

## **Short and long-term training effects on strength-related diagnostic parameters from mechanical and electrical stimulation**

(Speicher, U. / Nowak, S. / Schmithüsen J. / Kleinöder, H. / Mester, J., German Sport University Cologne 2008; published in "medical sports network" 04/2007, among others.)

### **Aim of study**

The goal of the present study was to compare classic strength training methods with dynamic whole body EMS with regard to their effects on strength and speed.

### **Methodology**

80 sports students were randomized into equal parts into classic training groups for hypertrophy, maximum strength, quickness and muscular endurance, the modern procedure for whole body EMS and vibration, as well as the two mixed groups, whole body EMS/hypertrophy and vibration/hypertrophy. The classic training groups worked on the leg curl and leg extension musculature on (Gym80) machines in the respective groups in 3 series with various additional weights (30-90%, 3-15 repetitions). The EMS groups executed side steps and knee bends without additional weights (load/interval 6 s/4 s, pulse frequency 85 Hz, pulse width 350  $\mu$ s, bipolar rectangular pulse (60% intensity). Standardization was via visual biofeedback. The training took place twice a week over a period of 4 weeks. Entry and exit tests were carried out on strength diagnostic machines before and after the training as well as after a two-week regeneration phase. The dynamics were measured by means of performance (strength x speed) with 40% and 60% additional load at various angles.

### **Results**

All types of strength training were able to improve maximum performance significantly. Maximum strength improved the most, 16%, within the hypertrophy group, followed by 9-10% for EMS. Only the EMS groups showed significant improvement in speed. The measured speed performance improved by about 30% – significantly more than by classic methods (16-18%). This is apparently due to EMS's direct control of fast-twitch muscle fibers.

Mixed training designs such as EMS and classic hypertrophy training show the typical changes that result from the two training stimuli (a maximum 7 % growth in strength and 12% improvement in performance).

Combinations of classic and modern training procedures could thus open up new, promising configurations of stimuli. Long-term effects of whole body EMS must in particular be emphasized. The greatest boosts in performance appear after a two-week period of regeneration.

### **Conclusion**

Compared with various types of training to boost strength and speed, dynamic whole body EMS training with miha bodytec has been shown to be a highly effective training method. Whole body EMS was the sole form of training able to improve maximum sports performance in speed of movement. In addition, pronounced long-term effects are opening up new possibilities in training periodization. An carefully dosed amount of whole body EMS together with the dynamic execution of movement represents a promising combination for strength and speed training.