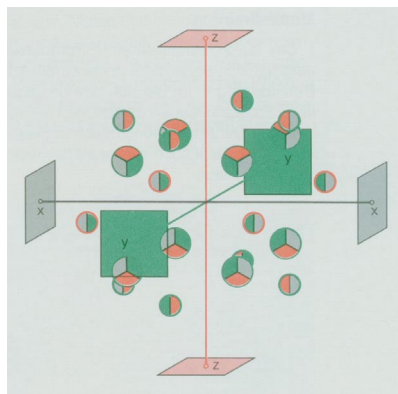




Figure 3 Distribution of the stereodynamic sites of interference (schematic)

-  Two-field interferential current with contributions of equal magnitude from the electric fields, for example, X and Y (in close neighborhood) and small contribution of the electric field Z (in the distant neighborhood).
-  Three-field interferential current with contributions of equal magnitude from X, Y and Z.

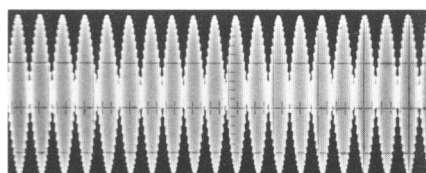


Figure 4 Interference pattern - classical

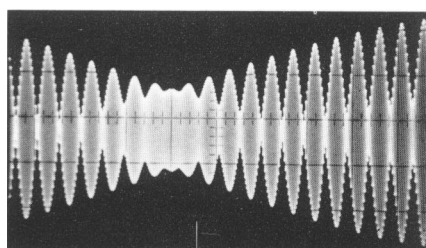


Figure 5 Stereodynamic interference

Why interferential current?

With the single-field classical low-frequency stimulation current technique, the electrical stimuli are developed in the immediate neighborhood of the electrodes, and not within the depth of the body as is frequently required.

With the aid of the two-field medium frequency procedure described above, the desired maximum low-frequency stimulation can be "displaced" out of the immediate vicinity of the electrodes into the depth of the body (Figure 1, stimulus sites D, D', D").

The "depth effect" is enhanced by the fact that the medium frequency of 8 kHz, which is "stimulation-neutral" at the conventional current intensities, encounters in the skin a much smaller resistance than the stimulation frequency of, for example, 50 Hz. Thus, with the medium-frequency technique, considerably higher current intensities can be selected than is possible with directly applied low-frequency currents, without inducing sensory "current stressing".

Improved effect by means of stereodynamic interferential current


Although, with the aid of the two-field interferential current technique, the site of stimulation can be displaced into the depth of the body and, with appropriate equipment, also from D to D' or D", it is not possible to involve all areas of the body within the stimulating effect.

All the areas located outside of the area demarcated by X-Z, are not stimulated, unless the electrodes are repositioned.

If, however, a third field is added to the two existing fields, the resulting field strength vector can "move out of" the area demarcated by X-Z and pass along any spatial direction, that is, can "reach" any structure within the area to be treated (spatial stimulation = stereo stimulation; see Figure 2).

Since, now, three electric fields are interfering, each with the others, the area "flooded" by current manifests

sites of maximal interference amplitudes that vary in their nature. Figure 3 shows, schematically, the interference sites representing equal contributions from two or three fields.

In contrast to the "classical" interference technique (Figure 4), the third electric field brings about an additional change in intensity (Figure 5). In the mode of operation "stereodynamic" =  ...this endogenous dynamism of the stimulation effect is supplemented by a dynamic alternation of the sites of stimulation (stereodynamic stimulation). Thus, its special features are:

- spatial stimulation effect
- multilocal stimulation effect
- intensity dynamism
- stimulation site dynamism

Medium- frequency stimulation

The therapy device can also be switched to provide desired electrotherapy close to the surface of the body but without any sensory stressing of the skin. For this purpose, a medium frequency current circuits of 8 kHz, is already included within the device,

so that an amplitude-modulated, medium-frequency therapeutic current is produced. You can select different modulation frequencies. (3..10 Hz, 10..30 Hz, 30..60 Hz, 100..200 Hz)

Indications

The application of stereodynamic currents has proved successful for the following indications:

1. Diseases of the musculo-skeletal system

Distortions - conditions following dislocations and subluxation - contusions and hematomas - muscular strains and muscular weaknesses - myalgias - myositis - myogelosis (lumbago) - ischemic muscular contractures - achillodynia - arthroses of the joints of the extremities

and the vertebral column - Bechterew's disease - contractures of the joints - meniscus injuries (knee joint) - shoulder-arm syndrome - joint rigidity and pain following fractures - delayed callus formation - Sudeck's dystrophy - epicondylitis - tendopathy.

