



## COMPEX ELECTROSTIMULATION A COMPLEMENTARY TRAINING TECHNIQUE

Compared to the numerous gadgets other ‘fake’ products to lose weight sold by dream sellers worldwide, neuro-electrical muscle stimulation (NEMS) is a serious technology developed and used by athletes concerned with improving their performance. Until recently, experience with electrical muscle stimulation (EMS) was limited to the treatments of atrophied muscles after an accident and EMS treatments for injured athletes by the physiotherapists or in recovery medical centers. Now, this technique is being extended to the training of healthy muscles for improved performance.

First of all it’s important to clearly identify the role of electricity. Electricity is not a magical flow that improves the muscle tissue. Contrary to common wisdom, the electricity used in the electrical stimulation process has no intrinsically beneficial effect on our muscles. The truth is that the process of electrostimulation stimulates the muscle via the motor nerve. This is most efficient and effective for two reasons. First, electrical stimulation of a motor neuron requires much less current than would be needed for direct stimulation of the muscle fiber and, second, the surface excitation effect achieved by using the nerve to distribute the current to all muscle fibers transmits the flow deep into the muscle.

Electricity acts on the muscle by provoking muscle work and the muscle progress is nothing but the result of that work. The electrical pulses excite the motor nerve, which transmits to the muscle the order to respond mechanically. These pulses must be prepared to pass through the skin without getting deformed and arrive practically “clean” to specifically excite, without producing burning or electrical pain. Though each current pulse corresponds to an elementary work order, the muscle fibers responding to this order do a muscle response (a work unit).

The number of working fibers, meaning the amount of progressing fibers, depends on the power of the pulse. Powerful pulses are needed in order to work the maximum number of fibers and get the overcompensation phenomenon on the highest possible percentage of muscle fibers. To achieve this result, an efficient electrostimulation must produce very powerful contractions. Normally, when we talk about powerful electrical pulses, we think of electrical danger and pain. So an innovative solution was required to provide powerful pulses and at the same time, comfort, with no electrical pain (burning, electrical discharges, etc.). Only a product using a sophisticated technology, along with high quality and accurate electronic components, can respond to the double challenge of power and comfort.



Having the quality electronics able to give an order to make the maximum number of muscle fibers work is not the only condition. It is also necessary to control the nature and the amount of work imposed on the fibers through stimulation. For example, the work done by the quadriceps of a sprinter is not the same work performed by the quadriceps of a marathon runner!

The physiology of the contraction and the muscle effort gives very precise information about the function of the different types of muscle fibers (slow, fast, intermediates, very fast, etc.).

The different working regimes corresponding to the particular types of muscle performance are also known in a very detailed way. Trials on animals and human beings have established the correspondence between the frequency of the repetition of the pulses and the nature of the work obtained (strength, explosive strength, light or active endurance, resistance). The different programs and, within them, the different levels, correspond to the differences of nature and quantity of muscle work. By adapting the pulse frequencies, the contraction, rest duration and the total time of the ESM sessions, we get different working regimes and therefore different muscle trainings.

### **The Compex Sport**

An EMS device, like the Compex Sport, which meets the requirements described above, provides an extremely powerful means for improving muscle performance. In fact, thanks to its different stimulation programs, one can impose exactly the required nature and quantity of stimulation for specific sport disciplines.

With this product one can:

- Increase and improve the muscle recovery after a competition or an intense training session;
- Impose a considerable amount of work to the muscles, not limited by the mental and general physical fatigue;
- Recruit an amount of muscle fibers bigger than the one obtained by voluntary contractions;
- Improve the proprioceptive control;
- Modify the fibers' typology;
- Impose some beneficial work that the fibers can not do with a voluntary contraction;
- Improve the muscle elasticity
- Increase the resistance;
- Increase the endurance;
- Increase the strength
- Develop the explosive strength;
- Have a much better and faster warm-up

The training possibilities with EMS depend on the type of programs one can find:

- Strength,
- Explosive strength,
- Resistance,
- Endurance,
- Potentiation,
- Active Recovery

➤ **Strength Programs**

Classical programs of muscle reinforcement consist of tetanic contractions of the fast fibers alternating with long active rest periods. These programs are meant to improve the muscle strength and are recommended for the majority of sports where an increase in strength will improve the performance. For instance, they are often used in skiing and mountain biking, as a muscle training complement or even instead of the active muscle work out. These programs can be used during the season to reduce the general fatigue induced by the active muscle work out.

➤ **Explosive Strength Programs**

These programs are different from the classic strength programs, since they allow a supra-tetanic of the fast fibers. They are conceived to increase the explosivity of the strength and they are mainly useful for sports using enormous strength and velocity (jumps, sprints, throws, etc.). They are extremely beneficial since they impose activity regimes to the muscle fibers that usually can only be obtained in a voluntary way with terrific and maximum strength efforts, which are traumatic for the body.

➤ **Resistance Programs**

The resistance programs are composed of relatively long tetanic contractions and quite short active rest periods. With this, the stimulated muscles get a large quantity, as well as, a high intensity of work to be taken until the limit of their glycolytic metabolism. If, in the voluntary training, we wanted to achieve comparable levels, we would have to do physically and mentally exhaustive trainings. The resistance programs allow the athlete to replace grueling training sessions or go beyond what could be achieved in the resistance trainings.

➤ **Endurance Programs**

These are long programs with medium intensity efforts, but with a large amount of work imposed on the slow fiber of the stimulated muscles. The different levels offer great precision to progressively increase the working intensity. They give a complement of endurance training to most sports in which a good level of  $VO_2\text{max}$  is necessary. They also may allow the reduction in total duration of endurance training sessions and may, perhaps, reduce the need for the number of long runs, which could reduce the osteo-tendinosis trauma, which is often a consequence of these long runs.



➤ **Potential**

This program is not used to train the muscles; instead it is used as a super warm-up after the normal one. It is based on the physiological mechanism (not widely) known as “twitch potentiation”. A muscle with potentiated fibers releases greater velocity and reaches its maximum strength more easily and rapidly. It is primarily used before sprinting, jumping, and throwing. Used shortly before a football, basketball, hockey, volleyball, or baseball player starts to play; it enables the athlete to compete at peak performance immediately after using briefly before an event.

➤ **Active Recovery**

This program is particularly efficient and appreciated by all the athletes. It is designed to speed recovery of the muscles after a strenuous workout or competition. It consists of a low stimulation frequency regime, without tetanic contractions. The frequencies progressively decrease automatically allowing for optimum recovery by accelerating the elimination of lactic acid without adding to the general fatigue that usually accompanies voluntary efforts. This program provides “massage like” pulses that increase blood circulation, and then provoke an endorphin analgesic effect resulting in a very intense muscle relaxation, so you feel better faster – and can resume training more quickly.

This is much more than a simple means to mitigate the muscle inactivity of an athlete prevented from training due to an injury!

The integration of ESM in a training program is not a substitute for the necessary training regime of any sport practice, but this technique, already used at the very high level, is now becoming a real training complement for all competing athletes.

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The FDA has cleared Compex for the following 6 indications:

- ❖ Increased Muscle Strength/Density
- ❖ Increased Muscle Size
- ❖ Improved Endurance (VO<sub>2</sub> max)
- ❖ Improved Explosive Strength (Velocity and Strength)
- ❖ Increased Speed of Muscle Recovery
- ❖ Ability to Warm-up Muscles

