

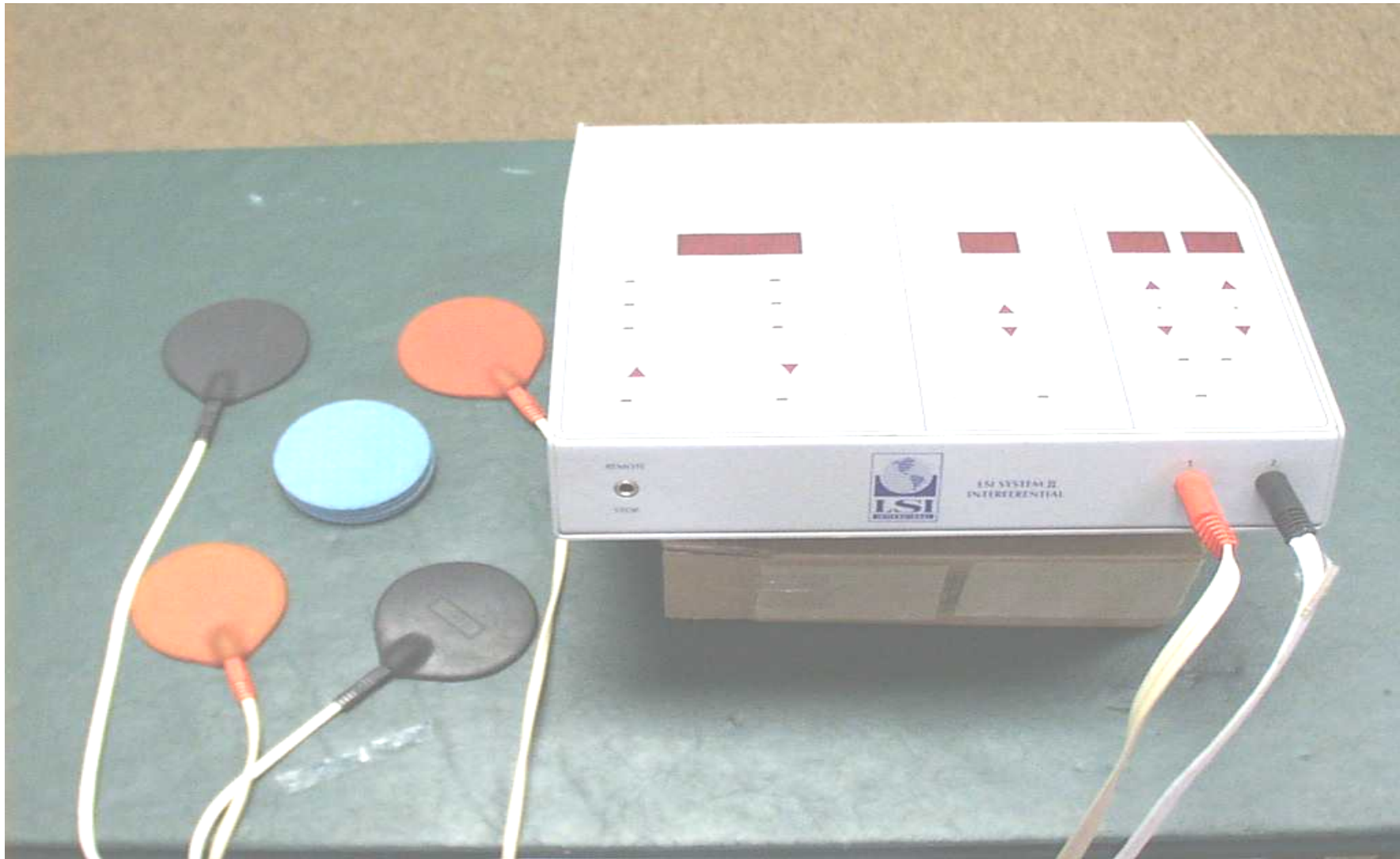
MEDIUM FREQUENCY CURRENTS INTERFERENTIAL CURRENT

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INTERFERENTIAL CURRENT

- Also called as Nemec's current after the name of Ho Nemec (an Austrian scientists).
- The name Interferential current stems from the concept of two currents interfering with each other.
- This becomes readily apparent when one views the four electrodes that are necessary to produce the standard interferential effect in a patient²