2. Circulatory diseases

Raynaud's disease - endangiitic and arteriosclerotic circulatory disturbances - varicosis - ulcus cruris varicosum - cold injuries (chilblains).

3. Neuralgia and neuritis

Sciatica syndrome - occipital neuralgia - trigeminal neuralgia - herpes zoster.

4. Muscle activation

(Electro-gymnastics)

5. Muscular tension

(Electro-massage)

Remarks and contraindications

The use of low-frequency stimulation currents, and in particular medium-frequency currents, can lead to serious interference with cardiac pacemaker function. In these cases, such therapy should be carried out only under continuous monitoring of the patient's pulse and ECG (BISPING, 1972). The treatment of pacemaker patients is harmless if the patient's pulse is continuously monitored (IRNICH, 1976).

In animal experiments involving selective stimulation current effects, it was found that endoprostheses and their immediate neighborhood can be electrolytically modified. Observed loosening, however, may also have

been brought about by muscular contractions (EINFELDT, 1977). In the case of medullary nails, a certain endangerment is to be expected, but not in the case of small foreign bodies of approximately spherical shape. An influence arises only when the electric field "reaches" the foreign body. Thus, for example, the legs can be subjected to treatment if the arm contains a foreign body (JANTSCH, 1977). Metal implants are not heated by the effects of stimulation current. At normal therapeutic intensities, the galvanic component is so small that chemical damage need not to be expected (ARNOLD, LANGEHEINE, 1977).

Contraindications

Febrile diseases, tuberculosis, multiple sclerosis, Parkinson's disease, pregnancy, gynecological hemorrhages. Acute local infections or inflammations, for example, furuncles, carbuncles, lymphangitis, thrombophlebitis.

Application of the electrodes

The stereodynamic interferential currents are applied via flexible, star-shaped electrode sets that are attached to the body with appropriate fixing aids, e.g. rubber straps. The electrodes proper - made of black conductive rubber - are embedded in these electrode sets. For bipolar and

monopolar application, normal "classical" stimulation current electrodes are employed.

Suction electrodes, together with their pneumatic and electrical leads, can be adapted directly to the device with optional vacuum unit.



Figure 6 Electrode sets, rubber straps and sponge pockets



Figure 7 Suction electrodes with paper sheets

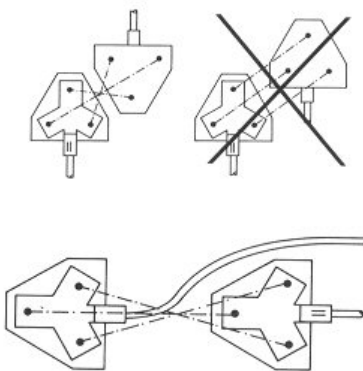


Figure 8 For description see text
"Electrode position"



Figure 9 Arrangement for longitudinal flow of current in a low extremity (dc current)

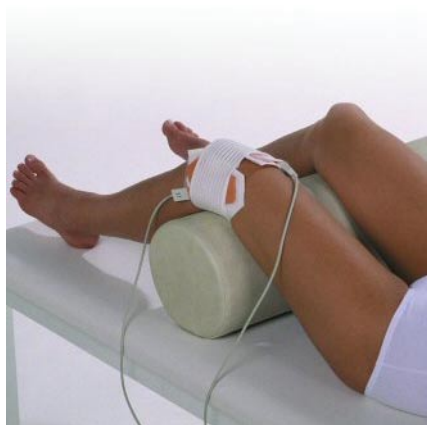


Figure 10 Attachment of the electrode set.

