



The Benefits of EMS on Metabolism

These data show that the Contour MX9 electrical muscle stimulator (EMS) can significantly increase energy expenditure in both men and women.

– Craig E. Broeder, Ph.D. FACSM, Dimitria Vandarakis, MS, Amanda Salacinski, Ph.D., Steve Mauk, BS

Introduction

Previous thermographic body heat sensor data has suggested 5-minutes of the Contour EMS abdominal activation increased body heat more than if that same person did 50 sit-ups in 5-minutes. These results suggest that the Contour MX9 EMS unit increases a person’s energy expenditure while being used.

Unlike voluntary exercise, which is dependent on a person’s ability to sustain a muscle contraction at a given force to activate a muscle group completely, EMS muscle activation completely stimulates a group of muscles once the proper muscle activation level is set. As a

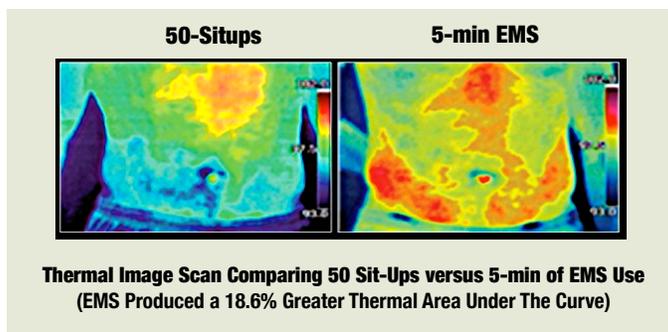
result, unlike voluntary muscle activity, EMS muscle activation has the potential to induce a higher repeatable quality muscle contraction beyond what a person could normally do; especially, as a muscle starts to

conducted a highly controlled study to determine if the Contour MX9 EMS system could indeed significantly increase a person’s energy expenditure while using the Contour MX9 EMS system. This

FDA claims approval research studies.

The Study

Thirty-eight subjects (males=19; females n=19) ages 18 to 45 years old participated. Each subject performed the following items; a pretesting orientation, consent form explanation, a health and physical activity questionnaire, a standardized food frequency questionnaire, a body composition assessment, a free-living physical activity assessment, a graded exercise treadmill test for the determination of each person’s aerobic fitness level, a practice energy expenditure measurement trial and EMS accommodation training, and



fatigue. Recently, researchers at Exercising Nutritionally, LLC and Northern Illinois University

study was independently monitored by LibraMedical who develops and monitors

two standardized energy expenditure trials with and without the Contour MX9 EMS. The energy expenditure trials with and without EMS were performed in duplicate on all subjects to assure accurate data collection and account for day-to-day subject variability.

EMS Accommodation Period and RMR Measurements

Prior to starting the primary energy expenditure measurements with and without the Contour MX9 EMS trials, each subject was familiarized with the testing process. The Contour MX9 EMS abdominal belt was set to the muscle strength setting at the greatest EMS tolerated level for each subject. These settings provided each person with a stimulation dosage that assured both slow and fast muscle fibers were activated.

During the energy expenditure measurements, subjects were instructed to lay as still as possible while allowing the CONTOUR MX9 unit to initiate and perform all of the abdominal muscle work. Each energy expenditure trial was carefully monitored following a standardized protocol that included fasting 4-hrs prior to testing from food, caffeine, energy drinks, and nicotine. All subjects avoided intense exercise 12-hrs prior to the start of testing. To assure subjects avoided intense exercise and were well rested prior to testing, a twenty-four hour energy monitor armband system was used that directly measured body heat changes, sweat rate, body movements and position, and sleep quality. The activity monitor was worn by each subject prior to and during the energy expenditure measurements in the lab.

