

## Electrical Muscle Stimulation: Highly Charged Workout or Hair-raising Experience?

*Advertisements for Electrical Muscle Stimulation (EMS) machines, a common fixture of in-flight magazines and late-night TV, suggest that a few sessions are all one needs to achieve a sculpted, rock-hard body. Not so, say researchers at the University of Wisconsin, La Crosse, who were commissioned by the American Council on Exercise to investigate the validity of these claims.*

**E**lectrical muscle stimulation (EMS) has been a mainstay of physical therapy practice for many years as a means of rehabilitating immobilized muscles following an injury or surgery. It was first popularized as a potential training technique in the early '70s as word spread that Russian and other Eastern Bloc athletes were making huge gains in muscle strength by using EMS in conjunction with their regular training regimens. Recently, the benefits of EMS have been more along the "get fit quick" lines, with many manufacturers claiming their products will build rock hard abs or firm the flab on your buttocks and thighs while you work at your computer or watch TV. Results without effort. What could be more appealing?

### A Shock to the System

A research team at the University of Wisconsin, La Crosse, led by Dr. John Porcari, recruited 29 college-aged, apparently healthy volunteers to test the effectiveness of EMS in promoting weight and fat loss, increasing strength

and improving overall appearance. Seventeen subjects were placed in the EMS group, while 12 were placed in the control group. (Researchers anticipated a greater drop-out rate among the EMS group due to the potential discomfort of the stimulation; however, this was not the case.)

Subjects' weight, body fat, body size (i.e., measurements) and strength were measured prior to beginning the study. Subjects were also photographed from the front, side and back while wearing swimsuits. Using a 10-point scale, one of the researchers reviewed and graded the photographs of the subjects for firmness and tone.

Subjects in both groups underwent electrical stimulation three times per week for eight weeks. The machines used by the control group were altered so as not to deliver any electrical current. The Body Shapers, Intl., EMS machine (Model BM1012BI), widely available on the Internet and in numerous magazines, was purchased for this purpose. [Editors Note: The purpose of this study was to determine the effectiveness of EMS itself, not simply this particular brand of stimulator.]

The following muscles were targeted:

- bilateral biceps
- triceps
- quadriceps
- hamstrings
- abdominals

Applying the electrodes proved difficult and time-consuming. Researchers fashioned custom-sewn lycra sleeves to fit the subjects' upper arm and thigh areas. All subjects adhered to a prescribed protocol of stimulation and adjusted the amplitude of each session to the maximum tolerable level. Both the frequency and length of contractions were increased over the eight-week period according to the manufacturer's recommendations.

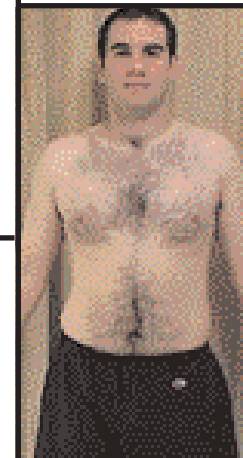
### Not-so-Shocking Results

After eight weeks of "training" using EMS, subjects experienced no significant changes in weight, body-fat percentage, strength or overall appearance. Not only was EMS ineffective, it was painful, too. To achieve a necessary stimulus, the machines would have to be cranked up to a level beyond what most people can tolerate (think hand in light socket while stand-

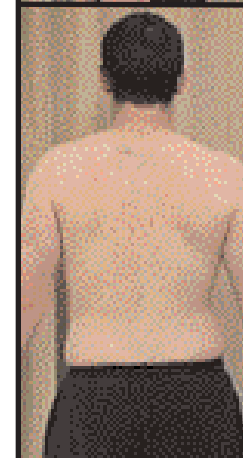
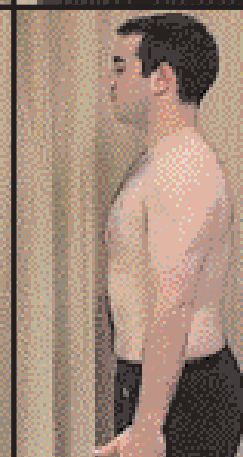
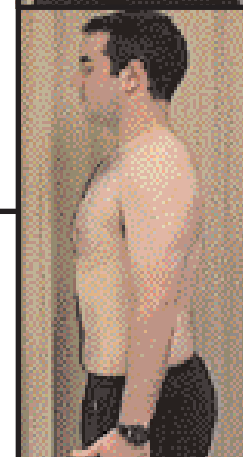
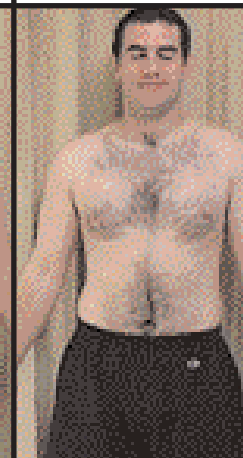
ing in water). Some subjects also experienced some disturbing side-effects—one woman was unable to put her arms down every time the stimulator delivered its shock. It was also time-consuming. Not only did sessions last 45 minutes, but in the time it took to attach the electrodes one could easily have completed an effective cardio or strength workout. The model used in this study cost upwards of \$500, which would probably be better spent on a gym membership, a piece of home exercise equipment or time with a personal trainer.

**Electrical muscle stimulation, which is used to stimulate specific muscles by channeling electrical impulses into the body via wire connections and rubber pads, has proven effective in helping to speed the rehabilitation process and to reduce atrophy in individuals confined to a bed. However, to date, there is no research to suggest that it will help people lose weight or reduce body fat.**

Before  
EMS



After  
EMS



EMS machine

## Better Equipment, Better Results?

**T**here is some evidence that slight improvements in strength can be seen when higher quality EMS machines are used. For example, we reported on a Utah State University, Logan, study a few years ago that focused on the strength benefits of EMS. As in our study, subjects were divided into a control group, which received no treatment, and a treatment group, which received approximately two dozen 30-minute treatments over an eight-week period. The rectus abdominus, the quadriceps and the gluteus maximus/hamstring muscles were targeted, with each group receiving 10 minutes of stimulation per session. Anthropometric measurements, taken pre- and post-treatment, included body weight, body-fat percentage, girth measurements, isometric abdominal strength and dynamic hip strength. Results showed no significant differences in weight, body fat or girth measurements. Abdominal and hip strength, however, improved dramatically when compared to the control group.

However, as lead researcher Julianne Abedroth-Smith noted at the time, "EMS may strengthen muscles to a point, but probably will not help [individuals] lose weight, lose fat, or change their basic body dimensions.

And Dr. Porcari adds that "any potential strength benefits are likely to be isometric and, therefore, probably have little practical significance or carryover benefit in the real world. People need to realize these units are going to provide very little health benefit as compared to aerobic exercise or a regular resistance training program."

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