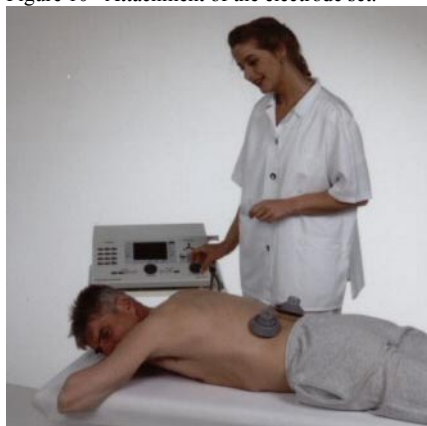


Figure 11 Application of an electrode set to the back

Preparation of the patient

For optimal electrotherapy, the patient, or the part of the body to be treated, should be completely relaxed. For expedience, the patient should be seated or lying in a comfortable position. The joints should be brought into a "medium" position, in which both the flexing and extending muscles can be stimulated.

Each electrode set is placed in its own, well-moistened, pouch, in such a way that the conductive rubber electrodes are facing to the patient.

Note

Before first being used, the factory-new "intermediate" material should be thoroughly rinsed with water!

Electrode position

The sets can be applied directly to the site of pain or on either side of this zone.

Rule:

- If the electrodes are positioned "facing one another", the cable connections must point in the opposite direction (Figure 8 upper left corner)
- If the electrodes are applied in the longitudinal direction, e.g. along the course of a muscle, the cable connections must point in the same direction (Figure 8 lower side)

Only in this arrangement of the electrodes can the current paths cross, thus giving rise to optimal stereo-dynamic stimulation currents.

In special cases, depending upon the application, e.g. in the shoulder-arm syndrome, this general rule can be ignored.


All electrodes must be in good contact with the substrate, since only in this case, an optimal interferential stimulation will be obtained (a visual display in the device facilitates monitoring).

For the single channel currents DF, CP, MF, HV, TENS or GALV (galvanization), the usual stimulation current electrodes must be used (e.g. tin sheet with viscose sponge, etc.). Usually, electrodes of the same size are applied. In general, the cathode is arranged distally to the anode.

Electrode application

The electrodes are preferentially applied with the aid of wide rubber straps fastened by means of a button. Elastic straps with velcro fastener, or sand sacks can also be employed. With the optional vacuum inside the unit, suction electrodes can also be used.

Current qualities -therapy programs

Predominantly, the device is employed for interferential applications in the operating mode  ... (stereo). In the setting "endogenous", the electrical stimuli are produced "in the depth". If one of the two buttons is set to "exogenous", the stimulation beneath

the associated electrode set is enhanced. In the mode MF, surface-proximal amplitude-modulated mediumfrequency stimulation is effected via the corresponding output of the device.

The selection of the current quality depends upon the indication involved.

SEDAT (200Hz)	produces an analgesic effect ("masking effect") and, at the same time, has a "sedating" effect on the sympathetic nerve, thus producing an indirect blood-flow-promoting action when hypertonicity of the vascular walls presents.
MYOMOT (50 Hz)	stimulates the skeletal musculature
VEGETATStim. I (2.5 - 25 Hz)	normalizes the tonus of the autonomic system (current sensation: vibrations)
VEGETATStim. II (10 Hz)	normalizes the tonus of the autonomic system (current sensation: shaking)
VEGETATStim. III (0.1 - 1 Hz)	normalizes the tonus of the autonomic system Frequent combination with SEDAT
Univers. (1 - 200 Hz)	produces rhythmic stimulation and relaxation of the tissue.

VEGETAT Stim. II and III (up to 10 Hz) give rise to a preferential stimulation of the sympathetic nerve, VEGETATStim. I (up to 25 Hz) on the other hand, stimulates the parasympathetic nerve (Lullies). The reason for this is to be found in the difference in the rate of the transmitter substances adrenaline

(sympathetic nerve) and acetyl choline (parasympathetic nerve). The stimulation of one component of the autonomic nervous system brings about a "sedation" of the antagonists, and vice versa (sympathetic nerve \Leftrightarrow parasympathetic nerve).

The current strength (intensity)

The tolerable current intensity depends upon the surface area of the electrodes: the larger the electrode, the greater the current intensity set can be.