Subject Characteristic

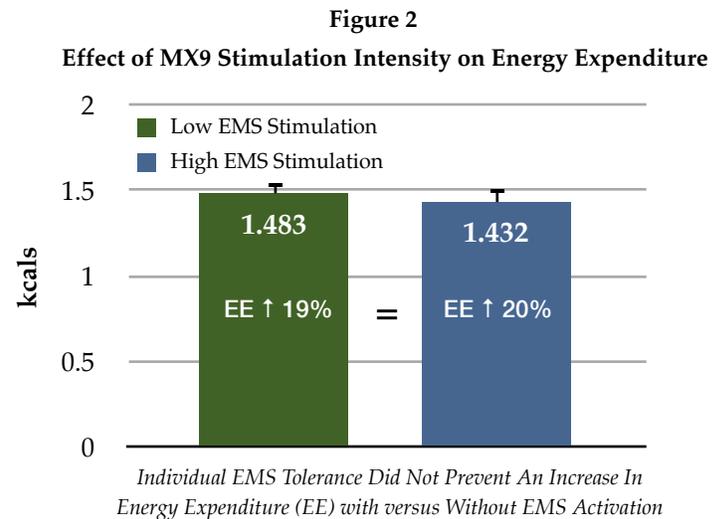
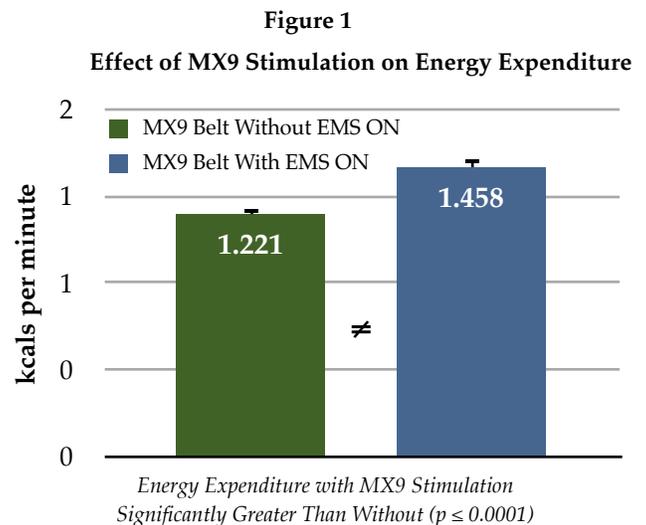
| Subject Characteristic | All Subjects (n=38) |
|--|---------------------|
| Age (Years) | 27.9 ± 6.9 |
| Weight (lbs) | 168.1 ± 37.4 |
| Body Fat Percent (%) | 21.2 ± 8.7 |
| 24-hr Energy Expenditure (kcal/day) | 2,881 ± 637 |
| Daily Step Count (Steps/Day) | 10,630 ± 4,687 |
| Baseline Energy Expenditure (kcal/min) | 1.215 ± 0.013 |

Energy Expenditure Measurement Results

The results of this study verified that the Contour MX9 EMS significantly increases a person’s energy expenditure while being used (Figure 1). Resting heart rate, as expected with an increase in metabolic demand, also increased from 56 to 64 beats per minute (p = 0.0001). Use of the Contour MX9 abdominal belt increased caloric burn ranging between 2.3% and 54.1% compared to baseline Contour MX9 belt on without EMS activation (Shame treatment condition). Both men and women responded in a similar fashion with an average caloric burn for all subjects equal to approximately 20%.