INTERFERENTIAL THERAPY



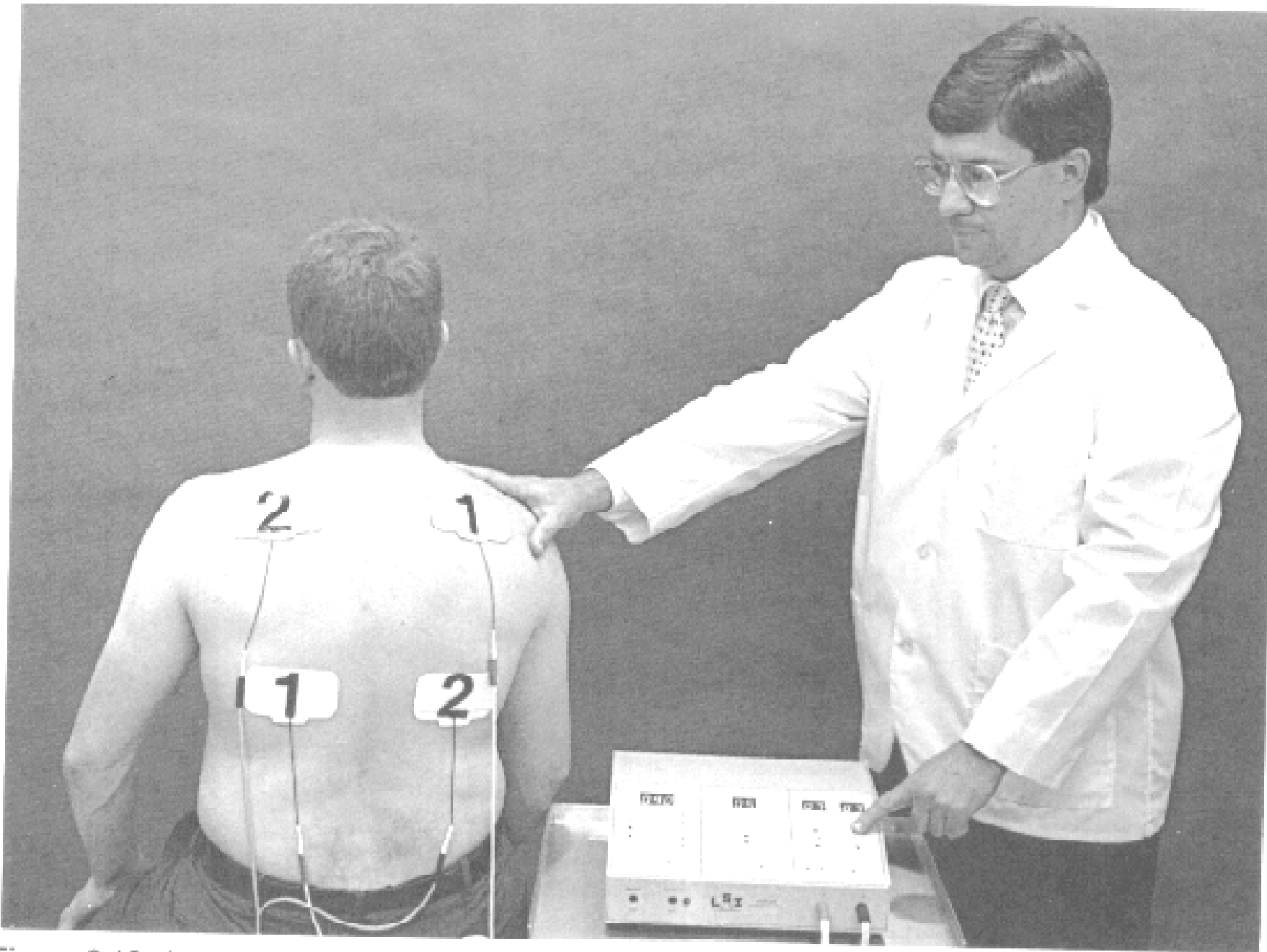


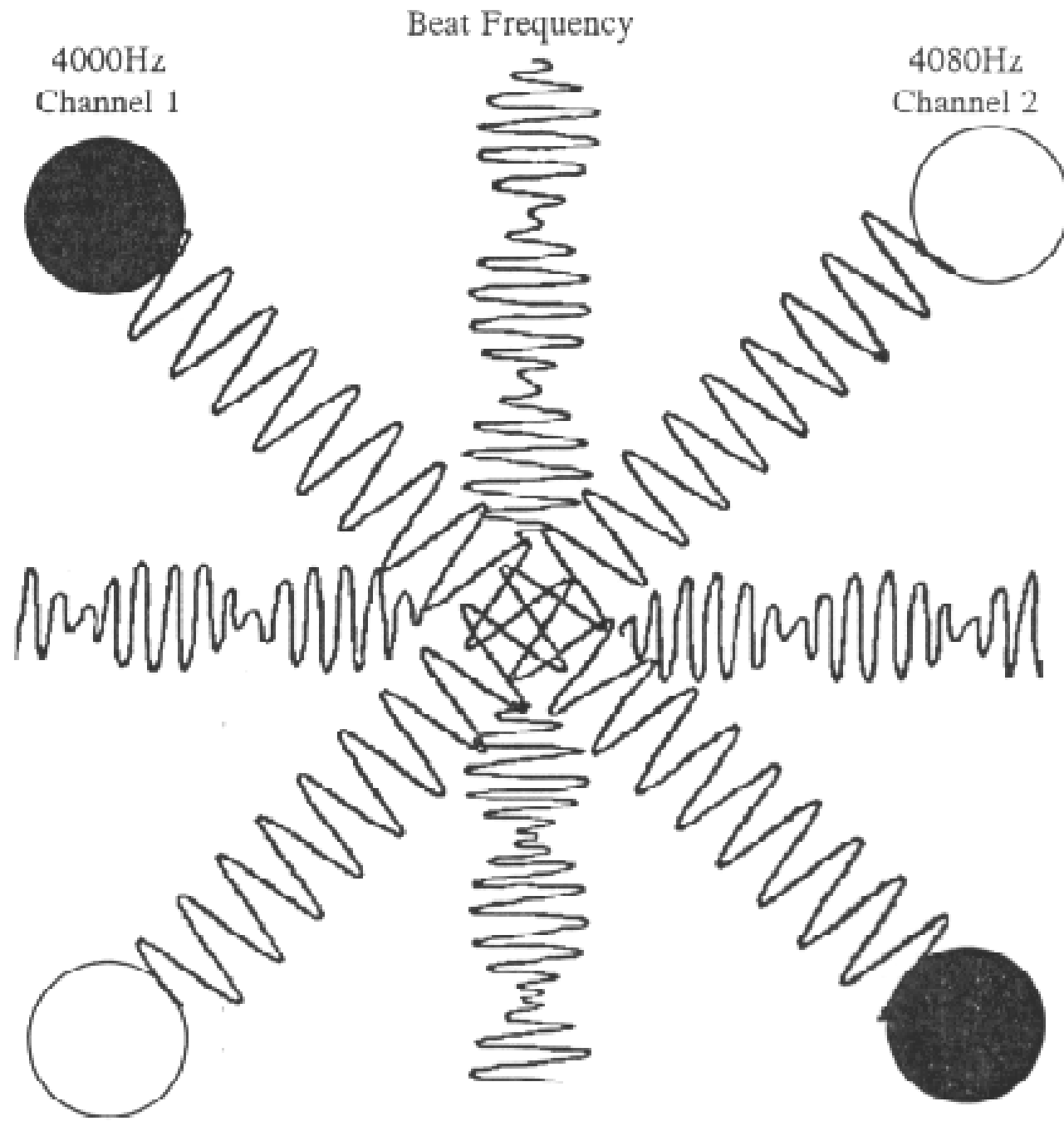
Figure 9.13. Application of interferential therapy to the thoracic region of the back (photo courtesy of LSI International).

INTERFERENTIAL CURRENT

- In the interferential current two medium frequency currents are used to produce low frequency current effect.
- Since direct application of **low frequency faradic current** results in pain due to high impedance of tissues, so to have low frequency affect two medium frequency currents are used.
- Out of these two medium frequency currents, one current is usually of **4000Hz** because there is **minimum impedance generated** by tissue against this frequency. The other current may be varied accordingly

INTERFERENTIAL THERAPY (IFT)

- The interferential therapy depends upon the **principle of inferential effect** of two medium frequency currents crossing the patients tissues. The interface is produced by two currents in the tissue is called **BEAT FREQUENCY**.
- E.g. let us take the medium frequency currents, current in circuit A=4000 Hz and circuit B=3900. where these two currents are applied to tissues at the point where the **current cross over**, a new beat frequency is set up whose amplitude is modulated and the **frequency of new current is called beat frequency (interferential current)** and that is 100 Hz.