The intensity of the current can be continuously adjusted within the range 0 to 100 mA. It is selected to match the desired therapeutic objectives.

In general, the following applies:

Current-sensitive pathological processes and acute stages of a disease require, in the first instance, a low intensity.

The intensity of the current should never be set so high that unpleasant sensory stimulation effects result. In contrast to the settings employed with the classical current of Bernard, in numerous indications (e.g. muscular strains, muscle training, muscle tension), stimulation should be "supraliminal", that is, contractions should be induced. Where required, the intensity should be readjusted when, for example, the desired effect

(e.g. "vibration") should lessen during the course of the treatment. When a "motor-exciting" frequency spectrum is "run through", permanent contractions of the muscles should not occur.

Duration of treatment

Sensitive pathological conditions and acute stages of a disease require only a short period of treatment, less current-sensitive and chronic diseases a more lengthy period of treatment (up to 15 min. maximum).

Number of treatments

This depends upon the nature of the disease and its stage. Three to six; maximum 20 individual treatments for each therapeutic series.

Interval between the individual treatments

Treatment is most expediently given daily. The interval between treatments should never be more than 1 day.

Diseases of the musculo-skeletal system

Distortions, conditions following luxations and subluxations

These conditions are accompanied by a marked strain (over stretching) of the joint capsule and the ligaments, most frequently of the ankle, the knee, the wrist and the finger joints. Clinically, the patient presents with pain, functional weakness, swellings around the joint, and other symptoms.

Treatment:

The electrodes should "enclose" the joint: transversal current flow. Initially, the current quality SEDAT (200 Hz) is employed. After the third treatment, VEGETAT Stim. III (0.1 - 1 Hz) is added. Treatments are carried out every day for 10 to 15 minutes.

An improvement may be seen already after the first session, that is, pain is ameliorated, swellings are diminished and mobility improved.

Contusions, hematomas

To avoid complications, the treatment should be initiated as early as possible. The electrodes are applied over trigger points (pain spots), e.g. on the joint. In case of hematomas, the stereodynamic current should be suitable for "supporting the muscle pump" ' Treatment is carried out every day or every second day for 10 to 15 minutes on each occasion.

Muscle strains, muscular fatigue pains, myalgia, myositis, myogeloses (lumbago)

Treatment brings about the amelioration of pain, the regression of the hematoma, and helps speed up the regeneration of the muscle fibers. The electrodes are positioned along the course of the muscle and on either side of the affected musculature. The current qualities MYOMOT (50 Hz) or VEGETAT Stim. I (2.5 - 25 Hz) are employed alternatingly, each every other day.

VEGETAT Stim. III (0,1 - 1 Hz) serves to improve vegetative tonus. Treatment is given every day for 10 to 15 minutes. Number of treatments: 3 to 10.

Ischemic muscular contractures, achillodynia, tendopathy

The electrodes are positioned along the course of the muscle to be treated. In case of achillodynia, on either side of the Achilles tendon. To promote the bloodflow, the current quality SEDAT (200 Hz) is employed. A training of the skeletal musculature is achieved by using current quality MYOMOT (50 Hz). Treatment is carried out every day for 10 to 15 minutes, a total of 6 to 10 treatment sessions are given.

Arthrosis of the joints of the limbs, arthrosis of the vertebral column, spondylarthritis ankylopoietica (Bechterew's disease)

The earlier the treatment is initiated, the greater the possibility of either stopping or slowing down the dystrophicdegenerative process. The aim of treatment is to ameliorate pain and improve the circulation of the blood. Here, stereodynamic interferential current is particularly effective as a result of improving the bloodflow and metabolism within the tissue, while, at the same time, producing an analgetic effect.

The star-shaped electrode sets are applied on either side of the arthritic joint, or in paravertebral position. From the 1st to 3rd treatment, the current quality SEDAT (200 Hz) is employed. Thereafter, treatment is effected with the setting MYOMOT (50 Hz) or VEGETAT Stim. I (2.5 - 25 Hz).

Treatments are carried out for 10 to 20 minutes, either daily or every second day. Up to 12 treatment sessions and more may be needed!