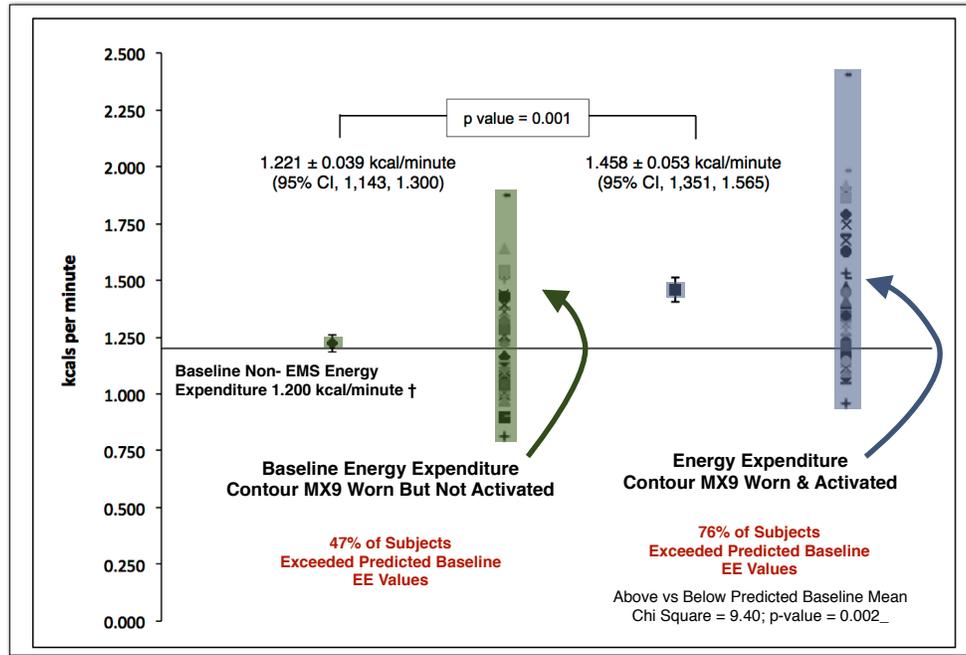
A very interesting finding of the study was that despite very individualized EMS tolerance levels (i.e., some people could

tolerate a low EMS activation level while others a very high one), the effect the Contour MX9 EMS activation had on increasing energy expenditure was not reduced at all. In fact, although not significantly different, the low EMS stimulation group showed a greater metabolic increase compared to the stimulation group that could tolerate the higher EMS level. What this finding means is that no matter what a person’s EMS tolerance level was during the study, low versus high, the study results showed that energy expenditure while using the Contour MX9 belt was significantly increased above baseline (Figure 2).



When the researchers looked at each subject’s predicted baseline energy expenditure versus the subject’s actual measured values, approximately half of the subjects were above (47%) and below (53%) his or her prediction value (Figure 3). However, when the same comparisons were made comparing the energy expenditure at rest with the MX9 EMS activated values, 76% of the subjects exceeded their respective predictive baseline values (p = 0.002) with 100% of the test subjects showing an increase in their respective baseline energy expenditure.

Figure 3
Effects of EMS Stimulation on
Measured Baseline Energy Expenditure versus Predicted



† = No significant difference observed between predicted baseline energy expenditure data and measured NON-EMS belt only trial.

In Addition & Summary Take Home Message

In addition to the observation that both resting heart rate and baseline energy expenditure significantly increased during the Contour MX9 trials, the increase in metabolic burn that occurred as a result of EMS did not compromise a person’s ability to burn fat at rest. It is a common metabolic principle that as a person’s metabolic demand increases, more of that energy normally comes from stored carbohydrates. However, the results of this study showed that although metabolic demand clearly increased with use of the Contour MX9 abdominal belt, the increase in caloric burn was able to off-set the small increase in stored carbohydrate use resulting in a similar fat burning ability at a greater total caloric burn per minute.

In summary, this study verified previously measured thermographic body heat data and showed the Contour MX9 abdominal belt can increase the caloric burn in both men and women. Interestingly, one can see in figure 4 that the more abdominal muscle mass a person had, the greater the energy expenditure (Correlation Value = 0.89, p-value = 0.0001). These findings suggests that the as person develops his or her abdominal muscle mass through EMS use or abdominal training, the greater the EMS activated metabolic burn they will see. The data also shows that even if you have a low initial EMS stimulation tolerance (Initial low intensity EMS setting), a person can see an increase in metabolic burn immediately with use of the Contour MX9 abdominal belt system. When one considers that previous EMS studies have shown that EMS is an effective rehabilitation tool, enhancer of abdominal muscular strength and endurance when used properly as a sport performance training aid, the results of this study indicate that EMS technologies can be an effective tool for enhancing a person’s metabolic burn while getting the additional benefits normally associated with EMS use - improved muscle strength and endurance!

Figure 4
Relationship Between
Lean Trunk Tissue and Energy Expenditure