INTERFERENTIAL THERAPY IFT

- **By varying the frequency** of second channel relative to the constant frequency of first, this possible to produce a wide range of beat frequencies deep in patient tissues, **thus it is possible to produce any desired frequency in the range of 1-250Hz by varying the frequency difference of carrier currents.**
- One of the major advantages of use of IFT is that the affect are produced where they are required without un-necessary or uncomfortable skin stimulation.

INTERFERENTIAL THERAPY

- The advantage of IFT is that it can be used for pain relief as well as muscle stimulation (pain relief through pain control theory and release of endorphins and enkephalines).
- Another advantage is that patient **can not be given higher doses** to produce desired effects as in low frequency current therapy like faradic stimulator.
- The skin resistance offered to the 4000cycles/sec is very low than the resistance offered to the low frequency current such as faradic current.

INTERFERENTIAL THERAPY

PRE-MODULATED BIPOLAR

- It is possible to deliver I.F. currents to a patient using two, instead of the conventional four electrodes.
- In this system, the two currents are “mixed” in the machine **OR** interferential current is generated inside the equipment and delivered to the patient via two electrodes (**premodulated**).

INTERFERENTIAL THERAPY PRE-MODULATED BIPOLAR

- **Premodulated bipolar therapy** helps to reduce pain and increase range of motion.
- In some cases, it provides an effective **substitute for quadrapolar** treatment especially when **treating small areas** of the body where four electrodes cannot be placed.

INTERFERENTIAL THERAPY TREATMENT DURATION

- The average treatment time for most applications being 20 to 30 minutes.
- On the first treatment session, it is wiser to halve this, in order to ensure that there is no abnormal response from the patient.

INTERFERENTIAL THERAPY TREATMENT DURATION

- However, if the overall treatment program has been **carefully designed** and delivered , then good results should be expected fairly quickly.
- IFT. like other forms of electrotherapy, are meant to be used as an adjunct to other forms of treatment.
- In most cases, six to ten sessions of I.F.T together with other measures should produce considerable improvement in the

INTERFERENTIAL THERAPY

- There is no point in continuing with a technique which appears to be having no effect.
- If the patient's condition is unchanged after one or two treatments, then the situation needs re-assessment.

INTERFERENTIAL THERAPY

PHYSIOLOGICAL effects

- **Pain relief both acute and chronic conditions**
- **re-education, stimulation and strengthening of muscle.**
- **Reduction of edema**
- **improvement of circulation**
- **General facilitation of healing**

INTERFERENTIAL THERAPY CONTRAINDICATIONS

- Pacemakers
- Thrombosis
- Cardiac Conditions
- Bacterial Infections
- Malignancy