Considered overall, the use of stereodynamic interferential currents represents a very effective electrotherapeutic procedure for these conditions, too.



Figure 12 Treatment of lumbago with electrodes set in position



Figure 13 Treatment of lumbago using suction electrodes



Figures 14 Suction electrodes used to treat arthrosis of the thoracic vertebral column

Joint contractures

With this conservative form of treatment excellent results are reported (Nikolova/ Troeva). The favorable effect is brought about by the fact that the current quality VEGETAT Stim. I (2.5 - 25 Hz) stimulates the nerves, gives rise to muscle contractions, improves the trophism (nutrition) of the tissue and also has an analgetic effect, the latter being particularly marked with the current quality SEDAT (200 Hz).

An improvement is often obtained after 10 to 15 treatment sessions. Frequently, a painful rigidity of the joint is also very rapidly eliminated, for example in contractures of the shoulder and elbow joints. Not infrequently, the contracture can be observed to improve already during the first session (Nikolova/Troeva). The electrodes are applied on either side of the joint.

Meniscus injuries (knee joint)

The incarcerated meniscus is repositioned and thereafter the leg, in the extended position, is splinted under traction. At the same time, or when the splint has been removed, treatment with stereodynamic interferential current is given: current quality SEDAT (200 Hz) and VEGETAT Stim. III (0.1 - 1 Hz). Treatment sessions are daily or every second day, and are of ten minutes duration. The electrodes are applied on either side of the knee joint. Note: Duration of treatment is often shortened by stimulation current therapy to such an extent that it is no longer necessary to immobilize the joint.

Periarthritis humero-scapularis (shoulder-arm syndrome)

In a large percentage of patients, this condition occurs between the ages of 30 and 50. Thus, the question of rapid and successful therapy is of considerable importance from the economic point of view, too. With this indication, good results can be achieved with the stereodynamic interferential currents. The electrodes are applied along the course of the muscle and in the region of the shoulder joint. Current qualities are SEDAT (200 Hz) for 1 to 3 treatments and VEGETAT Stim. III (0.1 - 1 Hz) for the remaining treatment sessions.

The treatment time is about 10 minutes, applied daily. A total of 10 to 15 treatment sessions are required. Treatment has an analgetic effect and also improves the blood circulation within the tissues. Amelioration of pain, improvement in mobility and undisturbed sleep are often observed within the first three treatment sessions.

Pseudoarthrosis, delayed formation of callus

A serious complication of fractures is the development of a pseudoarthrosis. In the majority of cases it can be attributed to local factors that hinder the formation of bone.

Treatment with stimulation current is usually carried out postoperatively, but not when metal implants are present in the "pathological field".

The electrodes are applied to the extremity affected. The recommended current qualities are SEDAT (200 Hz) and VEGETAT Stim. II (10 Hz): Treatment is carried out daily for 15 minutes at a time; the number of treatment sessions is 15 to 20 and even more.

In the treatment of delayed callus formation, both conservative and surgical procedures are employed. However, a surgical procedure is considered only when conservative therapy has proved unsuccessful. Treatment with interferential current can produce good results even when other methods have proved unsuccessful.

The star-shaped electrode sets are applied in such a manner that the site of the fracture is located in the "interference zone". If the patient is wearing a plaster, openings are made in the latter to accommodate the electrodes. The current qualities suitable for treatment are SEDAT (200 Hz) and VEGETAT Stim. III (0.1 - 1 Hz). Treatment is given every second day and the number of treatment sessions is 10 to 15 and more.

SUDECK's dystrophy

The electrodes are positioned in such a manner that the affected area is located within the interference zone. In this way, the entire extremity is involved. The treatment is effected with current quality SEDAT (200 Hz) at a current intensity of 10 to 20 mA, depending upon the individual sensitivity of the patient, who should experience a pleasant sensation of massage.



Figure 15 Treatment of a contracture affecting the shoulder joint



Figure 16 Suction electrodes applied to the knee joint

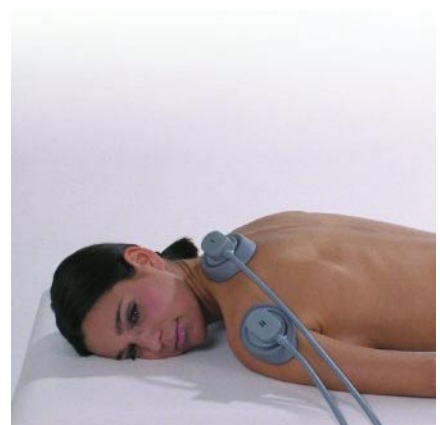


Figure 17 Shoulder-arm syndrome: the electrodes are applied along the course of the musculature and in the region of the shoulder joint



Figure 18 Application of star electrode



Figure 19 Electrodes applied for treatment of epicondylitis



Figure 20 Application of the star-shaped electrodes and fixation with elastic straps



Figure 21 Electrodes applied along the right leg

Treatment should be given either every day or every other day, for 10 to 15 minutes. The number of treatment sessions is 12.

The curative effect of the stereodynamic current with the current quality SEDAT (200 Hz) is based on the fact that SEDAT has a "sedative" effect on the sympathetic nerve and also an analgetic effect.

The elimination of vascular spasm is followed by active hyperemia, an opening of vascular anastomoses, an augmentation of the lymph flow, and other effects. Nikolova-Troeva has reported very good results in 170 treated patients, and considers the question of treatment for Sudeck's dystrophy to have been answered.

Circulatory disturbances

(Raynaud's disease)

Treatment with stereodynamic currents results in no side-effects when carried out using the conventional star-shaped electrode sets at the site of the disease. "Stellate blockades" effected with the aid of stimulation current, are not suitable for patients suffering from circulatory dysregulation.

The electrodes are applied on both sides, for example, of the palm of the hand. The current quality employed is SEDAT (200 Hz). Treatment is for 15 minutes, given every second day; 12 to 20 treatment sessions may be required.

Endangiitic and arteriosclerotic circulatory disturbances

The main objective of the physiotherapeutic treatment is in combating the spastic process, in the improvement of the bloodflow in the limbs, and in a maximum delay in the progression of the disease.

The stereodynamic interferential current is suitable for patients in the first and second stages of the disease. The electrodes are applied along the extremity; a paravertebral stimulation in the appropriate segment, can also be attempted. From the first to third treatment session, the current quality SEDAT (200 Hz) is employed alone, thereafter, the additional current quality -MYOMOT (50 HZ). Treatment is carried out daily or every second day for 15 minutes on each

Epicondylitis

Treatment is applied to the elbow joint, employing the current quality SEDAT (200 Hz) (for the first 3 treatments). Thereafter, current quality MYOMOT (50 Hz) or VEGETAT Stim. I (2.5 - 25 Hz). The number of treatment sessions is 12.

Stimulation current therapy can be combined with heat therapy (e.g. microwaves), in such a manner that the two modalities are employed alternately, each on every second day.

occasion. The number of treatment sessions is 15 to 20. When therapy is successful, in consequence of an improvement in bloodflow, the patient experiences an amelioration of pain and warming of the extremity already after the first treatment session. The painfree distance that the patient can walk is increased. Reports have been published on objective findings.

Varicose complex of symptoms

Under the conservative methods of treatment - in particular in the initial stages - the physical -therapeutic factors occupy an important position. For treatment with interferential current, two star-shaped electrode sets are applied in the region of the extremity.

The current qualities employed are SEDAT (200 Hz), VEGETAT Stim. I, II and MYOMOT (50 Hz). Treatment is carried out daily or every second day for a maximum of 15 minutes in each case. 10 to 12 treatment sessions are required.

Under this form of treatment, pain is ameliorated, and the trophic disturbances also regress. Two to three courses of treatment a year are recommended.

Neuralgia and neuritis

In numerous cases, affections of the peripheral nerves are a worthwhile area of indication for the application of stereodynamic interferential current. This also applies to those cases that are considered to present an underlying rheumatic condition. If the neuralgia or

neuritis is merely a symptom of another Trigeminal neuralgia disease, in many cases treatment may be expected to be successful only if, at the same time, the underlying disease is also treated and, as far as this is possible, eliminated. Thus, in the development of painful conditions affecting the nerves, toxic (e.g. intoxications), infectious (e.g. septicemia) and general metabolic and dietary anomalies (e.g. diabetes) can be causally involved.