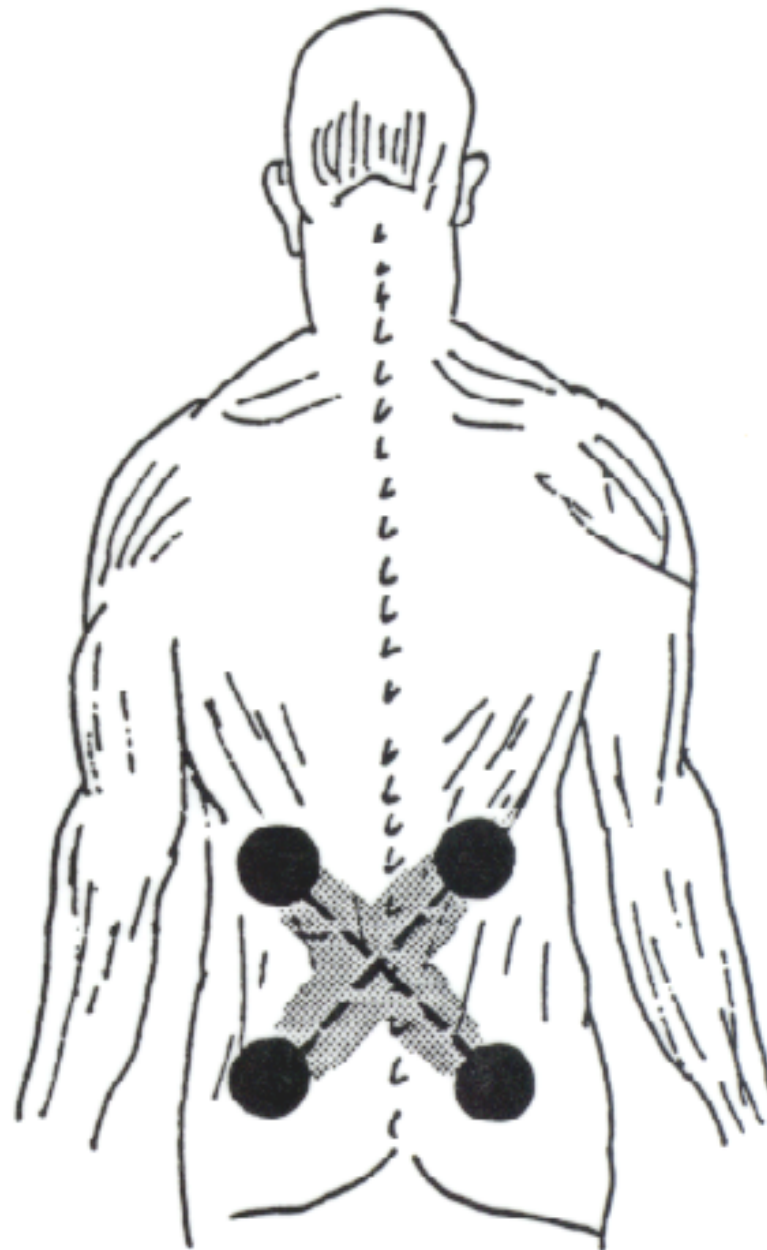
PRECAUTIONS:

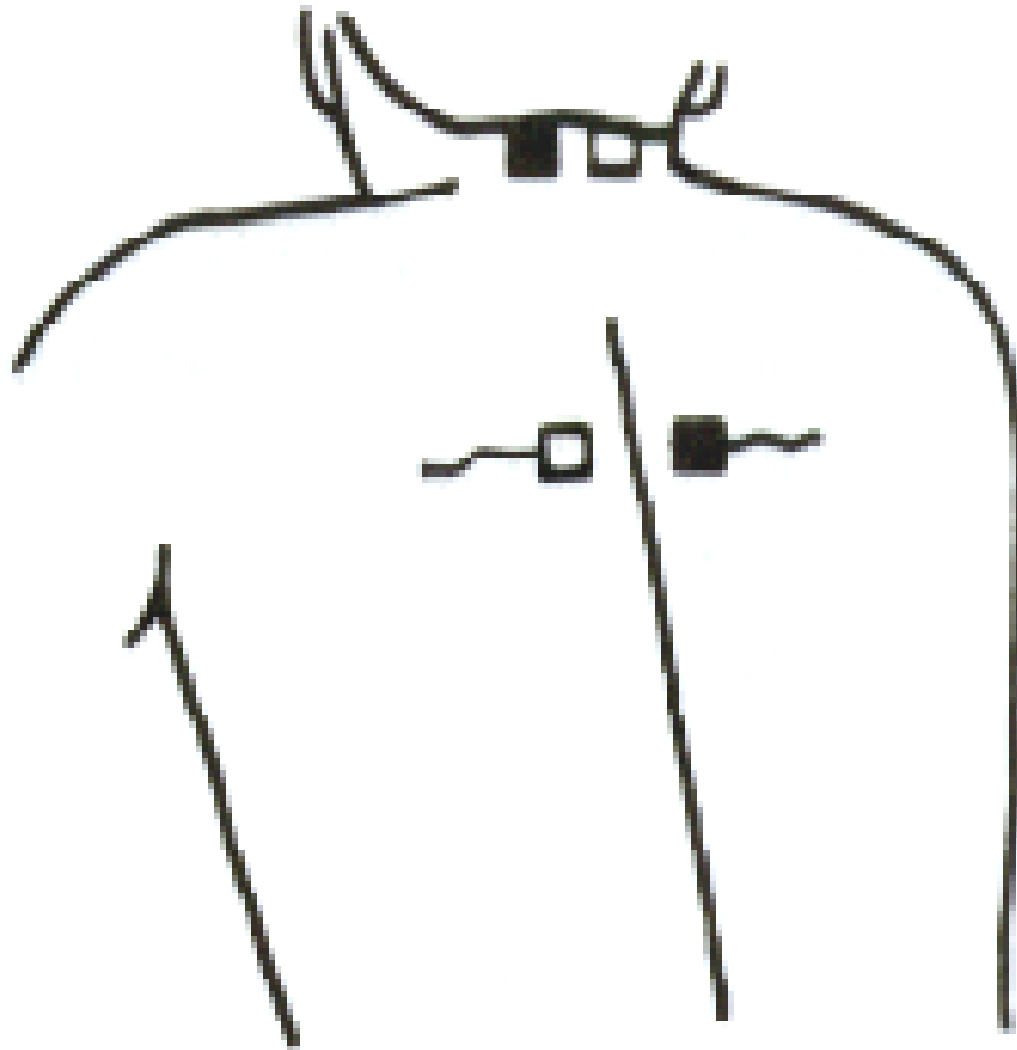
- Pregnancy
- Implants of any electrical nature/metal implants
- Skin diseases



IVD syndrome

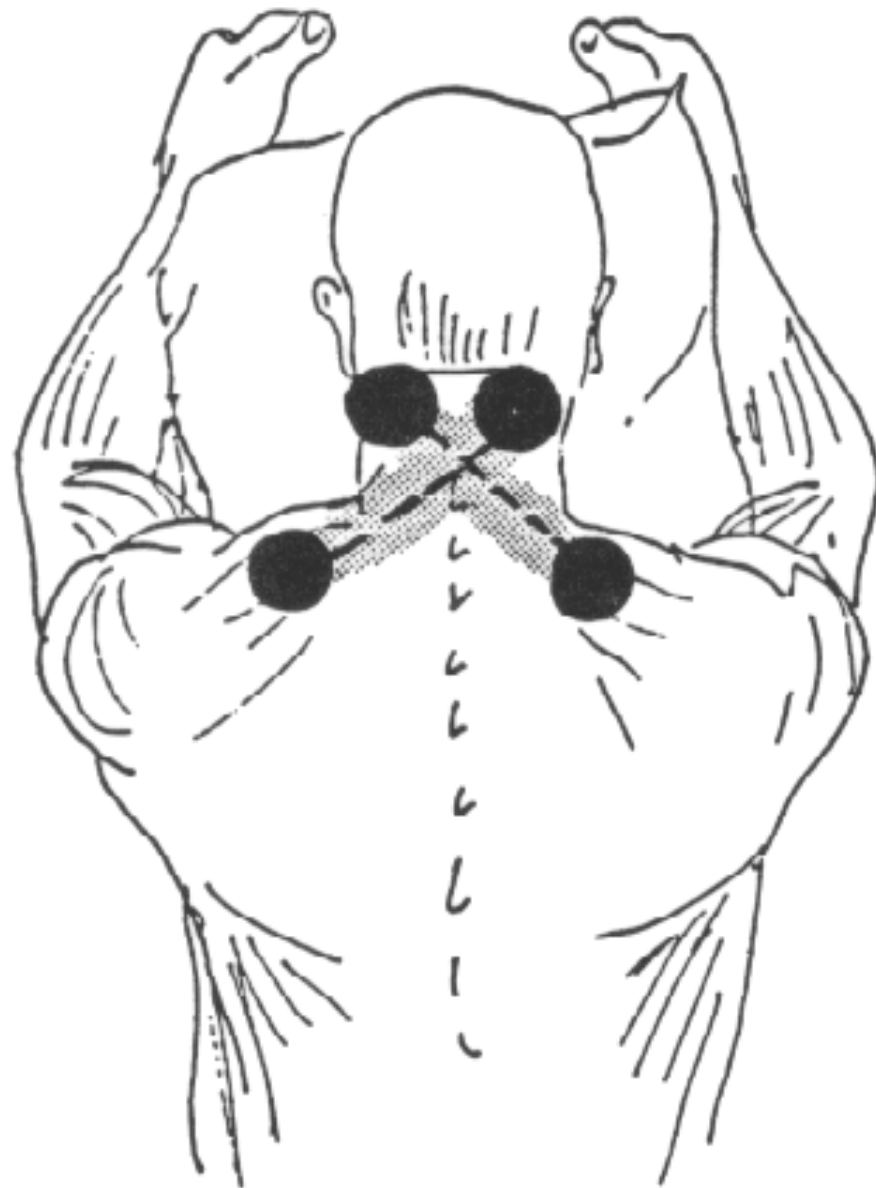
LUMBAR PAIN



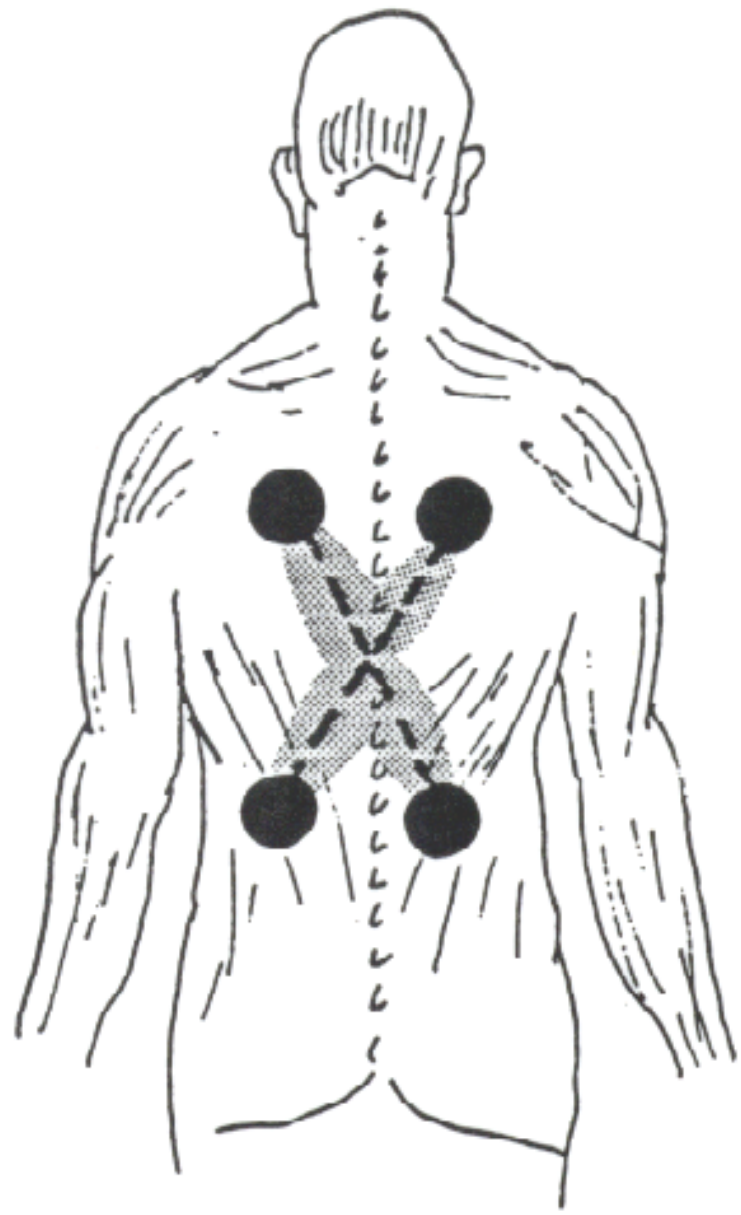


Cervical spondylosis

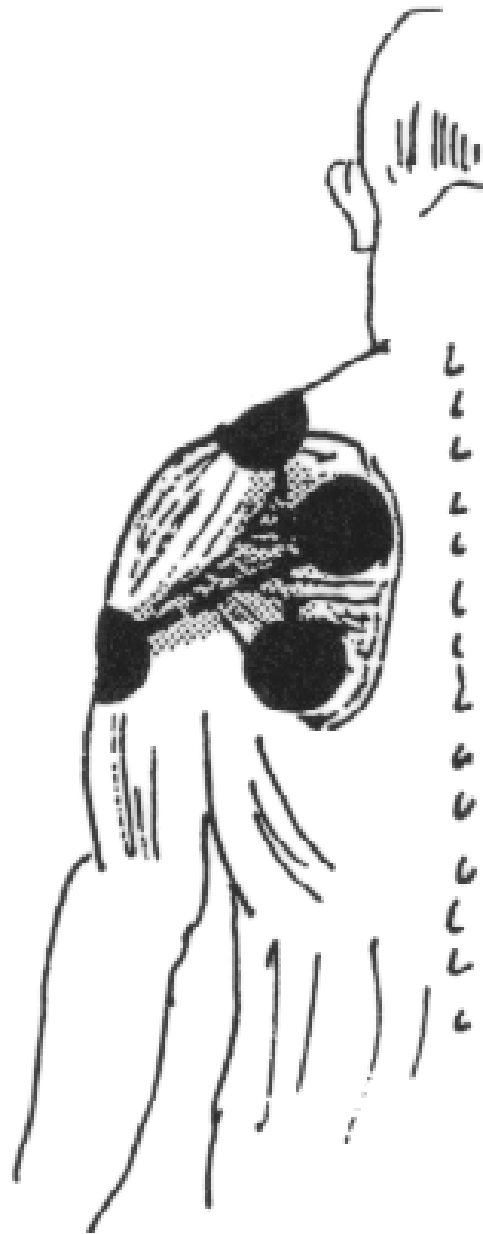
CERVICAL PAIN



THORACIC PAIN



SHOULDER



RUSSIAN CURRENTS

- This class of current generators was developed in Canada and the United States after the Russian scientist Yadou M. Kots presented a seminar on the use of **EMS to augment strength gain**.
- The stimulators developed after this presentation were termed “Russian Current”.

RUSSIAN CURRENTS

- Evenly alternating currents with a frequency 2500 Hz
- The stimulators have evolved and presently deliver a medium frequency of 2000 to 10,000 Hz polyphasic evenly alternating wave form.
- **The pulse can be varied/pulse duration from 50 to 250 m-sec;**
- **The Phase duration will be one half of the pulse duration, or 25 to 125 m-sec.**

RUSSIAN CURRENTS

- There are two basic waveforms: a sine wave and a square wave cycle with a fixed intra-pulse interval.
- The sine wave is produced in a burst mode that has a 50 percent duty cycle

RUSSIAN CURRENTS

- According to strength - duration curve data, to obtain the same stimulation effect as the duration of the stimulus decreases, the intensity must be increased.
- **The intensity associated with this duration of current could be considered as painful.**
- These are applied in series of separate bursts i. e. polyphasic AC wave form. To make this intensity of current tolerable, it is generated in 50-burst-per-second envelopes with an interburst interval of 10 m-sec.

RUSSIAN CURRENTS

- This slightly reduces the total current but allows enough of a peak current intensity to stimulate muscle very well.
- These bursts reduce the total amount of current given to patient thus increase patients tolerance.
- The **other factor** affecting patient tolerance is the **affect of frequency on patient tissues.**
- Higher frequency current reduces the resistance to current flow again making this type of wave form comfortable to patient so patient can tolerate with higher intensities.

RUSSIAN CURRENTS

- As the intensity increases, more motor nerves are stimulated, increasing the magnitude of the contraction.
- Because it is a fast oscillating AC current, as soon as the nerve repolarizes it is stimulated again, producing a current that will maximally summate muscle contraction.

RUSSIAN CURRENTS

- The frequency (bursts per second) is also a variable that can be controlled.
- This would make the muscle respond with a twitch rather than a gradually increasing mechanical contraction.
- Gradually increasing the number of bursts interrupts the mechanical relaxation cycle of the muscle and causes more shortening to take place.

RUSSIAN STIMULATION SUMMARY

- When an **electrical stimulation** is **applied** to muscle or nerve tissue, the result will be tissue membrane **depolarization**, provided that the current has the appropriate intensity, duration, and waveform to reach the tissue's excitability threshold.

RUSSIAN STIMULATION SUMMARY

- Muscle contraction will change according to changes in current.
- As the **frequency** of the electrical stimulus **increases**, the muscle will develop more tension as a result of the summation of the contraction of the muscle fiber through **progressive mechanical shortening**.

RUSSIAN STIMULATION SUMMARY

- **Increases in intensity** spreads the current over a larger area and increases the number of motor units activated by the current.
- **Increases in the duration** of the current also will cause more motor units to be activated.

RUSSIAN STIMULATION INDICATIONS

- Chronic back pain
- Post-injury muscle atrophy and/or wasting
- Post-casting
- Muscle spasms

RUSSIAN STIMULATION SUMMARY

- Electrically stimulated muscle contractions are used clinically to:
 1. Help with muscle re-education
 2. Muscle contraction for muscle pumping action
 3. Reduction of swelling
 4. Prevention or retardation of atrophy

RUSSIAN STIMULATION SUMMARY

5. Muscle strengthening
6. Increasing range of motion in tight joints.