Sciatica syndrome

In the first instance, stimulation current therapy is particularly suitable for cases of so-called "genuine" sciatica. Frequently, osteochondritic changes the region of the lumbar vertebral column have a "predisposing" effect.

Since the sciatica syndrome can be triggered by a variety of different etiological factors, a diagnosis that is as accurate as possible is a necessity. Locally, the electrodes are applied over the Vallex's points and over the pain points. A paravertebral positioning is also possible: On either side of the fifth lumbar vertebra and the first to third sacral vertebra. The current qualities employed are the SEDAT (200 Hz) and VEGETAT Stim. III (0.1 - 1 Hz). Treatment is carried out for five minutes, every day, at a low level of intensity.

Occipital neuralgia

Here, the electrode sets are applied on either side of the 2nd and 3rd cervical vertebrae. Also, the electrodes can be positioned on either side of the points of exit of the nerves, at the hairline. Here, too, the current qualities SEDAT (200 Hz) and VEGETAT Stim. III (0.1 - 1 Hz) are employed. Only low levels of intensity are used for a daily treatment time of 5 minutes.

Trigeminal neuralgia

With patience, genuine trigeminal neuralgia can be effectively treated. In case of the symptomatic form of trigeminal neuralgia, a lasting effect may be expected only when the underlying disease is treated, e.g. dental processes, empyema in the sinuses, neoplasms, diabetes, syphilis (3rd branch!), malaria and influenza (1st branch).

The star-shaped electrode sets are applied over the nerve branches. The current quality SEDAT (200 Hz) is used at a low level of intensity and short treatment time (5 minutes).

Herpes zoster

With daily treatment, the analgetic effect is achieved with a high degree of certainty. The electrodes are applied on either side of the vesicles. The recommended current quality is SEDAT (200 Hz) and VEGETAT Stim. III (0.1 - 1 Hz). Treatment is given daily for a period of 10 minutes.

Muscle training

For strengthening of innervated, atrophied muscles. The electrodes are applied along the course of the muscle or on either side (transregional) of the affected area. Current qualities: SEDAT and VEGETAT Stim. I (to III) applied daily for an average treatment period of 15 minutes.

Muscular tension

Relaxation of hyperactive muscles. The electrodes are applied along the course of the muscle or on either side (transregional) of the area involved. Recommended current qualities: SEDAT (200 Hz) and VEGETAT Stim. III (0.1 to 1 Hz) applied daily for an average of 15 minutes.



Figure 22 Treatment of herpes zoster

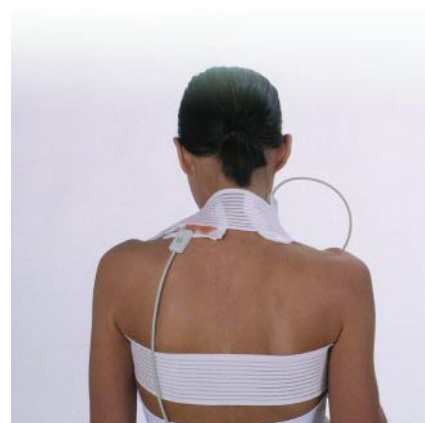


Figure 23 The starshaped electrodes are held in position by a wide elastic strap

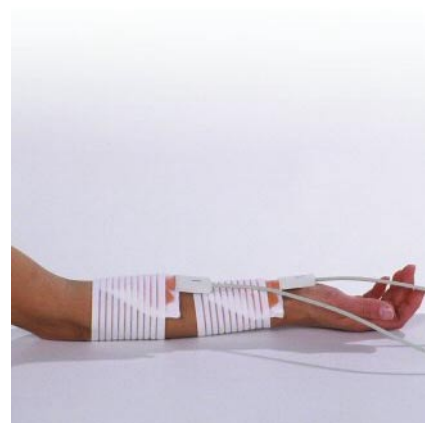


Bild 24 Application for muscle training

Notes:

