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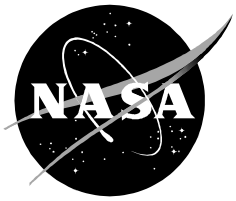

Heat Production During Countermeasure Exercises Planned for the International Space Station

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March 2004

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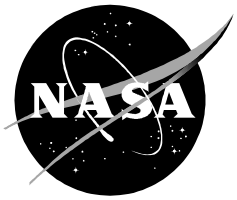

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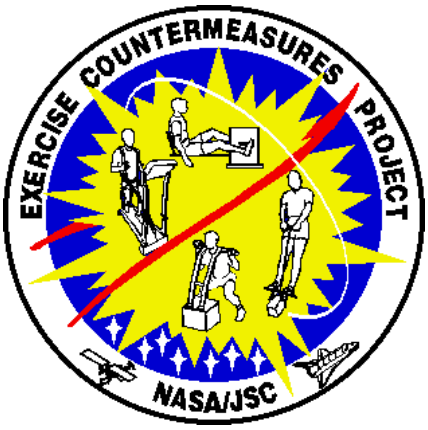

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ACRONYMS

GEE	gross energy expenditure
iRED	interim resistance exercise device
ISS	International Space Station
JSC	Lyndon B. Johnson Space Center
LMLSTP	Lunar-Mars Life Support Test Project
NEE	net energy expenditure
RM	repetition maximum
RMR	resting metabolic heart rate
SBW	segmented body weight
TVIS	treadmill in vibration isolation system
VO2	oxygen consumption
$VO2_{pk}$	peak oxygen consumption

SUMMARY

This investigation's purpose was to determine the amount of heat produced when performing aerobic and resistance exercises planned as part of the exercise countermeasures prescription for the International Space Station (ISS). The ISS Resource Management Group will use these data to determine the thermal control requirements of the Node 1 module and other modules where the exercise hardware might reside.

To determine heat production during resistive exercise, six subjects (35.5 ±2.2 yrs, 171 ±11 cm, 72.8 ±14.8 kg (mean ±SD)) using the interim resistance exercise device (iRED), performed five resistance exercises (squats, heel raises, dead lift, leg abduction, leg adduction), which form the core exercises of the current resistive exercise countermeasure for ISS. Each exerciser performed a warm-up set at approximately 50% effort, followed by three sets of increasing resistance, which was based on each subject's calculated 1 repetition maximum (1RM), with 10 reps per set @ 74% 1RM, 8 reps @ 79% 1RM, and 6 reps @ 84% 1RM. We measured oxygen consumption and work (force × distance moved) during each exercise. The mean gross energy expenditure, calculated from the oxygen consumption data, averaged 258 ± 113 kcal (1022 ± 446 Btu) per session (mean ± SD) and the average work performed averaged 37 ± 12 kcal (149 ± 49 kcal) per session. Heat loss was calculated as the difference between the gross energy expenditure (minus resting metabolism) and the work performed. During the resistive exercise tests, heat production averaged 154 ± 87 kcal (611 ± 345 Btu). The average heat produced each minute was 2.7 ± 1.3 kcal (10.6 ± 5 Btu/min.).

To determine heat production during aerobic exercise, 14 subjects (33 ± 5yrs, 175 ± 7 cm, 69.1 ± 10.5 kg) performed an interval, cycle exercise protocol (at 40%-90% peak oxygen consumption, $VO2_{pk}$) and 7 subjects (35 ± 5 yrs, 176 ± 9 cm, 74.3 ± 10.9 kg) performed a continuous, treadmill protocol (at 40% and 70% $VO2_{pk}$). Each exercise required 30 min. and is similar to the exercises planned for ISS. The oxygen consumption monitored continuously during the exercises was used to calculate the gross energy expenditure. For cycle exercise, the work performed was calculated based on the ergometer's resistance setting and pedaling frequency. The subjects' mean gross energy expended was 238 ± 44 kcal (944 ± 173 Btu) and the average work performed was 39 ± 8 kcal (155 ± 31 Btu). The average heat produced during cycle exercise was 165 ± 33 kcal (655 ± 130 Btu). For treadmill, total work was estimated by assuming a 25%work efficiency and subtracting the calculated heat production and resting metabolic rate from the gross energy expenditure. The average gross energy expenditure was 314 ± 51 kcal (1161 ± 188 Btu) and the average work performed was 79 ± 13 kcal (290 ± 47 Btu). Heat production averaged 236 ± 38 kcal (934 ± 151 Btu). The average heat produced each minute during the aerobic exercises was 5.5 ± 1.1 kcal/min. (21.9 ± 4.3 Btu/min.) for cycle exercise and 7.9 ± 1.3 kcal (31.2 ± 5.0 Btu/min.) for treadmill exercise.

This heat production for these subjects during countermeasure exercises ranged between 6 and 38 Btu/min. with the highest heat production rate during treadmill and the lowest during resistive exercises. This heat production needs to be considered when determining the location of exercise hardware on ISS and in the design of the environmental control systems. These values reflect only the human subject's produced heat; heat produced by the exercise hardware also will contribute to the heat load.

1 RESISTANCE EXERCISES

1.1 Introduction

1.1.1 Effects of Spaceflight on Muscle and Bone

Microgravity and hypodynamia during spaceflight result in structural and functional changes in skeletal muscle and bone. After only 5-11 days of spaceflight, significant reduction in muscle fiber size, metabolic properties, and vascularity was seen in muscle tissue obtained from the vastus lateralis muscle (Edgerton 95). A significant 4%-10% reduction in the volume of leg (soleus-gastrocnemius, anterior calf, hamstrings and quadriceps) and intrinsic back muscles was measured using magnetic resonance imaging after only 8 days of spaceflight (LeBlanc 95).

Changes in the skeletal system also occur due to microgravity, reduced muscle strength, changes in diet, and hormonal responses (e.g. Vitamin D, glucocorticoids, and catecholamines) during spaceflight. Calcium is removed from bone, which results in a decrease in bone mineral density in weight-bearing regions of the body. During recent *Mir* missions, total body bone mineral content decreased at a rate of about 0.6% each month of flight (Leblanc 96).

1.1.2 Resistance Exercise as a Countermeasure for the Effects of Microgravity on Muscle and Bone

It has been suggested that intense resistance exercise may be used as a countermeasure to maintain muscle and bone mass during long-duration spaceflight (Baldwin 96, Tipton 83). In a gravitational environment, long-term resistance exercise training causes muscle hypertrophy, increased muscle strength, and increased bone mineral density (Fleck and Kraemer, Chapter 7, 97). In a recent 12-wk ambulatory study performed in our laboratory (McCarthy 97), 10 healthy men performed nine whole-body resistance exercises three times a week. These subjects displayed strength gains in all nine exercises, especially in leg press (9.4%), leg curl (7.8%), bench press (18.9 %), and heel raises (14.8%), and also had an increase in spine bone mineral density. It is expected that resistance exercise will provide similar effects on muscle and bone when used during spaceflight.

We assume that during spaceflight, resistance exercise similar to that used to increase muscle mass in a 1-g environment will be required (Tipton 83). This theory was tested recently in a bed rest study. Bed rest studies have long been used to simulate bone and muscle adaptation to spaceflight. Sixteen healthy men performed a 2-wk bed rest study (Bamman 1997, Bamman 98) with 8 subjects participating as the control (no exercise) group and 8 subjects performing resistance exercise. The resistance exercise protocol incorporated both concentric and eccentric leg press and heel raise exercises against a constant resistance (80% of 1 repetition maximum [1RM]). The results showed that concentric and eccentric resistance exercise performed 3 times a week completely prevented a decrease in plantar flexor muscle strength. The exercise also prevented

myofiber atrophy and strength loss in the knee-extensor muscle group during the bed rest period. The control group, on the other hand, had significant decrease in plantar flexor and knee muscle strength, and atrophy in the knee-extensor muscle group. In a 120-day bed rest study (Koryak 98), subjects performing high-velocity and high-force arm and leg resistance exercises for 60 min. a day, 6 days a week, had a 3% decrease in strength of the foot extensor muscles compared to a 36% reduction in the control (no exercise) group. Such studies confirm that high-intensity resistance exercise training may maintain muscle performance during microgravity exposure. The quantity and intensity of resistance exercise required to maintain bone in microgravity are unknown but also are expected to require very high (>80% maximal contraction) resistances.

1.1.3 Interim Resistance Exercise Device

The first element of the International Space Station (ISS) was launched in November of 1998, and the first 90-day residency began in November of 2000. To help prevent the effects of microgravity on muscle and bone during the extended stays aboard ISS, an interim resistance exercise device (iRED) has been designed which should meet the minimal strength training needs of the crew while keeping the device small and portable. The iRED design will allow subjects to perform a variety of resistance exercises in a microgravity environment. The prototype design of the iRED used in this study was designed to provide a relatively constant (±15%) resistance load over the concentric range of motion of each exercise, and to allow for limited (50% of concentric) eccentric work.

Photo 1: Subject Performing Squats on the iRED breadboard

The iRED is composed of circular, plate-like flex packs. Each flex pack is composed of an outer aluminum wheel with rubber polymer spokes running toward and connecting to a smaller aluminum hub in the center, resembling a bicycle wheel (See Photo 2 below). The flex packs are lined up front to back with a metal shaft running through the aluminum hubs forming flex pack stacks. The metal shaft allows the flex packs to rotate easily in unison, while keeping them aligned. Winding the small aluminum hubs within the aluminum wheels causes tension on the rubber polymer spokes that, in turn, generate resistance. A cable made of a Technora core and a polyester cover line attaches to and winds around a spiral pulley which itself is attached to the aluminum hub of the first flex pack. The other end of the cable attaches to a metal clip which can be attached to exercise adapters, such as the squat bar or ankle wrap. Turning a crank on the outside of the iRED device sets the resistance. As the crank turns, it engages a gear on the inside of the machine, winding the small aluminum hubs creating pre-tension. The hub of the last flex pack of the stack is locked in place on the metal shaft and serves as the anchor while the rest of the flex pack stack is rotating. Numbers placed around one of the flex packs shows the resistance levels being attained while the crank is being turned. Once the desired resistance level has been reached, the flex packs are locked securely in place by lifting a lever located on the side of the machine.

Photo 2: iRED flex pack

1.1.4 Concern for Thermal Load Associated With Resistance Exercise

The iRED will initially reside in Node 1 of ISS. Node 1 is a small, non-ventilated area that connects together four modules and does not contain a dedicated life support system. The primary purpose of this investigation is to determine the metabolic heat production during daily resistance exercise on the iRED. The results of this investigation will in turn be used by the ISS Resource Management Group to calculate the thermal control requirements of the Node 1 module and other modules where the iRED might reside.

1.1.5 Project Objectives for Resistive Exercise

The purpose of the first part of the project was to characterize the heat production during an exercise session using a prototype of the iRED. Both the protocol and the exercise device are similar to that planned for use by astronauts on ISS.

1.2 Methods

1.2.1 Subjects

Six healthy subjects familiar with resistance training volunteered for participation in this project. Subjects were screened for participation by passing at least a modified Air Force Class III physical and a Bruce treadmill test with a 12-lead electrocardiogram. The subjects were three males and three females. Four of the subjects were astronauts and two were selected through the Human Test Subject Facility at NASA Johnson Space Center (JSC). The subjects were 35.5 ±2.2 years, 72.8 ±14.8 kg, and 170.8 ±11.1 cm (mean ±SD). See Appendix, Table 1, for individual subject characteristics. The protocol for this study was reviewed and approved by the NASA-JSC Institutional Review Board.

Written and verbal explanations of the procedures were given to each subject. An informed consent form was read and signed by each subject confirming his/her understanding and acceptance of participation in the investigation.

1.2.2 Protocol Overview

Each subject made three visits to the laboratory. The first visit served as a familiarization session to the hardware and exercises to be performed. This session also was used to determine the appropriate resistance loads to be used during the subsequent metabolic measurements during the second day of testing.

During the second visit, metabolic measurements were taken during the performance of the exercise protocol. Each subject performed five resistance exercises: squats, heel raises, dead lift, leg abduction, and leg adduction. This resistance exercise protocol was consistent with the guidelines for resistance exercise provided by the Space Medical Monitoring and Countermeasures Bone, Muscle, & Exercise Integrated Product Team. Subjects performed a warm-up set followed by 3 sets of 6-12 repetitions for each exercise. The resistance settings for squats, heel raises, and dead lifts were based on each subject's 10RM measurement (maximal amount of resistance lifted for 10 repetitions with correct form) taken during the familiarization session.

During the third visit, body composition measurements were recorded during whole-body scans obtained using a Dual Energy X-Ray Bone Densitometer (DEXA) (QDR-2000+, Hologic, Inc.; Waltham, MA).

1.2.3 Familiarization Session (Day 1)

Subjects were familiarized with the operation and safety features of the iRED and received an explanation of the protocol. Following acceptance of participation, a 10RM was determined for each resistance exercise, except for abduction and adduction. An "X" RM refers to the amount of resistance that allows for the performance of "X" repetitions in good form, with "X-plus-one repetition" in good form being impossible (Fleck, Kraemer 97). The 10RM was used to estimate each subject's 1RM (Table 26.1, Baechle 94), which, in turn, was used in the prescription of the resistance exercise protocol for Day 2. Due to concern about injury to the hip joint during the 10RM testing protocol, resistance was set at 15-35 lb. for abduction and adduction for all subjects based on comfort during exercise.

The protocol for determination of the 10RM was as follows. Subjects performed a set of ten repetitions (reps) with a light weight for each exercise (Table 1). Depending on the ease with which this was completed, additional weight was added and another 10 reps were performed, if possible. A rest period of 2-4 min. was allowed between trials. Subjects continued the process until a weight was determined which allowed only 10 reps at fatigue. No more than five trials were required per exercise.

Table 1. Familiarization Session: (Day 1)

1) Straight legged dead lift:	Determine 10 Rep Max. (estimate 1RM)
2) Squats:	Determine 10 Rep Max. (estimate 1RM)
3) Heel Raises:	Determine 10 Rep Max. (estimate 1RM)
4) Leg Abduction:	Practice exercise (no weight)
5) Leg Adduction:	Practice exercise (no weight)

1.2.4 Data Collection (Day 2)

1.2.4.1 Metabolic Measurements (VO2)

Oxygen consumption (VO2) was obtained using a metabolic gas analysis system (TEEM 100 Aerosport, Inc., Ann Arbor, MI). Subjects wore a nasal/mouth breathing facemask (Hans Rudolph, inc., Kansas City, MO., Part NO. 201021 8940) interfaced with the TEEM-100 pneumotach for the sampling of expired gases and measurement of ventilation.

Testing began with each subject wearing the nasal/mouth mask and standing for 2 min. to measure resting VO2. Thereafter, subjects performed the exercise protocol shown in Table 2. For each exercise, a warm-up set was performed at 50% of 10RM followed by three sets of increasing resistance. Subjects were allowed no more than a 2-min. rest period between each exercise or between sets. The amount of weight to be lifted was estimated based on the calculated 1RM and the desired number of repetitions per set.

Subjects completed as many repetitions as possible within the determined range in each set, except the warm-up set.

Table 2. Resistance Exercise Protocol (Day 2)

Exercise:	**Warm-up**	**1 Set (10RM)***	**2 Set (8RM)***	**3 Set (6RM)***
1) Squats:	50% of 10RM	10-12 Reps	8-10 Reps	6-8 Reps
2) Heel Raises:	50% of 10RM	10-12 Reps	8-10 Reps	6-8 Reps
3) Dead Lift:	50% of 10RM	10-12 Reps	8-10 Reps	6-8 Reps
4) Leg Abduction:				
(Right Leg)	No Warm-up	10-12 Reps @ 15 lb.	8-10 Reps @ 20-25 lb.	6-8 Reps @ 30-35 lb.
(Left Leg)	No Warm-up	10-12 Reps @ 15 lb.	8-10 Reps @ 20-25 lb.	6-8 Reps @ 30-35 lb.
5) Leg Adduction:				
(Right Leg)	No Warm-up	10-12 Reps @ 15 lb.	8-10 Reps @ 20-25 lb.	6-8 Reps @ 30-35 lb.
(Left Leg)	No Warm-up	10-12 Reps @ 15 lb.	8-10 Reps @ 20-25 lb.	6-8 Reps @ 30-35 lb.

*Weight lifted was based on a percentage of the subject'' estimated 1RM and the number of repetitions desired per set. Subjects were told to perform the maximum number of repetitions per set in order to ensure maximal effort.

1.2.4.2 Force Measurements

Force during exercise was measured with load cells (ELH 590, Entran Devices, Fairfield, NJ) placed in series with each cable on the iRED. Data were recorded using a program designed for this application (Lab View 4.1, National Instruments, Austin, TX, Part NO. 183553A-01 NIC). An example of a force curve taken during this investigation is given below.

1.2.5 DEXA Measurements (Day 3)

Body composition measurement was obtained from Whole Body Dual X-Ray Bone Densitometry scans (QDR 2000+ Hologic, Inc., Waltham, MA). Analysis of the scans provided a subject's fat-free mass and segmented body weights. Fat-free mass was used to determine the resting metabolic rate (RMR) for each subject (Table 9.1, McArdle, Katch, Katch 4th Ed.). Segmental weights were used in the computation of the work performed during exercise. A trained technician performed the DEXA scan and analyzed it with enhanced algorithm analysis software, which gives a whole-body soft tissue precision of 0.63 ±0.43% (mean ±SD) (Spector 95).

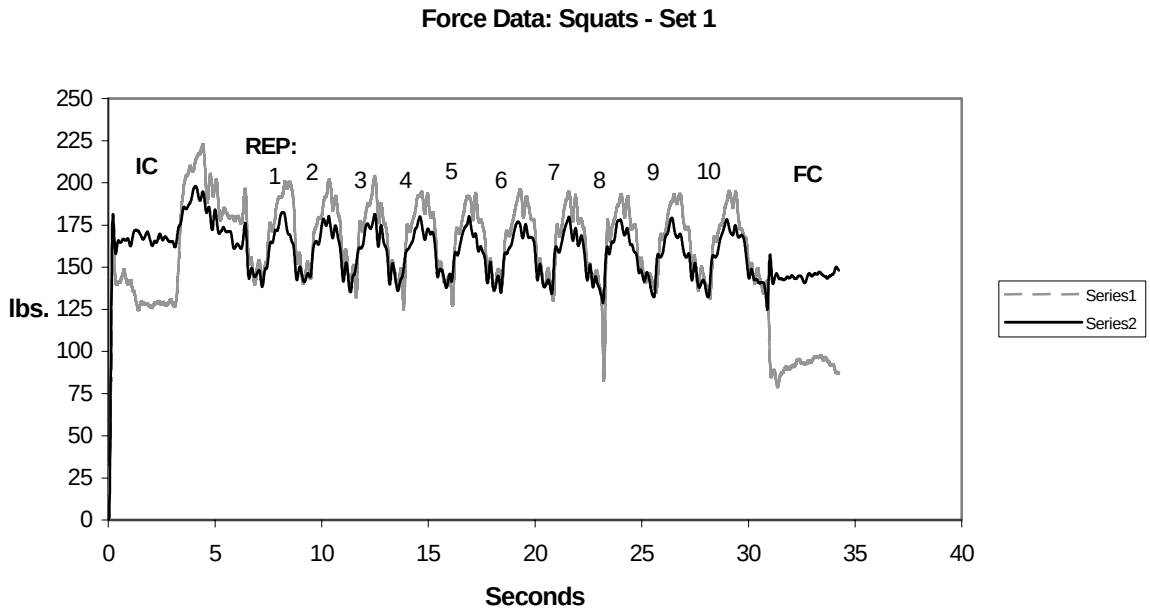

Figure 1: A representative force curve measured during performance of squat exercise. The IC represents the amount of force generated by the subject while lifting the squat bar into position, the initial concentric contraction. FC represents the amount of force generated while setting the squat bar back in to the starting position, the final eccentric contraction.

1.2.6 Data Analysis

Gross energy expenditure (GEE) was calculated as the sum of each minute of VO2 across the entire exercise session and converted to kilocalories. An estimated respiratory quotient (RQ)[1] value of 0.97 was assumed for the metabolic calculations, since steady-state conditions could not be attained doing this protocol (Dudley 88). Kcal per liter of oxygen consumed was determined to be 5.0 (Table 8-1, McArdle, Katch, Katch, 2nd Ed.). (See appendix, Table 5)

$$GEE = VO_2\ (L)\ *\ 5.0\ \ (kcals / liter\ O_2\ Consumed)$$

Work was calculated as the product of force and the distance through which the force was exerted. Total force was calculated as the sum of the force measured by the load cells during each repetition and the force required to move the appropriate segmented body weight (SBW) during the exercise. SBWs were determined taken from the Supine DEXA scans performed on each subject. The force required for moving body segments, which was added to the iRED resistance, varied depending upon the type of exercise being performed. Squats and dead lift exercises included the subject's body weight minus 5.8 lbs., the average weight of a human calf and foot, since they were not lifted during the exercise (Clauser 69). The heel raise exercise included total body weight. Leg abduction and adduction included only the weight of the leg being moved. Distance was measured (using a yardstick) as the range of motion through which the subject moved for the first repetition of each exercise

[1] Respiratory quotient is the number of CO_2 molecules produced relative to O_2 molecules consumed.

(inches). Distance was then multiplied against the total force, resulting in the work performed in foot-pounds (ft-lb.). Calculated work in ft-lbs. was converted to kcal (1 kcal=3087.4 ft-lb.). The formula for determining work is displayed below.

$$Work\ (kcal) = (Force\ (Resistance + SBW)\ x\ Distance\ (Exercise\ Performed)) * 3.087.4\ ft - lb$$

Concentric work was calculated using the formula above by multiplying the force in the positive direction of the force curve (representing the part of the exercise in which the resistance was lifted with muscle shortening) by the distance moved. Eccentric work was calculated from the force values obtained during the negative deflection of the force curve (representing the time when the weight was lowered with muscle lengthening). Because an encoder was not used to measure distance continuously, the force and distance during the exercises could not be synchronized. Therefore, for these calculations the assumption was made that the peak force in each movement coincided exactly with the peak range of motion. These values can only be considered an approximation of the true concentric/ eccentric resistances.

RMR was estimated from each subject's fat-free mass, recorded during the Supine Lateral DEXA scans (Table 9.1, McArdle, Katch, Katch 4th Ed.) (See appendix, Table 5).

Subtracting the amount of work performed and each subject's RMR from their gross energy expenditure estimated the amount of heat produced during each exercise session. Data were also expressed as Btu (1 kcal = 3.968 Btu) (McArdle, Katch, Katch 4th Ed.).

$$Net\ Energy\ Lost\ as\ Heat = GEE\ (kcals) - Work\ (kcals) - RMR\ (kcals)$$

Gross efficiency (%) was calculated by dividing the amount of work performed by the gross energy expenditure and then multiplying by 100 (Gladden 78).

$$Efficiency\ (\%) = \frac{Work\ (kcals)}{GEE\ (kcals)} * 100\%$$

Net energy expenditure (NEE), the amount of energy required in performing the exercises, was calculated by subtracting the estimated RMR from the GEE (McArdle, Katch, Katch 4th Ed.).

$$NEE\ (kcals) = GEE\ (kcals) - RMR\ (kcals)$$

1.3 Results

All subjects completed each of the five resistance exercises with maximal effort. The average (± SD) metabolic data for the six subjects are shown below.

Table 3: Mean Resistance Exercise Results for all Exercises

SUBJECTS 1-6		Exercise Time=56.25 min. ± 7.4	
		Mean	**SD**
Average Oxygen Consumption:VO2	**(L/min.)**	0.9	0.3
Peak VO2 per Session:	**(L/min.)**	1.8	0.7
Gross Energy Expenditure:	**(kcal)**	257.7	112.5
Est. RMR:	**(kcal)**	66.4	20.8
Net Energy Expenditure:	**(kcal)**	191.4	96.6
Total Work per Exercise Session:	**(Ft-Lb)**	**Mean**	**SD**
	Concentric:	58153.6	19098.4
	Eccentric:	57581.4	19003.8
	Total:	115735.0	38099.4
	(kcal)	**Mean**	**SD**
	Concentric:	18.8	6.2
	Eccentric:	18.7	6.2
	Total:	37.5	12.3
Net Energy Lost as Heat:	**(kcal)**	153.9	86.9
	(Btu):	610.5	344.7
	(Btu/min.):	10.6	5.3
Efficiency (%):		15.3	3.4

(For individual resistance exercise results for all exercises, see Appendix, Table 4.)

Table 4: Mean DEXA Measurements for 6 Resistance Exercise Subjects

Mean: 1-6								
Region:	Fat Free Mass				Total Mass			
	(grams)	SD	(lbs.)	SD	(grams)	SD	(lbs.)	SD
Left Leg:					12352	1969	27	4
Right Leg:					12330	1611	27	4
Total Body	60189	15832	133	35	71741	13592	158	30

(For individual segmental weights see Appendix, Table 3)

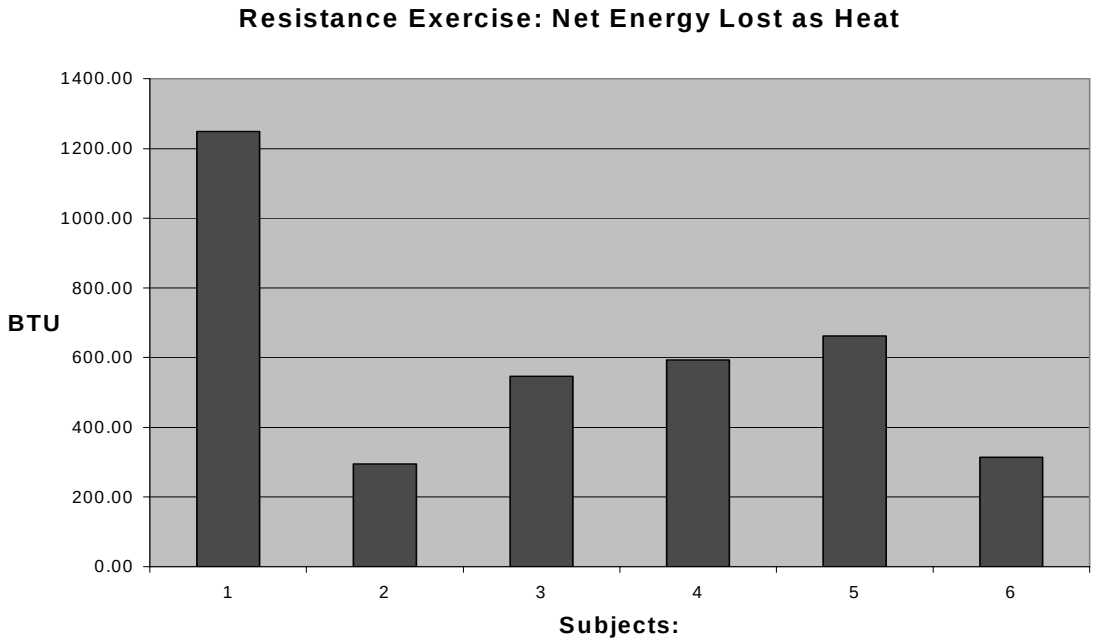

Figure 2: Total energy produced during all five resistance exercises for each of the six subjects. Results are expressed in British thermal units.

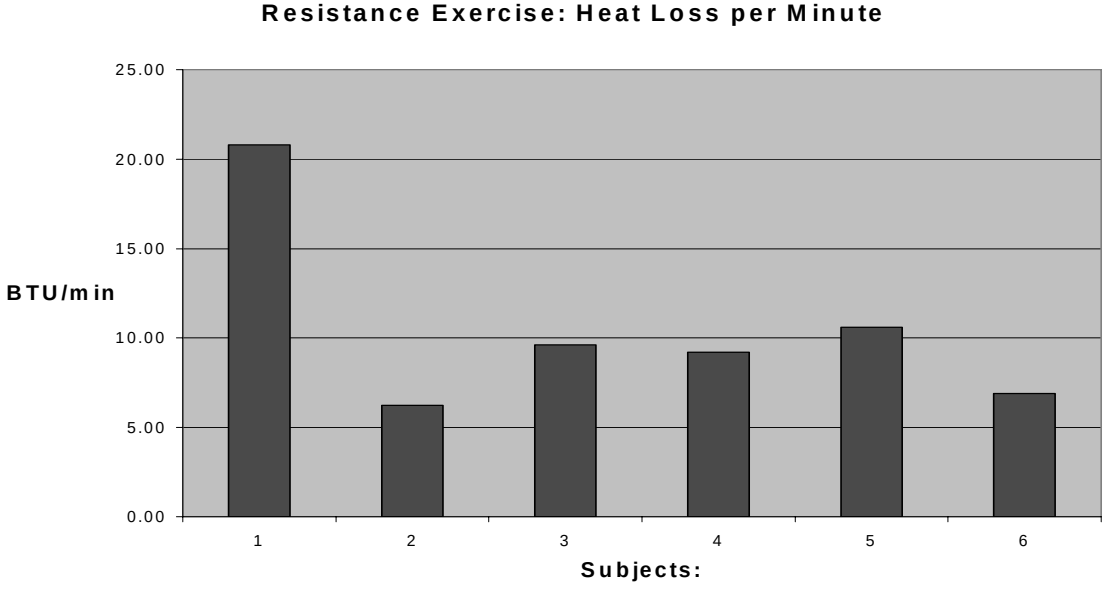

Figure 3: Amount of heat produced per minute during all five resistance exercises for each of the six subjects. Results are expressed in British thermal units per minute.

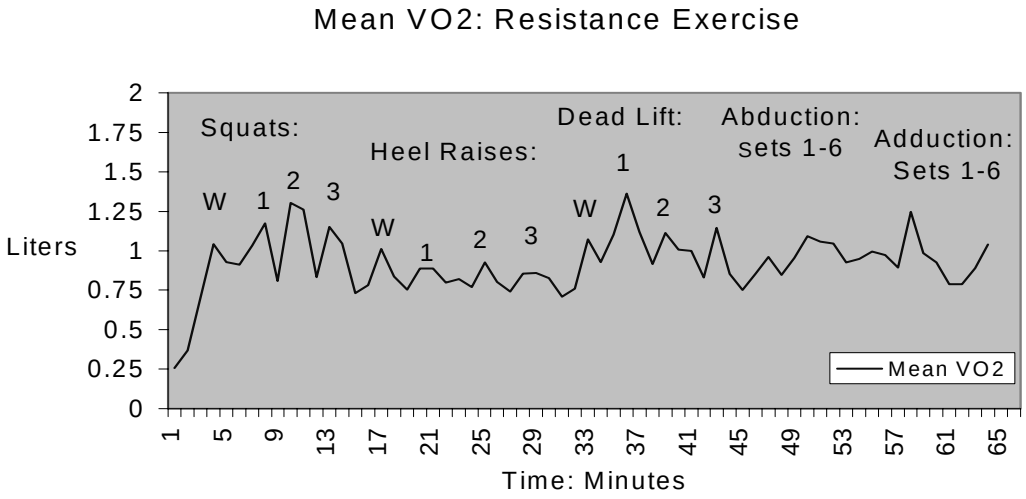

Figure 4: Profile of the average oxygen consumption, in liters, for all six subjects during the five resistance exercises. Each exercise is composed of the initial warm-up set (W) followed by the remaining three sets (1, 2, 3). VO2 measurements were recorded every minute.

1.4 Discussion: Resistance Exercise

Resistance exercise is required for all crewmembers during long-duration spaceflight as a countermeasure to prevent muscle atrophy and bone mineral loss. The current plan for the first few increments of ISS is that the iRED will be used for resistance exercise and it will be located within Node 1, a very small area without a dedicated environmental control system. The results from this study suggest that the total heat produced during the resistive exercise countermeasure will be approximately 154 kcal (611 Btu). This amount of heat produced per minute is two- to threefold lower than that typical for aerobic exercises, but the duration of the resistive exercise prescription is longer (50-60 min.) than for the aerobic protocols for ISS (30 min.). Thus, heat accumulation in the module containing the resistive exercise device is a concern for ISS. A portable cooling device may be required to prevent overheating of crewmembers and of any equipment located near the exercise station.

Little data exist about the oxygen cost and heat production during resistive exercise. Although the exercises represent maximal exertions of a targeted muscle group, the contractions are relatively slow and usually involve smaller muscle groups as compared to aerobic work. Thus, the oxygen consumption and heat production may be expected to be relatively small. Typically, the energy expenditure during a resistance exercise training session is around 200-300 kcal (Dudley 91) at a rate representing approximately 30%-50% of a subject's maximal aerobic capacity (Dudley 91, Gordon 85). On the other hand, work efficiency is less during resistive exercise. In this study, work efficiency was only 15% compared to a typical value during running exercise of about 25%, and this may result in a greater heat production for a given level of oxygen consumption.

For the subjects in this present study, the total energy expenditure during resistive exercise was 258 kcal. The average oxygen consumption throughout the exercises was 12.3 ml/kg/min., which is approximately 3.5 times a typical resting value of 3.5 ml/kg/min. This value is similar to that reported previously (16.4 ml/kg/min.) for young healthy men during an extensive 53-min. resistive training protocol (Gordon 85). In the study by Gordon and coworkers, their subjects were healthy young men with an average $VO2_{pk}$ of 50 ml/kg/min. Thus the average oxygen consumption was approximately 32% $VO2_{pk}$. Unfortunately, we did not measure $VO2_{pk}$ in our subjects, but we would expect that the average oxygen cost was similar to Gordon's results. However, during peak exertions such as in our study where the peak VO2 averaged 24.2 ml/kg/min., this level of exertion most likely represented about 40%-60 % $VO2_{pk}$.

Most exercise involves both concentric (exercise in which the muscles shorten) and eccentric (exercise in which the muscle lengthen) work. For example, lifting a barbell involves concentric work while lowering the barbell back to the floor is eccentric work. Most muscle groups are about 10%-20% stronger during eccentric work as compared to concentric. Also, eccentric work is much more efficient, requiring 1/5th to 1/7th the metabolic cost of concentric work for an equivalent level of work (Dudley 91, Lastayo 99). Thus, the heat production during resistive exercise may be a function of the ratio of concentric to eccentric work. The iRED prototype used in this study involves an elastomer form of resistance that produces more force during the concentric, than the eccentric, phase of each contraction. From force curves provided by the manufacturer, at a constant velocity the force produced during the eccentric phase of a contraction is approximately 50%-85% of the concentric work over the range of motion of the contraction. To compensate for these lower eccentric forces, crewmembers are being trained to perform the eccentric action more slowly than the concentric; approximately 2 sec to concentrically pull out the cable and 3-4 sec to eccentrically return the cable. Using this technique in the present study, the work for the concentric and eccentric phases was approximately the same: 18.8 kcal for concentric phase vs. 18.7 kcal for the eccentric phase. Thus, in using this particular exercise device, the training approach has been modified to complement the particular characteristics of the training hardware. Future ISS resistive exercise devices hopefully will provide a more consistent force curve over the range of motion and possibly provide for greater loading on the eccentric phase of a contraction to allow for optimization of the training protocol.

2 AEROBIC EXERCISES

2.1 Introduction

2.1.1 Effect of Spaceflight on Cardiovascular Conditioning

During spaceflight, cardiovascular deconditioning occurs most likely due to reductions in hydrostatic pressure gradients within the cardiovascular system, reduced mechanical loading on the muscles and bones, and a lower daily energy requirement (Convertino 96a, Convertino 96b). The most obvious signs of cardiovascular deconditioning are apparent postflight, and include $VO2_{pk}$ (Levine 97), orthostatic intolerance (Buckey 96, Fritsch-Yelle 96), and tachycardia and labile blood pressure during standing and exercise (Convertino 96a).

2.1.2 Aerobic Exercise as a Countermeasure for Cardiovascular Deconditioning

Cardiovascular deconditioning can have serious consequences when the space traveler is exposed to the acceleration forces that are associated with reentry or upon sudden re-exposure to the 1-g stress experienced on Earth (DeHart 96). During an emergency egress, crewmembers would be required to stand, move to the hatch, exit the spacecraft, and move unassisted to a distance of 380 m upwind from the vehicle while wearing the Launch and Entry Suit (Bishop 99). Exercise capacity of crewmembers is positively correlated with their egress performance (Bishop 99). Inability to perform any part of the emergency egress due to cardiovascular deconditioning may be life-threatening.

Orthostatic intolerance also could prevent optimal crew performance and impair egress capability during landing and egress. However, preliminary data suggest that moderate levels of aerobic exercise during Shuttle spaceflights might help to protect postflight orthostatic tolerance (Lee 99). Cycle or treadmill exercise performed at least three times a week at an intensity eliciting > 70% age-predicted maximum heart rate, for a minimum of 20 min. per session, was associated with smaller changes in heart rate and blood pressure during stand tests following Shuttle missions of 9 to 16 days.

The following ground-based studies also suggest that aerobic exercise may be useful as a countermeasure to maintain cardiovascular conditioning during spaceflight. Greenleaf and coworkers (89) studied 19 men (5=control, 7=isotonic training, 7= isokinetic training) during 30 days of head-down bed rest. The seven subjects who performed 30 min. isotonic interval leg exercise twice daily on a cycle ergometer maintained their supine $VO2_{pk}$. In contrast, the non-exercise and isokinetic training groups had significant reductions in supine $VO2_{pk}$ after bed rest. Another study (Lee 97), which evaluated the effect of upright exercise and of supine exercise against lower-body negative pressure to simulate gravity, found that 30 min. of exercise a day prevented submaximal exercise changes after five days of bed rest. Watenpaugh et al. used a similar lower-body negative

pressure exercise protocol to maintain $VO2_{pk}$ in subjects following 14 days of bed rest (Watenpaugh 00).

Postflight recovery time, the amount of time required for exercise responses to return to a preflight level, was more rapid for the crews of Skylab missions 3 & 4 compared to Skylab 2. It has been suggested that the use of longer and more vigorous exercise by the crews of Skylab 3 (60 min./day) & Skylab 4 (90 min./day) compared to Skylab 2 (30 min./day) may be the reason for their faster recovery (Levy 83).

2.1.3 Aerobic Exercise an Ineffective Countermeasure for Maintaining Bone in Spaceflight

Aerobic exercise has been used in spaceflight since the early 1970s but has not prevented the effects of microgravity on bone. Loss of mineral from the lumbar vertebrae, pelvis, and femur continue to be observed following long-duration spaceflight (Schneider 94; LeBlanc 96) despite extensive use of cycle ergometer and treadmill exercise (up to an hour a day in the Russian countermeasures program).

2.1.4 Origin of the Aerobic Exercise Countermeasure Protocols

The aerobic exercise protocols used in this study are similar to those proposed for ISS crewmembers by the Space Medicine Monitoring and Countermeasures Program Bone, Mineral, and Exercise Integrated Product Team. The cycle protocol is similar to that used by Greenleaf et al. (89, 92) during their 30-day bed rest studies and in our 5- (Lee 97) and 14-day bed rest studies (Watenpaugh 00). In addition to the resistive exercises described in the previous section, crewmembers will be recommended to perform an interval-cycle protocol 2-3 times each week (e.g. Monday, Wednesday, and Friday) and a continuous treadmill protocol on alternating days (e.g. Tuesday, Thursday, and Saturday). The seventh day will be a day of active rest where the crewmember may self-select his exercise program.

2.1.5 Concern for Thermal Load Associated With Aerobic Exercise

During aerobic exercises such as running or cycling, a majority of the muscles in the body are activated and heat production can increase up to 50 times resting level. Elevated heat production can be prolonged for several minutes at 20 times resting levels in a well-trained athlete. Since ISS is a confined and controlled environment, such an increase in heat production could stress the environmental control systems and therefore may be of concern to the ISS Resource Management Group.

2.1.6 Project Objectives for Aerobic Exercise

The purpose of this part of the project was to estimate the amount of heat ISS astronauts produce during the performance of aerobic exercise countermeasures using the cycle ergometer and treadmill.

2.2 Exercise Testing Methods for Metabolic Measurements During Aerobic Exercise Countermeasures

2.2.1 Subjects

Fourteen subjects participated in the cycle ergometer tests (10 men and 4 women) and 7 subjects (6 men and 2 women) participated in the treadmill tests. The individual subject characteristics are shown in Appendix Tables 7 and 8.

Subjects were screened for participation using a modified Air Force Class III physical and a modified Cunningham treadmill exercise protocol. Subjects received written and verbal explanation of the procedures and signed written consent forms confirming their understanding and acceptance. All subjects were participants in the Lunar-Mars Life Support Test Projects (LMLSTP IIa and III). For a complete description of this study, see NASA Technical Report: NASA/TP-1998-206537, *Exercise Countermeasures Demonstration Project During the Lunar-Mars Life Support Test Project Phase IIa* (98), and Phase III (in preparation).[2]

2.2.2 Protocol Overview

Data for the Aerobic Exercise Countermeasure portion of this report were obtained during the pre-chamber tests of the LMLSTP project. Each subject first performed a peak cycle test only (Phase IIA), and for Phase III, a peak cycle and a peak treadmill test. These tests were used to calculate the exercise intensities for the training protocols. The interval cycle and continuous treadmill protocols next were performed on separate days to measure the heat production during these exercise protocols.

2.2.2.1 Cycle Ergometer Protocols

2.2.2.1.1 Resting Metabolic Measurements. Each subject was fitted with a facemask with a one-way, non-rebreathing valve (Hans Rudolph, Inc., Kansas City, MO) for the collection of expired gases. Subjects rested quietly in the seated position for at least 20 min. while gases were collected in a 120-liter gasometer (Warren E. Collins, Inc., Braintree, MA) in four 5-min. increments.

2.2.2.1.2 Maximal Aerobic Exercise Test. Each subject pedaled on an electronically braked cycle ergometer in the upright position at a constant pedaling cadence of 75 rpm. The maximal exercise test began with three 3-min. stages of increasing intensities. The exercise intensities for male subjects were 50, 100, and 150 watts. The exercise intensities for female subjects were 50, 75, and 100 watts. Thereafter, for both subject groups, the exercise intensity was increased in 25-watt increments each minute until volitional fatigue. $VO2_{pk}$ was accepted as the mean of the last two 30-sec measurements of VO2. Expired gases were collected with a mouthpiece and analyzed using a Quinton Qplex Metabolic Cart (Quinton Industries, Seattle, WA) interfaced with a mass spectrometer (MG-1100, Marquette, Inc., Minneapolis, MN).

[2] TP-1998-206537 is available electronically at: http://ston.jsc.nasa.gov/collections/TRS/_1998-cit.html

Heart rate was monitored using a three-lead ECG configuration (Quinton Q5000 Stress Test System, Quinton Industries, Seattle, WA). The targeted exercise loads for the countermeasure exercises were calculated based on a regression equation determined from the oxygen consumption/cycle workload (watts) relationship.

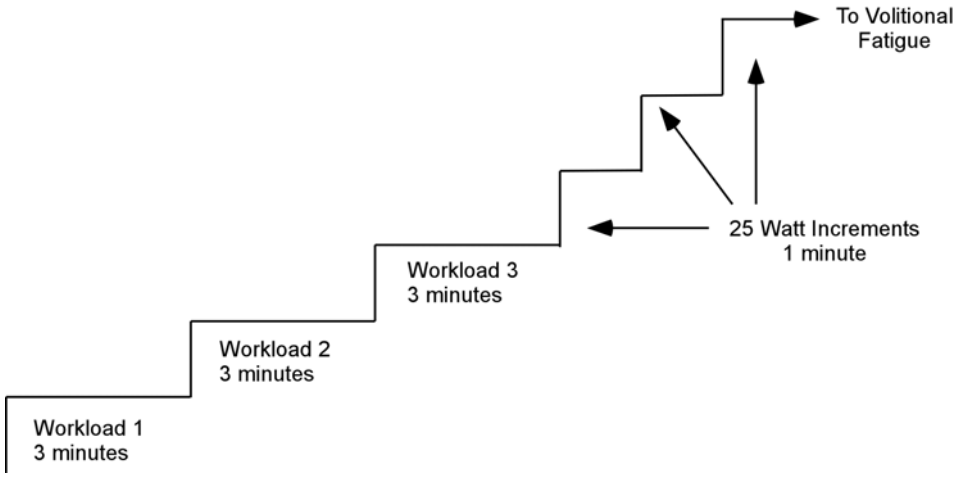

Figure 5: Peak aerobic exercise test: cycle ergometer (Lee et al., 1998).

2.2.2.1.3 Aerobic Exercise Countermeasure: Cycle Ergometer. The interval cycle protocol began with a warm-up period of 7 min. at an intensity equivalent to 40% of each subject's $VO2_{pk}$. Post warm-up, the exercise intensity alternated in 2-min. intervals between 40% $VO2_{pk}$ and 60%, 70%, 80%, 90% and back down to 80% $VO2_{pk}$. A five-min. exercise cool-down at 40% of $VO2_{pk}$ followed the training period. Expired gases were collected with a mouthpiece and analyzed using a Quinton Qplex Metabolic Cart interfaced with a mass spectrometer. Heart rate was monitored using a heart rate monitor (Polar Vantage XL, Polar, Inc., Stanford, CN).

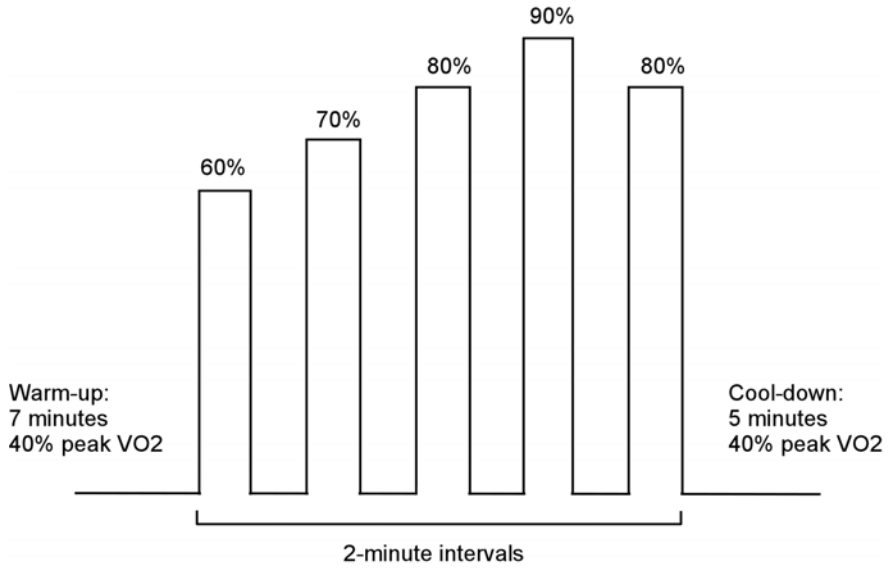

Figure 6: Aerobic exercise countermeasure: cycle ergometer.

2.2.2.1.4. Data Analysis: Gross Energy Expenditure (GEE): GEE was calculated from the total accumulated VO2 measured each minute across the entire exercise session (30 min.) and converted to kilocalories. An estimated RQ value of 0.95 was used for the metabolic calculations as an average value obtained during this interval protocol. Kcal per liter of oxygen consumed for this RQ value was determined to be 4.985 (Table 8-1, McArdle, Katch, Katch 2nd Ed.). (See Appendix, Table 5)

GEE = VO2 (L) x 4.985 (kcal / liter O_2 consumed)

Work: Work performed was determined by converting the recorded watts of each training period into total kcal (1 watt = 0.01433 kcal/min.) and then multiplying by the duration of the interval training period (warm-up = 7 min., interval training periods = 2 min. each, cool-down = 5 min.). The formula for determining work performed on the cycle ergometer is displayed below.

Cycle Work:

Warm-up (kcal) = (Recorded watts x 0.01433) x 7 min.

Each Interval Training Period (kcal) = (Recorded watts x 0.01433) x 2 min.

Cool-down (kcal) = (Recorded watts x 0.01433) x 5 min.

Resting metabolic rate (RMR): Resting seated VO2 (L/min.) measurements (see appendix) were multiplied by the kcal per liter of oxygen consumed (Table 8-1, McArdle, Katch, Katch 2nd Ed.). This number was then multiplied by the total duration of the exercise session. The formula for calculating RMR is given below.

RMR (kcal) = (Resting VO2 (L/min.) x kcal/L O_2) x 30 min.

Heat Production: Subtracting the amount of work performed and each subject's RMR from their GEE determined the amount of heat produced during cycle ergometer testing. Data were also expressed as Btu's (1 kcal = 3.968 Btu (McArdle, Katch, Katch 4th Ed.)).

Heat production (kcal) = GEE (kcal) – Work (kcal) – RMR (kcal)

The Gross Efficiency: Efficiency during cycle ergometer was calculated based on the formula given below.

$$\text{Efficiency (\%)} = \frac{\text{total work}}{\text{GEE}} * 100$$

2.2.2.2 Treadmill Protocols

2.2.2.2.1 Resting Metabolic Measurements. Each subject was fitted with a facemask with a one-way, non-rebreathing valve (Hans Rudolph, Inc., Kansas City, MO) for the collection of expired gases. Subjects rested quietly in the seated position for at least 20 min. while gases were collected in a 120-liter gasometer (Warren E. Collins, Inc., Braintree, MA) in four 5-min. increments.

2.2.2.2.2 Peak Aerobic Exercise Test (Treadmill). Subjects were required to run at a level incline for three consecutive three-min. submaximal stages of increasing speed. Thereafter, stages were limited to 1 min. each in which the speed was maintained at the rate of the third submaximal stage but the grade was increased 3% per stage. Speed was chosen, based upon results of a treadmill test performed during subject screening, such that volitional fatigue was reached before the subject obtained a 12% grade. Expired gases were collected and analyzed using a Quinton Qplex Metabolic Cart interfaced with a mass spectrometer. Heart rate was monitored using a three-lead ECG configuration. Based on a regression equation determined from the oxygen consumption/treadmill speed data, the treadmill speeds for the countermeasure exercise were determined for each subject.

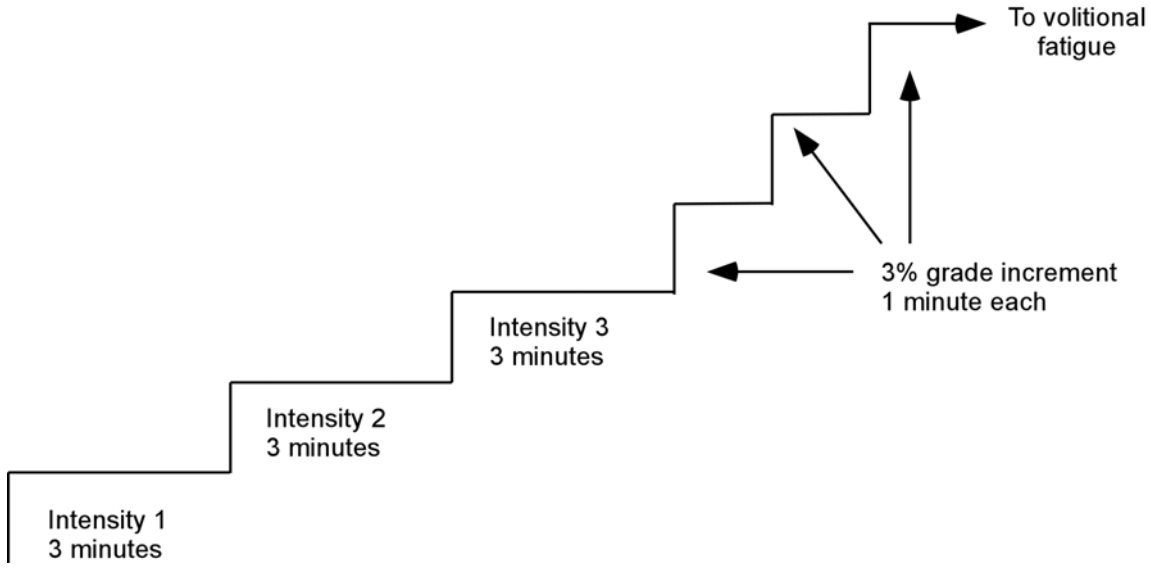

Figure 7: Peak aerobic exercise test: treadmill.

2.2.2.2.3 Aerobic Exercise Countermeasure (Treadmill). The aerobic exercise countermeasure protocol began with a 5-min. warm–up at 40% of subject's $VO2_{pk}$ derived from the previous peak treadmill exercise test. The exercise intensity was then increased to 70% of subject's $VO2_{pk}$ for 20 min. This effort was followed by a 5-min. cool-down at 40% of subject's $VO2_{pk}$. To be similar to an exercise prescription used in flight, where increasing treadmill grade is not possible, solely changing treadmill speed, not treadmill grade, varied exercise intensities on the treadmill. Expired gases were collected with a mouthpiece and analyzed using a Quinton Qplex Metabolic Cart interfaced with a mass spectrometer. Heart rate was monitored using the same heart rate monitor used during the cycle ergometer protocol.

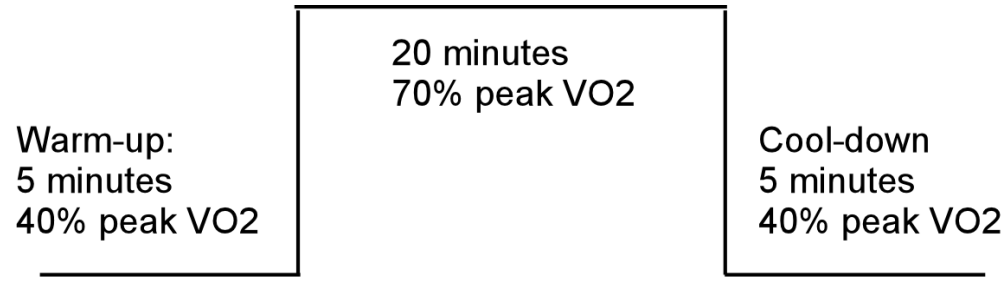

Figure 8: Aerobic exercise countermeasure: treadmill.

2.2.2.2.4 Data Analysis. Gross Energy Expenditure: GEE was calculated from the total accumulated VO2 measured each minute across the entire exercise session (30 min.) and converted to kilocalories. For the metabolic calculations, each subject's RQ value was an average of the last 2 min. of his or her measured RQ for each stage. Kcal per liter of oxygen consumed for each subject was determined and was based on the determined RQ value. (Table 8-1, McArdle, Katch, Katch 2nd Ed.; See Appendix, Table 5)

GEE = VO_2 (L) x (kcal/liter O_2 consumed)

Resting Metabolic Rate (RMR): Resting seated VO2 (L/min.) measurements were multiplied by the estimated kcal per liter of oxygen consumed (from Table 8-1, McArdle, Katch, Katch 2nd Ed.). This number was then multiplied by the total duration of the exercise session. The formula for calculating RMR is given below.

RMR (kcal) = (Resting VO_2 (L/min.) x kcal/liter O_2 consumed) x 30 min.

Work (W): Work performed on the treadmill was estimated as 25% of the GEE. Gross efficiency for mechanical work during treadmill exercise is reported to be approximately 25% based on previous studies (Guyton 96).

W (kcal) = GEE x efficiency (25%)

Heat Production: The amount of heat produced during individual treadmill testing was estimated by subtracting the subject's GEE (kcal) multiplied by the assumed efficiency (25%) from his or her GEE (kcal). Data were also expressed as Btu's (1 kcal = 3.968 Btu (McArdle, Katch, Katch 4th Ed.)).

Heat Production (kcal) = [GEE (kcal) – (GEE (kcal) x 0.25)]

Net Energy Expenditure: the net energy cost of the work.

NEE (kcal) = GEE (kcal) – RMR (kcal)

2.3 Aerobic Results

The average (± SD) metabolic data for all 14 subjects are shown below. The individual data are located in Appendix Table 9.

Table 5. Mean Aerobic Exercise Countermeasure Results

Mean Aerobic Results	Cycle (n=14)	SD	Treadmill (n=7)	SD
Average Oxygen Consumption: VO2, **(L/min.)**	1.59	0.29	2.10	0.34
Peak VO2 per Session: **(L/min.)**	2.47	0.46	2.82	0.46
Gross Energy Expenditure: **(kcal)**	237.9	43.6	314.1	50.8
Estimated Resting Metabolic Rate: **(kcal)**	33.6	4.1	35.2	4.8
Total Work per Exercise Session: **(kcal)**	39.2	7.8	78.5	12.7
Net Energy Lost as Heat:				
kcal	165.1	32.7	235.5	38.1
Btu	655.2	129.9	934.6	151.3
Btu/min.	21.8	4.3	31.2	5.0
Efficiency (%):	16.4%	1.0%	25%	N/A

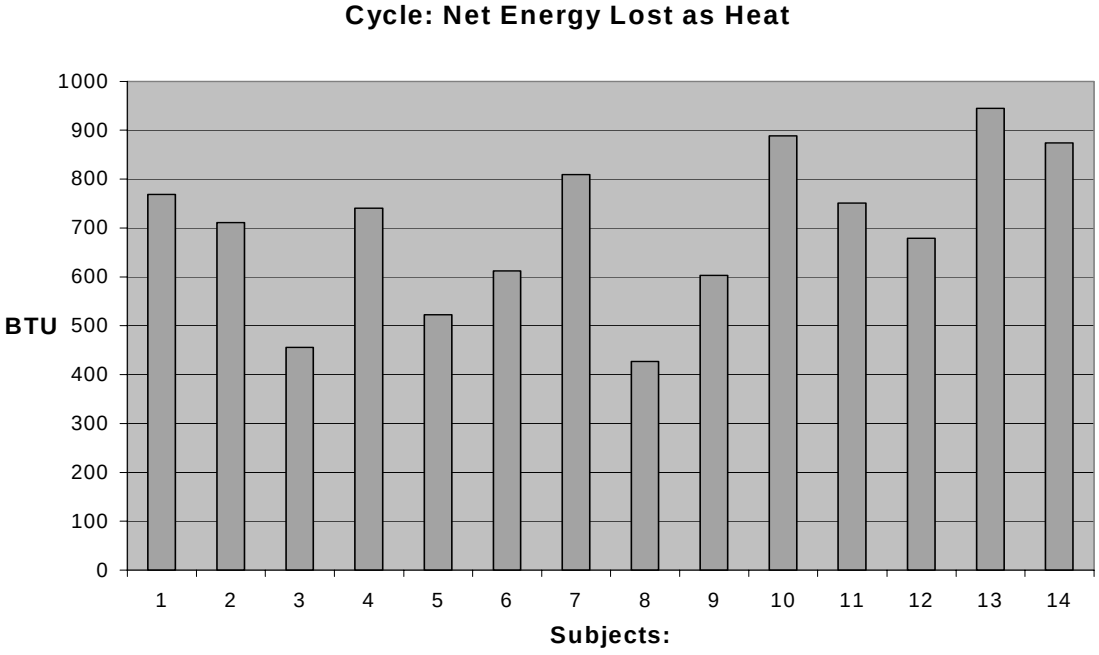

Figure 9: Amount of energy loss during cycle testing for each of the 14 subjects. Energy lost is in the form of heat.

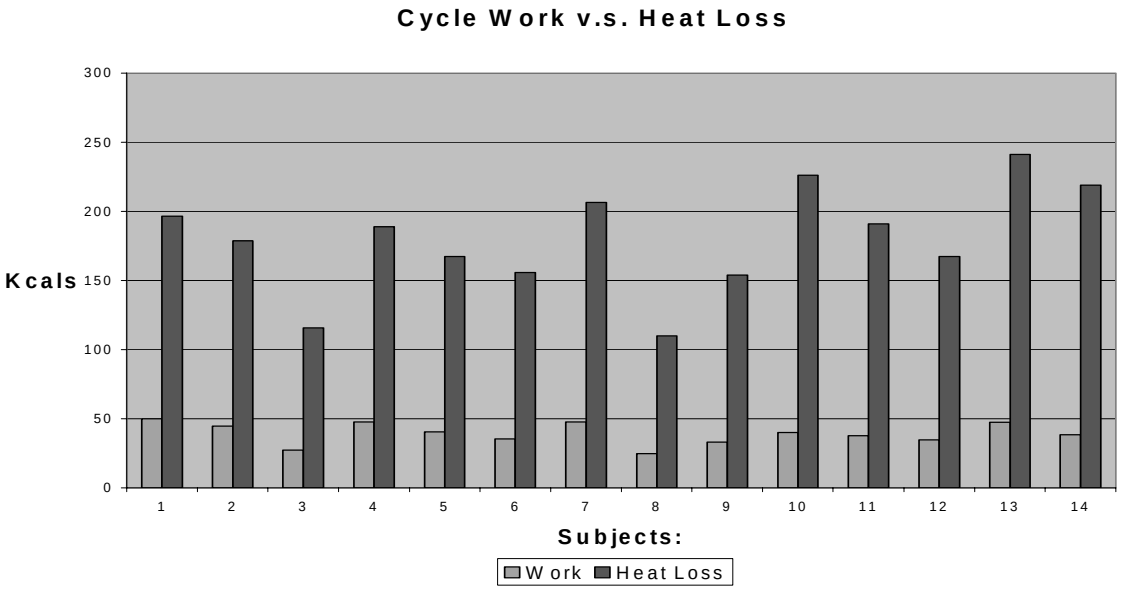

Figure 10: Individual subject comparisons between the amount of work performed and the heat given off using the cycle ergometer.

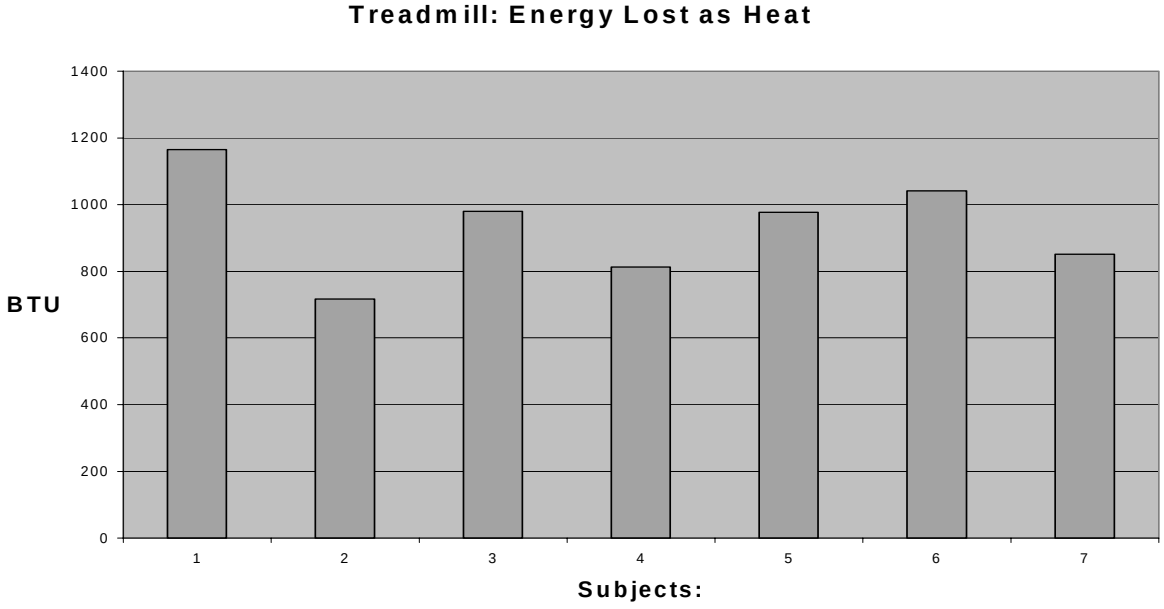

Figure 11: Amount of energy loss during treadmill testing for each of the 7 subjects. Energy lost is in the form of heat.

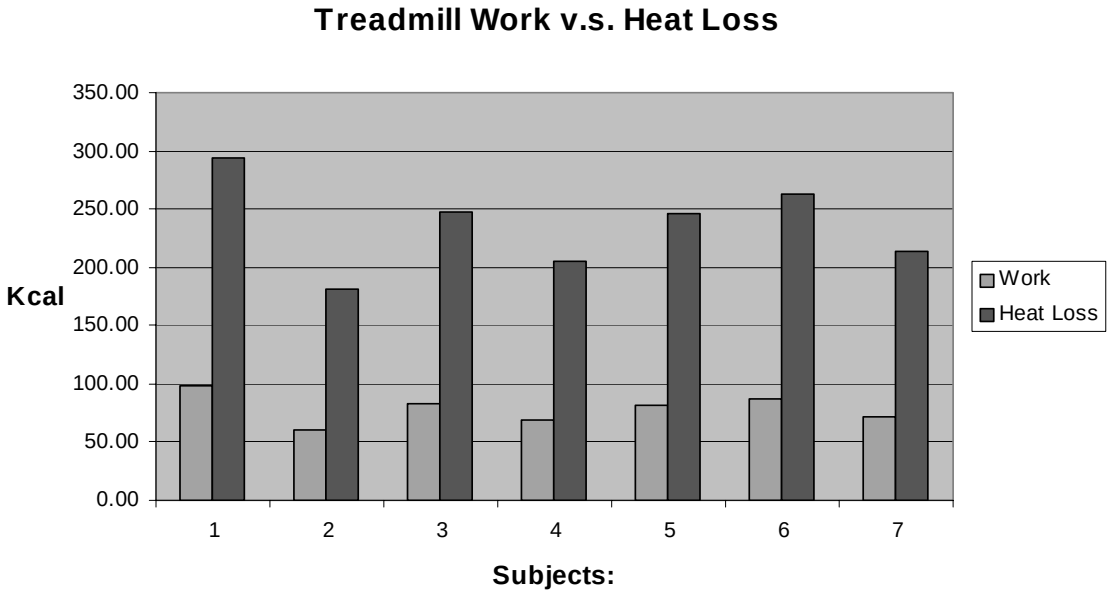

Figure 12: Individual subject comparisons between the amount of work performed and the heat given off in treadmill testing.

2.4 Discussion

It is recognized that oxygen consumption can increase up to 20 times resting values during maximal exercise in well-trained athletes (Guyton 96). For the ISS protocols in the present study, the overall average oxygen consumption during cycling was increased sixfold, with peak increases up to tenfold during the most intense (90% $VO2_{pk}$) cycling intervals. During the treadmill protocol, the average overall increase in oxygen consumption was eightfold, with a peak increase of tenfold. The greater variability in the cycle protocol was due to the interval protocol (40%-90% $VO2_{pk}$), vs. the continuous treadmill protocol (40% and 70% $VO2_{pk}$). The continuous training protocol is designed primarily to maintain aerobic endurance while the interval protocol should be more effective in maintaining speed and peak aerobic performance (Daniels 84, Lindsay 96).

Efficiency during walking, running, and cycling is generally assumed to be between 20% and 30% (McKardle 86, chapter 10). A value of 25% was assumed in the treadmill calculations, since the exact forces during walking and running could not be measured in this study. Most likely, this was a valid assumption for this continuous protocol where subjects could maintain a steady state during most of the exercise and where most of the subjects were accustomed to the walking/running movement. With 25% efficiency, then 75% of the total gross energy expenditure would be lost to the environment as heat. For these subjects, this value averaged 935 Btu (236 kcal) over the 30-min. exercise protocol. Therefore, an average heat production of 31.2 Btu/min. would need to be removed from the ISS module to account for the heat produced by the subject during treadmill exercise. The present results were obtained from a standard, commercial treadmill resting solidly

on the laboratory floor. On ISS, the treadmill will be vibration-isolated from the ISS structure. This treadmill in vibration isolation system (TVIS) results in a very small, almost undetectable movement of the treadmill, relative to the subject, during exercise. From a recent ground-based study in our laboratory, the oxygen cost of walking on the TVIS compared to a hard-mounted treadmill was approximately 10% higher. During running on the TVIS, the oxygen consumption was only 3% higher than the hard-mounted treadmill. Therefore, the data collected in this ground-based study may be only slightly lower than that which would be acquired during running in a vibration-isolated treadmill, assuming the same efficiency when exercising in microgravity. This assumption however, is most likely not true. When crewmembers exercise in microgravity, they must wear a harness system to produce a footward force during running. This harness system alters their running biomechanics and would most likely affect running efficiency.

Unlike the treadmill, efficiency could be calculated during the cycling protocol since the work on the cycle could be controlled and measured. The average efficiency was only 16% for these subjects. This value, however, is somewhat suspect, as the 2-min. exercise intervals in this cycle protocol were insufficient to allow the subject to reach a steady-state value at each work level. Therefore, the caloric cost of the oxygen consumption had to be estimated using an assumed respiratory quotient. It is likely however, that the efficiency during our cycling protocol really was lower than running. Most subjects are not as accustomed to cycling and the frequently changing and higher exercise levels involved in this interval protocol require a greater anaerobic metabolism during the exercise. Anaerobic work is less efficient compared to aerobic work and therefore an interval protocol would be expected to have lower overall efficiency.

The total work during the treadmill protocol was almost twice the total work during the cycle. However, the absolute numbers from these two sets of data cannot be directly compared since the subject groups differed somewhat. The treadmill subjects were slightly heavier (74 vs. 69 kg) and also had a higher level of aerobic fitness (45 vs. 38 ml/kg/min.). Even accounting for an approximately 5% difference in treadmill vs. cycle $VO2_{pk}$, the treadmill subjects as a group still tended to be slightly more fit than the cycle group, which would have resulted in higher absolute exercise intensities and work performed. Another reason for the greater work during the treadmill exercise was that the cumulative work involved in the continuous protocol is 13% greater than for the interval protocol used for the cycle exercise. Therefore, it would be expected that more work would be performed on the treadmill when comparing these two protocols. The average heat production during the treadmill exercise was therefore also approximately one and a half times that of the cycle exercise (22 Btu/min. for cycle vs. 31 Btu/min. for treadmill).

It is possible during ISS operation that both the treadmill and the cycle will be located within the same module (currently the Russian service module) and two crewmembers could exercise at the same time. American crewmembers from the Shuttle-*Mir* program reported that they preferred to exercise at the same time as their Russian crewmates.

Exercising simultaneously caused less overall disruption of the timeline and consolidated the period of loud noise and vibration from the exercise hardware, to leave longer consecutive quiet periods for vibration-sensitive experiments or for sleep. It is also possible that a third crewmember could be performing resistive exercise in another module on ISS at the same time. This worst-case scenario for heat production should be considered in the ISS air-handling requirements.

3 CONCLUSIONS AND COMMENTS

Resistive exercise on ISS will pose a challenge to environmental control. This is especially true because current plans are to place the iRED in a small enclosure without dedicated cooling or dehumidifying capacity. Small portable fans should be manifested to prevent overheating of the crewmembers and to prevent overheating of equipment in the immediate area of the node.

The resistive exercise heat calculations in this report are dependent on the specific resistance exercise hardware used: the prototype for the elastomer iRED device. Other resistance exercise machines may provide greater forces, force over a larger range of motion, and greater eccentric forces, all of which would cause a greater heat production.

Aerobic exercise on ISS will mostly likely occur more frequently than previously experienced during Space Shuttle flights. Also, it is likely that the aerobic exercise hardware may be located in one module and that two crewmembers may exercise simultaneously, thus causing greater perturbations in the environment than previously experienced. The amount of heat produced during treadmill exercise may be expected to be slightly more than during cycling. The continuous exercise protocol used in the present report produced slightly greater heat than the continuous protocol of equal total time.

In this report, the measurements were obtained in a 1-g environment. In the ISS microgravity environment, the actual heat production may be different. During cycle exercise, it is likely that heat production will be similar between 1g and micro-g environments, since cycle exercise is a non-weight-bearing exercise. For treadmill exercise, it is unclear how microgravity might alter heat production. At any given treadmill speed, heat production may be reduced, as the total work would be less, due to a smaller footward force. Most crewmembers report that they perform in-flight exercise at approximately 50%-60% body weight, due to the discomfort associated with the treadmill harness. However, to obtain a given training stimulus, whether estimated by attaining a given VO2 or heart rate, a faster treadmill speed would be required. As the velocity of walking or running increases, efficiency decreases (Cavanagh and Kram 1985), resulting in a greater heat production. Therefore, the values obtained in this report should be considered as minimal heat production values during the treadmill countermeasures.

The heat production estimates in this paper are based on the heat produced only by the subject. Heat produced by the exercise hardware must also be considered in determining the impact of the exercise countermeasures on the environmental control systems.

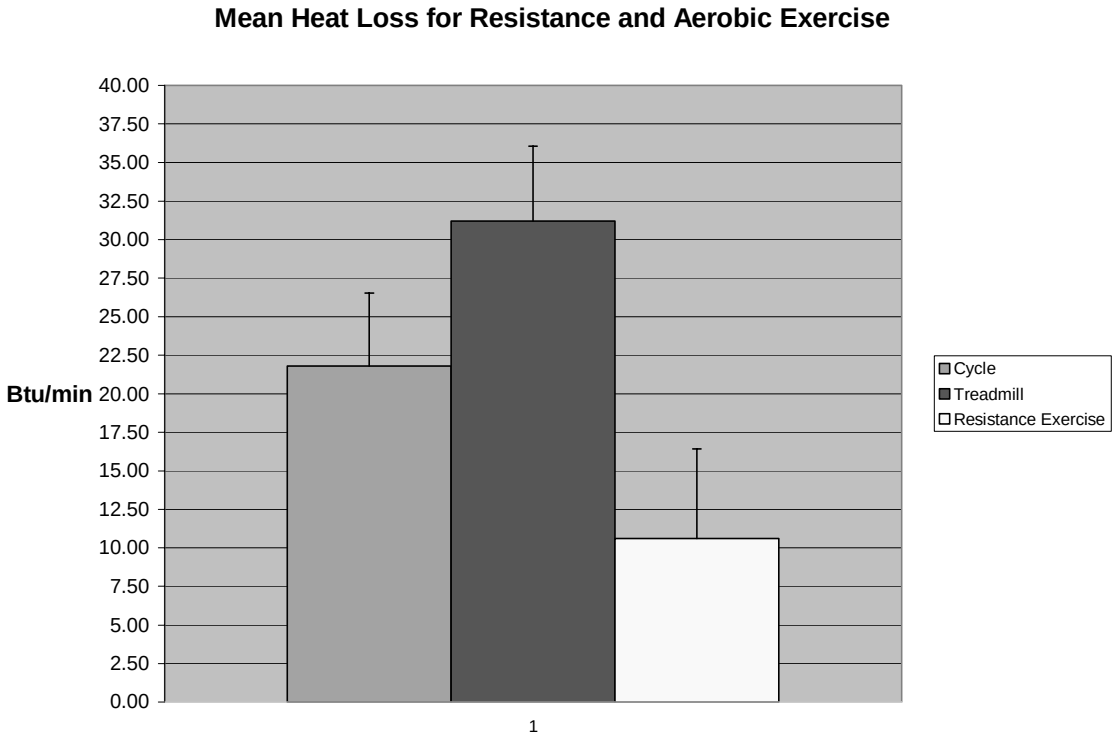

Figure 13: Average amount of heat lost per minute during the resistive and aerobic (treadmill and cycle) exercise tests.

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APPENDIX

Table 1: Resistance Exercise Subject Characteristics

Subject:	Age:	Height (cm)	Weight (Kg)
1	36	182.9	84.4
2	34	158.8	55.8
3	37	170.2	63.5
4	36	182.9	93.9
5	32	172.7	77.6
6	38	157.5	61.7
Mean:	35.5	170.8	72.8
Standard Deviation:	2.2	11.1	14.8

Table 2: Individual DEXA Results for Resistance Exercise Subjects 1-6

Subject 0001				
Region:	FFM (grams)	(lbs.)	Total (grams)	(lbs.)
Left Leg:			13698.9	30.206
Right Leg:			13514.2	29.799
Total Body Wt:	76041	167.7	82166.1	181.18

Subject 0002				
Region:	FFM (grams)	(lbs.)	Total (grams)	(lbs.)
Left Leg:			0	0
Right Leg:			0	0
Total Body Wt:	0	0	0	0

Subject 0003				
Region:	FFM (grams)	(lbs.)	Total (grams)	(lbs.)
Left Leg:			10729.1	23.658
Right Leg:			10589.4	23.35
Total Body Wt:	45643	100.6	60953.4	134.4

Subject 0004				
Region:	FFM (grams)	(lbs.)	Total (grams)	(lbs.)
Left Leg:			15473.6	34.12
Right Leg:			14865.4	32.78
Total Body Wt:	81347	179.4	91081.6	200.8

Subject 0005				
Region:	FFM (grams)	(lbs.)	Total (grams)	(lbs.)
Left Leg:			12594	27.77
Right Leg:			12368.2	27.272
Total Body Wt:	62637	138.1	76399.6	168.46

Subject 0006				
Region:	FFM (grams)	(lbs.)	Total (grams)	(lbs.)
Left Leg:			11239	24.78
Right Leg:			11525.1	25.41
Total Body Wt:	51356	113.2	63359.1	139.7

Table 3: Summary of Resistive Exercise Results

Subj. #	Work		GEE		RMR	VO2	Pk VO2	Efficie	Heat loss				NEE
	kcal	btu	kcal	btu	kcal	L/min	L/min	%	kcal	kcal/min	Btu	Btu/min	kcal
1	53.65	212.8	452.00	1793.54	83.83	1.51	2.84	11.87	314.52	5.24	1248.0	20.8	368.17
2	24.66	97.8	144.00	571.39	44	0.6	1.04	17.1	75.34	1.57	298.9	6.2	100.00
3	27.21	107.9	219.45	870.78	53.99	0.77	1.46	12.3	138.25	2.43	548.5	9.6	165.46
4	51.57	204.6	294.40	1168.18	94.22	0.92	2.11	17.5	148.61	2.32	589.6	9.2	200.18
5	35.69	141.6	275.90	1094.77	74.53	0.89	1.95	12.9	165.68	2.67	657.4	10.6	201.37
6	32.13	127.4	160.43	636.57	47.53	0.69	1.16	20.0	80.77	1.74	320.4	6.8	112.90
MEAN	37.48	148.7	257.69	1022.53	66.35	0.89	1.76	15.3	153.86	2.66	610.5	10.5	191.34
SD	12.3	48.9	112.50	446.40	20.76	0.32	0.67	3.3	86.86	1.33	344.6	5.2	96.55

Table 4: Resistance Exercise Subject Results

SUBJECT:0001		Exercise Time=60 min	
Total Work per Exercise Session:		**(Ft-Lb.)**	**Kcal**
	Concentric:	83239.77	26.96
	Eccentric:	82402.56	26.69
	Total:	165642.33	**53.65**
Gross Energy Expenditure (Kcal):		452.0	
Est. RMR Kcal/60 min):		83.83	*
Net Energy Expenditure (Kcal/60 min.):		368.17	
Oxygen Consumption: VO2 (L/min)		1.51	
Peak VO2: (L/min)		2.84	
Efficiency (%):		11.87	
LBM (kg):		0.00	
Net Energy Lost as Heat	**(Kcal):**	314.52	
	(Btu):	**1248.00**	
	(Btu/minute):	**20.80**	
	Peak Btu:	**56.35**	

SUBJECT:0002		Exercise Time=48 min	
Total Work per Exercise Session:		**(Ft-Lb.)**	**Kcal**
	Concentric:	37952.34	12.29
	Eccentric:	38196.96	12.37
	Total:	76149.3	**24.66**
Gross Energy Expenditure (Kcal):		144.0	
Est. RMR Kcal/48 min):		44.0	*
Net Energy Expenditure (Kcal/48 min.):		100.00	
Oxygen Consumption: VO2 (L/min)		0.60	
Peak VO2: (L/min)		1.04	
Efficiency (%):		17.13	
LBM (kg):		0.00	
Net Energy Lost as Heat	**(Kcal):**	75.34	
	(Btu):	**298.95**	
	(Btu/minute):	**6.23**	

SUBJECT:0003		Exercise Time=57 min	
Total Work per Exercise Session:		**(Ft-Lb.)**	**Kcal**
	Concentric:	42448.42	13.75
	Eccentric:	41572.15	13.47
	Total:	84020.56	**27.21**
Gross Energy Expenditure (Kcal):		219.45	
Est. RMR Kcal/57 min):		53.99	
Net Energy Expenditure (Kcal/57 min):		165.46	
Oxygen Consumption: VO2 (L/min)		0.77	
Peak VO2: (L/min)		1.46	
Efficiency (%):		12.40	
LBM (kg):		45.64	
Net Energy Lost as Heat	**(Kcal):**	138.25	
	(Btu):	**548.58**	
	(Btu/minute):	**9.62**	

SUBJECT:0004	Exercise Time=64 min	
Total Work per Exercise Session:	**(Ft-Lb.)**	**Kcal**
Concentric:	79735.54	25.83
Eccentric:	79472.20	25.74
Total:	159207.74	**51.57**
Gross Energy Expenditure (Kcal):	294.40	
Est. RMR Kcal/64 min):	94.22	
Net Energy Expenditure (Kcal/64 min):	200.18	
Oxygen Consumption: VO2 (L/min)	0.92	
Peak VO2: (L/min)	2.11	
Efficiency (%):	17.52	
LBM (kg):	45.64	
Net Energy Lost as Heat (Kcal):	148.61	
(Btu):	**589.68**	
(Btu/minute):	**9.21**	
Peak Btu:	**40.71**	

SUBJECT:0005	Exercise Time=62 min	
Total Work per Exercise Session:	**(Ft-Lb.)**	**Kcal**
Concentric:	55600.25	18.01
Eccentric:	54599.28	17.68
Total:	110199.53	**35.69**
Gross Energy Expenditure (Kcal):	275.90	
Est. RMR Kcal/62 min):	74.53	
Net Energy Expenditure (Kcal/62 min):	201.37	
Oxygen Consumption: VO2 (L/min)	0.89	
Peak VO2: (L/min)	1.95	
Efficiency (%):	12.94	
LBM (kg):	62.64	
Net Energy Lost as Heat (Kcal):	165.68	
(Btu):	657.42	
(Btu/minute):	10.60	

SUBJECT:0006	Exercise Time=46.5 min	
Total Work per Exercise Session:	**(Ft-Lb.)**	**Kcal**
Concentric:	49945.07	16.18
Eccentric:	49245.41	15.95
Total:	99190.48	**32.13**
Gross Energy Expenditure (Kcal):	160.43	
Est. RMR Kcal/46.5 min):	47.53	
Net Energy Expenditure (Kcal/46.5 min):	112.90	
Oxygen Consumption: VO2 (L/min)	0.69	
Peak VO2: (L/min)	1.16	
Efficiency (%):	20.03	
LBM (kg):	51.36	
Net Energy Lost as Heat (Kcal):	80.77	
(Btu):	320.48	
(Btu/minute):	6.89	

Table 5: Referenced Table 8.1 McArdle, Katch, Katch 2th Edu. & Referenced Table 9.1 McArdle, Katch, Katch 4th Edu.

TABLE 9.1
ESTIMATION OF RESTING METABOLIC RATE (RMR) BASED ON FAT-FREE BODY MASS*

FFM (kg)	*RMR (kcal)†*	*FFM (kg)*	*RMR (kcal)†*	*FFM (kg)*	*RMR (kcal)†*
30	1318	58	1625	86	2238
31	1340	59	1644	87	2249
32	1361	60	1666	88	2271
33	1383	61	1685	89	2292
34	1404	62	1709	90	2314
35	1426	63	1731	91	2336
36	1448	64	1753	92	2357
37	1469	65	1774	93	2379
38	1491	66	1796	94	2400
39	1512	67	1817	95	2422
40	1534	68	1839	96	2444
41	1556	69	1860	97	2465
42	1577	70	1885	98	2487
43	1599	71	1904	99	2508
44	1620	72	1925	100	2530
45	1642	73	1947	101	2552
46	1664	74	1968	102	2573
47	1685	75	1990	103	2595
48	1707	76	2015	104	2616
49	1728	77	2035	105	2638
50	1750	78	2055	106	2659
51	1772	79	2076	107	2681
52	1793	80	2098	108	2703
53	1815	81	2120	109	2724
54	1836	82	2141	110	2746
55	1858	83	2163	111	2768
56	1880	84	2184	112	2789
57	1901	85	2206	113	2811

TABLE 9-1. *Thermal equivalent of oxygen for nonprotein respiratory quotient, including percent kcal and grams derived from carbohydrate and fat*[a]

NONPROTEIN RQ	KCAL PER LITER OXYGEN CONSUMED	PERCENTAGE KCAL DERIVED FROM		GRAMS PER LITER O_2 CONSUMED	
		CARBOHYDRATE	FAT	CARBOHYDRATE	FAT
0.707	4.686	0	100	0.000	.496
.71	4.690	1.10	98.9	.012	.491
.72	4.702	4.75	95.2	.051	.476
.73	4.714	8.40	91.6	.090	.460
.74	4.727	12.0	88.0	.130	.444
.75	4.739	15.6	84.4	.170	.428
.76	4.751	19.2	80.8	.211	.412
.77	4.764	22.8	77.2	.250	.396
.78	4.776	26.3	73.7	.290	.380
.79	4.788	29.9	70.1	.330	.363
.80	4.801	33.4	66.6	.371	.347
.81	4.813	36.9	63.1	.413	.330
.82	4.825	40.3	59.7	.454	.313
.83	4.838	43.8	56.2	.493	.297
.84	4.850	47.2	52.8	.537	.280
.85	4.862	50.7	49.3	.579	.263
.86	4.875	54.1	45.9	.621	.247
.87	4.887	57.5	42.5	.663	.230
.88	4.899	60.8	39.2	.705	.213
.89	4.911	64.2	35.8	.749	.195
.90	4.924	67.5	32.5	.791	.178
.91	4.935	70.8	29.2	.834	.160
.92	4.948	74.1	25.9	.877	.143
.93	4.961	77.4	22.6	.921	.125
.94	4.973	80.7	19.3	.964	.108
.95	4.985	84.0	16.0	1.009	.090
.96	4.998	87.2	12.8	1.052	.072
.97	5.010	90.4	9.58	1.097	.054
.99	5.022	93.6	6.37	1.142	.036
.99	5.035	96.8	3.18	1.100	.018
1.00	5.047	100.0	0	1.231	.000

Table 6: Individual Subject Force Data

Subject 0001:	**ABDUCTION**			
Distance (ft.):		3.05		
Set 1 (Left Leg)				
Weight Lifted lb.:		15lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Work (Kcal) per Rep:
1/1con	11.66	41.87	127.69	0.04
1/1/ecc	13.42	43.62	133.06	0.04
1/2 con	14.21	44.41	135.46	0.04
1/2ecc	15.49	45.69	139.36	0.05
1/3 con	17.06	47.27	144.17	0.05
1/3ecc	14.58	44.79	136.60	0.04
1/4 con	14.73	44.94	137.06	0.04
1/4ecc	15.10	45.30	138.17	0.04
1/5con	11.54	41.74	127.31	0.04
1/5ecc	14.71	44.91	136.98	0.04
1/6con	15.49	45.70	139.38	0.05
1/6ecc	13.69	43.89	133.88	0.04
1/7con	16.62	46.82	142.81	0.05
1/7ecc	15.82	46.02	140.37	0.05
1/8con	12.56	42.77	130.43	0.04
1/8ecc	13.80	44.00	134.21	0.04
1/9con	17.79	48.00	146.39	0.05
1/9ecc	13.95	44.15	134.67	0.04
1/10con	12.49	42.70	130.22	0.04
1/10ecc	13.41	43.62	133.04	0.04
1/11con	16.91	47.11	143.70	0.05
1/11ecc	12.63	42.84	130.65	0.04
1/12con	16.17	46.37	141.44	0.05
1/12ecc	11.00	41.21	125.68	0.04
		Total per Set:		
		Con:	1646.07	0.53
		Ecc:	1616.68	0.52

Set 2 (Left Leg)				
Weight Lifted (lb.):		20 lb.		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	7.13	37.34	113.87	0.04
1/1/ecc	14.99	45.19	137.84	0.04
1/2 con	18.39	48.59	148.21	0.05
1/2ecc	14.49	44.70	136.33	0.04
1/3 con	7.04	37.24	113.59	0.04
1/3ecc	14.68	44.89	136.92	0.04
1/4 con	17.64	47.84	145.92	0.05
1/4ecc	14.38	44.59	135.99	0.04
1/5con	14.58	44.79	136.59	0.04
1/5ecc	14.46	44.67	136.23	0.04
1/6con	18.93	49.13	149.86	0.05
1/6ecc	12.85	43.05	131.31	0.04
1/7con	16.33	46.53	141.92	0.05
1/7ecc	14.69	44.90	136.95	0.04
1/8con	13.10	43.31	132.09	0.04
1/8ecc	14.35	44.55	135.89	0.04
1/9con	17.04	47.25	144.11	0.05
1/9ecc	12.52	42.73	130.31	0.04
1/10con	18.93	49.14	149.88	0.05
1/10ecc	12.52	42.73	130.31	0.04
1/11con	14.24	44.45	135.56	0.04
1/11ecc	15.03	45.24	137.97	0.04
1/12con	13.76	43.96	134.09	0.04
1/12ecc	15.22	45.43	138.55	0.04
		Total per Set:		
		Con:	1645.70	0.53
		Ecc:	1624.59	0.53

Set 3 (Left Leg)				
Weight Lifted (lb.):		30 lb.		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	22.46	52.66	160.63	0.05
1/1/ecc	24.94	55.14	168.18	0.05
1/2 con	22.46	52.66	160.63	0.05
1/2ecc	24.94	55.14	168.18	0.05
1/3 con	22.46	52.66	160.63	0.05
1/3ecc	24.94	55.14	168.18	0.05
1/4 con	25.40	55.61	169.61	0.05
1/4ecc	26.09	56.30	171.72	0.06
1/5con	23.91	54.12	165.05	0.05
1/5ecc	24.87	55.07	167.98	0.05
1/6con	21.89	52.10	158.90	0.05
1/6ecc	24.94	55.15	168.21	0.05
1/7con	18.43	48.64	148.35	0.05
1/7ecc	26.35	56.56	172.50	0.06
1/8con	20.81	51.02	155.61	0.05
1/8ecc	24.57	54.78	167.07	0.05
1/9con	22.71	52.91	161.38	0.05
1/9ecc	24.64	54.84	167.28	0.05
1/10con	24.06	54.26	165.50	0.05
1/10ecc	23.08	53.28	162.51	0.05
		Total per Set:		
		Con:	1606.28	0.52
		Ecc:	1681.81	0.54

Set 4 (Right Leg)				
Weight Lifted (lb.):		15 lb.		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	9.43	39.22	119.63	0.04
1/1/ecc	15.93	45.73	139.46	0.05
1/2 con	11.05	40.85	124.59	0.04
1/2ecc	14.82	44.61	136.07	0.04
1/3 con	11.16	40.96	124.91	0.04
1/3ecc	15.40	45.19	137.84	0.04
1/4 con	10.73	40.53	123.61	0.04
1/4ecc	13.91	43.71	133.30	0.04
1/5con	12.01	41.81	127.51	0.04
1/5ecc	14.14	43.94	134.02	0.04
1/6con	14.50	44.30	135.10	0.04
1/6ecc	13.65	43.45	132.53	0.04
1/7con	13.67	43.46	132.57	0.04
1/7ecc	13.92	43.72	133.35	0.04
1/8con	10.93	40.73	124.22	0.04
1/8ecc	13.92	43.72	133.33	0.04
1/9con	13.27	43.07	131.35	0.04
1/9ecc	14.88	44.68	136.28	0.04
1/10con	11.31	41.11	125.37	0.04
1/10ecc	14.55	44.35	135.27	0.04
1/11con	14.06	43.86	133.78	0.04
1/11ecc	14.58	44.38	135.35	0.04
1/12con	14.50	44.30	135.10	0.04
1/12ecc	12.04	41.84	127.62	0.04
		Total per Set:		
		Con:	1537.76	0.50
		Ecc:	1614.42	0.52

Set 5 (Right Leg)				
Weight Lifted (lb.):		20 lb.		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	8.91	38.71	118.06	0.04
1/1/ecc	14.41	44.21	134.85	0.04
1/2 con	9.11	38.91	118.66	0.04
1/2ecc	12.68	42.48	129.57	0.04
1/3 con	13.69	43.48	132.63	0.04
1/3ecc	13.51	43.31	132.09	0.04
1/4 con	11.29	41.09	125.33	0.04
1/4ecc	15.25	45.05	137.39	0.04
1/5con	11.47	41.27	125.88	0.04
1/5ecc	12.74	42.54	129.75	0.04
1/6con	8.15	37.95	115.75	0.04
1/6ecc	13.30	43.10	131.45	0.04
1/7con	13.38	43.18	131.71	0.04
1/7ecc	12.36	42.16	128.59	0.04
1/8con	7.88	37.68	114.92	0.04
1/8ecc	12.94	42.74	130.34	0.04
1/9con	15.65	45.45	138.61	0.04
1/9ecc	13.27	43.07	131.37	0.04
1/10con	8.23	38.03	115.99	0.04
1/10ecc	13.42	43.22	131.81	0.04
1/11con	13.60	43.40	132.37	0.04
1/11ecc	12.43	42.23	128.79	0.04
1/12con	12.71	42.51	129.67	0.04
1/12ecc	12.88	42.67	130.16	0.04
		Total per Set:		
		Con:	1499.57	0.49
		Ecc:	1576.17	0.51

Set 6 (Right Leg)				
Weight Lifted (lb.):		30 lb.		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	11.89	41.68	127.14	0.04
1/1/ecc	14.01	43.81	133.61	0.04
1/2 con	13.22	43.02	131.21	0.04
1/2ecc	16.39	46.19	140.87	0.05
1/3 con	9.28	39.08	119.19	0.04
1/3ecc	14.76	44.55	135.89	0.04
1/4 con	14.56	44.36	135.30	0.04
1/4ecc	15.76	45.56	138.97	0.05
1/5con	14.16	43.95	134.06	0.04
1/5ecc	14.53	44.32	135.19	0.04
1/6con	9.60	39.40	120.16	0.04
1/6ecc	14.97	44.77	136.54	0.04
1/7con	16.03	45.82	139.77	0.05
1/7ecc	13.42	43.22	131.81	0.04
1/8con	14.59	44.39	135.40	0.04
1/8ecc	12.72	42.52	129.68	0.04
1/9con	14.04	43.84	133.71	0.04
1/9ecc	14.13	43.93	134.00	0.04
1/10con	11.72	41.52	126.63	0.04
1/10ecc	11.99	41.78	127.44	0.04
		Total per Set:		
		Con:	1302.57	0.42
		Ecc:	1343.98	0.44

Subject 0001:	**DEAD LIFT**				
Set 0 (Warm-up)					
Distance (ft.):		1.83			
Weight Lifted lb.:		120.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	34.60	69.20	239.87	439.76	0.14
1/1/ecc	39.66	79.33	249.99	458.32	0.15
1/2 con	38.40	76.79	247.46	453.68	0.15
1/2ecc	40.40	80.80	251.47	461.02	0.15
1/3 con	32.88	65.75	236.42	433.44	0.14
1/3ecc	40.26	80.52	251.19	460.52	0.15
1/4 con	32.82	65.65	236.32	433.25	0.14
1/4ecc	41.49	82.99	253.66	465.04	0.15
1/5con	37.08	74.15	244.82	448.83	0.15
1/5ecc	39.49	78.97	249.64	457.68	0.15
1/6con	42.22	84.44	255.11	467.70	0.15
1/6ecc	33.76	67.52	238.19	436.68	0.14
1/7con	37.41	74.83	245.49	450.07	0.15
1/7ecc	39.48	78.97	249.63	457.66	0.15
1/8con	34.79	69.58	240.25	440.46	0.14
1/8ecc	39.42	78.85	249.51	457.44	0.15
1/9con	40.00	80.00	250.66	459.55	0.15
1/9ecc	36.78	73.57	244.24	447.76	0.15
1/10con	37.36	74.73	245.40	449.89	0.15
1/10ecc	38.59	77.18	247.84	454.38	0.15
			Total per Set:		
			Con:	4476.64	1.45
			Ecc:	4556.50	1.48

Set 1					
Weight Lifted (lb.):		230.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Initial con	58.09	116.18	286.84	525.88	0.17
Initial ecc	109.56	219.13	389.80	714.63	0.23
1/1con	108.68	217.36	388.03	711.39	0.23
1/1/ecc	103.42	206.84	377.51	692.09	0.22
1/2 con	108.52	217.05	387.72	710.81	0.23
1/2ecc	99.58	199.17	369.84	678.03	0.22
1/3 con	101.71	203.41	374.08	685.82	0.22
1/3ecc	98.78	197.56	368.22	675.08	0.22
1/4 con	101.52	203.04	373.71	685.13	0.22
1/4ecc	98.36	196.71	367.38	673.53	0.22
1/5con	100.65	201.30	371.97	681.94	0.22
1/5ecc	98.55	197.11	367.77	674.25	0.22
1/6con	105.30	210.61	381.28	699.01	0.23
1/6ecc	95.99	191.98	362.65	664.86	0.22
1/7con	100.44	200.89	371.56	681.18	0.22
1/7ecc	98.70	197.40	368.07	674.80	0.22
1/8con	99.40	198.79	369.46	677.34	0.22
1/8ecc	98.56	197.11	367.78	674.26	0.22
1/9con	105.10	210.19	380.86	698.25	0.23
1/9ecc	95.20	190.40	361.07	661.97	0.21
1/10con	99.75	199.50	370.17	678.65	0.22
1/10ecc	97.75	195.49	366.16	671.30	0.22
1/11con	105.86	211.73	382.39	701.05	0.23
1/11ecc	94.64	189.27	359.94	659.89	0.21
1/12con	104.44	208.89	379.56	695.85	0.23
1/12ecc	89.88	179.76	350.43	642.46	0.21
			Total per Set:		
			Con:	8832.30	2.86
			Ecc:	8757.15	2.84

Set 2					
Weight Lifted (lb.):		260.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	124.81	249.62	420.29	770.53	0.25
1/1/ecc	112.03	224.06	394.73	723.66	0.23
1/2 con	115.83	231.67	402.33	737.61	0.24
1/2ecc	121.24	242.48	413.15	757.43	0.25
1/3 con	130.95	261.90	432.56	793.03	0.26
1/3ecc	113.96	227.93	398.60	730.76	0.24
1/4 con	126.65	253.29	423.96	777.26	0.25
1/4ecc	112.59	225.19	395.86	725.74	0.24
1/5con	125.78	251.55	422.22	774.07	0.25
1/5ecc	110.96	221.91	392.58	719.73	0.23
1/6con	124.32	248.64	419.31	768.74	0.25
1/6ecc	111.35	222.70	393.37	721.17	0.23
1/7con	126.74	253.48	424.15	777.61	0.25
1/7ecc	113.37	226.75	397.41	728.59	0.24
1/8con	124.72	249.43	420.10	770.18	0.25
1/8ecc	110.69	221.38	392.04	718.75	0.23
1/9con	124.06	248.11	418.78	767.76	0.25
1/9ecc	109.89	219.78	390.45	715.82	0.23
1/10con	124.25	248.49	419.16	768.46	0.25
1/10ecc	104.21	208.41	379.08	694.98	0.23
			Total per Set:		
			Con:	7705.25	2.50
			Ecc:	7236.64	2.34

Set 3					
Weight Lifted (lb.):		280.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	98.21	196.42	367.09	673.00	0.22
1/1/ecc	136.25	272.51	443.18	812.49	0.26
1/2 con	145.05	290.10	460.77	844.75	0.27
1/2ecc	125.73	251.47	422.13	773.91	0.25
1/3 con	138.86	277.71	448.38	822.03	0.27
1/3ecc	122.29	244.58	415.24	761.28	0.25
1/4 con	137.01	274.02	444.69	815.27	0.26
1/4ecc	119.55	239.11	409.78	751.26	0.24
1/5con	135.72	271.43	442.10	810.51	0.26
1/5ecc	119.70	239.40	410.07	751.79	0.24
1/6con	136.55	273.10	443.76	813.57	0.26
1/6ecc	119.42	238.84	409.50	750.76	0.24
1/7con	135.52	271.03	441.70	809.78	0.26
1/7ecc	117.41	234.82	405.48	743.39	0.24
1/8con	137.36	274.72	445.39	816.54	0.26
1/8ecc	114.20	228.41	399.08	731.64	0.24
			Total per Set:		
			Con:	6405.45	2.07
			Ecc:	6076.51	1.97

Subject 0001:	**HEEL RAISES**				
Set 0 (Warm-up)					
Distance (ft.):		0.32			
Weight Lifted lb.:		130.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Total Body Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Initial con	39.19	78.39	259.57	83.82	0.03
Initial ecc	63.66	127.33	308.50	99.62	0.03
1/1con	65.07	130.14	311.31	100.53	0.03
1/1/ecc	58.90	117.80	298.98	96.54	0.03
1/2 con	61.15	122.29	303.47	97.99	0.03
1/2ecc	61.42	122.85	304.03	98.17	0.03
1/3 con	59.38	118.76	299.94	96.85	0.03
1/3ecc	58.14	116.29	297.47	96.06	0.03
1/4 con	61.78	123.56	304.74	98.41	0.03
1/4ecc	57.79	115.58	296.76	95.83	0.03
1/5con	59.65	119.29	300.47	97.03	0.03
1/5ecc	57.71	115.41	296.59	95.77	0.03
1/6con	58.45	116.90	298.08	96.25	0.03
1/6ecc	56.50	113.00	294.17	94.99	0.03
1/7con	58.57	117.13	298.31	96.33	0.03
1/7ecc	57.56	115.13	296.31	95.68	0.03
1/8con	57.57	115.15	296.33	95.69	0.03
1/8ecc	55.28	110.57	291.74	94.21	0.03
1/9con	57.24	114.49	295.67	95.48	0.03
1/9ecc	56.67	113.35	294.52	95.11	0.03
1/10con	61.13	122.26	303.44	97.98	0.03
1/10ecc	55.70	111.40	292.57	94.48	0.03
1/11con	59.73	119.46	300.64	97.08	0.03
1/11ecc	55.77	111.53	292.71	94.52	0.03
1/12con	57.52	115.04	296.21	95.65	0.03
1/12ecc	44.65	89.31	270.49	87.34	0.03
			Total per Set:		
			Con:	1249.09	0.40
			Ecc:	1238.33	0.40

Set 1					
Weight Lifted (lb.):		250.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Total Body Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init. con	58.68	117.36	298.54	96.40	0.03
Init. ecc	114.85	229.70	410.88	132.68	0.04
1/1con	118.42	236.84	418.02	134.99	0.04
1/1/ecc	111.70	223.41	404.59	130.65	0.04
1/2 con	112.85	225.70	406.88	131.39	0.04
1/2ecc	112.89	225.79	406.96	131.41	0.04
1/3 con	113.83	227.66	408.84	132.02	0.04
1/3ecc	112.07	224.14	405.32	130.88	0.04
1/4 con	109.82	219.63	400.81	129.43	0.04
1/4ecc	105.69	211.38	392.56	126.76	0.04
1/5con	114.14	228.29	409.46	132.22	0.04
1/5ecc	110.55	221.11	402.28	129.90	0.04
1/6con	109.78	219.57	400.74	129.41	0.04
1/6ecc	106.68	213.35	394.53	127.40	0.04
1/7con	113.50	227.00	408.18	131.81	0.04
1/7ecc	108.58	217.16	398.34	128.63	0.04
1/8con	110.49	220.98	402.15	129.86	0.04
1/8ecc	108.32	216.64	397.82	128.46	0.04
1/9con	111.37	222.73	403.91	130.43	0.04
1/9ecc	106.68	213.35	394.53	127.40	0.04
1/10con	112.34	224.67	405.85	131.06	0.04
1/10ecc	103.01	206.01	387.19	125.03	0.04
1/11con	112.77	225.55	406.73	131.34	0.04
1/11ecc	104.46	208.93	390.10	125.97	0.04
1/12con	111.67	223.35	404.52	130.63	0.04
1/12ecc	82.75	165.51	346.69	111.95	0.04
			Total per Set:		
			Con:	1670.97	0.54
			Ecc:	1657.14	0.54

Set 2					
Weight Lifted (lb.):		270.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Total Body Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init. con	113.08	226.16	407.33	131.54	0.04
Init. ecc	124.96	249.92	431.10	139.21	0.05
1/1con	124.15	248.31	429.49	138.69	0.04
1/1/ecc	122.20	244.39	425.57	137.42	0.04
1/2 con	126.70	253.39	434.57	140.33	0.05
1/2ecc	121.71	243.43	424.60	137.11	0.04
1/3 con	124.09	248.18	429.36	138.65	0.04
1/3ecc	121.91	243.82	425.00	137.24	0.04
1/4 con	125.58	251.16	432.34	139.61	0.05
1/4ecc	117.52	235.05	416.22	134.41	0.04
1/5con	124.83	249.65	430.83	139.12	0.05
1/5ecc	119.78	239.56	420.74	135.86	0.04
1/6con	125.43	250.86	432.04	139.51	0.05
1/6ecc	115.21	230.42	411.60	132.91	0.04
1/7con	124.82	249.63	430.81	139.11	0.05
1/7ecc	118.98	237.96	419.14	135.35	0.04
1/8con	124.06	248.12	429.30	138.63	0.04
1/8ecc	116.07	232.14	413.32	133.47	0.04
1/9con	118.06	236.13	417.31	134.75	0.04
1/9ecc	121.05	242.11	423.28	136.69	0.04
1/10con	118.75	237.50	418.68	135.20	0.04
1/10ecc	104.72	209.44	390.62	126.14	0.04
			Total per Set:		
			Con:	1515.14	0.49
			Ecc:	1485.80	0.48

Set 3					
Weight Lifted (lb.):		290.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Total Body Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init. con	54.79	109.59	290.76	93.89	0.03
Init. ecc	140.22	280.43	461.61	149.06	0.05
1/1con	141.51	283.02	464.19	149.90	0.05
1/1/ecc	134.87	269.74	450.91	145.61	0.05
1/2 con	139.19	278.38	459.55	148.40	0.05
1/2ecc	131.51	263.01	444.19	143.44	0.05
1/3 con	138.20	276.39	457.57	147.76	0.05
1/3ecc	127.42	254.83	436.01	140.79	0.05
1/4 con	137.89	275.79	456.96	147.56	0.05
1/4ecc	127.49	254.97	436.15	140.84	0.05
1/5con	136.45	272.90	454.08	146.63	0.05
1/5ecc	131.93	263.85	445.03	143.71	0.05
1/6con	137.15	274.30	455.48	147.08	0.05
1/6ecc	127.76	255.52	436.69	141.02	0.05
1/7con	137.32	274.65	455.82	147.19	0.05
1/7ecc	129.42	258.84	440.01	142.09	0.05
1/8con	135.66	271.32	452.50	146.12	0.05
1/8ecc	102.29	204.58	385.76	124.57	0.04
			Total per Set:		
			Con:	1274.52	0.41
			Ecc:	1271.12	0.41

Subject 0001:		SQUATS			
Set 0					
Distance (ft.):		1.88			
Weight Lifted lb.:		150.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init Con	39.30	78.60	249.27	467.37	0.15
1/1/ecc	62.82	125.65	296.32	555.59	0.18
1/1 con	63.42	126.84	297.50	557.82	0.18
1/2ecc	69.77	139.54	310.21	581.64	0.19
1/2 con	58.70	117.39	288.06	540.11	0.17
1/3ecc	60.29	120.58	291.25	546.09	0.18
1/3con	64.78	129.55	300.22	562.91	0.18
1/4ecc	55.03	110.06	280.73	526.36	0.17
1/4con	63.37	126.73	297.40	557.62	0.18
1/5ecc	53.22	106.44	277.11	519.58	0.17
1/5con	55.30	110.60	281.27	527.37	0.17
1/6ecc	43.47	86.94	257.61	483.02	0.16
1/6con	39.61	79.22	249.89	468.53	0.15
1/7ecc	61.52	123.03	293.70	550.69	0.18
1/7con	61.04	122.08	292.75	548.90	0.18
1/8ecc	57.91	115.81	286.48	537.15	0.17
1/8con	61.90	123.80	294.47	552.13	0.18
1/9ecc	58.45	116.89	287.56	539.17	0.17
1/9con	64.28	128.56	299.22	561.04	0.18
1/10ecc	56.76	113.52	284.19	532.85	0.17
1/10con	63.23	126.46	297.12	557.11	0.18
1/11ecc	60.58	121.16	291.83	547.19	0.18
1/11con	61.86	123.71	294.38	551.96	0.18
1/12ecc	60.76	121.52	292.19	547.85	0.18
1/12con	62.07	124.13	294.80	552.75	0.18
1/13ecc	59.11	118.21	288.88	541.65	0.18
1/13con	61.76	123.52	294.19	551.61	0.18
Final Ecc	49.12	98.24	268.91	504.21	0.16
			Total per Set:		
			Con:	7557.26	2.45
			Ecc:	7513.03	2.43

Set 1					
Weight Lifted lb.:		240.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Total Body Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init. con	107.89	215.79	386.46	724.61	0.23
Init. ecc	118.44	236.88	407.55	764.16	0.25
1/1con	119.01	238.02	408.69	766.29	0.25
1/1/ecc	114.35	228.71	399.38	748.83	0.24
1/2 con	119.19	238.38	409.05	766.96	0.25
1/2ecc	113.94	227.89	398.55	747.29	0.24
1/3 con	116.95	233.90	404.57	758.57	0.25
1/3ecc	109.20	218.39	389.06	729.49	0.24
1/4 con	117.39	234.79	405.46	760.23	0.25
1/4ecc	112.12	224.24	394.90	740.44	0.24
1/5con	113.95	227.89	398.56	747.30	0.24
1/5ecc	112.33	224.65	395.32	741.22	0.24
1/6con	115.68	231.35	402.02	753.78	0.24
1/6ecc	111.72	223.44	394.11	738.96	0.24
1/7con	115.80	231.60	402.27	754.25	0.24
1/7ecc	110.81	221.62	392.29	735.54	0.24
1/8con	115.26	230.52	401.19	752.23	0.24
1/8ecc	110.80	221.60	392.27	735.50	0.24
1/9con	115.21	230.43	401.09	752.05	0.24
1/9ecc	110.00	219.99	390.66	732.49	0.24
1/10con	114.89	229.78	400.45	750.85	0.24
1/10ecc	109.93	219.86	390.53	732.24	0.24
1/11con	114.35	228.71	399.38	748.83	0.24
1/11ecc	110.54	221.08	391.75	734.52	0.24
1/12con	114.32	228.63	399.30	748.69	0.24
1/12ecc	99.73	199.46	370.13	693.99	0.22
			Total per Set:		
			Con:	9784.64	3.17
			Ecc:	9574.68	3.10

Set 2					
Distance (ft.):		1.67			
Weight Lifted lb.:		260.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Total Body Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init. con	109.21	218.42	389.08	648.47	0.21
Init. ecc	122.69	245.38	416.05	693.41	0.22
1/1con	125.01	250.02	420.68	701.14	0.23
1/1/ecc	119.10	238.20	408.87	681.45	0.22
1/2 con	125.63	251.26	421.93	703.21	0.23
1/2ecc	119.00	238.00	408.67	681.11	0.22
1/3 con	124.84	249.67	420.34	700.56	0.23
1/3ecc	120.15	240.30	410.97	684.94	0.22
1/4 con	124.66	249.32	419.98	699.97	0.23
1/4ecc	120.06	240.12	410.79	684.64	0.22
1/5con	123.77	247.55	418.22	697.03	0.23
1/5ecc	119.42	238.84	409.51	682.51	0.22
1/6con	123.44	246.89	417.56	695.93	0.23
1/6ecc	117.47	234.94	405.61	676.02	0.22
1/7con	123.93	247.85	418.52	697.54	0.23
1/7ecc	116.23	232.47	403.14	671.89	0.22
1/8con	124.27	248.55	419.22	698.69	0.23
1/8ecc	116.88	233.75	404.42	674.03	0.22
1/9con	122.30	244.61	415.28	692.13	0.22
1/9ecc	106.16	212.33	383.00	638.33	0.21
			Total per Set:		
			Con:	6934.68	2.25
			Ecc:	6768.35	2.19

Set 3					
Distance (ft.):		1.67			
Weight Lifted lb.:		280.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Total Body Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init. con	109.59	219.18	389.85	649.74	0.21
Init. ecc	130.67	261.34	432.01	720.02	0.23
1/1con	136.13	272.27	442.94	738.23	0.24
1/1/ecc	125.37	250.75	421.42	702.36	0.23
1/2 con	136.25	272.50	443.16	738.61	0.24
1/2ecc	125.79	251.58	422.25	703.74	0.23
1/3 con	135.40	270.79	441.46	735.77	0.24
1/3ecc	124.73	249.47	420.13	700.22	0.23
1/4 con	132.68	265.36	436.02	726.71	0.24
1/4ecc	125.13	250.25	420.92	701.54	0.23
1/5con	134.17	268.34	439.01	731.69	0.24
1/5ecc	122.43	244.86	415.53	692.55	0.22
1/6con	130.63	261.26	431.93	719.88	0.23
1/6ecc	116.14	232.28	402.95	671.58	0.22
			Total per Set:		
			Con:	5040.62	1.63
			Ecc:	4892.01	1.58

Subject 0001:	**ADDUCTION**			
Distance (ft.):		3.05		
Set 1 (Left Leg)				
Weight Lifted lb.:		15lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	18.84	38.64	117.85	0.04
1/1/ecc	14.30	34.11	104.03	0.03
1/2 con	18.30	38.10	116.21	0.04
1/2ecc	16.36	36.16	110.28	0.04
1/3 con	17.85	37.65	114.83	0.04
1/3ecc	13.56	33.36	101.76	0.03
1/4 con	18.09	37.89	115.57	0.04
1/4ecc	14.91	34.71	105.86	0.03
1/5con	17.04	36.84	112.36	0.04
1/5ecc	14.77	34.58	105.46	0.03
1/6con	17.79	37.60	114.67	0.04
1/6ecc	14.77	34.57	105.44	0.03
1/7con	14.24	34.04	103.83	0.03
1/7ecc	14.15	33.96	103.56	0.03
1/8con	16.51	36.31	110.76	0.04
1/8ecc	14.10	33.90	103.40	0.03
1/9con	11.49	31.29	95.45	0.03
1/9ecc	15.93	35.74	108.99	0.04
1/10con	14.06	33.86	103.27	0.03
1/10ecc	14.09	33.89	103.38	0.03
1/11con	14.33	34.13	104.09	0.03
1/11ecc	13.00	32.80	100.04	0.03
1/12con	15.11	34.91	106.48	0.03
1/12ecc	14.66	34.46	105.10	0.03
		Total per Set:		
		Con:	1315.37	0.43
		Ecc:	1257.30	0.41

Set 2 (Left Leg)				
Weight Lifted lb.:		15lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	20.97	40.77	124.36	0.04
1/1/ecc	16.48	36.28	110.65	0.04
1/2 con	18.31	38.12	116.25	0.04
1/2ecc	15.74	35.54	108.39	0.04
1/3 con	20.43	40.24	122.72	0.04
1/3ecc	14.92	34.72	105.89	0.03
1/4 con	15.95	35.75	109.04	0.04
1/4ecc	16.40	36.20	110.41	0.04
1/5con	12.45	32.25	98.36	0.03
1/5ecc	15.56	35.36	107.85	0.03
1/6con	13.98	33.78	103.03	0.03
1/6ecc	17.07	36.87	112.45	0.04
1/7con	15.95	35.75	109.04	0.04
1/7ecc	14.71	34.51	105.25	0.03
1/8con	14.26	34.07	103.91	0.03
1/8ecc	16.53	36.33	110.80	0.04
1/9con	13.91	33.71	102.82	0.03
1/9ecc	15.64	35.44	108.10	0.04
1/10con	16.63	36.44	111.13	0.04
1/10ecc	13.32	33.12	101.02	0.03
1/11con	15.20	35.01	106.77	0.03
1/11ecc	15.42	35.22	107.42	0.03
1/12con	11.99	31.79	96.97	0.03
1/12ecc	15.81	35.61	108.62	0.04
		Total per Set:		
		Con:	1304.40	0.42
		Ecc:	1296.86	0.42

Set 3 (Left Leg)				
Weight Lifted lb.:		20lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	16.70	36.50	111.33	0.04
1/1/ecc	17.04	36.84	112.36	0.04
1/2 con	22.22	42.03	128.18	0.04
1/2ecc	15.72	35.53	108.36	0.04
1/3 con	17.09	36.89	112.53	0.04
1/3ecc	16.50	36.30	110.72	0.04
1/4 con	19.18	38.98	118.89	0.04
1/4ecc	15.57	35.37	107.89	0.03
1/5con	19.64	39.44	120.30	0.04
1/5ecc	15.10	34.91	106.47	0.03
1/6con	19.14	38.95	118.79	0.04
1/6ecc	14.45	34.25	104.47	0.03
1/7con	19.11	38.91	118.68	0.04
1/7ecc	14.33	34.13	104.09	0.03
1/8con	13.26	33.06	100.84	0.03
1/8ecc	16.32	36.12	110.17	0.04
1/9con	18.09	37.89	115.58	0.04
1/9ecc	13.68	33.48	102.11	0.03
1/10con	12.70	32.50	99.14	0.03
1/10ecc	17.92	37.72	115.06	0.04
		Total per Set:		
		Con:	1144.25	0.37
		Ecc:	1081.70	0.35

Set 4 (Right Leg)				
Weight Lifted lb.:		15lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	17.80	37.61	114.70	0.04
1/1/ecc	13.62	33.43	101.95	0.03
1/2 con	15.59	35.40	107.96	0.03
1/2ecc	16.02	35.83	109.27	0.04
1/3 con	15.02	34.82	106.20	0.03
1/3ecc	16.09	35.89	109.47	0.04
1/4 con	12.77	32.57	99.34	0.03
1/4ecc	15.91	35.71	108.92	0.04
1/5con	12.03	31.83	97.09	0.03
1/5ecc	14.25	34.05	103.85	0.03
1/6con	14.94	34.74	105.95	0.03
1/6ecc	14.94	34.74	105.96	0.03
1/7con	13.38	33.18	101.20	0.03
1/7ecc	15.07	34.88	106.38	0.03
1/8con	12.70	32.50	99.12	0.03
1/8ecc	15.30	35.10	107.06	0.03
1/9con	12.44	32.24	98.33	0.03
1/9ecc	14.56	34.37	104.82	0.03
1/10con	15.85	35.65	108.73	0.04
1/10ecc	14.48	34.28	104.55	0.03
1/11con	11.35	31.16	95.03	0.03
1/11ecc	14.76	34.56	105.42	0.03
1/12con	10.11	29.92	91.25	0.03
1/12ecc	14.37	34.17	104.23	0.03
		Total per Set:		
		Con:	1224.89	0.40
		Ecc:	1271.89	0.41

Set 5 (Right Leg)				
Weight Lifted lb.:		15lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	19.83	39.63	120.88	0.04
1/1/ecc	16.39	36.20	110.40	0.04
1/2 con	11.22	31.02	94.62	0.03
1/2ecc	15.76	35.57	108.48	0.04
1/3 con	16.23	36.03	109.89	0.04
1/3ecc	14.90	34.71	105.86	0.03
1/4 con	12.86	32.66	99.61	0.03
1/4ecc	15.59	35.39	107.94	0.03
1/5con	12.09	31.90	97.29	0.03
1/5ecc	15.92	35.72	108.96	0.04
1/6con	10.06	29.86	91.09	0.03
1/6ecc	14.26	34.07	103.90	0.03
1/7con	17.66	37.46	114.25	0.04
1/7ecc	15.12	34.93	106.53	0.03
1/8con	13.88	33.68	102.73	0.03
1/8ecc	14.36	34.16	104.19	0.03
1/9con	10.87	30.68	93.56	0.03
1/9ecc	14.53	34.34	104.73	0.03
1/10con	13.87	33.67	102.69	0.03
1/10ecc	12.49	32.29	98.49	0.03
1/11con	11.96	31.77	96.89	0.03
1/11ecc	15.82	35.62	108.65	0.04
1/12con	10.24	30.04	91.64	0.03
1/12ecc	15.07	34.87	106.36	0.03
		Total per Set:		
		Con:	1215.14	0.39
		Ecc:	1274.47	0.41

Set 6 (Right Leg)				
Weight Lifted lb.:		20lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	12.78	32.59	99.39	0.03
1/1/ecc	17.67	37.47	114.29	0.04
1/2 con	17.70	37.50	114.38	0.04
1/2ecc	16.74	36.54	111.45	0.04
1/3 con	13.86	33.66	102.67	0.03
1/3ecc	17.99	37.80	115.28	0.04
1/4 con	10.87	30.67	93.55	0.03
1/4ecc	16.22	36.02	109.87	0.04
1/5con	16.62	36.42	111.08	0.04
1/5ecc	16.07	35.87	109.42	0.04
1/6con	12.69	32.50	99.11	0.03
1/6ecc	16.70	36.50	111.32	0.04
1/7con	20.27	40.08	122.24	0.04
1/7ecc	13.28	33.08	100.91	0.03
1/8con	13.83	33.63	102.57	0.03
1/8ecc	15.59	35.39	107.93	0.03
1/9con	12.56	32.37	98.72	0.03
1/9ecc	14.91	34.72	105.88	0.03
1/10con	11.83	31.63	96.48	0.03
1/10ecc	15.98	35.78	109.14	0.04
		Total per Set:		
		Con:	1040.18	0.34
		Ecc:	1095.49	0.35

SUBJECT:0001			
		Ft-lbs.	**Total Kcal**
Total Work per Exercise Session:	Concentric:	78928.76	25.56
(Ft-Lb.)	Eccentric:	77762.60	25.19
		156691.36	**50.75**

Subject 0002:	**ABDUCTION**			
Distance (ft.):		2.83		
Set 1 (Left Leg)				
Weight Lifted lb.:		15lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	10.28	30.08	85.13	0.03
1/1/ecc	13.04	32.84	92.94	0.03
1/2 con	16.40	36.20	102.44	0.03
1/2ecc	13.96	33.76	95.55	0.03
1/3 con	12.56	32.36	91.59	0.03
1/3ecc	15.21	35.02	99.09	0.03
1/4 con	15.78	35.59	100.71	0.03
1/4ecc	13.81	33.61	95.12	0.03
1/5con	17.14	36.94	104.54	0.03
1/5ecc	13.51	33.32	94.28	0.03
1/6con	18.25	38.06	107.70	0.03
1/6ecc	15.42	35.22	99.68	0.03
1/7con	16.07	35.88	101.53	0.03
1/7ecc	14.74	34.55	97.77	0.03
1/8con	12.23	32.04	90.66	0.03
1/8ecc	15.56	35.36	100.07	0.03
1/9con	12.23	32.03	90.65	0.03
1/9ecc	14.84	34.64	98.03	0.03
1/10con	14.66	34.46	97.52	0.03
1/10ecc	14.42	34.22	96.85	0.03
1/11con	12.10	31.90	90.28	0.03
1/11ecc	13.22	33.02	93.45	0.03
		Total per Set:		
		Con:	1062.76	0.34
		Ecc:	1062.83	0.34

Set 2 (Left Leg)				
Weight Lifted lb.:		25lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init con	6.31	26.11	73.90	0.02
Init ecc	9.01	28.82	81.55	0.03
1/1con	14.55	34.35	97.21	0.03
1/1/ecc	20.39	40.19	113.73	0.04
1/2 con	18.72	38.52	109.02	0.04
1/2ecc	18.18	37.99	107.50	0.03
1/3 con	21.42	41.22	116.66	0.04
1/3ecc	16.46	36.27	102.64	0.03
1/4 con	22.06	41.86	118.47	0.04
1/4ecc	16.03	35.83	101.40	0.03
1/5con	17.47	37.27	105.49	0.03
1/5ecc	16.81	36.61	103.62	0.03
1/6con	18.32	38.13	107.90	0.03
1/6ecc	16.85	36.65	103.72	0.03
1/7con	16.82	36.62	103.63	0.03
1/7ecc	15.51	35.32	99.94	0.03
1/8con	16.69	36.49	103.27	0.03
1/8ecc	16.44	36.25	102.58	0.03
		Total per Set:		
		Con:	935.55	0.30
		Ecc:	916.69	0.30

Set 3 (Left Leg)				
Weight Lifted lb.:		30lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	17.54	37.34	105.67	0.03
1/1/ecc	23.62	43.42	122.89	0.04
1/2 con	22.39	42.20	119.42	0.04
1/2ecc	21.14	40.94	115.86	0.04
1/3 con	22.89	42.69	120.82	0.04
1/3ecc	24.28	44.08	124.76	0.04
1/4 con	21.47	41.27	116.79	0.04
1/4ecc	23.12	42.93	121.48	0.04
1/5con	19.07	38.88	110.02	0.04
1/5ecc	23.60	43.40	122.83	0.04
1/6con	20.12	39.92	112.98	0.04
1/6ecc	20.58	40.38	114.28	0.04
		Total per Set:		
		Con:	685.70	0.22
		Ecc:	722.10	0.23

Set 4 (Right Leg)				
Weight Lifted lb.:		15lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	8.09	27.89	78.93	0.03
1/1/ecc	10.95	30.75	87.03	0.03
1/2 con	14.49	34.29	97.05	0.03
1/2ecc	16.32	36.12	102.22	0.03
1/3 con	15.33	35.13	99.43	0.03
1/3ecc	14.46	34.26	96.97	0.03
1/4 con	16.55	36.36	102.89	0.03
1/4ecc	14.26	34.06	96.39	0.03
1/5con	16.78	36.58	103.53	0.03
1/5ecc	13.16	32.96	93.29	0.03
1/6con	16.17	35.97	101.80	0.03
1/6ecc	14.55	34.35	97.22	0.03
1/7con	16.39	36.19	102.43	0.03
1/7ecc	14.77	34.57	97.85	0.03
1/8con	14.43	34.23	96.87	0.03
1/8ecc	13.89	33.69	95.35	0.03
1/9con	16.38	36.19	102.41	0.03
1/9ecc	13.24	33.04	93.51	0.03
1/10con	17.27	37.07	104.91	0.03
1/10ecc	13.42	33.22	94.02	0.03
1/11con	13.64	33.44	94.65	0.03
1/11ecc	14.13	33.93	96.03	0.03
1/12con	13.87	33.67	95.30	0.03
1/12ecc	15.03	34.84	98.59	0.03
		Total per Set:		
		Con:	1180.20	0.38
		Ecc:	1148.47	0.37

Set 5 (Right Leg)				
Weight Lifted lb.:		25lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	10.28	30.08	85.13	0.03
1/1/ecc	13.04	32.84	92.94	0.03
1/2 con	16.40	36.20	102.44	0.03
1/2ecc	13.96	33.76	95.55	0.03
1/3 con	12.56	32.36	91.59	0.03
1/3ecc	15.21	35.02	99.09	0.03
1/4 con	15.78	35.59	100.71	0.03
1/4ecc	13.81	33.61	95.12	0.03
1/5con	17.14	36.94	104.54	0.03
1/5ecc	13.51	33.32	94.28	0.03
1/6con	18.25	38.06	107.70	0.03
1/6ecc	15.42	35.22	99.68	0.03
1/7con	16.07	35.88	101.53	0.03
1/7ecc	14.74	34.55	97.77	0.03
1/8con	12.23	32.04	90.66	0.03
1/8ecc	15.56	35.36	100.07	0.03
1/9con	12.23	32.03	90.65	0.03
1/9ecc	14.84	34.64	98.03	0.03
		Total per Set:		
		Con:	874.95	0.28
		Ecc:	872.53	0.28

Set 6 (Right Leg)				
Weight Lifted lb.:		30lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	18.79	38.59	109.22	0.04
1/1/ecc	24.15	43.95	124.37	0.04
1/2 con	20.39	40.19	113.75	0.04
1/2ecc	24.77	44.57	126.13	0.04
1/3 con	17.94	37.74	106.81	0.03
1/3ecc	22.23	42.04	118.97	0.04
1/4 con	21.05	40.86	115.62	0.04
1/4ecc	21.78	41.58	117.68	0.04
1/5con	20.14	39.95	113.05	0.04
1/5ecc	21.67	41.47	117.37	0.04
		Total per Set:		
		Con:	558.44	0.18
		Ecc:	604.53	0.20

Subject 0002:	**DEAD LIFT**				
Set 0 (Warm-up)					
Distance (ft.):		1.42			
Weight Lifted lb.:		95.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	23.41	46.82	162.68	230.46	0.07
1/1/ecc	28.29	56.59	172.46	244.31	0.08
1/2 con	27.05	54.11	169.97	240.79	0.08
1/2ecc	25.84	51.69	167.56	237.37	0.08
1/3 con	26.50	53.00	168.87	239.23	0.08
1/3ecc	26.97	53.94	169.80	240.55	0.08
1/4 con	27.60	55.19	171.06	242.33	0.08
1/4ecc	27.48	54.95	170.82	241.99	0.08
1/5con	27.53	55.06	170.93	242.14	0.08
1/5ecc	25.54	51.07	166.94	236.50	0.08
1/6con	25.58	51.16	167.03	236.62	0.08
1/6ecc	28.77	57.55	173.41	245.67	0.08
1/7con	22.53	45.06	160.92	227.97	0.07
1/7ecc	25.18	50.36	166.22	235.48	0.08
1/8con	24.72	49.45	165.31	234.19	0.08
1/8ecc	25.31	50.61	166.48	235.84	0.08
1/9con	24.70	49.40	165.27	234.13	0.08
1/9ecc	24.62	49.25	165.11	233.91	0.08
1/10con	29.29	58.57	174.44	247.12	0.08
1/10ecc	30.01	60.02	175.89	249.17	0.08
1/11con	26.52	53.05	168.91	239.29	0.08
1/11ecc	24.01	48.02	163.89	232.17	0.08
1/12con	27.74	55.47	171.34	242.73	0.08
1/12ecc	21.62	43.23	159.10	225.39	0.07
			Total per Set:		
			Con:	2857.02	0.93
			Ecc:	2858.36	0.93

Set 1					
Weight Lifted (lb.):		140.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	25.33	50.67	166.53	235.92	0.08
1/1/ecc	27.55	55.10	170.96	242.20	0.08
1/2 con	37.23	74.45	190.32	269.61	0.09
1/2ecc	36.74	73.47	189.34	268.23	0.09
1/3 con	36.59	73.17	189.04	267.80	0.09
1/3ecc	35.80	71.60	187.47	265.58	0.09
1/4 con	34.77	69.55	185.42	262.67	0.09
1/4ecc	40.46	80.91	196.78	278.77	0.09
1/5con	27.50	55.00	170.86	242.06	0.08
1/5ecc	32.67	65.34	181.20	256.70	0.08
1/6con	40.40	80.80	196.66	278.61	0.09
1/6ecc	42.33	84.65	200.52	284.07	0.09
1/7con	27.44	54.88	170.74	241.88	0.08
1/7ecc	34.41	68.82	184.68	261.63	0.08
1/8con	39.43	78.87	194.73	275.87	0.09
1/8ecc	34.29	68.57	184.44	261.29	0.08
1/9con	37.96	75.91	191.78	271.68	0.09
1/9ecc	38.01	76.01	191.88	271.83	0.09
1/10con	33.81	67.62	183.48	259.94	0.08
1/10ecc	33.96	67.93	183.79	260.37	0.08
1/11con	38.23	76.45	192.32	272.45	0.09
1/11ecc	35.49	70.98	186.85	264.70	0.09
1/12con	36.75	73.51	189.37	268.28	0.09
1/12ecc	29.61	59.23	175.10	248.05	0.08
			Total per Set:		
			Con:	3381.78	1.10
			Ecc:	3399.42	1.10

Set 2					
Weight Lifted (lb.):		150.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	21.86	43.73	159.59	226.09	0.07
1/1/ecc	31.22	62.44	178.31	252.61	0.08
1/2 con	50.01	100.01	215.88	305.83	0.10
1/2ecc	46.45	92.91	208.77	295.76	0.10
1/3 con	52.76	105.52	221.39	313.64	0.10
1/3ecc	43.46	86.92	202.78	287.28	0.09
1/4 con	51.73	103.46	219.33	310.71	0.10
1/4ecc	44.09	88.18	204.05	289.07	0.09
1/5con	47.21	94.43	210.29	297.91	0.10
1/5ecc	47.34	94.68	210.55	298.28	0.10
1/6con	44.49	88.98	204.84	290.19	0.09
1/6ecc	46.18	92.35	208.22	294.97	0.10
1/7con	37.22	74.45	190.32	269.61	0.09
1/7ecc	43.50	87.00	202.87	287.39	0.09
1/8con	40.08	80.17	196.03	277.71	0.09
1/8ecc	44.98	89.95	205.82	291.57	0.09
			Total per Set:		
			Con:	2291.70	0.74
			Ecc:	2296.94	0.74

Set 3					
Weight Lifted (lb.):		160.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	40.00	80.00	195.87	277.48	0.09
1/1/ecc	50.74	101.48	217.34	307.90	0.10
1/2 con	41.66	83.31	199.18	282.17	0.09
1/2ecc	55.35	110.71	226.58	320.98	0.10
1/3 con	50.22	100.43	216.30	306.43	0.10
1/3ecc	54.34	108.69	224.55	318.12	0.10
1/4 con	50.43	100.85	216.72	307.02	0.10
1/4ecc	48.74	97.49	213.35	302.25	0.10
1/5con	48.81	97.63	213.49	302.45	0.10
1/5ecc	50.44	100.87	216.74	307.05	0.10
1/6con	42.71	85.41	201.28	285.14	0.09
1/6ecc	52.11	104.23	220.09	311.80	0.10
			Total per Set:		
			Con:	1760.69	0.57
			Ecc:	1868.10	0.61

Subject 0002:	**HEEL RAISES**				
Set 0 (Warm-up)					
Distance (ft.):		0.33			
Weight Lifted lb.:		80.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Total Body Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init Con	11.54	23.08	146.08	48.69	0.02
1/1con	43.94	87.89	210.89	70.30	0.02
1/1/ecc	40.76	81.51	204.51	68.17	0.02
1/2 con	42.67	85.34	208.34	69.45	0.02
1/2ecc	40.95	81.91	204.91	68.30	0.02
1/3 con	41.92	83.84	206.84	68.95	0.02
1/3ecc	39.50	79.00	202.00	67.33	0.02
1/4 con	42.13	84.25	207.25	69.08	0.02
1/4ecc	38.90	77.80	200.80	66.93	0.02
1/5con	40.95	81.90	204.90	68.30	0.02
1/5ecc	39.56	79.13	202.13	67.38	0.02
1/6con	40.32	80.64	203.64	67.88	0.02
1/6ecc	38.88	77.77	200.77	66.92	0.02
1/7con	39.68	79.36	202.36	67.45	0.02
1/7ecc	39.30	78.59	201.59	67.20	0.02
1/8con	41.16	82.31	205.31	68.44	0.02
1/8ecc	39.82	79.63	202.63	67.54	0.02
1/9con	38.79	77.57	200.57	66.86	0.02
1/9ecc	39.53	79.05	202.05	67.35	0.02
1/10con	39.67	79.34	202.34	67.45	0.02
1/10ecc	39.18	78.36	201.36	67.12	0.02
1/11con	40.94	81.87	204.87	68.29	0.02
1/11ecc	38.18	76.35	199.35	66.45	0.02
			Total per Set:		
			Con:	801.14	0.26
			Ecc:	740.70	0.24

Set 1					
Weight Lifted (lb.):		130.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Total Body Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Initial Con	15.21	30.42	153.42	51.14	0.02
1/1con	53.96	107.91	230.91	76.97	0.02
1/1/ecc	52.50	105.01	228.01	76.00	0.02
1/2 con	53.55	107.09	230.09	76.70	0.02
1/2ecc	51.86	103.72	226.72	75.57	0.02
1/3 con	50.83	101.66	224.66	74.89	0.02
1/3ecc	51.38	102.76	225.76	75.25	0.02
1/4 con	49.62	99.24	222.24	74.08	0.02
1/4ecc	49.47	98.95	221.95	73.98	0.02
1/5con	51.15	102.30	225.30	75.10	0.02
1/5ecc	49.53	99.07	222.07	74.02	0.02
1/6con	51.24	102.47	225.47	75.16	0.02
1/6ecc	49.06	98.11	221.11	73.70	0.02
1/7con	50.66	101.33	224.33	74.78	0.02
1/7ecc	49.39	98.78	221.78	73.93	0.02
1/8con	49.23	98.46	221.46	73.82	0.02
1/8ecc	50.31	100.62	223.62	74.54	0.02
1/9con	49.32	98.65	221.65	73.88	0.02
1/9ecc	49.45	98.90	221.90	73.97	0.02
1/10con	50.15	100.31	223.31	74.44	0.02
1/10ecc	49.96	99.92	222.92	74.31	0.02
Final Ecc	19.83	39.67	162.67	54.22	0.02
			Total per Set:		
			Con:	855.17	0.28
			Ecc:	799.50	0.26

Set 2					
Weight Lifted (lb.):		150.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Total Body Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Initial Con	15.92	31.85	154.85	51.62	0.02
1/1con	58.54	117.09	240.09	80.03	0.03
1/1/ecc	54.41	108.83	231.83	77.28	0.03
1/2 con	58.44	116.89	239.89	79.96	0.03
1/2ecc	56.40	112.80	235.80	78.60	0.03
1/3 con	58.77	117.54	240.54	80.18	0.03
1/3ecc	54.38	108.75	231.75	77.25	0.03
1/4 con	56.49	112.97	235.97	78.66	0.03
1/4ecc	56.75	113.49	236.49	78.83	0.03
1/5con	54.88	109.76	232.76	77.59	0.03
1/5ecc	54.59	109.17	232.17	77.39	0.03
1/6con	56.71	113.41	236.41	78.80	0.03
1/6ecc	54.04	108.08	231.08	77.03	0.02
1/7con	56.40	112.80	235.80	78.60	0.03
1/7ecc	52.94	105.88	228.88	76.29	0.02
1/8con	54.50	109.00	232.00	77.33	0.03
1/8ecc	53.74	107.49	230.49	76.83	0.02
Final Ecc	26.38	52.75	175.75	58.58	0.02
			Total per Set:		
			Con:	682.77	0.22
			Ecc:	678.08	0.22

Set 3					
Weight Lifted (lb.):		160.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Total Body Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Initial Con	18.25	36.50	159.50	53.17	0.02
1/1con	69.51	139.02	262.02	87.34	0.03
1/1/ecc	62.14	124.28	247.28	82.43	0.03
1/2 con	66.06	132.13	255.13	85.04	0.03
1/2ecc	64.17	128.34	251.34	83.78	0.03
1/3 con	63.63	127.27	250.27	83.42	0.03
1/3ecc	63.66	127.31	250.31	83.44	0.03
1/4 con	62.79	125.58	248.58	82.86	0.03
1/4ecc	62.22	124.45	247.45	82.48	0.03
1/5con	64.06	128.13	251.13	83.71	0.03
1/5ecc	61.09	122.17	245.17	81.72	0.03
1/6con	63.56	127.13	250.13	83.38	0.03
1/6ecc	62.76	125.53	248.53	82.84	0.03
Final Ecc	30.19	60.38	183.38	61.13	0.02
			Total per Set:		
			Con:	558.92	0.18
			Ecc:	557.82	0.18

Subject 0002:		SQUATS
	Set 0	(Warm-up)
Distance (ft.):		1.42
Weight Lifted lb.:		130.00

Repetition:	Mean Force (lb.)	Force.x2	(+) Total Body Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init. con	6.05	12.09	127.96	181.28	0.06
1/1con	43.48	86.97	202.84	287.35	0.09
1/1/ecc	42.75	85.51	201.37	285.28	0.09
1/2 con	43.48	86.97	202.84	287.35	0.09
1/2ecc	42.75	85.51	201.37	285.28	0.09
1/3 con	45.06	90.12	205.98	291.81	0.09
1/3ecc	42.08	84.16	200.03	283.37	0.09
1/4 con	43.05	86.10	201.97	286.12	0.09
1/4ecc	42.57	85.14	201.01	284.76	0.09
1/5con	43.65	87.29	203.16	287.81	0.09
1/5ecc	41.33	82.66	198.52	281.24	0.09
1/6con	42.03	84.07	199.93	283.24	0.09
1/6ecc	40.93	81.85	197.72	280.10	0.09
1/7con	42.01	84.01	199.88	283.16	0.09
1/7ecc	46.04	92.07	207.94	294.58	0.10
1/8con	44.33	88.65	204.52	289.74	0.09
1/8ecc	43.28	86.55	202.42	286.76	0.09
1/9con	42.77	85.54	201.40	285.32	0.09
1/9ecc	43.35	86.71	202.58	286.98	0.09
1/10con	46.07	92.13	208.00	294.67	0.10
1/10ecc	42.66	85.32	201.18	285.01	0.09
1/11con	42.41	84.81	200.68	284.30	0.09
1/11ecc	42.54	85.09	200.95	284.69	0.09
final ecc	10.85	21.69	137.56	194.87	0.06
			Total per Set:		
			Con:	3342.14	1.08
			Ecc:	3332.92	1.08

	Set 1	
Weight Lifted lb.:		140.00

Repetition:	Mean Force (lb.)	Force.x2	(+) Total Body Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init. con	14.53	29.07	144.93	205.32	0.07
Init. ecc	24.32	48.64	164.51	233.05	0.08
1/1con	*43.68*	87.37	203.23	287.91	0.09
1/1/ecc	*42.24*	84.49	200.35	283.83	0.09
1/2 con	*43.68*	87.37	203.23	287.91	0.09
1/2ecc	*42.24*	84.49	200.35	283.83	0.09
1/3 con	*43.68*	87.37	203.23	287.91	0.09
1/3ecc	*42.24*	84.49	200.35	283.83	0.09
1/4 con	42.25	84.51	200.37	283.86	0.09
1/4ecc	44.00	87.99	203.86	288.80	0.09
1/5con	44.91	89.82	205.68	291.38	0.09
1/5ecc	42.03	84.06	199.92	283.22	0.09
1/6con	48.80	97.60	213.46	302.41	0.10
1/6ecc	38.50	77.01	192.87	273.24	0.09
1/7con	45.73	91.47	207.33	293.72	0.10
1/7ecc	42.20	84.41	200.28	283.72	0.09
1/8con	39.53	79.07	194.93	276.15	0.09
1/8ecc	44.53	89.06	204.93	290.32	0.09
1/9con	40.86	81.71	197.58	279.90	0.09
1/9ecc	42.29	84.58	200.45	283.97	0.09
1/10con	43.80	87.60	203.47	288.25	0.09
1/10ecc	41.22	82.44	198.31	280.94	0.09
1/11con	45.17	90.34	206.20	292.12	0.09
1/11ecc	42.10	84.19	200.06	283.42	0.09
1/12con	43.31	86.62	202.48	286.85	0.09
1/12ecc	40.08	80.15	196.02	277.69	0.09
Final Ecc	6.20	12.40	128.27	181.71	0.06
			Total per Set:		
			Con:	3663.71	1.19
			Ecc:	3811.57	1.23

Set 2					
Weight Lifted lb.:		180.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Total Body Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init. con	17.12	34.25	150.11	212.66	0.07
1/1con	75.94	151.89	267.76	379.32	0.12
1/1/ecc	71.17	142.34	258.21	365.79	0.12
1/2 con	69.92	139.85	255.71	362.26	0.12
1/2ecc	70.81	141.62	257.49	364.77	0.12
1/3 con	69.92	139.85	255.71	362.26	0.12
1/3ecc	70.81	141.62	257.49	364.77	0.12
1/4 con	69.92	139.85	255.71	362.26	0.12
1/4ecc	70.81	141.62	257.49	364.77	0.12
1/5con	68.05	136.09	251.96	356.94	0.12
1/5ecc	68.92	137.84	253.70	359.41	0.12
1/6con	68.49	136.97	252.84	358.19	0.12
1/6ecc	71.29	142.59	258.45	366.14	0.12
1/7con	67.42	134.85	250.71	355.17	0.12
1/7ecc	72.77	145.54	261.40	370.32	0.12
1/8con	69.71	139.43	255.29	361.66	0.12
1/8ecc	69.90	139.80	255.67	362.19	0.12
Final Ecc	21.90	43.80	159.66	226.19	0.07
			Total per Set:		
			Con:	3110.72	1.01
			Ecc:	3144.36	1.02

Set 3					
Weight Lifted lb.:		190.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Total Body Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init. con	21.25	42.49	158.36	224.34	0.07
1/1con	77.10	154.20	270.07	382.60	0.12
1/1/ecc	78.69	157.37	273.24	387.09	0.13
1/2 con	87.32	174.63	290.50	411.54	0.13
1/2ecc	77.19	154.39	270.26	382.86	0.12
1/3 con	81.00	162.00	277.87	393.65	0.13
1/3ecc	77.41	154.82	270.68	383.47	0.12
1/4 con	70.40	140.80	256.67	363.61	0.12
1/4ecc	80.47	160.94	276.81	392.14	0.13
1/5con	73.45	146.91	262.78	372.26	0.12
1/5ecc	78.35	156.69	272.56	386.13	0.13
1/6con	73.33	146.66	262.53	371.92	0.12
1/6ecc	80.02	160.03	275.90	390.86	0.13
Final Ecc	33.27	66.54	182.41	258.41	0.08
			Total per Set:		
			Con:	2519.92	0.82
			Ecc:	2580.96	0.84

Subject 0002:		**ADDUCTION**		
Distance (ft.):		2.67		
Set 1 (Left Leg)				
Weight Lifted lb.:		15lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	10.99	30.79	82.12	0.03
1/1/ecc	14.45	34.26	91.35	0.03
1/2 con	14.28	34.08	90.88	0.03
1/2ecc	15.78	35.58	94.89	0.03
1/3 con	13.47	33.28	88.74	0.03
1/3ecc	13.97	33.77	90.06	0.03
1/4 con	14.64	34.45	91.85	0.03
1/4ecc	13.62	33.43	89.14	0.03
1/5con	14.10	33.90	90.41	0.03
1/5ecc	14.49	34.30	91.46	0.03
1/6con	13.99	33.79	90.11	0.03
1/6ecc	14.64	34.44	91.85	0.03
1/7con	13.89	33.70	89.86	0.03
1/7ecc	15.11	34.92	93.11	0.03
1/8con	14.40	34.20	91.20	0.03
1/8ecc	15.75	35.55	94.81	0.03
1/9con	13.57	33.37	88.99	0.03
1/9ecc	14.39	34.19	91.19	0.03
1/10con	16.18	35.98	95.95	0.03
1/10ecc	14.73	34.53	92.09	0.03
1/11con	11.75	31.55	84.14	0.03
1/11ecc	12.69	32.49	86.65	0.03
		Total per Set:		
		Con:	984.27	0.32
		Ecc:	1006.58	0.33

Set 2 (Left Leg)				
Weight Lifted lb.:		25lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	*22.37*	42.18	112.47	0.04
1/1/ecc	*18.78*	38.59	102.90	0.03
1/2 con	*22.37*	42.18	112.47	0.04
1/2ecc	*18.78*	38.59	102.90	0.03
1/3 con	22.31	42.11	112.31	0.04
1/3ecc	20.12	39.93	106.47	0.03
1/4 con	23.68	43.48	115.96	0.04
1/4ecc	18.72	38.52	102.72	0.03
1/5con	21.69	41.49	110.65	0.04
1/5ecc	18.43	38.24	101.97	0.03
1/6con	22.76	42.57	113.51	0.04
1/6ecc	19.25	39.05	104.15	0.03
1/7con	23.19	42.99	114.64	0.04
1/7ecc	18.04	37.84	100.91	0.03
1/8con	19.91	39.71	105.90	0.03
1/8ecc	19.59	39.39	105.05	0.03
1/9con	22.15	41.95	111.88	0.04
1/9ecc	18.67	38.48	102.60	0.03
1/10con	23.29	43.10	114.92	0.04
1/10ecc	17.45	37.25	99.33	0.03
		Total per Set:		
		Con:	1124.70	0.36
		Ecc:	1028.99	0.33

Set 3 (Left Leg)				
Weight Lifted lb.:		30lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	21.72	41.52	110.73	0.04
1/1/ecc	23.48	43.28	115.43	0.04
1/2 con	20.13	39.93	106.49	0.03
1/2ecc	20.62	40.42	107.79	0.03
1/3 con	21.74	41.54	110.78	0.04
1/3ecc	24.39	44.20	117.86	0.04
1/4 con	20.23	40.03	106.75	0.03
1/4ecc	22.65	42.45	113.21	0.04
1/5con	24.18	43.98	117.28	0.04
1/5ecc	26.52	46.32	123.52	0.04
1/6con	22.33	42.13	112.34	0.04
1/6ecc	23.23	43.03	114.75	0.04
		Total per Set:		
		Con:	664.38	0.22
		Ecc:	692.55	0.22

	Set 4 (Right Leg)			
Weight Lifted lb.:		15lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	6.85	26.65	71.07	0.02
1/1/ecc	9.51	29.31	78.15	0.03
1/2 con	15.03	34.84	92.90	0.03
1/2ecc	13.45	33.25	88.67	0.03
1/3 con	12.74	32.54	86.78	0.03
1/3ecc	14.69	34.49	91.97	0.03
1/4 con	13.40	33.21	88.55	0.03
1/4ecc	14.43	34.23	91.28	0.03
1/5con	13.93	33.73	89.95	0.03
1/5ecc	13.81	33.61	89.63	0.03
1/6con	13.58	33.38	89.02	0.03
1/6ecc	13.31	33.11	88.29	0.03
1/7con	15.91	35.71	95.23	0.03
1/7ecc	14.49	34.29	91.44	0.03
1/8con	12.56	32.36	86.30	0.03
1/8ecc	13.72	33.52	89.39	0.03
1/9con	12.16	31.96	85.22	0.03
1/9ecc	14.38	34.18	91.15	0.03
1/10con	12.96	32.76	87.37	0.03
1/10ecc	13.43	33.23	88.61	0.03
1/11con	15.46	35.27	94.04	0.03
1/11ecc	12.78	32.58	86.88	0.03
		Total per Set:		
		Con:	966.44	0.31
		Ecc:	975.47	0.32

Set 5 (Right Leg)				
Weight Lifted lb.:		25lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	16.79	36.60	97.59	0.03
1/1/ecc	17.42	37.22	99.25	0.03
1/2 con	16.79	36.60	97.59	0.03
1/2ecc	17.42	37.22	99.25	0.03
1/3 con	17.72	37.53	100.07	0.03
1/3ecc	16.55	36.36	96.95	0.03
1/4 con	16.86	36.66	97.76	0.03
1/4ecc	18.99	38.79	103.45	0.03
1/5con	15.64	35.44	94.51	0.03
1/5ecc	17.71	37.51	100.03	0.03
1/6con	17.33	37.13	99.02	0.03
1/6ecc	16.85	36.65	97.74	0.03
1/7con	18.49	38.29	102.11	0.03
1/7ecc	18.56	38.36	102.30	0.03
1/8con	13.98	33.78	90.09	0.03
1/8ecc	17.01	36.82	98.18	0.03
1/9con	16.07	35.88	95.67	0.03
1/9ecc	17.59	37.39	99.70	0.03
1/10con	18.27	38.07	101.52	0.03
1/10ecc	16.07	35.87	95.67	0.03
		Total per Set:		
		Con:	975.93	0.32
		Ecc:	992.52	0.32

Set 6 (Right Leg)				
Weight Lifted lb.:		30lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	19.54	39.34	104.92	0.03
1/1/ecc	18.85	38.65	103.06	0.03
1/2 con	18.87	38.67	103.12	0.03
1/2ecc	19.41	39.21	104.56	0.03
1/3 con	21.98	41.78	111.41	0.04
1/3ecc	19.88	39.68	105.82	0.03
1/4 con	17.44	37.25	99.33	0.03
1/4ecc	21.33	41.14	109.69	0.04
1/5con	17.03	36.83	98.22	0.03
1/5ecc	16.54	36.34	96.90	0.03
1/6con	22.39	42.20	112.52	0.04
1/6ecc	17.07	36.87	98.33	0.03
		Total per Set:		
		Con:	629.52	0.20
		Ecc:	618.38	0.20

SUBJECT:0002				
				Kcal
Total Work per Exercise Session:		Concentric:	36468.50	11.81
	(Ft-Lb.)	Eccentric:	36710.37	11.89
			73178.87	23.70

Subject 0003:	**ABDUCTION**
Distance (ft.):	2.50
Set 1 (Left Leg)	
Weight Lifted lb.:	15lb

Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	16.09	39.75	99.37	0.03
1/1/ecc	12.14	35.80	89.49	0.03
1/2 con	18.82	42.48	106.21	0.03
1/2ecc	16.94	40.60	101.50	0.03
1/3 con	18.96	42.62	106.55	0.03
1/3ecc	16.24	39.90	99.76	0.03
1/4 con	19.38	43.03	107.58	0.03
1/4ecc	15.78	39.44	98.59	0.03
1/5con	17.19	40.85	102.12	0.03
1/5ecc	17.27	40.93	102.33	0.03
1/6con	18.47	42.13	105.32	0.03
1/6ecc	18.43	42.09	105.22	0.03
1/7con	17.80	41.46	103.65	0.03
1/7ecc	17.70	41.36	103.39	0.03
1/8con	19.36	43.02	107.55	0.03
1/8ecc	17.75	41.40	103.51	0.03
1/9con	18.35	42.01	105.02	0.03
1/9ecc	17.16	40.81	102.04	0.03
1/10con	16.49	40.15	100.37	0.03
1/10ecc	17.63	41.29	103.23	0.03
1/11con	16.68	40.34	100.84	0.03
1/11ecc	17.14	40.80	102.00	0.03
1/12con	15.24	38.90	97.25	0.03
1/12ecc	13.95	37.61	94.03	0.03
		Total per Set:		
		Con:	1241.83	0.40
		Ecc:	1205.08	0.39

Set 2 (Left Leg)	
Weight Lifted lb.:	25lb

Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	17.70	41.36	103.39	0.03
1/1/ecc	22.74	46.39	115.99	0.04
1/2 con	21.99	45.65	114.13	0.04
1/2ecc	21.75	45.41	113.52	0.04
1/3 con	22.74	46.40	116.01	0.04
1/3ecc	21.92	45.58	113.95	0.04
1/4 con	23.90	47.56	118.90	0.04
1/4ecc	22.40	46.06	115.15	0.04
1/5con	23.43	47.08	117.71	0.04
1/5ecc	21.51	45.17	112.92	0.04
1/6con	22.83	46.49	116.22	0.04
1/6ecc	23.24	46.90	117.25	0.04
1/7con	21.57	45.23	113.08	0.04
1/7ecc	22.50	46.16	115.40	0.04
1/8con	24.73	48.39	120.97	0.04
1/8ecc	18.75	42.40	106.01	0.03
		Total per Set:		
		Con:	920.42	0.30
		Ecc:	910.19	0.29

Set 3 (Left Leg)				
Weight Lifted lb.:		30lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	23.91	47.57	118.92	0.04
1/1/ecc	30.16	53.82	134.55	0.04
1/2 con	31.92	55.58	138.94	0.05
1/2ecc	27.50	51.16	127.89	0.04
1/3 con	31.66	55.31	138.29	0.04
1/3ecc	27.25	50.91	127.26	0.04
1/4 con	29.40	53.05	132.64	0.04
1/4ecc	25.89	49.55	123.87	0.04
1/5con	23.12	46.78	116.95	0.04
1/5ecc	27.35	51.01	127.53	0.04
1/6con	24.19	47.85	119.63	0.04
1/6ecc	27.54	51.20	128.00	0.04
		Total per Set:		
		Con:	765.36	0.25
		Ecc:	769.10	0.25

	Set 4 (Right Leg)			
Weight Lifted lb.:		15lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	9.67	33.02	82.54	0.03
1/1/ecc	16.28	39.63	99.08	0.03
1/2 con	17.09	40.44	101.11	0.03
1/2ecc	15.51	38.86	97.14	0.03
1/3 con	17.35	40.70	101.75	0.03
1/3ecc	15.43	38.78	96.94	0.03
1/4 con	15.99	39.34	98.34	0.03
1/4ecc	13.84	37.19	92.98	0.03
1/5con	18.97	42.32	105.79	0.03
1/5ecc	17.16	40.51	101.27	0.03
1/6con	16.37	39.72	99.30	0.03
1/6ecc	15.33	38.68	96.70	0.03
1/7con	17.68	41.03	102.57	0.03
1/7ecc	15.59	38.94	97.36	0.03
1/8con	16.18	39.53	98.83	0.03
1/8ecc	15.71	39.06	97.64	0.03
1/9con	16.37	39.72	99.29	0.03
1/9ecc	14.38	37.73	94.32	0.03
1/10con	19.87	43.22	108.05	0.03
1/10ecc	16.03	39.38	98.45	0.03
1/11con	13.61	36.96	92.41	0.03
1/11ecc	15.47	38.82	97.04	0.03
1/12con	13.08	36.43	91.06	0.03
1/12ecc	16.01	39.36	98.41	0.03
		Total per Set:		
		Con:	1181.05	0.38
		Ecc:	1167.34	0.38

Set 5 (Right Leg)				
Weight Lifted lb.:		25lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	21.10	44.45	111.12	0.04
1/1/ecc	23.27	46.62	116.56	0.04
1/2 con	24.70	48.05	120.12	0.04
1/2ecc	25.10	48.45	121.11	0.04
1/3 con	22.19	45.54	113.84	0.04
1/3ecc	23.75	47.10	117.76	0.04
1/4 con	25.92	49.27	123.17	0.04
1/4ecc	20.20	43.55	108.88	0.04
1/5con	21.80	45.15	112.88	0.04
1/5ecc	23.15	46.50	116.24	0.04
1/6con	23.76	47.11	117.78	0.04
1/6ecc	22.76	46.11	115.26	0.04
1/7con	26.88	50.23	125.58	0.04
1/7ecc	21.58	44.93	112.34	0.04
1/8con	22.86	46.21	115.54	0.04
1/8ecc	22.93	46.28	115.69	0.04
1/9ecc	22.18	45.53	113.82	0.04
1/10con	24.50	47.85	119.63	0.04
1/10ecc	21.71	45.06	112.65	0.04
1/11con	22.82	46.17	115.42	0.04
1/11ecc	18.09	41.44	103.60	0.03
		Total per Set:		
		Con:	1278.16	0.41
		Ecc:	1253.91	0.41

Set 6 (Right Leg)				
Weight Lifted lb.:		30lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	21.32	44.67	111.68	0.04
1/1/ecc	31.83	55.18	137.96	0.04
1/2 con	34.77	58.12	145.31	0.05
1/2ecc	31.74	55.09	137.72	0.04
1/3 con	36.79	60.13	150.34	0.05
1/3ecc	31.07	54.42	136.04	0.04
1/4 con	33.25	56.60	141.50	0.05
1/4ecc	31.92	55.27	138.19	0.04
1/5con	34.35	57.70	144.24	0.05
1/5ecc	31.41	54.76	136.90	0.04
1/6con	30.18	53.53	133.82	0.04
1/6ecc	22.13	45.48	113.69	0.04
		Total per Set:		
		Con:	826.87	0.27
		Ecc:	800.50	0.26

Subject 0003:		DEAD LIFT
	Set 0	(Warm-up)
Distance (ft.):		1.42
Weight Lifted lb.:		95.00

Repetition:	Mean Force (lb.)	Force.x2	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init con	2.96	5.92	132.53	187.75	0.06
1/1con	21.38	42.76	169.37	239.94	0.08
1/1/ecc	25.60	51.20	177.81	251.89	0.08
1/2 con	24.77	49.54	176.15	249.54	0.08
1/2ecc	24.55	49.11	175.71	248.93	0.08
1/3 con	23.59	47.17	173.78	246.19	0.08
1/3ecc	27.51	55.01	181.62	257.29	0.08
1/4 con	25.82	51.64	178.24	252.51	0.08
1/4ecc	25.59	51.19	177.79	251.87	0.08
1/5con	26.02	52.04	178.65	253.08	0.08
1/5ecc	24.15	48.30	174.91	247.79	0.08
1/6con	25.42	50.83	177.44	251.37	0.08
1/6ecc	25.66	51.32	177.93	252.07	0.08
1/7con	27.15	54.30	180.90	256.28	0.08
1/7ecc	25.21	50.42	177.03	250.79	0.08
1/8con	26.17	52.33	178.94	253.50	0.08
1/8ecc	26.58	53.16	179.76	254.66	0.08
1/9con	26.47	52.95	179.55	254.37	0.08
1/9ecc	21.75	43.50	170.10	240.98	0.08
			Total per Set:		
			Con:	2444.52	0.79
			Ecc:	2256.27	0.73

	Set 1	
Weight Lifted (lb.):		140.00

Repetition:	Mean Force (lb.)	Force.x2	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	46.16	92.31	218.92	310.13	0.10
1/1/ecc	48.45	96.90	223.51	316.64	0.10
1/2 con	44.76	89.52	216.13	306.18	0.10
1/2ecc	46.12	92.25	218.85	310.04	0.10
1/3 con	43.16	86.32	212.93	301.65	0.10
1/3ecc	40.79	81.58	208.19	294.93	0.10
1/4 con	37.91	75.81	202.42	286.76	0.09
1/4ecc	40.49	80.98	207.58	294.08	0.10
1/5con	36.36	72.73	199.33	282.39	0.09
1/5ecc	38.95	77.90	204.51	289.72	0.09
1/6con	40.92	81.84	208.45	295.30	0.10
1/6ecc	33.18	66.36	192.97	273.37	0.09
1/7con	33.84	67.69	194.29	275.25	0.09
1/7ecc	41.59	83.19	209.80	297.21	0.10
1/8con	46.84	93.68	220.29	312.07	0.10
1/8ecc	42.71	85.43	212.03	300.38	0.10
1/9con	44.93	89.85	216.46	306.65	0.10
1/9ecc	37.42	74.85	201.45	285.39	0.09
1/10con	37.70	75.40	202.01	286.18	0.09
1/10ecc	39.43	78.87	205.47	291.09	0.09
1/11con	42.08	84.17	210.77	298.59	0.10
1/11ecc	41.13	82.26	208.87	295.90	0.10
1/12con	44.16	88.32	214.93	304.48	0.10
1/12ecc	33.00	65.99	192.60	272.85	0.09
			Total per Set:		
			Con:	3565.63	1.15
			Ecc:	3521.60	1.14

Set 2					
Weight Lifted (lb.):		150.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init con	5.12	10.24	136.85	193.87	0.06
1/1con	40.55	81.11	207.71	294.26	0.10
1/1/ecc	56.50	113.00	239.60	339.44	0.11
1/2 con	56.13	112.25	238.86	338.39	0.11
1/2ecc	50.60	101.19	227.80	322.72	0.10
1/3 con	55.27	110.55	237.16	335.97	0.11
1/3ecc	51.24	102.47	229.08	324.53	0.11
1/4 con	49.08	98.17	224.77	318.43	0.10
1/4ecc	54.36	108.72	235.32	333.38	0.11
1/5con	47.66	95.31	221.92	314.39	0.10
1/5ecc	54.82	109.63	236.24	334.67	0.11
1/6con	50.14	100.28	226.89	321.43	0.10
1/6ecc	54.41	108.83	235.44	333.53	0.11
1/7con	50.16	100.33	226.93	321.49	0.10
1/7ecc	47.11	94.21	220.82	312.83	0.10
1/8con	46.51	93.02	219.63	311.14	0.10
1/8ecc	52.02	104.04	230.64	326.75	0.11
1/9con	50.30	100.60	227.21	321.88	0.10
1/9ecc	52.86	105.71	232.32	329.12	0.11
1/10con	53.74	107.48	234.09	331.63	0.11
1/10ecc	43.58	87.16	213.77	302.84	0.10
			Total per Set:		
			Con:	3402.87	1.10
			Ecc:	3259.81	1.06

Set 3					
Weight Lifted (lb.):		160.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init con	4.86	9.71	136.32	193.12	0.06
1/1con	41.37	82.73	209.34	296.56	0.10
1/1/ecc	62.50	124.99	251.60	356.43	0.12
1/2 con	58.21	116.43	243.04	344.30	0.11
1/2ecc	59.31	118.61	245.22	347.39	0.11
1/3 con	24.33	48.67	175.27	248.30	0.08
1/3ecc	42.47	84.93	211.54	299.68	0.10
1/4 con	34.20	68.40	195.01	276.27	0.09
1/4ecc	44.45	88.90	215.51	305.30	0.10
1/5con	39.50	79.01	205.61	291.29	0.09
1/5ecc	22.77	45.53	172.14	243.86	0.08
1/6con	18.22	36.43	163.04	230.97	0.07
1/6ecc	48.07	96.14	222.75	315.56	0.10
1/7con	32.11	64.22	190.83	270.34	0.09
1/7ecc	53.76	107.52	234.12	331.68	0.11
1/8con	41.35	82.70	209.30	296.51	0.10
1/8ecc	25.06	50.12	176.73	250.37	0.08
1/9con	47.43	94.85	221.46	313.74	0.10
1/9ecc	27.33	54.66	181.27	256.79	0.08
			Total per Set:		
			Con:	2761.40	0.89
			Ecc:	2707.06	0.88

Subject 0003:		HEEL RAISES
	Set 0	(Warm-up)
Distance (ft.):		0.35
Weight Lifted lb.:		130.00

Repetition:	Mean Force (lb.)	Force.x2	(+) Total Body Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init. con	2.73	5.45	139.85	49.53	0.02
1/1con	37.37	74.75	209.15	74.07	0.02
1/1/ecc	55.58	111.16	245.56	86.97	0.03
1/2 con	57.88	115.76	250.16	88.60	0.03
1/2ecc	57.75	115.49	249.90	88.50	0.03
1/3 con	57.00	114.01	248.41	87.98	0.03
1/3ecc	55.94	111.88	246.28	87.23	0.03
1/4 con	56.86	113.72	248.12	87.88	0.03
1/4ecc	56.03	112.07	246.47	87.29	0.03
1/5con	55.93	111.87	246.27	87.22	0.03
1/5ecc	56.64	113.27	247.67	87.72	0.03
1/6con	55.63	111.25	245.66	87.00	0.03
1/6ecc	53.52	107.03	241.43	85.51	0.03
1/7con	54.94	109.87	244.28	86.51	0.03
1/7ecc	54.88	109.77	244.17	86.48	0.03
1/8con	54.13	108.26	242.66	85.94	0.03
1/8ecc	52.93	105.85	240.26	85.09	0.03
1/9con	54.80	109.59	243.99	86.41	0.03
1/9ecc	52.67	105.33	239.74	84.91	0.03
1/10con	55.51	111.02	245.42	86.92	0.03
1/10ecc	53.94	107.88	242.29	85.81	0.03
1/11con	55.09	110.17	244.57	86.62	0.03
1/11ecc	36.98	73.96	208.37	73.80	0.02
			Total per Set:		
			Con:	994.70	0.32
			Ecc:	939.30	0.30

	Set 1	
Weight Lifted (lb.):		190.00

Repetition:	Mean Force (lb.)	Force.x2	(+) Total Body Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	76.67	153.34	287.74	101.91	0.03
1/1/ecc	86.27	172.54	306.95	108.71	0.04
1/2 con	87.66	175.32	309.72	109.69	0.04
1/2ecc	85.07	170.14	304.54	107.86	0.03
1/3 con	85.18	170.36	304.76	107.94	0.03
1/3ecc	83.81	167.62	302.02	106.97	0.03
1/4 con	84.14	168.28	302.68	107.20	0.03
1/4ecc	83.55	167.10	301.50	106.78	0.03
1/5con	81.52	163.04	297.45	105.35	0.03
1/5ecc	82.56	165.13	299.53	106.08	0.03
1/6con	85.29	170.58	304.98	108.01	0.03
1/6ecc	83.49	166.99	301.39	106.74	0.03
1/7con	83.37	166.75	301.15	106.66	0.03
1/7ecc	81.38	162.76	297.16	105.24	0.03
1/8con	83.68	167.37	301.77	106.88	0.03
1/8ecc	81.28	162.56	296.96	105.17	0.03
1/9con	82.81	165.62	300.02	106.26	0.03
1/9ecc	81.59	163.18	297.58	105.39	0.03
1/10con	82.42	164.84	299.25	105.98	0.03
1/10ecc	82.34	164.67	299.07	105.92	0.03
1/11con	83.78	167.56	301.96	106.95	0.03
1/11ecc	83.72	167.44	301.84	106.90	0.03
1/12con	83.53	167.06	301.47	106.77	0.03
1/12ecc	82.03	164.06	298.46	105.71	0.03
1/13con	83.24	166.49	300.89	106.57	0.03
1/13ecc	71.63	143.25	277.65	98.34	0.03
			Total per Set:		
			Con:	1386.15	0.45
			Ecc:	1375.82	0.45

Set 2					
Weight Lifted (lb.):		200.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Total Body Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init. con	2.09	4.18	138.58	49.08	0.02
1/1con	66.50	133.00	267.40	94.71	0.03
1/1/ecc	91.92	183.84	318.24	112.71	0.04
1/2 con	91.56	183.11	317.52	112.45	0.04
1/2ecc	91.23	182.45	316.86	112.22	0.04
1/3 con	90.19	180.38	314.78	111.49	0.04
1/3ecc	88.10	176.21	310.61	110.01	0.04
1/4 con	90.86	181.73	316.13	111.96	0.04
1/4ecc	87.51	175.01	309.41	109.58	0.04
1/5con	89.90	179.81	314.21	111.28	0.04
1/5ecc	88.11	176.21	310.61	110.01	0.04
1/6con	88.83	177.66	312.06	110.52	0.04
1/6ecc	89.79	179.58	313.98	111.20	0.04
1/7con	89.60	179.20	313.60	111.07	0.04
1/7ecc	88.50	177.00	311.40	110.29	0.04
1/8con	89.43	178.87	313.27	110.95	0.04
1/8ecc	89.05	178.10	312.50	110.68	0.04
1/9con	90.15	180.31	314.71	111.46	0.04
1/9ecc	88.25	176.50	310.91	110.11	0.04
1/10con	89.01	178.01	312.42	110.65	0.04
1/10ecc	87.95	175.91	310.31	109.90	0.04
1/11con	90.48	180.96	315.37	111.69	0.04
1/11ecc	70.54	141.08	275.48	97.57	0.03
			Total per Set:		
			Con:	1257.31	0.41
			Ecc:	1204.27	0.39

Set 3					
Weight Lifted (lb.):		220.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Total Body Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init. con	2.31	4.61	139.01	49.23	0.02
1/1con	77.95	155.89	290.29	102.81	0.03
1/1/ecc	105.12	210.24	344.64	122.06	0.04
1/2 con	107.11	214.21	348.61	123.47	0.04
1/2ecc	105.90	211.80	346.21	122.61	0.04
1/3 con	105.43	210.86	345.26	122.28	0.04
1/3ecc	103.07	206.15	340.55	120.61	0.04
1/4 con	103.41	206.82	341.22	120.85	0.04
1/4ecc	102.48	204.95	339.35	120.19	0.04
1/5con	104.85	209.69	344.09	121.87	0.04
1/5ecc	101.00	202.00	336.40	119.14	0.04
1/6con	103.41	206.82	341.22	120.85	0.04
1/6ecc	99.66	199.32	333.72	118.19	0.04
1/7con	101.69	203.38	337.78	119.63	0.04
1/7ecc	98.92	197.85	332.25	117.67	0.04
1/8con	98.93	197.86	332.26	117.68	0.04
1/8ecc	100.76	201.52	335.92	118.97	0.04
1/9con	97.57	195.13	329.53	116.71	0.04
1/9ecc	84.50	169.00	303.40	107.46	0.03
			Total per Set:		
			Con:	1115.38	0.36
			Ecc:	1066.91	0.35

Subject 0003:		SQUATS			
	Set 0	(Warm-up)			
Distance (ft.):		1.29			
Weight Lifted lb.:		80.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init. con	4.39	8.77	135.38	174.86	0.06
1/1con	31.05	62.11	188.72	243.76	0.08
1/1ecc	33.10	66.20	192.81	249.05	0.08
1/2 con	35.45	70.89	197.50	255.10	0.08
1/2ecc	32.23	64.46	191.07	246.80	0.08
1/3 con	32.15	64.30	190.91	246.59	0.08
1/3ecc	33.53	67.07	193.67	250.16	0.08
1/4 con	34.99	69.98	196.59	253.92	0.08
1/4ecc	30.11	60.23	186.83	241.33	0.08
1/5con	32.92	65.85	192.46	248.59	0.08
1/5ecc	34.77	69.54	196.15	253.36	0.08
1/6con	34.43	68.87	195.48	252.49	0.08
1/6ecc	32.79	65.59	192.20	248.25	0.08
1/7con	35.48	70.95	197.56	255.18	0.08
1/7ecc	32.19	64.38	190.98	246.69	0.08
1/8con	34.42	68.83	195.44	252.45	0.08
1/8ecc	31.56	63.11	189.72	245.05	0.08
1/9con	32.70	65.40	192.01	248.01	0.08
1/9ecc	34.02	68.03	194.64	251.41	0.08
1/10con	35.73	71.47	198.07	255.84	0.08
1/10ecc	25.42	50.84	177.45	229.21	0.07
			Total per Set:		
			Con:	2686.80	0.87
			Ecc:	2461.30	0.80

	Set 1				
Weight Lifted lb.:		120.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init. con	7.85	15.70	142.30	183.81	0.06
1/1con	39.04	78.08	204.69	264.39	0.09
1/1ecc	53.75	107.50	234.11	302.39	0.10
1/2 con	48.93	97.87	224.48	289.95	0.09
1/2ecc	47.97	95.94	222.54	287.45	0.09
1/3 con	48.60	97.19	223.80	289.07	0.09
1/3ecc	46.33	92.67	219.28	283.23	0.09
1/4 con	49.44	98.89	225.49	291.26	0.09
1/4ecc	48.54	97.07	223.68	288.92	0.09
1/5con	45.41	90.81	217.42	280.83	0.09
1/5ecc	48.77	97.53	224.14	289.51	0.09
1/6con	51.66	103.32	229.93	296.99	0.10
1/6ecc	46.80	93.60	220.21	284.43	0.09
1/7con	49.34	98.68	225.29	291.00	0.09
1/7ecc	47.76	95.53	222.14	286.92	0.09
1/8con	47.99	95.98	222.59	287.51	0.09
1/8ecc	49.02	98.05	224.65	290.18	0.09
1/9con	48.05	96.10	222.70	287.66	0.09
1/9ecc	49.44	98.88	225.49	291.26	0.09
1/10con	48.30	96.60	223.21	288.31	0.09
1/10ecc	48.14	96.28	222.88	287.89	0.09
1/11con	49.19	98.39	224.99	290.62	0.09
1/11ecc	46.78	93.56	220.16	284.38	0.09
1/12con	48.14	96.29	222.89	287.90	0.09
1/12ecc	48.65	97.29	223.90	289.20	0.09
1/13con	46.54	93.07	219.68	283.75	0.09
1/13ecc	35.25	70.50	197.11	254.60	0.08
			Total per Set:		
			Con:	3913.05	1.27
			Ecc:	3720.36	1.21

Set 2					
Weight Lifted lb.:		130.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init. con	4.07	8.14	134.75	174.05	0.06
1/1con	47.96	95.92	222.53	287.43	0.09
1/1ecc	56.19	112.38	238.99	308.70	0.10
1/2 con	55.72	111.43	238.04	307.47	0.10
1/2ecc	52.91	105.82	232.43	300.22	0.10
1/3 con	54.74	109.49	236.09	304.96	0.10
1/3ecc	54.06	108.12	234.73	303.19	0.10
1/4 con	53.46	106.92	233.53	301.64	0.10
1/4ecc	55.10	110.21	236.82	305.89	0.10
1/5con	52.17	104.34	230.94	298.30	0.10
1/5ecc	55.41	110.82	237.42	306.67	0.10
1/6con	54.10	108.21	234.82	303.30	0.10
1/6ecc	53.78	107.56	234.17	302.47	0.10
1/7con	55.41	110.83	237.43	306.68	0.10
1/7ecc	53.08	106.16	232.77	300.66	0.10
1/8con	51.12	102.24	228.84	295.59	0.10
1/8ecc	56.04	112.08	238.69	308.31	0.10
1/9con	52.67	105.34	231.94	299.59	0.10
1/9ecc	53.55	107.09	233.70	301.86	0.10
1/10con	52.23	104.45	231.06	298.45	0.10
1/10ecc	54.30	108.61	235.21	303.82	0.10
1/11con	55.50	111.01	237.62	306.92	0.10
1/11ecc	39.98	79.95	206.56	266.80	0.09
			Total per Set:		
			Con:	3484.39	1.13
			Ecc:	3308.59	1.07

Set 3					
Weight Lifted lb.:		140.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1 con	38.16	76.33	202.93	262.12	0.08
1/1 ecc	63.32	126.64	253.25	327.11	0.11
1/2 con	61.76	123.52	250.13	323.08	0.10
1/2ecc	62.83	125.67	252.27	325.85	0.11
1/3 con	63.31	126.61	253.22	327.07	0.11
1/3 ecc	61.54	123.07	249.68	322.51	0.10
1/4 con	60.85	121.71	248.32	320.74	0.10
1/4ecc	62.48	124.97	251.58	324.95	0.11
1/5con	61.87	123.73	250.34	323.35	0.10
1/5ecc	61.86	123.71	250.32	323.33	0.10
1/6con	62.90	125.79	252.40	326.02	0.11
1/6ecc	59.82	119.64	246.25	318.07	0.10
1/7con	62.59	125.18	251.78	325.22	0.11
1/7ecc	60.68	121.37	247.98	320.30	0.10
1/8con	58.57	117.14	243.75	314.84	0.10
1/8ecc	62.90	125.80	252.41	326.03	0.11
1/9con	60.67	121.34	247.95	320.27	0.10
1/9ecc	49.15	98.30	224.91	290.51	0.09
			Total per Set:		
			Con:	2842.72	0.92
			Ecc:	2878.67	0.93

Subject 0003:		**ADDUCTION**		
Distance (ft.):		2.83		
Set 1 (Left Leg)				
Weight Lifted lb.:		15lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	13.00	36.66	36.83	0.01
1/1/ecc	17.81	41.47	50.47	0.02
1/2 con	16.40	40.05	46.46	0.02
1/2ecc	17.44	41.10	49.41	0.02
1/3 con	15.72	39.38	44.54	0.01
1/3ecc	18.44	42.10	52.24	0.02
1/4 con	12.52	36.17	35.47	0.01
1/4ecc	18.48	42.14	52.36	0.02
1/5con	16.89	40.55	47.86	0.02
1/5ecc	17.25	40.91	48.89	0.02
1/6con	15.61	39.27	44.24	0.01
1/6ecc	16.51	40.17	46.79	0.02
1/7con	17.76	41.41	50.31	0.02
1/7ecc	14.96	38.62	42.40	0.01
1/8con	17.07	40.72	48.36	0.02
1/8ecc	17.94	41.60	50.83	0.02
1/9con	12.47	36.13	35.34	0.01
1/9ecc	18.81	42.47	53.29	0.02
1/10con	16.03	39.68	45.41	0.01
1/10ecc	17.53	41.19	49.67	0.02
1/11con	14.01	37.67	39.69	0.01
1/11ecc	17.78	41.43	50.36	0.02
1/12con	15.72	39.37	44.53	0.01
1/12ecc	19.48	43.13	55.19	0.02
		Total per Set:		
		Con:	519.01	0.17
		Ecc:	601.89	0.19

Set 2 (Left Leg)				
Weight Lifted lb.:		20lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	16.34	40.00	113.33	0.04
1/1/ecc	18.75	42.40	120.14	0.04
1/2 con	18.53	42.19	119.54	0.04
1/2ecc	18.62	42.27	119.77	0.04
1/3 con	18.55	42.21	119.60	0.04
1/3ecc	19.70	43.36	122.85	0.04
1/4 con	12.78	36.44	103.24	0.03
1/4ecc	18.45	42.11	119.32	0.04
1/5con	17.49	41.15	116.59	0.04
1/5ecc	19.89	43.55	123.39	0.04
1/6con	18.79	42.45	120.28	0.04
1/6ecc	17.81	41.47	117.48	0.04
1/7con	14.07	37.73	106.90	0.03
1/7ecc	19.49	43.14	122.24	0.04
1/8con	15.57	39.22	111.13	0.04
1/8ecc	18.70	42.35	120.00	0.04
		Total per Set:		
		Con:	910.61	0.29
		Ecc:	965.20	0.31

Set 3 (Left Leg)				
Weight Lifted lb.:		30lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	21.79	45.45	128.77	0.04
1/1/ecc	30.35	54.01	153.03	0.05
1/2 con	26.93	50.58	143.32	0.05
1/2ecc	25.63	49.28	139.64	0.05
1/3 con	23.95	47.61	134.88	0.04
1/3ecc	33.01	56.67	160.57	0.05
1/4 con	29.20	52.86	149.77	0.05
1/4ecc	31.37	55.02	155.90	0.05
1/5con	27.53	51.19	145.04	0.05
1/5ecc	32.03	55.69	157.78	0.05
1/6con	27.28	50.94	144.34	0.05
1/6ecc	29.55	53.21	150.75	0.05
1/7con	23.95	47.60	134.88	0.04
1/7ecc	27.95	51.60	146.21	0.05
1/8con	21.94	45.59	129.18	0.04
1/8ecc	23.93	47.59	134.82	0.04
		Total per Set:		
		Con:	1110.17	0.36
		Ecc:	1198.70	0.39

	Set 4 (Right Leg)			
Weight Lifted lb.:		15lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	19.10	42.45	120.27	0.04
1/1/ecc	19.89	43.24	122.51	0.04
1/2 con	16.12	39.47	111.83	0.04
1/2ecc	20.66	44.01	124.70	0.04
1/3 con	20.17	43.52	123.31	0.04
1/3ecc	17.75	41.10	116.44	0.04
1/4 con	21.06	44.41	125.82	0.04
1/4ecc	19.05	42.40	120.14	0.04
1/5con	20.04	43.39	122.93	0.04
1/5ecc	20.64	43.99	124.64	0.04
1/6con	18.15	41.50	117.58	0.04
1/6ecc	19.09	42.44	120.25	0.04
1/7con	16.39	39.74	112.60	0.04
1/7ecc	19.16	42.51	120.45	0.04
1/8con	18.79	42.14	119.39	0.04
1/8ecc	20.14	43.49	123.23	0.04
1/9con	18.53	41.88	118.66	0.04
1/9ecc	19.13	42.48	120.36	0.04
1/10con	19.48	42.83	121.36	0.04
1/10ecc	21.26	44.61	126.38	0.04
1/11con	17.24	40.59	115.02	0.04
1/11ecc	20.39	43.74	123.94	0.04
1/12con	18.46	41.81	118.45	0.04
1/12ecc	20.74	44.09	124.92	0.04
		Total per Set:		
		Con:	1427.22	0.46
		Ecc:	1467.95	0.48

Set 5 (Right Leg)				
Weight Lifted lb.:		20lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	18.81	42.16	119.45	0.04
1/1/ecc	22.43	45.78	129.72	0.04
1/2 con	22.22	45.57	129.12	0.04
1/2ecc	20.95	44.30	125.51	0.04
1/3 con	20.94	44.29	125.50	0.04
1/3ecc	22.07	45.42	128.70	0.04
1/4 con	20.39	43.74	123.93	0.04
1/4ecc	21.11	44.46	125.97	0.04
1/5con	20.53	43.88	124.31	0.04
1/5ecc	21.35	44.70	126.64	0.04
1/6con	21.67	45.02	127.56	0.04
1/6ecc	21.05	44.40	125.81	0.04
1/7con	22.75	46.10	130.62	0.04
1/7ecc	20.23	43.58	123.48	0.04
1/8con	18.94	42.29	119.82	0.04
1/8ecc	18.67	42.01	119.04	0.04
1/9con	20.21	43.56	123.43	0.04
1/9ecc	21.12	44.47	126.01	0.04
1/10con	17.95	41.30	117.02	0.04
1/10ecc	18.60	41.94	118.84	0.04
		Total per Set:		
		Con:	1240.77	0.40
		Ecc:	1249.71	0.40

Set 6 (Right Leg)				
Weight Lifted lb.:		30lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	22.59	45.94	130.15	0.04
1/1/ecc	32.08	55.43	157.06	0.05
1/2 con	32.26	55.61	157.57	0.05
1/2ecc	33.98	57.33	162.43	0.05
1/3 con	31.22	54.57	154.62	0.05
1/3ecc	34.33	57.68	163.42	0.05
1/4 con	28.85	52.20	147.91	0.05
1/4ecc	34.54	57.89	164.01	0.05
1/5con	26.08	49.43	140.05	0.05
1/5ecc	33.50	56.85	161.07	0.05
1/6con	27.67	51.01	144.54	0.05
1/6ecc	32.12	55.47	157.17	0.05
1/7con	30.47	53.82	152.49	0.05
1/7ecc	32.32	55.67	157.72	0.05
1/8con	27.72	51.07	144.71	0.05
1/8ecc	33.02	56.37	159.72	0.05
		Total per Set:		
		Con:	1172.04	0.38
		Ecc:	1282.60	0.42

SUBJECT:0003				
				Kcal
Total Work per Exercise Session:		Concentric:	42448.42	13.75
	(Ft-Lb.)	Eccentric:	41572.15	13.47
			84020.56	27.21

Subject 0004:		**ABDUCTION**		
Distance (ft.):		3.00		
Set 1 (Left Leg)				
Weight Lifted lb.:		15lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init con	6.86	40.98	122.94	0.04
1/1con	14.54	48.66	145.98	0.05
1/1/ecc	17.35	51.47	154.41	0.05
1/2 con	18.20	52.32	156.97	0.05
1/2ecc	15.52	49.64	148.92	0.05
1/3 con	17.51	51.63	154.89	0.05
1/3ecc	16.18	50.30	150.90	0.05
1/4 con	16.18	50.30	150.90	0.05
1/4ecc	17.05	51.17	153.51	0.05
1/5con	18.86	52.98	158.94	0.05
1/5ecc	15.20	49.32	147.95	0.05
1/6con	16.94	51.06	153.18	0.05
1/6ecc	15.85	49.97	149.92	0.05
1/7con	18.53	52.65	157.94	0.05
1/7ecc	16.17	50.29	150.86	0.05
1/8con	19.04	53.16	159.48	0.05
1/8ecc	14.78	48.90	146.71	0.05
1/9con	15.83	49.95	149.85	0.05
1/9ecc	16.13	50.25	150.74	0.05
1/10con	16.40	50.51	151.54	0.05
1/10ecc	17.21	51.33	153.99	0.05
1/11con	16.66	50.78	152.33	0.05
1/11ecc	16.72	50.84	152.52	0.05
1/12con	16.72	50.84	152.51	0.05
1/12ecc	17.64	51.76	155.27	0.05
1/13con	18.34	52.45	157.36	0.05
1/13ecc	17.49	51.61	154.83	0.05
		Total per Set:		
		Con:	2124.82	0.64
		Ecc:	1970.53	0.69

Set 2 (Left Leg)				
Weight Lifted lb.:		25lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init con	4.92	39.04	117.13	0.04
1/1con	22.61	56.73	170.19	0.06
1/1/ecc	20.03	54.15	162.44	0.05
1/2 con	23.43	57.55	172.64	0.06
1/2ecc	23.25	57.37	172.11	0.06
1/3 con	23.93	58.05	174.16	0.06
1/3ecc	22.97	57.09	171.28	0.06
1/4 con	24.39	58.51	175.52	0.06
1/4ecc	21.59	55.71	167.14	0.05
1/5con	22.57	56.69	170.07	0.06
1/5ecc	21.83	55.95	167.84	0.05
1/6con	24.08	58.20	174.59	0.06
1/6ecc	20.05	54.17	162.50	0.05
1/7con	23.16	57.28	171.83	0.06
1/7ecc	20.90	55.02	165.06	0.05
1/8con	22.32	56.44	169.31	0.05
1/8ecc	21.44	55.56	166.68	0.05
1/9con	22.77	56.89	170.66	0.06
1/9ecc	20.88	55.00	164.99	0.05
1/10con	23.09	57.21	171.63	0.06
1/10ecc	19.53	53.65	160.95	0.05
		Total per Set:		
		Con:	1837.73	0.54
		Ecc:	1661.01	0.60

Set 3 (Left Leg)				
Weight Lifted lb.:		30lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	21.65	55.77	167.32	0.05
1/1/ecc	41.43	75.55	226.65	0.07
1/2 con	41.17	75.29	225.88	0.07
1/2ecc	38.25	72.37	217.11	0.07
1/3 con	39.35	73.47	220.40	0.07
1/3ecc	37.38	71.50	214.50	0.07
1/4 con	37.37	71.49	214.48	0.07
1/4ecc	35.24	69.36	208.07	0.07
1/5con	32.38	66.50	199.50	0.06
1/5ecc	31.29	65.41	196.23	0.06
1/6con	30.88	64.99	194.98	0.06
1/6ecc	32.23	66.35	199.04	0.06
1/7con	20.10	54.22	162.66	0.05
1/7ecc	25.21	59.33	177.98	0.06
1/8con	26.69	60.81	182.43	0.06
1/8ecc	26.28	60.40	181.21	0.06
		Total per Set:		
		Con:	1567.65	0.51
		Ecc:	1620.78	0.52

Set 4 (Right Leg)				
Weight Lifted lb.:		15lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	9.83	42.60	127.81	0.04
1/1/ecc	16.67	49.45	148.36	0.05
1/2 con	17.67	50.45	151.34	0.05
1/2ecc	19.15	51.93	155.78	0.05
1/3 con	21.14	53.92	161.77	0.05
1/3ecc	18.50	51.28	153.85	0.05
1/4 con	20.67	53.45	160.36	0.05
1/4ecc	18.79	51.57	154.72	0.05
1/5con	20.02	52.80	158.39	0.05
1/5ecc	19.12	51.90	155.70	0.05
1/6con	19.76	52.54	157.62	0.05
1/6ecc	18.83	51.61	154.83	0.05
1/7con	20.52	53.30	159.90	0.05
1/7ecc	18.54	51.32	153.95	0.05
1/8con	17.82	50.60	151.80	0.05
1/8ecc	18.30	51.08	153.24	0.05
1/9con	19.76	52.54	157.62	0.05
1/9ecc	17.56	50.33	151.00	0.05
1/10con	18.10	50.88	152.65	0.05
1/10ecc	18.57	51.35	154.04	0.05
1/11con	18.81	51.59	154.77	0.05
1/11ecc	19.43	52.20	156.61	0.05
1/12con	20.96	53.74	161.22	0.05
1/12ecc	18.04	50.82	152.45	0.05
1/13con	17.72	50.49	151.48	0.05
1/13ecc	17.24	50.02	150.06	0.05
		Total per Set:		
		Con:	2006.73	0.65
		Ecc:	1994.59	0.65

	Set 5 (Right Leg)			
Weight Lifted lb.:		25lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	24.06	56.84	170.52	0.06
1/1/ecc	25.46	58.24	174.72	0.06
1/2 con	26.85	59.63	178.89	0.06
1/2ecc	27.80	60.58	181.74	0.06
1/3 con	24.28	57.06	171.18	0.06
1/3ecc	26.67	59.45	178.35	0.06
1/4 con	24.14	56.92	170.76	0.06
1/4ecc	27.33	60.11	180.34	0.06
1/5con	22.94	55.71	167.14	0.05
1/5ecc	25.80	58.58	175.73	0.06
1/6con	26.83	59.61	178.82	0.06
1/6ecc	23.48	56.25	168.76	0.05
1/7con	22.10	54.88	164.65	0.05
1/7ecc	24.08	56.85	170.56	0.06
		Total per Set:		
		Con:	1201.97	0.39
		Ecc:	1230.21	0.40

	Set 6 (Right Leg)			
Weight Lifted lb.:		30lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	18.73	51.51	154.53	0.05
1/1/ecc	33.95	66.72	200.17	0.06
1/2 con	42.13	74.91	224.73	0.07
1/2ecc	39.54	72.32	216.96	0.07
1/3 con	42.29	75.07	225.21	0.07
1/3ecc	45.16	77.93	233.80	0.08
1/4 con	41.68	74.46	223.38	0.07
1/4ecc	40.02	72.80	218.40	0.07
1/5con	42.78	75.56	226.67	0.07
1/5ecc	38.79	71.57	214.71	0.07
1/6con	38.81	71.59	214.78	0.07
1/6ecc	29.56	62.34	187.01	0.06
1/7con	25.51	58.29	174.86	0.06
1/7ecc	31.34	64.12	192.36	0.06
		Total per Set:		
		Con:	1444.15	0.47
		Ecc:	1463.42	0.47

Subject 0004:		DEAD LIFT
	Set 0	(Warm-up)
Distance (ft.):		1.58
Weight Lifted lb.:		180.00

Repetition:	Mean Force (lb.)	Force.x2	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	45.77	91.55	280.73	444.50	0.14
1/1/ecc	74.62	149.24	338.43	535.84	0.17
1/2 con	69.17	138.34	327.53	518.59	0.17
1/2ecc	71.88	143.77	332.96	527.18	0.17
1/3 con	73.39	146.79	335.97	531.96	0.17
1/3ecc	71.20	142.41	331.60	525.03	0.17
1/4 con	73.52	147.05	336.23	532.37	0.17
1/4ecc	70.94	141.88	331.07	524.20	0.17
1/5con	72.47	144.94	334.12	529.03	0.17
1/5ecc	71.50	143.00	332.18	525.96	0.17
1/6con	67.72	135.45	324.63	514.00	0.17
1/6ecc	72.24	144.49	333.67	528.32	0.17
1/7con	72.58	145.15	334.34	529.37	0.17
1/7ecc	71.93	143.85	333.04	527.32	0.17
1/8con	71.85	143.70	332.88	527.06	0.17
1/8ecc	72.06	144.11	333.30	527.72	0.17
1/9con	72.63	145.25	334.44	529.53	0.17
1/9ecc	72.01	144.03	333.21	527.59	0.17
1/10con	72.61	145.22	334.41	529.48	0.17
1/10ecc	70.45	140.91	330.09	522.65	0.17
			Total per Set:		
			Con:	5185.88	1.68
			Ecc:	5271.79	1.71

	Set 1	
Weight Lifted (lb.):		280.00

Repetition:	Mean Force (lb.)	Force.x2	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Initcon	7.32	14.64	203.82	322.72	0.10
1/1con	78.04	156.08	345.27	546.67	0.18
1/1/ecc	133.89	267.79	456.97	723.54	0.23
1/2 con	133.21	266.42	455.61	721.38	0.23
1/2ecc	128.54	257.08	446.27	706.59	0.23
1/3 con	129.40	258.79	447.98	709.30	0.23
1/3ecc	126.60	253.19	442.38	700.44	0.23
1/4 con	130.27	260.54	449.73	712.07	0.23
1/4ecc	123.38	246.75	435.94	690.24	0.22
1/5con	123.43	246.85	436.04	690.39	0.22
1/5ecc	122.69	245.37	434.56	688.05	0.22
1/6con	122.31	244.61	433.80	686.85	0.22
1/6ecc	119.53	239.06	428.24	678.05	0.22
1/7con	114.44	228.88	418.06	661.93	0.21
1/7ecc	119.09	238.18	427.37	676.66	0.22
1/8con	119.45	238.89	428.08	677.79	0.22
1/8ecc	117.75	235.50	424.69	672.42	0.22
1/9con	112.14	224.28	413.46	654.65	0.21
1/9ecc	102.12	204.24	393.43	622.93	0.20
1/10con	114.17	228.34	417.52	661.08	0.21
1/10ecc	106.67	213.35	402.53	637.34	0.21
			Total per Set:		
			Con:	7044.85	2.20
			Ecc:	6796.27	2.28

Set 2					
Weight Lifted (lb.):		305.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Initcon	6.76	13.52	202.71	320.96	0.10
1/1con	114.22	228.45	417.64	661.26	0.21
1/1/ecc	137.51	275.03	464.22	735.01	0.24
1/2 con	145.56	291.12	480.31	760.49	0.25
1/2ecc	134.39	268.79	457.97	725.13	0.23
1/3 con	145.68	291.37	480.55	760.87	0.25
1/3ecc	130.70	261.39	450.58	713.41	0.23
1/4 con	138.56	277.12	466.31	738.32	0.24
1/4ecc	136.82	273.63	462.82	732.80	0.24
1/5con	142.72	285.45	474.64	751.51	0.24
1/5ecc	132.36	264.72	453.91	718.69	0.23
1/6con	139.27	278.54	467.72	740.56	0.24
1/6ecc	120.85	241.71	430.89	682.25	0.22
1/7con	130.47	260.94	450.12	712.70	0.23
1/7ecc	103.45	206.91	396.09	627.15	0.20
1/8con	62.89	125.78	314.97	498.70	0.16
1/8ecc	112.70	225.40	414.58	656.42	0.21
			Total per Set:		
			Con:	5255.38	1.70
			Ecc:	5624.41	1.82

Set 3					
Weight Lifted (lb.):		330.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Initcon	7.22	14.44	203.63	322.41	0.10
1/1con	115.27	230.53	419.72	664.55	0.22
1/1/ecc	158.24	316.49	505.67	800.65	0.26
1/2 con	167.23	334.46	523.65	829.11	0.27
1/2ecc	146.11	292.22	481.40	762.22	0.25
1/3 con	160.37	320.75	509.93	807.39	0.26
1/3ecc	144.59	289.19	478.37	757.43	0.25
1/4 con	155.53	311.07	500.26	792.07	0.26
1/4ecc	113.04	226.09	415.28	657.52	0.21
1/5con	115.07	230.14	419.33	663.93	0.22
1/5ecc	123.74	247.48	436.67	691.39	0.22
1/6con	91.46	182.91	372.10	589.15	0.19
1/6ecc	136.32	272.64	461.82	731.22	0.24
			Total per Set:		
			Con:	3991.62	1.29
			Ecc:	4346.21	1.41

Subject 0004:		HEEL RAISES		
	Set 0	(Warm-up)		
Distance (ft.):		0.46		
Weight Lifted lb.:		205.00		
Repetition:	Mean Force (lb.)	(+) Total Body Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init Con	146.93	347.77	159.39	0.05
1/1/ecc	172.67	373.51	171.19	0.06
1/1 con	164.63	365.47	167.51	0.05
1/2ecc	166.52	367.35	168.37	0.05
1/2 con	156.76	357.60	163.90	0.05
1/3ecc	161.19	362.03	165.93	0.05
1/3con	162.41	363.24	166.49	0.05
1/4ecc	159.78	360.61	165.28	0.05
1/4con	162.58	363.41	166.56	0.05
1/5ecc	157.95	358.78	164.44	0.05
1/5con	164.68	365.51	167.53	0.05
1/6ecc	160.75	361.59	165.73	0.05
1/6con	163.06	363.90	166.79	0.05
1/7ecc	156.56	357.40	163.81	0.05
1/7con	164.83	365.67	167.60	0.05
1/8ecc	160.48	361.31	165.60	0.05
1/8con	164.13	364.96	167.28	0.05
1/9ecc	163.49	364.33	166.98	0.05
1/9con	154.21	355.05	162.73	0.05
1/10ecc	160.87	361.71	165.78	0.05
1/10con	162.67	363.51	166.61	0.05
Final Ecc	153.96	354.79	162.61	0.05
		Total per Set:		
		Con:	1822.37	0.59
		Ecc:	1825.73	0.59

	Set 1				
Weight Lifted (lb.):		300.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Total Body Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Initcon	14.92	29.83	230.67	105.72	0.03
1/1con	98.49	196.97	397.81	182.33	0.06
1/1/ecc	126.59	253.17	454.01	208.09	0.07
1/2 con	130.12	260.24	461.08	211.33	0.07
1/2ecc	124.63	249.26	450.10	206.29	0.07
1/3 con	129.67	259.34	460.17	210.91	0.07
1/3ecc	124.97	249.95	450.78	206.61	0.07
1/4 con	126.54	253.08	453.91	208.04	0.07
1/4ecc	124.45	248.91	449.74	206.13	0.07
1/5con	127.05	254.10	454.93	208.51	0.07
1/5ecc	123.85	247.71	448.54	205.58	0.07
1/6con	123.69	247.39	448.22	205.43	0.07
1/6ecc	126.27	252.54	453.37	207.79	0.07
1/7con	125.27	250.55	451.38	206.88	0.07
1/7ecc	125.32	250.65	451.48	206.93	0.07
1/8con	125.34	250.68	451.51	206.94	0.07
1/8ecc	124.98	249.96	450.79	206.61	0.07
1/9con	128.28	256.55	457.39	209.64	0.07
1/9ecc	124.50	249.00	449.83	206.17	0.07
1/10con	127.31	254.63	455.46	208.75	0.07
1/10ecc	124.35	248.71	449.54	206.04	0.07
1/11con	125.01	250.03	450.86	206.64	0.07
1/11ecc	126.71	253.43	454.26	208.20	0.07
1/12con	123.53	247.06	447.89	205.28	0.07
1/12ecc	124.85	249.70	450.54	206.50	0.07
1/13con	126.57	253.13	453.97	208.07	0.07
1/13ecc	105.79	211.58	412.41	189.02	0.06
			Total per Set:		
			Con:	2784.49	0.90
			Ecc:	2669.98	0.86

Set 2					
Weight Lifted (lb.):		340.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Total Body Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	59.38	118.75	319.59	146.48	0.05
1/1/ecc	147.35	294.70	495.53	227.12	0.07
1/2 con	148.76	297.51	498.35	228.41	0.07
1/2ecc	143.38	286.77	487.60	223.49	0.07
1/3 con	145.98	291.96	492.80	225.87	0.07
1/3ecc	143.12	286.24	487.07	223.24	0.07
1/4 con	142.03	284.06	484.90	222.24	0.07
1/4ecc	143.68	287.36	488.20	223.76	0.07
1/5con	144.43	288.85	489.69	224.44	0.07
1/5ecc	144.06	288.12	488.95	224.10	0.07
1/6con	143.89	287.78	488.61	223.95	0.07
1/6ecc	141.97	283.95	484.78	222.19	0.07
1/7con	147.27	294.54	495.38	227.05	0.07
1/7ecc	140.02	280.04	480.88	220.40	0.07
1/8con	145.18	290.37	491.20	225.14	0.07
1/8ecc	143.31	286.61	487.45	223.41	0.07
1/9con	148.64	297.28	498.11	228.30	0.07
1/9ecc	141.10	282.21	483.04	221.40	0.07
1/10con	146.14	292.28	493.11	226.01	0.07
1/10ecc	113.24	226.48	427.32	195.85	0.06
			Total per Set:		
			Con:	2177.88	0.71
			Ecc:	2204.96	0.71

Set 3					
Weight Lifted (lb.):		360.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Total Body Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Initcon	18.58	37.15	237.99	109.08	0.04
1/1con	89.13	178.26	379.09	173.75	0.06
1/1/ecc	158.23	316.46	517.29	237.09	0.08
1/2 con	156.09	312.19	513.02	235.14	0.08
1/2ecc	152.82	305.64	506.47	232.13	0.08
1/3 con	153.75	307.51	508.34	232.99	0.08
1/3ecc	152.02	304.03	504.87	231.40	0.07
1/4 con	156.23	312.47	513.30	235.26	0.08
1/4ecc	152.70	305.41	506.24	232.03	0.08
1/5con	153.57	307.14	507.97	232.82	0.08
1/5ecc	154.67	309.35	510.18	233.83	0.08
1/6con	153.95	307.89	508.73	233.17	0.08
1/6ecc	154.80	309.59	510.43	233.95	0.08
1/7con	155.53	311.07	511.90	234.62	0.08
1/7ecc	150.73	301.47	502.30	230.22	0.07
1/8con	157.69	315.38	516.22	236.60	0.08
1/8ecc	151.47	302.95	503.78	230.90	0.07
1/9con	155.62	311.24	512.08	234.70	0.08
1/9ecc	133.29	266.58	467.42	214.23	0.07
			Total per Set:		
			Con:	2158.13	0.70
			Ecc:	2075.79	0.67

Subject 0004:		SQUATS		
	Set 0	(Warm-up)		
Distance (ft.):		1.54		
Weight Lifted lb.:		150.00		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init Con	146.93	336.12	518.18	0.17
1/1/ecc	172.67	361.86	557.87	0.18
1/1 con	164.63	353.82	545.47	0.18
1/2ecc	166.52	355.70	548.38	0.18
1/2 con	156.76	345.95	533.34	0.17
1/3ecc	161.19	350.38	540.17	0.17
1/3con	162.41	351.60	542.04	0.18
1/4ecc	159.78	348.96	537.99	0.17
1/4con	162.58	351.76	542.30	0.18
1/5ecc	157.95	347.14	535.17	0.17
1/5con	164.68	353.86	545.54	0.18
1/6ecc	160.75	349.94	539.49	0.17
1/6con	163.06	352.25	543.05	0.18
1/7ecc	156.56	345.75	533.03	0.17
1/7con	164.83	354.02	545.78	0.18
1/8ecc	160.48	349.67	539.07	0.17
1/8con	164.13	353.32	544.70	0.18
1/9ecc	163.49	352.68	543.71	0.18
1/9con	154.21	343.40	529.41	0.17
1/10ecc	160.87	350.06	539.68	0.17
1/10con	162.67	351.86	542.45	0.18
1/11ecc	160.81	350.00	539.58	0.17
1/11con	165.33	354.51	546.54	0.18
1/12ecc	165.32	354.51	546.53	0.18
1/12con	155.65	344.84	531.62	0.17
Final Ecc	153.96	343.15	529.02	0.17
		Total per Set:		
		Con:	7010.43	2.27
		Ecc:	7029.67	2.28

	Set 1			
Weight Lifted lb.:		310.00		
Repetition:	Mean Force (lb.)	(+) Total Body Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init Con	316.89	506.08	780.20	0.25
1/1/ecc	344.04	533.23	822.06	0.27
1/1 con	340.63	529.82	816.81	0.26
1/2ecc	334.61	523.79	807.51	0.26
1/2 con	331.79	520.98	803.18	0.26
1/3ecc	332.03	521.21	803.54	0.26
1/3con	332.94	522.12	804.94	0.26
1/4ecc	342.21	531.40	819.24	0.27
1/4con	317.47	506.65	781.09	0.25
1/5ecc	321.70	510.89	787.61	0.26
1/5con	337.56	526.75	812.07	0.26
1/6ecc	328.71	517.89	798.42	0.26
1/6con	321.58	510.77	787.43	0.26
1/7ecc	331.86	521.05	803.28	0.26
1/7con	318.06	507.25	782.01	0.25
1/8ecc	313.71	502.89	775.29	0.25
1/8con	334.61	523.79	807.51	0.26
1/9ecc	317.53	506.72	781.19	0.25
1/9con	328.80	517.99	798.57	0.26
1/10ecc	316.79	505.97	780.04	0.25
1/10con	329.86	519.04	800.19	0.26
Final Ecc	265.31	454.50	700.68	0.23
		Total per Set:		
		Con:	8774.00	2.84
		Ecc:	8678.88	2.81

Set 2				
Weight Lifted lb.:		340.00		
Repetition:	Mean Force (lb.)	(+) Total Body Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init Con	266.79	455.97	702.96	0.23
1/1/ecc	357.67	546.85	843.06	0.27
1/1 con	329.77	518.96	800.07	0.26
1/2ecc	336.18	525.36	809.93	0.26
1/2 con	340.73	529.92	816.95	0.26
1/3ecc	330.47	519.66	801.14	0.26
1/3con	350.09	539.27	831.38	0.27
1/4ecc	335.12	524.31	808.31	0.26
1/4con	336.46	525.65	810.38	0.26
1/5ecc	326.06	515.25	794.35	0.26
1/5con	346.84	536.03	826.38	0.27
1/6ecc	322.35	511.54	788.62	0.26
1/6con	342.37	531.56	819.49	0.27
1/7ecc	332.99	522.17	805.02	0.26
1/7con	337.07	526.26	811.32	0.26
1/8ecc	334.02	523.20	806.60	0.26
1/8con	335.09	524.27	808.26	0.26
Final Ecc	307.33	496.51	765.46	0.25
		Total per Set:		
		Con:	7227.17	2.34
		Ecc:	7222.49	2.34

Set 3				
Weight Lifted lb.:		360.00		
Repetition:	Mean Force (lb.)	(+) Total Body Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init Con	251.97	441.15	680.11	0.22
1/1/ecc	343.16	532.35	820.71	0.27
1/1 con	365.02	554.20	854.39	0.28
1/2ecc	342.14	531.33	819.13	0.27
1/2 con	359.58	548.77	846.02	0.27
1/3ecc	337.94	527.12	812.65	0.26
1/3con	362.82	552.01	851.02	0.28
1/4ecc	337.99	527.18	812.74	0.26
1/4con	357.39	546.57	842.63	0.27
1/5ecc	338.40	527.59	813.36	0.26
1/5con	365.46	554.65	855.09	0.28
1/6ecc	345.53	534.72	824.36	0.27
1/6con	363.66	552.85	852.30	0.28
Final Ecc	257.40	446.58	688.48	0.22
		Total per Set:		
		Con:	5781.56	1.87
		Ecc:	5591.43	1.81

Subject 0004:		**ADDUCTION**		
Distance (ft.):		2.92		
Set 1 (Left Leg)				
Weight Lifted lb.:		15lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	8.09	42.21	123.11	0.04
1/1/ecc	9.58	43.70	127.47	0.04
1/2 con	17.56	51.68	150.74	0.05
1/2ecc	19.14	53.26	155.35	0.05
1/3 con	19.32	53.44	155.88	0.05
1/3ecc	18.99	53.10	154.89	0.05
1/4 con	18.28	52.40	152.82	0.05
1/4ecc	17.67	51.78	151.04	0.05
1/5con	19.90	54.02	157.55	0.05
1/5ecc	16.57	50.69	147.84	0.05
1/6con	19.95	54.07	157.70	0.05
1/6ecc	17.07	51.19	149.30	0.05
1/7con	17.61	51.73	150.89	0.05
1/7ecc	16.12	50.24	146.54	0.05
1/8con	20.66	54.78	159.77	0.05
1/8ecc	19.20	53.32	155.53	0.05
1/9con	18.18	52.30	152.54	0.05
1/9ecc	17.14	51.26	149.51	0.05
1/10con	18.41	52.53	153.21	0.05
1/10ecc	17.21	51.33	149.70	0.05
1/11con	17.04	51.16	149.22	0.05
1/11ecc	18.09	52.21	152.27	0.05
1/12con	20.66	54.77	159.76	0.05
1/12ecc	12.01	46.13	134.54	0.04
		Total per Set:		
		Con:	1823.17	0.59
		Ecc:	1773.96	0.57

Set 2 (Left Leg)				
Weight Lifted lb.:		25lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	22.27	56.39	164.48	0.05
1/1/ecc	20.69	54.81	159.87	0.05
1/2 con	19.05	53.17	155.07	0.05
1/2ecc	22.45	56.57	164.98	0.05
1/3 con	23.95	58.07	169.36	0.05
1/3ecc	21.20	55.32	161.34	0.05
1/4 con	23.92	58.04	169.28	0.05
1/4ecc	20.41	54.53	159.05	0.05
1/5con	20.77	54.89	160.10	0.05
1/5ecc	21.54	55.66	162.35	0.05
1/6con	22.51	56.63	165.18	0.05
1/6ecc	20.54	54.66	159.41	0.05
1/7con	22.73	56.85	165.80	0.05
1/7ecc	21.65	55.77	162.67	0.05
1/8con	22.63	56.75	165.51	0.05
1/8ecc	19.70	53.82	156.98	0.05
1/9con	22.17	56.28	164.16	0.05
1/9ecc	18.98	53.10	154.86	0.05
1/10con	22.74	56.86	165.84	0.05
1/10ecc	19.78	53.90	157.21	0.05
		Total per Set:		
		Con:	1644.78	0.53
		Ecc:	1598.73	0.52

Set 3 (Left Leg)				
Weight Lifted lb.:		35lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	24.38	58.50	170.62	0.06
1/1/ecc	34.94	69.06	201.42	0.07
1/2 con	33.89	68.01	198.37	0.06
1/2ecc	35.21	69.32	202.20	0.07
1/3 con	35.15	69.27	202.05	0.07
1/3ecc	34.31	68.43	199.58	0.06
1/4 con	30.63	64.75	188.85	0.06
1/4ecc	32.73	66.85	194.99	0.06
1/5con	26.81	60.93	177.70	0.06
1/5ecc	31.92	66.04	192.61	0.06
1/6con	27.28	61.40	179.08	0.06
1/6ecc	30.90	65.02	189.65	0.06
1/7con	26.78	60.90	177.63	0.06
1/7ecc	31.31	65.43	190.84	0.06
1/8con	29.07	63.19	184.31	0.06
1/8ecc	22.24	56.35	164.37	0.05
		Total per Set:		
		Con:	1478.60	0.48
		Ecc:	1535.65	0.50

Set 4 (Right Leg)				
Weight Lifted lb.:		15lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	16.12	48.90	142.62	0.05
1/1/ecc	19.61	52.39	152.80	0.05
1/2 con	20.57	53.35	155.61	0.05
1/2ecc	19.89	52.67	153.62	0.05
1/3 con	21.47	54.25	158.23	0.05
1/3ecc	17.79	50.57	147.49	0.05
1/4 con	19.87	52.65	153.56	0.05
1/4ecc	18.06	50.84	148.27	0.05
1/5con	17.58	50.36	146.89	0.05
1/5ecc	19.36	52.14	152.08	0.05
1/6con	20.17	52.94	154.42	0.05
1/6ecc	18.54	51.31	149.67	0.05
1/7con	16.60	49.37	144.01	0.05
1/7ecc	17.13	49.90	145.56	0.05
1/8con	16.95	49.73	145.05	0.05
1/8ecc	17.09	49.86	145.44	0.05
1/9con	17.40	50.18	146.35	0.05
1/9ecc	17.18	49.96	145.72	0.05
1/10con	18.47	51.25	149.49	0.05
1/10ecc	17.24	50.02	145.89	0.05
1/11con	19.39	52.16	152.14	0.05
1/11ecc	17.72	50.50	147.28	0.05
1/12con	17.33	50.10	146.13	0.05
1/12ecc	17.89	50.66	147.77	0.05
1/13con	19.35	52.13	152.05	0.05
1/13ecc	18.07	50.85	148.32	0.05
1/14con	21.17	53.94	157.34	0.05
1/14ecc	17.66	50.43	147.10	0.05
1/15con	17.86	50.64	147.71	0.05
1/15ecc	17.27	50.05	145.98	0.05
		Total per Set:		
		Con:	2251.59	0.73
		Ecc:	2222.98	0.72

Set 5 (Right Leg)				
Weight Lifted lb.:		25lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	8.71	41.49	121.01	0.04
1/1/ecc	20.65	53.43	155.83	0.05
1/2 con	21.06	53.84	157.03	0.05
1/2ecc	19.79	52.57	153.34	0.05
1/3 con	21.88	54.66	159.43	0.05
1/3ecc	19.28	52.06	151.84	0.05
1/4 con	20.40	53.17	155.09	0.05
1/4ecc	19.30	52.08	151.89	0.05
1/5con	19.28	52.06	151.83	0.05
1/5ecc	18.75	51.53	150.28	0.05
1/6con	19.89	52.67	153.62	0.05
1/6ecc	19.39	52.16	152.15	0.05
1/7con	20.19	52.97	154.49	0.05
1/7ecc	19.20	51.98	151.60	0.05
1/8con	20.97	53.74	156.75	0.05
1/8ecc	20.61	53.39	155.72	0.05
1/9con	20.17	52.95	154.44	0.05
1/9ecc	20.64	53.41	155.79	0.05
1/10con	19.64	52.42	152.90	0.05
1/10ecc	16.06	48.84	142.44	0.05
		Total per Set:		
		Con:	1516.60	0.49
		Ecc:	1520.87	0.49

Set 6 (Right Leg)				
Weight Lifted lb.:		35lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	25.98	58.76	171.38	0.06
1/1/ecc	35.52	68.29	199.19	0.06
1/2 con	43.07	75.85	221.22	0.07
1/2ecc	35.56	68.33	199.31	0.06
1/3 con	39.31	72.08	210.25	0.07
1/3ecc	34.26	67.04	195.53	0.06
1/4 con	32.44	65.22	190.21	0.06
1/4ecc	36.47	69.25	201.98	0.07
1/5con	41.84	74.62	217.63	0.07
1/5ecc	35.32	68.10	198.62	0.06
1/6con	37.65	70.43	205.41	0.07
1/6ecc	34.63	67.41	196.61	0.06
1/7con	36.22	69.00	201.25	0.07
1/7ecc	34.64	67.41	196.62	0.06
1/8con	38.07	70.85	206.65	0.07
1/8ecc	20.02	52.80	153.99	0.05
		Total per Set:		
		Con:	1624.01	0.53
		Ecc:	1541.86	0.50

SUBJECT:0004				
				Kcal
Total Work per Exercise Session:		Concentric:	79735.54	25.83
	(Ft-Lb.)	Eccentric:	79472.20	25.74
			159207.74	**51.57**

Subject 0005:		**ABDUCTION**		
Distance (ft.):		2.75		
Set 1 (Left Leg)				
Weight Lifted lb.:		15lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	15.08	42.85	117.83	0.04
1/1/ecc	15.84	43.61	119.92	0.04
1/2 con	18.53	46.30	127.34	0.04
1/2ecc	16.89	44.66	122.81	0.04
1/3 con	17.92	45.69	125.65	0.04
1/3ecc	16.63	44.40	122.09	0.04
1/4 con	17.62	45.39	124.82	0.04
1/4ecc	15.73	43.50	119.63	0.04
1/5con	18.46	46.23	127.14	0.04
1/5ecc	15.51	43.28	119.02	0.04
1/6con	11.67	39.44	108.45	0.04
1/6ecc	15.96	43.72	120.24	0.04
1/7con	16.40	44.17	121.46	0.04
1/7ecc	15.22	42.99	118.23	0.04
1/8con	13.39	41.16	113.18	0.04
1/8ecc	15.08	42.85	117.85	0.04
1/9con	14.93	42.70	117.42	0.04
1/9ecc	16.40	44.17	121.47	0.04
1/10con	14.71	42.48	116.83	0.04
1/10ecc	18.57	46.34	127.44	0.04
1/11con	12.16	39.93	109.81	0.04
1/11ecc	15.44	43.21	118.84	0.04
		Total per Set:		
		Con:	1309.94	0.42
		Ecc:	1327.55	0.43

Set 2 (Left Leg)				
Weight Lifted (lb.):		20 lb.		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	10.64	38.41	105.62	0.03
1/1/ecc	17.08	44.85	123.34	0.04
1/2 con	13.37	41.14	113.12	0.04
1/2ecc	21.00	48.77	134.11	0.04
1/3 con	12.57	40.33	110.92	0.04
1/3ecc	15.69	43.46	119.52	0.04
1/4 con	16.37	44.14	121.37	0.04
1/4ecc	14.46	42.23	116.13	0.04
1/5con	15.40	43.17	118.71	0.04
1/5ecc	15.02	42.79	117.67	0.04
1/6con	16.37	44.14	121.38	0.04
1/6ecc	15.05	42.81	117.74	0.04
1/7con	15.68	43.45	119.48	0.04
1/7ecc	15.11	42.88	117.93	0.04
1/8con	14.19	41.96	115.38	0.04
1/8ecc	18.45	46.22	127.12	0.04
1/9con	12.44	40.21	110.59	0.04
1/9ecc	19.89	47.66	131.06	0.04
1/10con	13.16	40.93	112.56	0.04
1/10ecc	19.33	47.10	129.52	0.04
1/11con	12.68	40.45	111.23	0.04
1/11ecc	16.80	44.56	122.55	0.04
1/12con	14.86	42.63	117.24	0.04
1/12ecc	11.79	39.56	108.78	0.04
		Total per Set:		
		Con:	1377.61	0.45
		Ecc:	1465.46	0.47

Set 3 (Left Leg)				
Weight Lifted (lb.):		25 lb.		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init con	10.25	38.02	104.55	0.03
1/1con	19.98	47.75	131.31	0.04
1/1/ecc	20.64	48.41	133.12	0.04
1/2 con	21.31	49.08	134.97	0.04
1/2ecc	20.70	48.47	133.28	0.04
1/3 con	19.86	47.63	130.97	0.04
1/3ecc	22.34	50.11	137.79	0.04
1/4 con	20.89	48.66	133.80	0.04
1/4ecc	19.57	47.34	130.19	0.04
1/5con	21.87	49.64	136.50	0.04
1/5ecc	21.63	49.40	135.86	0.04
1/6con	15.59	43.36	119.24	0.04
1/6ecc	20.99	48.76	134.10	0.04
1/7con	18.47	46.24	127.15	0.04
1/7ecc	21.57	49.34	135.68	0.04
1/8con	17.54	45.31	124.60	0.04
1/8ecc	22.86	50.63	139.24	0.05
		Total per Set:		
		Con:	1143.09	0.37
		Ecc:	1079.26	0.35

Set 4 (Right Leg)				
Weight Lifted (lb.):		15 lb.		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	6.99	34.26	94.21	0.03
1/1/ecc	14.83	42.11	115.79	0.04
1/2 con	15.97	43.24	118.92	0.04
1/2ecc	14.50	41.77	114.87	0.04
1/3 con	15.46	42.73	117.51	0.04
1/3ecc	13.83	41.10	113.03	0.04
1/4 con	15.50	42.78	117.63	0.04
1/4ecc	13.85	41.13	113.09	0.04
1/5con	14.03	41.31	113.59	0.04
1/5ecc	14.67	41.94	115.33	0.04
1/6con	12.45	39.73	109.24	0.04
1/6ecc	16.14	43.42	119.39	0.04
1/7con	12.32	39.59	108.87	0.04
1/7ecc	13.63	40.90	112.49	0.04
1/8con	13.97	41.24	113.41	0.04
1/8ecc	16.79	44.06	121.18	0.04
1/9con	11.77	39.05	107.38	0.03
1/9ecc	16.11	43.39	119.31	0.04
1/10con	11.54	38.81	106.73	0.03
1/10ecc	15.07	42.34	116.45	0.04
1/11con	11.06	38.34	105.43	0.03
1/11ecc	12.66	39.93	109.82	0.04
1/12con	13.19	40.46	111.27	0.04
1/12ecc	11.09	38.36	105.49	0.03
		Total per Set:		
		Con:	1324.19	0.43
		Ecc:	1376.24	0.45

Set 5 (Right Leg)				
Weight Lifted (lb.):		20 lb.		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	16.57	43.85	120.58	0.04
1/1/ecc	15.13	42.40	116.60	0.04
1/2 con	16.20	43.47	119.56	0.04
1/2ecc	18.34	45.62	125.44	0.04
1/3 con	13.10	40.37	111.01	0.04
1/3ecc	18.09	45.36	124.75	0.04
1/4 con	14.43	41.70	114.67	0.04
1/4ecc	17.97	45.24	124.41	0.04
1/5con	13.91	41.18	113.25	0.04
1/5ecc	17.92	45.19	124.28	0.04
1/6con	15.11	42.39	116.56	0.04
1/6ecc	15.12	42.40	116.59	0.04
1/7con	17.50	44.77	123.13	0.04
1/7ecc	16.05	43.32	119.13	0.04
1/8con	13.77	41.04	112.86	0.04
1/8ecc	14.41	41.68	114.62	0.04
1/9con	14.29	41.56	114.30	0.04
1/9ecc	14.06	41.33	113.65	0.04
1/10con	9.77	37.05	101.88	0.03
1/10ecc	14.03	41.30	113.58	0.04
1/11con	16.88	44.15	121.42	0.04
1/11ecc	15.22	42.49	116.84	0.04
		Total per Set:		
		Con:	1269.21	0.41
		Ecc:	1309.90	0.42

Set 6 (Right Leg)				
Weight Lifted (lb.):		25 lb.		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init Con	9.02	36.29	99.80	0.03
1/1con	16.78	44.05	121.14	0.04
1/1/ecc	20.60	47.88	131.66	0.04
1/2 con	20.56	47.83	131.54	0.04
1/2ecc	22.95	50.23	138.12	0.04
1/3 con	18.02	45.29	124.56	0.04
1/3ecc	20.46	47.73	131.26	0.04
1/4 con	21.86	49.13	135.11	0.04
1/4ecc	20.54	47.82	131.49	0.04
1/5con	19.45	46.72	128.47	0.04
1/5ecc	19.61	46.88	128.93	0.04
1/6con	18.55	45.82	126.01	0.04
1/6ecc	19.86	47.13	129.62	0.04
1/7con	16.74	44.01	121.02	0.04
1/7ecc	24.03	51.30	141.09	0.05
1/8con	16.73	44.01	121.02	0.04
1/8ecc	20.09	47.36	130.25	0.04
		Total per Set:		
		Con:	1108.66	0.36
		Ecc:	1062.42	0.34

Subject 0005:		DEAD LIFT
	Set 0	(Warm-up)
Distance (ft.):		1.25
Weight Lifted lb.:		150.00

Repetition:	Mean Force (lb.)	Force.x2	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	37.10	74.20	232.89	291.12	0.09
1/1/ecc	65.52	131.03	289.72	362.16	0.12
1/2 con	59.72	119.44	278.13	347.66	0.11
1/2ecc	64.35	128.70	287.39	359.23	0.12
1/3 con	58.95	117.89	276.58	345.73	0.11
1/3ecc	59.97	119.95	278.64	348.30	0.11
1/4 con	57.20	114.39	273.08	341.35	0.11
1/4ecc	61.22	122.45	281.14	351.42	0.11
1/5con	58.91	117.81	276.51	345.63	0.11
1/5ecc	62.64	125.27	283.96	354.95	0.11
1/6con	56.83	113.65	272.34	340.43	0.11
1/6ecc	62.81	125.63	284.32	355.40	0.12
1/7con	58.92	117.83	276.52	345.65	0.11
1/7ecc	61.63	123.27	281.96	352.45	0.11
1/8con	58.43	116.85	275.54	344.43	0.11
1/8ecc	60.53	121.05	279.74	349.68	0.11
1/9con	57.44	114.88	273.57	341.97	0.11
1/9ecc	61.28	122.57	281.26	351.57	0.11
1/10con	59.36	118.71	277.40	346.75	0.11
1/10ecc	61.29	122.58	281.27	351.58	0.11
1/11con	62.63	125.27	283.96	354.95	0.11
1/11ecc	59.78	119.56	278.25	347.81	0.11
1/12con	60.26	120.52	279.21	349.01	0.11
1/12ecc	53.89	107.78	266.47	333.08	0.11
			Total per Set:		
			Con:	4094.67	1.33
			Ecc:	4217.63	1.37

	Set 1	
Weight Lifted (lb.):		220.00

Repetition:	Mean Force (lb.)	Force.x2	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init Con	10.94	21.88	180.57	225.71	0.07
1/1con	88.70	177.40	336.09	420.12	0.14
1/1/ecc	100.76	201.52	360.21	450.27	0.15
1/2 con	97.12	194.24	352.94	441.17	0.14
1/2ecc	97.41	194.82	353.51	441.89	0.14
1/3 con	95.16	190.31	349.00	436.25	0.14
1/3ecc	96.51	193.03	351.72	439.65	0.14
1/4 con	95.58	191.17	349.86	437.32	0.14
1/4ecc	94.80	189.61	348.30	435.37	0.14
1/5con	95.70	191.40	350.09	437.61	0.14
1/5ecc	93.52	187.03	345.72	432.15	0.14
1/6con	97.07	194.15	352.84	441.05	0.14
1/6ecc	94.97	189.93	348.62	435.78	0.14
1/7con	93.94	187.88	346.57	433.21	0.14
1/7ecc	93.22	186.44	345.13	431.41	0.14
1/8con	95.15	190.30	349.00	436.24	0.14
1/8ecc	94.56	189.11	347.80	434.75	0.14
1/9con	91.55	183.10	341.79	427.24	0.14
1/9ecc	93.94	187.87	346.56	433.20	0.14
1/10con	94.56	189.12	347.82	434.77	0.14
1/10ecc	91.85	183.69	342.38	427.98	0.14
1/11con	94.38	188.76	347.45	434.31	0.14
1/11ecc	91.13	182.26	340.95	426.19	0.14
1/12con	94.03	188.06	346.75	433.44	0.14
1/12ecc	75.29	150.58	309.27	386.58	0.13
			Total per Set:		
			Con:	5438.45	1.76
			Ecc:	5175.23	1.68

Set 2					
Weight Lifted (lb.):		235.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init Con	5.65	11.31	170.00	212.49	0.07
1/1con	85.23	170.46	329.15	411.44	0.13
1/1/ecc	104.17	208.35	367.04	458.80	0.15
1/2 con	103.37	206.73	365.42	456.78	0.15
1/2ecc	101.92	203.84	362.53	453.16	0.15
1/3 con	102.60	205.20	363.90	454.87	0.15
1/3ecc	99.88	199.76	358.45	448.06	0.15
1/4 con	101.28	202.56	361.25	451.56	0.15
1/4ecc	101.66	203.32	362.01	452.51	0.15
1/5con	101.48	202.97	361.66	452.07	0.15
1/5ecc	100.18	200.35	359.04	448.80	0.15
1/6con	101.65	203.29	361.99	452.48	0.15
1/6ecc	103.28	206.57	365.26	456.57	0.15
1/7con	98.47	196.94	355.63	444.54	0.14
1/7ecc	99.85	199.69	358.38	447.98	0.15
1/8con	102.27	204.54	363.23	454.04	0.15
1/8ecc	99.15	198.29	356.98	446.23	0.14
1/9con	100.59	201.18	359.87	449.84	0.15
1/9ecc	98.80	197.61	356.30	445.38	0.14
1/10con	98.90	197.79	356.48	445.60	0.14
1/10ecc	94.33	188.65	347.34	434.18	0.14
			Total per Set:		
			Con:	4685.71	1.52
			Ecc:	4491.66	1.45

Set 3					
Weight Lifted (lb.):		250.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init Con	12.25	24.50	183.19	228.98	0.07
1/1con	82.82	165.63	324.32	405.40	0.13
1/1/ecc	119.42	238.84	397.53	496.91	0.16
1/2 con	119.56	239.12	397.82	497.27	0.16
1/2ecc	116.44	232.87	391.56	489.45	0.16
1/3 con	117.37	234.74	393.43	491.79	0.16
1/3ecc	113.66	227.32	386.01	482.52	0.16
1/4 con	115.80	231.59	390.28	487.85	0.16
1/4ecc	113.17	226.34	385.03	481.28	0.16
1/5con	115.97	231.94	390.63	488.29	0.16
1/5ecc	111.90	223.81	382.50	478.12	0.15
1/6con	118.88	237.76	396.45	495.56	0.16
1/6ecc	61.31	122.63	281.32	351.65	0.11
			Total per Set:		
			Con:	3095.15	1.00
			Ecc:	2779.93	0.90

Subject 0005:		HEEL RAISES
	Set 0	(Warm-up)
Distance (ft.):		0.50
Weight Lifted lb.:		165.00

Repetition:	Mean Force (lb.)	Force.x2	(+) Total Body Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init Con	2.51	5.02	173.48	86.74	0.03
1/1con	48.35	96.70	265.17	132.58	0.04
1/1/ecc	69.41	138.83	307.29	153.65	0.05
1/2 con	69.66	139.32	307.78	153.89	0.05
1/2ecc	69.05	138.10	306.56	153.28	0.05
1/3 con	69.16	138.31	306.77	153.39	0.05
1/3ecc	67.24	134.48	302.94	151.47	0.05
1/4 con	69.55	139.09	307.55	153.78	0.05
1/4ecc	68.76	137.53	305.99	152.99	0.05
1/5con	66.36	132.73	301.19	150.60	0.05
1/5ecc	67.45	134.89	303.35	151.68	0.05
1/6con	68.47	136.94	305.40	152.70	0.05
1/6ecc	66.78	133.56	302.02	151.01	0.05
1/7con	66.36	132.72	301.18	150.59	0.05
1/7ecc	66.66	133.31	301.78	150.89	0.05
1/8con	68.84	137.68	306.14	153.07	0.05
1/8ecc	64.90	129.81	298.27	149.14	0.05
1/9con	67.76	135.52	303.98	151.99	0.05
1/9ecc	65.34	130.68	299.14	149.57	0.05
1/10con	66.35	132.70	301.16	150.58	0.05
1/10ecc	66.74	133.48	301.94	150.97	0.05
1/11con	65.99	131.98	300.44	150.22	0.05
1/11ecc	66.32	132.64	301.10	150.55	0.05
1/12con	66.42	132.84	301.30	150.65	0.05
1/12ecc	48.89	97.78	266.24	133.12	0.04
			Total per Set:		
			Con:	1890.78	0.61
			Ecc:	1798.31	0.58

	Set 1	
Weight Lifted (lb.):		240.00

Repetition:	Mean Force (lb.)	Force.x2	(+) Total Body Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	115.54	231.09	399.55	199.77	0.06
1/1/ecc	114.49	228.98	397.44	198.72	0.06
1/2 con	111.20	222.41	390.87	195.43	0.06
1/2ecc	110.44	220.88	389.34	194.67	0.06
1/3 con	110.67	221.35	389.81	194.90	0.06
1/3ecc	109.75	219.50	387.96	193.98	0.06
1/4 con	110.61	221.22	389.68	194.84	0.06
1/4ecc	108.10	216.20	384.66	192.33	0.06
1/5con	109.29	218.58	387.04	193.52	0.06
1/5ecc	107.79	215.57	384.03	192.02	0.06
1/6con	109.20	218.41	386.87	193.43	0.06
1/6ecc	107.52	215.03	383.50	191.75	0.06
1/7con	109.58	219.16	387.62	193.81	0.06
1/7ecc	107.97	215.93	384.39	192.20	0.06
1/8con	109.80	219.60	388.06	194.03	0.06
1/8ecc	107.25	214.50	382.96	191.48	0.06
1/9con	109.97	219.94	388.40	194.20	0.06
1/9ecc	106.37	212.75	381.21	190.60	0.06
1/10con	102.26	204.52	372.98	186.49	0.06
1/10ecc	98.60	197.20	365.66	182.83	0.06
			Total per Set:		
			Con:	1940.44	0.63
			Ecc:	1920.57	0.62

Set 2					
Weight Lifted (lb.):		260.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Total Body Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init Con	1.47	2.94	171.40	85.70	0.03
1/1con	84.21	168.43	336.89	168.44	0.05
1/1/ecc	123.03	246.06	414.52	207.26	0.07
1/2 con	118.99	237.98	406.44	203.22	0.07
1/2ecc	118.08	236.16	404.62	202.31	0.07
1/3 con	118.62	237.24	405.70	202.85	0.07
1/3ecc	115.20	230.40	398.86	199.43	0.06
1/4 con	119.55	239.11	407.57	203.78	0.07
1/4ecc	115.79	231.58	400.04	200.02	0.06
1/5con	117.70	235.40	403.86	201.93	0.07
1/5ecc	116.65	233.30	401.76	200.88	0.07
1/6con	117.49	234.98	403.44	201.72	0.07
1/6ecc	114.73	229.45	397.91	198.96	0.06
1/7con	115.21	230.41	398.87	199.44	0.06
1/7ecc	115.55	231.11	399.57	199.79	0.06
1/8con	114.62	229.24	397.71	198.85	0.06
1/8ecc	82.15	164.30	332.76	166.38	0.05
			Total per Set:		
			Con:	1665.93	0.54
			Ecc:	1575.02	0.51

Set 3					
Weight Lifted (lb.):		270.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Total Body Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init Con	2.29	4.58	173.04	86.52	0.03
1/1con	84.43	168.86	337.33	168.66	0.05
1/1/ecc	130.54	261.07	429.54	214.77	0.07
1/2 con	128.44	256.88	425.34	212.67	0.07
1/2ecc	123.84	247.68	416.15	208.07	0.07
1/3 con	126.75	253.51	421.97	210.98	0.07
1/3ecc	123.56	247.12	415.58	207.79	0.07
1/4 con	126.19	252.37	420.84	210.42	0.07
1/4ecc	126.22	252.44	420.90	210.45	0.07
1/5con	126.90	253.81	422.27	211.13	0.07
1/5ecc	118.80	237.60	406.06	203.03	0.07
1/6con	125.50	251.00	419.46	209.73	0.07
1/6ecc	99.35	198.69	367.15	183.58	0.06
			Total per Set:		
			Con:	1310.12	0.42
			Ecc:	1227.69	0.40

Subject 0005:		SQUATS			
	Set 0				
Distance (ft.):		1.25			
Weight Lifted lb.:		150.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	34.78	69.57	228.26	285.33	0.09
1/1/ecc	62.10	124.20	282.89	353.62	0.11
1/2 con	57.19	114.38	273.07	341.33	0.11
1/2ecc	60.87	121.75	280.44	350.54	0.11
1/3 con	58.51	117.01	275.70	344.63	0.11
1/3ecc	61.54	123.08	281.77	352.21	0.11
1/4 con	62.06	124.12	282.81	353.51	0.11
1/4ecc	59.96	119.91	278.60	348.26	0.11
1/5con	58.28	116.56	275.25	344.06	0.11
1/5ecc	60.07	120.15	278.84	348.55	0.11
1/6con	56.51	113.02	271.71	339.64	0.11
1/6ecc	62.43	124.85	283.54	354.43	0.11
1/7con	54.01	108.02	266.71	333.39	0.11
1/7ecc	63.10	126.20	284.89	356.11	0.12
1/8con	59.49	118.98	277.67	347.09	0.11
1/8ecc	25.17	50.33	209.02	261.28	0.08
			Total per Set:		
			Con:	2688.97	0.87
			Ecc:	2725.00	0.88

	Set 1				
Weight Lifted lb.:		220.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	56.27	112.54	271.23	339.04	0.11
1/1/ecc	100.56	201.11	359.80	449.75	0.15
1/2 con	100.99	201.98	360.67	450.84	0.15
1/2ecc	96.08	192.17	350.86	438.57	0.14
1/3 con	100.20	200.41	359.10	448.87	0.15
1/3ecc	95.52	191.04	349.73	437.17	0.14
1/4 con	99.40	198.81	357.50	446.87	0.14
1/4ecc	95.94	191.89	350.58	438.22	0.14
1/5con	97.03	194.07	352.76	440.95	0.14
1/5ecc	95.58	191.16	349.85	437.31	0.14
1/6con	95.95	191.90	350.59	438.24	0.14
1/6ecc	97.63	195.25	353.94	442.43	0.14
1/7con	95.95	191.90	350.59	438.24	0.14
1/7ecc	95.91	191.82	350.51	438.14	0.14
1/8con	97.03	194.07	352.76	440.95	0.14
1/8ecc	96.60	193.20	351.89	439.86	0.14
1/9con	96.96	193.91	352.60	440.76	0.14
1/9ecc	97.43	194.86	353.55	441.94	0.14
1/10con	92.82	185.64	344.33	430.41	0.14
1/10ecc	97.78	195.56	354.25	442.82	0.14
1/11con	96.82	193.63	352.32	440.40	0.14
1/11ecc	94.13	188.26	346.95	433.69	0.14
1/12con	95.72	191.43	350.12	437.65	0.14
1/12ecc	71.31	142.62	301.31	376.64	0.12
			Total per Set:		
			Con:	5193.22	1.68
			Ecc:	5216.52	1.69

Set 2					
Weight Lifted lb.:		240.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	111.32	222.64	381.33	476.66	0.15
1/1/ecc	110.21	220.42	379.11	473.88	0.15
1/2 con	105.98	211.97	370.66	463.32	0.15
1/2ecc	105.15	210.30	368.99	461.24	0.15
1/3 con	109.02	218.05	376.74	470.92	0.15
1/3ecc	103.05	206.10	364.79	455.98	0.15
1/4 con	107.87	215.74	374.44	468.04	0.15
1/4ecc	105.97	211.93	370.62	463.28	0.15
1/5con	103.15	206.31	365.00	456.25	0.15
1/5ecc	104.94	209.89	368.58	460.72	0.15
1/6con	103.81	207.61	366.30	457.88	0.15
1/6ecc	104.69	209.37	368.06	460.08	0.15
1/7con	105.95	211.89	370.58	463.23	0.15
1/7ecc	107.32	214.64	373.33	466.66	0.15
1/8con	102.29	204.58	363.27	454.09	0.15
1/8ecc	104.96	209.93	368.62	460.77	0.15
1/9con	103.08	206.17	364.86	456.07	0.15
1/9ecc	104.24	208.47	367.16	458.95	0.15
1/10con	101.49	202.99	361.68	452.10	0.15
1/10ecc	97.82	195.65	354.34	442.92	0.14
			Total per Set:		
			Con:	4618.56	1.50
			Ecc:	4604.50	1.49

Set 3					
Weight Lifted lb.:		250.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	93.13	186.25	344.94	431.18	0.14
1/1/ecc	110.44	220.88	379.57	474.46	0.15
1/2 con	106.46	212.93	371.62	464.52	0.15
1/2ecc	106.21	212.42	371.11	463.88	0.15
1/3 con	108.75	217.51	376.20	470.25	0.15
1/3ecc	105.54	211.08	369.77	462.21	0.15
1/4 con	105.63	211.27	369.96	462.45	0.15
1/4ecc	105.90	211.80	370.49	463.11	0.15
1/5con	107.21	214.42	373.11	466.39	0.15
1/5ecc	107.65	215.31	374.00	467.50	0.15
1/6con	105.58	211.16	369.85	462.32	0.15
1/6ecc	105.76	211.51	370.20	462.75	0.15
1/7con	105.74	211.47	370.16	462.71	0.15
1/7ecc	107.72	215.45	374.14	467.67	0.15
1/8con	102.71	205.42	364.11	455.13	0.15
1/8ecc	98.44	196.88	355.57	444.47	0.14
			Total per Set:		
			Con:	3674.94	1.19
			Ecc:	3706.05	1.20

Subject 0005:		**ADDUCTION**		
Distance (ft.):		2.67		
	Set 1 (Left Leg)			
Weight Lifted lb.:		15lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	13.31	41.08	109.55	0.04
1/1/ecc	13.89	41.66	111.09	0.04
1/2 con	17.12	44.89	119.71	0.04
1/2ecc	14.78	42.55	113.48	0.04
1/3 con	17.40	45.17	120.45	0.04
1/3ecc	15.23	42.99	114.65	0.04
1/4 con	15.34	43.11	114.97	0.04
1/4ecc	15.10	42.87	114.33	0.04
1/5con	14.60	42.37	112.98	0.04
1/5ecc	18.27	46.04	122.78	0.04
1/6con	13.34	41.11	109.64	0.04
1/6ecc	18.57	46.34	123.58	0.04
1/7con	14.85	42.62	113.65	0.04
1/7ecc	14.57	42.34	112.90	0.04
1/8con	17.58	45.35	120.92	0.04
1/8ecc	15.34	43.11	114.96	0.04
1/9con	15.33	43.10	114.93	0.04
1/9ecc	16.21	43.98	117.27	0.04
1/10con	16.73	44.50	118.68	0.04
1/10ecc	14.53	42.30	112.79	0.04
1/11con	17.32	45.09	120.25	0.04
1/11ecc	15.41	43.18	115.14	0.04
1/12con	14.48	42.25	112.67	0.04
1/12ecc	13.38	41.15	109.75	0.04
		Total per Set:		
		Con:	1388.38	0.45
		Ecc:	1382.72	0.45

	Set 2 (Left Leg)			
Weight Lifted lb.:		20lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	15.04	42.81	114.17	0.04
1/1/ecc	19.30	47.07	125.51	0.04
1/2 con	19.22	46.99	125.31	0.04
1/2ecc	18.32	46.09	122.91	0.04
1/3 con	20.30	48.07	128.20	0.04
1/3ecc	17.60	45.37	120.99	0.04
1/4 con	20.99	48.76	130.02	0.04
1/4ecc	18.56	46.33	123.56	0.04
1/5con	18.29	46.06	122.82	0.04
1/5ecc	18.41	46.18	123.15	0.04
1/6con	17.42	45.19	120.50	0.04
1/6ecc	19.00	46.77	124.72	0.04
1/7con	16.95	44.72	119.26	0.04
1/7ecc	17.32	45.09	120.23	0.04
1/8con	18.85	46.62	124.31	0.04
1/8ecc	17.26	45.03	120.08	0.04
1/9con	16.52	44.29	118.11	0.04
1/9ecc	16.62	44.39	118.36	0.04
1/10con	21.37	49.14	131.03	0.04
1/10ecc	15.12	42.89	114.36	0.04
		Total per Set:		
		Con:	1233.73	0.40
		Ecc:	1213.88	0.39

Set 3 (Left Leg)				
Weight Lifted lb.:		25lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init Con	11.47	39.24	104.64	0.03
1/1con	22.51	50.28	134.09	0.04
1/1/ecc	22.22	49.99	133.30	0.04
1/2 con	19.74	47.51	126.70	0.04
1/2ecc	22.06	49.83	132.88	0.04
1/3 con	22.34	50.11	133.63	0.04
1/3ecc	23.04	50.81	135.50	0.04
1/4 con	24.42	52.19	139.18	0.05
1/4ecc	22.53	50.30	134.12	0.04
1/5con	19.64	47.41	126.43	0.04
1/5ecc	23.06	50.83	135.55	0.04
1/6con	18.94	46.71	124.55	0.04
1/6ecc	20.58	48.35	128.92	0.04
1/7con	20.82	48.59	129.57	0.04
1/7ecc	21.31	49.08	130.88	0.04
1/8con	23.80	51.57	137.52	0.04
1/8ecc	17.93	45.69	121.85	0.04
		Total per Set:		
		Con:	1156.31	0.37
		Ecc:	1053.00	0.34

Set 4 (Right Leg)				
Weight Lifted lb.:		15lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	16.85	44.12	117.67	0.04
1/1/ecc	19.96	47.23	125.95	0.04
1/2 con	16.62	43.89	117.04	0.04
1/2ecc	20.13	47.40	126.39	0.04
1/3 con	18.06	45.33	120.87	0.04
1/3ecc	16.02	43.30	115.45	0.04
1/4 con	19.38	46.65	124.41	0.04
1/4ecc	17.94	45.21	120.56	0.04
1/5con	20.23	47.50	126.66	0.04
1/5ecc	16.43	43.70	116.54	0.04
1/6con	17.45	44.72	119.26	0.04
1/6ecc	16.80	44.08	117.54	0.04
1/7con	16.37	43.64	116.37	0.04
1/7ecc	17.10	44.38	118.33	0.04
1/8con	16.12	43.39	115.71	0.04
1/8ecc	20.00	47.28	126.07	0.04
1/9con	16.48	43.75	116.68	0.04
1/9ecc	18.75	46.02	122.72	0.04
1/10con	17.68	44.95	119.87	0.04
1/10ecc	18.65	45.92	122.46	0.04
1/11con	17.22	44.49	118.63	0.04
1/11ecc	17.18	44.45	118.54	0.04
1/12con	17.51	44.78	119.42	0.04
1/12ecc	15.51	42.78	114.08	0.04
		Total per Set:		
		Con:	1432.59	0.46
		Ecc:	1444.63	0.47

Set 5 (Right Leg)				
Weight Lifted lb.:		20lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init con	12.36	39.63	105.68	0.03
1/1con	21.79	49.06	130.83	0.04
1/1/ecc	20.17	47.45	126.52	0.04
1/2 con	19.36	46.64	124.36	0.04
1/2ecc	24.08	51.35	136.93	0.04
1/3 con	17.17	44.44	118.52	0.04
1/3ecc	20.07	47.34	126.24	0.04
1/4 con	18.89	46.17	123.11	0.04
1/4ecc	21.67	48.94	130.51	0.04
1/5con	17.52	44.80	119.46	0.04
1/5ecc	18.80	46.07	122.85	0.04
1/6con	20.24	47.51	126.70	0.04
1/6ecc	16.86	44.13	117.68	0.04
1/7con	17.24	44.52	118.71	0.04
1/7ecc	17.81	45.08	120.21	0.04
1/8con	18.51	45.79	122.09	0.04
1/8ecc	18.77	46.04	122.78	0.04
1/9con	19.81	47.08	125.55	0.04
1/9ecc	18.98	46.26	123.35	0.04
1/10con	21.13	48.40	129.07	0.04
1/10ecc	18.74	46.02	122.71	0.04
1/11con	19.70	46.97	125.25	0.04
1/11ecc	15.22	42.49	113.31	0.04
		Total per Set:		
		Con:	1469.34	0.48
		Ecc:	1363.10	0.44

Set 6 (Right Leg)				
Weight Lifted lb.:		25lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	14.97	42.24	112.64	0.04
1/1/ecc	25.23	52.50	140.01	0.05
1/2 con	24.47	51.74	137.99	0.04
1/2ecc	24.66	51.93	138.47	0.04
1/3 con	23.25	50.52	134.72	0.04
1/3ecc	25.67	52.94	141.18	0.05
1/4 con	24.62	51.89	138.37	0.04
1/4ecc	24.19	51.46	137.23	0.04
1/5con	24.75	52.02	138.72	0.04
1/5ecc	23.42	50.69	135.17	0.04
1/6con	27.89	55.16	147.10	0.05
1/6ecc	24.88	52.16	139.08	0.05
1/7con	26.33	53.60	142.93	0.05
1/7ecc	23.91	51.19	136.50	0.04
1/8con	24.40	51.67	137.79	0.04
1/8ecc	15.99	43.26	115.37	0.04
		Total per Set:		
		Con:	1090.26	0.35
		Ecc:	1083.01	0.35

SUBJECT:0005				
				Kcal
Total Work per Exercise Session:		Concentric:	55600.25	18.01
	(Ft-Lb.)	Eccentric:	54599.28	17.68
			110199.53	**35.69**

Subject 0006:		**ABDUCTION**		
Distance (ft.):		2.58		
Set 1 (Left Leg)				
Weight Lifted lb.:		15lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	13.19	37.97	98.09	0.03
1/1/ecc	16.10	40.88	105.62	0.03
1/2 con	13.70	38.48	99.40	0.03
1/2ecc	15.65	40.44	104.46	0.03
1/3 con	17.25	42.03	108.58	0.04
1/3ecc	14.00	38.78	100.17	0.03
1/4 con	19.76	44.54	115.07	0.04
1/4ecc	17.13	41.91	108.27	0.04
1/5con	16.09	40.87	105.59	0.03
1/5ecc	15.89	40.68	105.08	0.03
1/6con	16.81	41.60	107.46	0.03
1/6ecc	15.30	40.08	103.55	0.03
1/7con	17.17	41.95	108.37	0.04
1/7ecc	14.36	39.14	101.12	0.03
1/8con	13.67	38.45	99.33	0.03
1/8ecc	16.05	40.83	105.49	0.03
1/9con	15.86	40.64	104.98	0.03
1/9ecc	14.36	39.14	101.11	0.03
1/10con	16.06	40.85	105.52	0.03
1/10ecc	13.47	38.25	98.82	0.03
1/11con	19.61	44.39	114.67	0.04
1/11ecc	16.61	41.39	106.93	0.03
1/12con	15.67	40.45	104.49	0.03
1/12ecc	14.81	39.59	102.28	0.03
		Total per Set:		
		Con:	1271.54	0.41
		Ecc:	1242.91	0.40

Set 2 (Left Leg)				
Weight Lifted (lb.):		25 lb.		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	19.44	44.22	114.24	0.04
1/1/ecc	19.69	44.47	114.88	0.04
1/2 con	13.33	38.12	98.47	0.03
1/2ecc	22.62	47.40	122.46	0.04
1/3 con	20.66	45.45	117.40	0.04
1/3ecc	20.86	45.64	117.92	0.04
1/4 con	21.70	46.48	120.08	0.04
1/4ecc	20.48	45.26	116.92	0.04
1/5con	19.77	44.55	115.10	0.04
1/5ecc	20.91	45.69	118.04	0.04
1/6con	19.87	44.66	115.36	0.04
1/6ecc	20.64	45.42	117.34	0.04
1/7con	17.75	42.53	109.88	0.04
1/7ecc	20.18	44.96	116.14	0.04
1/8con	17.44	42.23	109.08	0.04
1/8ecc	19.42	44.20	114.20	0.04
1/9con	22.25	47.03	121.50	0.04
1/9ecc	19.97	44.75	115.61	0.04
1/10con	22.18	46.96	121.32	0.04
1/10ecc	12.09	36.87	95.26	0.03
		Total per Set:		
		Con:	1142.44	0.37
		Ecc:	1148.75	0.37

Set 3 (Left Leg)				
Weight Lifted (lb.):		30 lb.		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init Con	10.49	35.28	91.13	0.03
1/1con	22.94	47.72	123.28	0.04
1/1/ecc	30.54	55.32	142.92	0.05
1/2 con	29.66	54.44	140.64	0.05
1/2ecc	28.60	53.38	137.91	0.04
1/3 con	28.71	53.49	138.19	0.04
1/3ecc	29.13	53.91	139.26	0.05
1/4 con	29.90	54.68	141.26	0.05
1/4ecc	25.99	50.78	131.17	0.04
1/5con	26.63	51.41	132.81	0.04
1/5ecc	28.70	53.49	138.17	0.04
1/6con	26.75	51.53	133.12	0.04
1/6ecc	28.10	52.88	136.61	0.04
1/7con	26.85	51.63	133.38	0.04
1/7ecc	28.75	53.54	138.30	0.04
1/8con	26.93	51.72	133.60	0.04
1/8ecc	26.71	51.49	133.02	0.04
1/9con	26.35	51.13	132.09	0.04
1/9ecc	27.44	52.22	134.90	0.04
1/10con	29.82	54.60	141.04	0.05
1/10ecc	19.61	44.40	114.69	0.04
		Total per Set:		
		Con:	1440.54	0.47
		Ecc:	1346.97	0.44

Set 4 (Right Leg)				
Weight Lifted (lb.):		15 lb.		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	14.88	40.29	104.08	0.03
1/1/ecc	16.42	41.83	108.07	0.04
1/2 con	14.88	40.29	104.08	0.03
1/2ecc	16.42	41.83	108.07	0.04
1/3 con	15.84	41.26	106.58	0.03
1/3ecc	18.55	43.96	113.57	0.04
1/4 con	18.74	44.15	114.06	0.04
1/4ecc	18.17	43.59	112.59	0.04
1/5con	12.59	38.00	98.17	0.03
1/5ecc	16.60	42.01	108.52	0.04
1/6con	13.79	39.20	101.27	0.03
1/6ecc	16.71	42.12	108.81	0.04
1/7con	17.11	42.52	109.85	0.04
1/7ecc	15.45	40.87	105.57	0.03
1/8con	14.65	40.06	103.49	0.03
1/8ecc	17.21	42.62	110.11	0.04
1/9con	15.01	40.42	104.42	0.03
1/9ecc	17.12	42.54	109.88	0.04
1/10con	13.10	38.51	99.48	0.03
1/10ecc	15.55	40.96	105.82	0.03
1/11con	15.58	41.00	105.91	0.03
1/11ecc	14.06	39.47	101.98	0.03
1/12con	12.34	37.76	97.54	0.03
1/12ecc	14.78	40.20	103.84	0.03
		Total per Set:		
		Con:	1248.93	0.40
		Ecc:	1296.85	0.42

Set 5 (Right Leg)				
Weight Lifted (lb.):		25 lb.		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init Con	5.04	30.45	78.66	0.03
1/1con	13.88	39.29	101.50	0.03
1/1/ecc	20.90	46.31	119.63	0.04
1/2 con	22.79	48.20	124.53	0.04
1/2ecc	22.16	47.57	122.90	0.04
1/3 con	22.51	47.93	123.81	0.04
1/3ecc	19.63	45.04	116.36	0.04
1/4 con	19.25	44.67	115.39	0.04
1/4ecc	21.30	46.72	120.69	0.04
1/5con	19.79	45.20	116.77	0.04
1/5ecc	22.15	47.56	122.87	0.04
1/6con	23.22	48.63	125.64	0.04
1/6ecc	20.46	45.87	118.50	0.04
1/7con	24.20	49.61	128.17	0.04
1/7ecc	21.62	47.03	121.50	0.04
1/8con	16.32	41.74	107.82	0.03
1/8ecc	20.97	46.39	119.83	0.04
1/9con	23.73	49.15	126.96	0.04
1/9ecc	19.33	44.74	115.58	0.04
1/10con	23.32	48.74	125.90	0.04
1/10ecc	16.26	41.68	107.66	0.03
		Total per Set:		
		Con:	1275.15	0.41
		Ecc:	1185.53	0.38

Set 6 (Right Leg)				
Weight Lifted (lb.):		30 lb.		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	22.73	48.14	124.37	0.04
1/1/ecc	24.89	50.31	129.96	0.04
1/2 con	22.48	47.90	123.73	0.04
1/2ecc	24.57	49.99	129.13	0.04
1/3 con	24.05	49.46	127.78	0.04
1/3ecc	25.21	50.63	130.79	0.04
1/4 con	25.58	50.99	131.73	0.04
1/4ecc	24.36	49.78	128.59	0.04
1/5con	19.37	44.79	115.70	0.04
1/5ecc	25.54	50.96	131.64	0.04
1/6con	21.48	46.90	121.15	0.04
1/6ecc	24.31	49.72	128.45	0.04
1/7con	20.94	46.35	119.74	0.04
1/7ecc	25.41	50.82	131.29	0.04
1/8con	25.21	50.62	130.77	0.04
1/8ecc	24.83	50.24	129.80	0.04
		Total per Set:		
		Con:	994.97	0.32
		Ecc:	1039.64	0.34

Subject 0006:		DEAD LIFT
	Set 0	(Warm-up)
Distance (ft.):		1.83
Weight Lifted lb.:		130.00

Repetition:	Mean Force (lb.)	Force.x2	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	30.50	61.00	192.60	353.10	0.11
1/1/ecc	49.37	98.74	230.35	422.30	0.14
1/2 con	49.05	98.09	229.70	421.11	0.14
1/2ecc	46.83	93.66	225.26	412.98	0.13
1/3 con	50.76	101.52	233.13	427.40	0.14
1/3ecc	46.03	92.07	223.67	410.07	0.13
1/4 con	44.67	89.35	220.95	405.07	0.13
1/4ecc	49.75	99.50	231.10	423.69	0.14
1/5con	44.96	89.92	221.53	406.13	0.13
1/5ecc	48.50	96.99	228.59	419.09	0.14
1/6con	47.67	95.34	226.95	416.07	0.13
1/6ecc	47.97	95.95	227.55	417.18	0.14
1/7con	43.87	87.73	219.34	402.12	0.13
1/7ecc	50.42	100.85	232.45	426.16	0.14
1/8con	49.05	98.09	229.70	421.11	0.14
1/8ecc	49.84	99.68	231.29	424.02	0.14
1/9con	51.87	103.74	235.34	431.46	0.14
1/9ecc	38.61	77.21	208.81	382.83	0.12
			Total per Set:		
			Con:	3683.57	1.19
			Ecc:	3738.31	1.21

	Set 1	
Weight Lifted (lb.):		180.00

Repetition:	Mean Force (lb.)	Force.x2	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	47.88	95.76	227.37	416.84	0.14
1/1/ecc	77.35	154.70	286.31	524.89	0.17
1/2 con	71.09	142.18	273.79	501.94	0.16
1/2ecc	72.73	145.47	277.07	507.97	0.16
1/3 con	75.33	150.66	282.26	517.48	0.17
1/3ecc	70.63	141.26	272.87	500.25	0.16
1/4 con	71.03	142.06	273.66	501.71	0.16
1/4ecc	72.40	144.81	276.41	506.76	0.16
1/5con	72.20	144.39	276.00	505.99	0.16
1/5ecc	73.58	147.15	278.76	511.05	0.17
1/6con	75.37	150.75	282.35	517.64	0.17
1/6ecc	69.92	139.85	271.45	497.66	0.16
1/7con	68.55	137.10	268.70	492.62	0.16
1/7ecc	72.14	144.28	275.88	505.78	0.16
1/8con	69.21	138.42	270.02	495.04	0.16
1/8ecc	72.42	144.84	276.44	506.81	0.16
1/9con	75.27	150.53	282.14	517.25	0.17
1/9ecc	71.24	142.48	274.08	502.48	0.16
1/10con	68.35	136.71	268.31	491.90	0.16
1/10ecc	71.75	143.50	275.10	504.35	0.16
1/11con	72.27	144.54	276.14	506.26	0.16
1/11ecc	38.78	77.55	209.16	383.45	0.12
			Total per Set:		
			Con:	5464.69	1.77
			Ecc:	5451.45	1.77

Set 2					
Weight Lifted (lb.):		190.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init Con	14.42	28.83	160.43	294.13	0.10
1/1con	60.85	121.70	253.30	464.38	0.15
1/1/ecc	84.70	169.40	301.01	551.84	0.18
1/2 con	81.63	163.27	294.87	540.60	0.18
1/2ecc	76.18	152.36	283.97	520.60	0.17
1/3 con	75.98	151.96	283.56	519.87	0.17
1/3ecc	76.26	152.52	284.12	520.89	0.17
1/4 con	78.12	156.24	287.84	527.71	0.17
1/4ecc	78.56	157.12	288.73	529.33	0.17
1/5con	85.13	170.26	301.86	553.42	0.18
1/5ecc	38.30	76.60	208.20	381.70	0.12
1/6con	56.33	112.65	244.26	447.80	0.15
1/6ecc	76.24	152.49	284.09	520.83	0.17
1/7con	79.09	158.18	289.79	531.28	0.17
1/7ecc	74.76	149.52	281.13	515.40	0.17
1/8con	74.40	148.80	280.40	514.07	0.17
1/8ecc	65.12	130.24	261.84	480.04	0.16
			Total per Set:		
			Con:	4393.26	1.42
			Ecc:	4020.64	1.30

Set 3					
Weight Lifted (lb.):		210.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	84.72	169.45	301.05	551.93	0.18
1/1/ecc	88.97	177.94	309.54	567.49	0.18
1/2 con	89.78	179.56	311.16	570.46	0.18
1/2ecc	88.47	176.93	308.54	565.65	0.18
1/3 con	90.42	180.85	312.45	572.83	0.19
1/3ecc	75.47	150.93	282.53	517.98	0.17
1/4 con	69.08	138.15	269.76	494.55	0.16
1/4ecc	80.09	160.18	291.79	534.94	0.17
1/5con	87.58	175.15	306.75	562.38	0.18
1/5ecc	35.13	70.26	201.86	370.08	0.12
			Total per Set:		
			Con:	2752.15	0.89
			Ecc:	2556.15	0.83

Subject 0006:		HEEL RAISES
	Set 0	(Warm-up)
Distance (ft.):		0.29
Weight Lifted lb.:		160.00

Repetition:	Mean Force (lb.)	Force.x2	(+) Total Body Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	66.08	132.17	271.87	79.30	0.03
1/1/ecc	68.30	136.59	276.30	80.59	0.03
1/2 con	68.22	136.45	276.16	80.55	0.03
1/2ecc	69.44	138.88	278.59	81.25	0.03
1/3 con	69.81	139.61	279.32	81.47	0.03
1/3ecc	69.29	138.58	278.28	81.17	0.03
1/4 con	69.93	139.85	279.56	81.54	0.03
1/4ecc	68.88	137.75	277.46	80.93	0.03
1/5con	69.62	139.23	278.94	81.36	0.03
1/5ecc	67.86	135.71	275.42	80.33	0.03
1/6con	68.97	137.94	277.65	80.98	0.03
1/6ecc	68.57	137.13	276.84	80.75	0.03
1/7con	69.35	138.70	278.41	81.20	0.03
1/7ecc	68.44	136.88	276.59	80.67	0.03
1/8con	68.37	136.74	276.45	80.63	0.03
1/8ecc	67.92	135.83	275.54	80.37	0.03
1/9con	69.36	138.72	278.43	81.21	0.03
1/9ecc	66.37	132.74	272.45	79.46	0.03
1/10con	66.88	133.77	273.47	79.76	0.03
			Total per Set:		
			Con:	807.99	0.26
			Ecc:	725.51	0.23

	Set 1	
Weight Lifted (lb.):		220.00

Repetition:	Mean Force (lb.)	Force.x2	(+) Total Body Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	58.69	117.39	257.10	74.99	0.02
1/1/ecc	108.23	216.45	356.16	103.88	0.03
1/2 con	106.78	213.56	353.27	103.04	0.03
1/2ecc	105.55	211.10	350.80	102.32	0.03
1/3 con	105.34	210.69	350.40	102.20	0.03
1/3ecc	103.18	206.37	346.07	100.94	0.03
1/4 con	103.82	207.64	347.35	101.31	0.03
1/4ecc	103.33	206.66	346.37	101.02	0.03
1/5con	104.59	209.18	348.89	101.76	0.03
1/5ecc	102.47	204.94	344.64	100.52	0.03
1/6con	104.57	209.15	348.85	101.75	0.03
1/6ecc	103.45	206.90	346.61	101.09	0.03
1/7con	104.55	209.10	348.80	101.73	0.03
1/7ecc	102.82	205.64	345.35	100.73	0.03
1/8con	104.59	209.19	348.89	101.76	0.03
1/8ecc	101.89	203.77	343.48	100.18	0.03
1/9con	103.65	207.30	347.00	101.21	0.03
1/9ecc	102.40	204.80	344.50	100.48	0.03
1/10con	102.77	205.53	345.24	100.69	0.03
1/10ecc	99.83	199.66	339.36	98.98	0.03
1/11con	103.26	206.53	346.23	100.99	0.03
1/11ecc	47.87	95.75	235.45	68.67	0.02
			Total per Set:		
			Con:	1091.42	0.35
			Ecc:	1078.81	0.35

Set 2					
Weight Lifted (lb.):		240.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Total Body Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init Con	95.49	190.98	330.68	96.45	0.03
Init Ecc	75.13	150.25	289.96	84.57	0.03
1/1con	69.00	138.00	277.70	81.00	0.03
1/1/ecc	117.74	235.48	375.19	109.43	0.04
1/2 con	116.45	232.90	372.60	108.68	0.04
1/2ecc	115.86	231.73	371.43	108.33	0.04
1/3 con	116.67	233.35	373.06	108.81	0.04
1/3ecc	113.98	227.96	367.66	107.24	0.03
1/4 con	114.22	228.43	368.14	107.37	0.03
1/4ecc	112.76	225.53	365.23	106.53	0.03
1/5con	114.18	228.36	368.06	107.35	0.03
1/5ecc	113.21	226.41	366.12	106.78	0.03
1/6con	112.41	224.83	364.54	106.32	0.03
1/6ecc	113.27	226.54	366.25	106.82	0.03
1/7con	113.68	227.36	367.06	107.06	0.03
1/7ecc	112.25	224.49	364.20	106.22	0.03
1/8con	113.60	227.19	366.90	107.01	0.03
1/8ecc	112.31	224.63	364.33	106.26	0.03
1/9con	113.61	227.22	366.93	107.02	0.03
1/9ecc	82.70	165.41	305.12	88.99	0.03
			Total per Set:		
			Con:	1037.07	0.34
			Ecc:	1031.19	0.33

Set 3					
Weight Lifted (lb.):		250.00			
Distance (ft.):		0.33			
Repetition:	Mean Force (lb.)	Force.x2	(+) Total Body Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init Con	67.75	135.51	275.21	91.74	0.03
Init Ecc	57.68	115.37	255.08	85.03	0.03
1/1con	72.26	144.52	284.23	94.74	0.03
1/1/ecc	130.41	260.82	400.53	133.51	0.04
1/2 con	132.04	264.08	403.79	134.60	0.04
1/2ecc	125.87	251.75	391.45	130.48	0.04
1/3 con	127.78	255.56	395.27	131.76	0.04
1/3ecc	125.40	250.80	390.51	130.17	0.04
1/4 con	125.55	251.10	390.81	130.27	0.04
1/4ecc	125.20	250.40	390.11	130.04	0.04
1/5con	122.91	245.82	385.53	128.51	0.04
1/5ecc	124.21	248.42	388.12	129.37	0.04
1/6con	123.19	246.38	386.09	128.70	0.04
1/6ecc	124.53	249.05	388.76	129.59	0.04
1/7con	124.48	248.95	388.66	129.55	0.04
1/7ecc	99.90	199.80	339.51	113.17	0.04
			Total per Set:		
			Con:	969.86	0.31
			Ecc:	981.35	0.32

Subject 0006:		SQUATS			
	Set 0	(Warm-up)			
Distance (ft.):		1.33			
Weight Lifted lb.:		140.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init Con	53.14	106.28	237.89	317.18	0.10
1/1/ecc	55.15	110.31	241.91	322.55	0.10
1/1 con	51.93	103.86	235.46	313.95	0.10
1/2ecc	45.35	90.69	222.30	296.39	0.10
1/2 con	50.38	100.76	232.36	309.82	0.10
1/3ecc	47.42	94.85	226.45	301.94	0.10
1/3con	50.74	101.48	233.09	310.78	0.10
1/4ecc	46.84	93.69	225.29	300.39	0.10
1/4con	48.33	96.67	228.27	304.36	0.10
1/5ecc	50.90	101.80	233.41	311.21	0.10
1/5con	49.89	99.79	231.39	308.52	0.10
1/6ecc	51.30	102.61	234.21	312.28	0.10
1/6con	49.72	99.44	231.05	308.06	0.10
1/7ecc	50.93	101.86	233.46	311.28	0.10
1/7con	50.07	100.13	231.74	308.98	0.10
1/8ecc	52.94	105.88	237.48	316.64	0.10
1/8con	48.19	96.38	227.99	303.98	0.10
1/9ecc	51.06	102.11	233.71	311.62	0.10
1/9con	54.88	109.76	241.37	321.82	0.10
1/10ecc	40.99	81.98	213.58	284.78	0.09
1/10con	47.47	94.93	226.54	302.05	0.10
Final Ecc	33.43	66.86	198.46	264.62	0.09
			Total per Set:		
			Con:	3409.50	1.10
			Ecc:	3333.69	1.08

	Set 1				
Weight Lifted lb.:		200.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init Con	32.68	65.37	196.97	262.63	0.09
Init Ecc	15.16	30.33	161.93	215.91	0.07
Init Con#2	71.23	142.46	274.06	365.42	0.12
Init Ecc#2	65.69	131.39	262.99	350.65	0.11
Init Con#3	55.20	110.40	242.01	322.67	0.10
1/1/ecc	93.85	187.70	319.30	425.74	0.14
1/1 con	87.59	175.18	306.79	409.05	0.13
1/2ecc	90.48	180.97	312.57	416.76	0.13
1/2 con	85.84	171.67	303.27	404.37	0.13
1/3ecc	86.94	173.89	305.49	407.32	0.13
1/3con	87.67	175.35	306.95	409.27	0.13
1/4ecc	84.72	169.45	301.05	401.40	0.13
1/4con	84.02	168.04	299.64	399.52	0.13
1/5ecc	86.93	173.87	305.47	407.29	0.13
1/5con	83.64	167.28	298.88	398.51	0.13
1/6ecc	88.03	176.06	307.66	410.21	0.13
1/6con	87.15	174.30	305.91	407.87	0.13
1/7ecc	85.33	170.66	302.26	403.02	0.13
1/7con	86.29	172.58	304.18	405.58	0.13
1/8ecc	86.21	172.42	304.02	405.37	0.13
1/8con	87.35	174.71	306.31	408.42	0.13
1/9ecc	85.99	171.99	303.59	404.79	0.13
1/9con	85.08	170.16	301.77	402.36	0.13
1/10ecc	84.40	168.79	300.40	400.53	0.13
1/10con	83.38	166.76	298.36	397.81	0.13
Final Ecc	61.94	123.88	255.48	340.65	0.11
			Total per Set:		
			Con:	4993.47	1.62
			Ecc:	4989.64	1.62

Set 2					
Weight Lifted lb.:		220.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init Con	57.84	115.68	247.28	329.71	0.11
1/1/ecc	103.33	206.65	338.26	451.01	0.15
1/1 con	96.69	193.38	324.98	433.31	0.14
1/2ecc	98.33	196.66	328.26	437.69	0.14
1/2 con	96.64	193.29	324.89	433.19	0.14
1/3ecc	100.60	201.20	332.80	443.74	0.14
1/3con	95.72	191.44	323.04	430.72	0.14
1/4ecc	98.47	196.94	328.55	438.06	0.14
1/4con	97.86	195.72	327.33	436.44	0.14
1/5ecc	100.19	200.37	331.98	442.63	0.14
1/5con	95.71	191.42	323.02	430.70	0.14
1/6ecc	96.90	193.81	325.41	433.88	0.14
1/6con	95.65	191.30	322.90	430.54	0.14
1/7ecc	100.41	200.81	332.41	443.22	0.14
1/7con	97.35	194.71	326.31	435.08	0.14
1/8ecc	97.80	195.61	327.21	436.28	0.14
1/8con	94.24	188.48	320.08	426.78	0.14
Final Ecc	86.98	173.96	305.56	407.42	0.13
			Total per Set:		
			Con:	3786.46	1.23
			Ecc:	3933.94	1.27

Set 3					
Weight Lifted lb.:		230.00			
Repetition:	Mean Force (lb.)	Force.x2	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init Con	59.98	119.96	251.57	335.42	0.11
1/1/ecc	104.07	208.14	339.74	452.99	0.15
1/1 con	101.25	202.49	334.10	445.46	0.14
1/2ecc	103.34	206.68	338.29	451.05	0.15
1/2 con	98.49	196.98	328.59	438.11	0.14
1/3ecc	100.74	201.49	333.09	444.12	0.14
1/3con	99.28	198.57	330.17	440.23	0.14
1/4ecc	100.81	201.62	333.22	444.29	0.14
1/4con	100.65	201.30	332.90	443.87	0.14
1/5ecc	99.87	199.74	331.34	441.79	0.14
1/5con	97.04	194.07	325.68	434.23	0.14
1/6ecc	99.85	199.70	331.30	441.74	0.14
1/6con	101.30	202.60	334.21	445.61	0.14
Final Ecc	84.38	168.77	300.37	400.50	0.13
			Total per Set:		
			Con:	2982.94	0.97
			Ecc:	3076.47	1.00

Subject 0006:		**ADDUCTION**		
Distance (ft.):		2.67		
Set 1 (Left Leg)				
Weight Lifted lb.:		15lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	15.60	40.38	107.69	0.03
1/1/ecc	14.32	39.10	104.26	0.03
1/2 con	10.37	35.15	93.73	0.03
1/2ecc	16.51	41.29	110.11	0.04
1/3 con	15.71	40.49	107.97	0.03
1/3ecc	16.33	41.11	109.64	0.04
1/4 con	16.49	41.28	110.07	0.04
1/4ecc	14.34	39.12	104.32	0.03
1/5con	15.11	39.89	106.38	0.03
1/5ecc	15.79	40.57	108.18	0.04
1/6con	18.41	43.19	115.17	0.04
1/6ecc	14.63	39.41	105.10	0.03
1/7con	13.84	38.63	103.00	0.03
1/7ecc	14.34	39.12	104.32	0.03
1/8con	16.67	41.45	110.53	0.04
1/8ecc	14.57	39.35	104.94	0.03
1/9con	16.65	41.44	110.49	0.04
1/9ecc	13.13	37.91	101.09	0.03
1/10con	15.32	40.10	106.94	0.03
1/10ecc	12.90	37.68	100.48	0.03
1/11con	17.42	42.21	112.55	0.04
1/11ecc	13.58	38.36	102.29	0.03
1/12con	15.63	40.41	107.77	0.03
1/12ecc	11.38	36.16	96.42	0.03
		Total per Set:		
		Con:	1184.53	0.38
		Ecc:	1154.72	0.37

Set 2 (Left Leg)				
Weight Lifted lb.:		25lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	18.34	43.12	114.99	0.04
1/1/ecc	19.13	43.91	117.10	0.04
1/2 con	16.49	41.27	110.05	0.04
1/2ecc	22.54	47.32	126.20	0.04
1/3 con	23.37	48.15	128.40	0.04
1/3ecc	19.62	44.40	118.40	0.04
1/4 con	18.91	43.70	116.52	0.04
1/4ecc	19.62	44.40	118.41	0.04
1/5con	19.49	44.27	118.06	0.04
1/5ecc	18.86	43.64	116.37	0.04
1/6con	17.39	42.17	112.46	0.04
1/6ecc	14.61	39.39	105.04	0.03
1/7con	14.99	39.78	106.07	0.03
1/7ecc	21.94	46.72	124.59	0.04
1/8con	18.21	43.00	114.66	0.04
1/8ecc	20.69	45.47	121.25	0.04
1/9con	20.08	44.86	119.64	0.04
1/9ecc	16.82	41.60	110.94	0.04
1/10con	16.13	40.91	109.10	0.04
1/10ecc	17.48	42.26	112.69	0.04
		Total per Set:		
		Con:	1149.94	0.37
		Ecc:	1170.98	0.38

Set 3 (Left Leg)				
Weight Lifted lb.:		30lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	19.22	44.00	117.33	0.04
1/1/ecc	28.73	53.51	142.69	0.05
1/2 con	29.04	53.82	143.52	0.05
1/2ecc	29.96	54.74	145.98	0.05
1/3 con	29.08	53.86	143.62	0.05
1/3ecc	28.74	53.53	142.74	0.05
1/4 con	29.18	53.96	143.89	0.05
1/4ecc	29.26	54.04	144.10	0.05
1/5con	27.78	52.56	140.17	0.05
1/5ecc	27.52	52.30	139.47	0.05
1/6con	25.77	50.55	134.81	0.04
1/6ecc	26.73	51.52	137.38	0.04
1/7con	26.06	50.84	135.57	0.04
1/7ecc	27.50	52.28	139.42	0.05
1/8con	25.87	50.65	135.08	0.04
1/8ecc	18.74	43.52	116.05	0.04
		Total per Set:		
		Con:	1093.98	0.35
		Ecc:	1107.82	0.36

	Set 4 (Right Leg)			
Weight Lifted lb.:		15lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
1/1con	13.08	38.49	102.64	0.03
1/1/ecc	14.79	40.20	107.21	0.03
1/2 con	13.75	39.16	104.43	0.03
1/2ecc	16.16	41.57	110.85	0.04
1/3 con	11.43	36.84	98.25	0.03
1/3ecc	15.21	40.63	108.34	0.04
1/4 con	10.29	35.71	95.22	0.03
1/4ecc	15.53	40.94	109.18	0.04
1/5con	12.75	38.16	101.76	0.03
1/5ecc	15.44	40.85	108.93	0.04
1/6con	14.77	40.18	107.14	0.03
1/6ecc	13.57	38.98	103.94	0.03
1/7con	12.01	37.42	99.80	0.03
1/7ecc	15.55	40.97	109.24	0.04
1/8con	13.40	38.82	103.51	0.03
1/8ecc	14.41	39.82	106.19	0.03
1/9con	12.43	37.84	100.92	0.03
1/9ecc	16.76	42.17	112.45	0.04
1/10con	15.16	40.58	108.21	0.04
1/10ecc	13.33	38.74	103.32	0.03
1/11con	16.86	42.28	112.74	0.04
1/11ecc	15.64	41.05	109.46	0.04
1/12con	11.00	36.41	97.10	0.03
1/12ecc	11.12	36.53	97.42	0.03
		Total per Set:		
		Con:	1231.72	0.40
		Ecc:	1286.55	0.42

Set 5 (Right Leg)				
Weight Lifted lb.:		25lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init Con	6.08	31.49	83.98	0.03
1/1con	16.62	42.03	112.09	0.04
1/1/ecc	20.68	46.09	122.91	0.04
1/2 con	20.47	45.88	122.34	0.04
1/2ecc	21.42	46.84	124.90	0.04
1/3 con	22.95	48.36	128.96	0.04
1/3ecc	21.37	46.78	124.76	0.04
1/4 con	20.38	45.79	122.11	0.04
1/4ecc	21.74	47.16	125.75	0.04
1/5con	22.89	48.30	128.81	0.04
1/5ecc	21.66	47.08	125.54	0.04
1/6con	22.00	47.41	126.43	0.04
1/6ecc	20.27	45.69	121.83	0.04
1/7con	22.01	47.42	126.46	0.04
1/7ecc	20.38	45.80	122.12	0.04
1/8con	21.48	46.90	125.06	0.04
1/8ecc	21.45	46.87	124.98	0.04
1/9con	22.21	47.62	127.00	0.04
1/9ecc	21.05	46.47	123.91	0.04
1/10con	21.99	47.41	126.41	0.04
1/10ecc	16.25	41.66	111.09	0.04
		Total per Set:		
		Con:	1329.63	0.43
		Ecc:	1227.79	0.40

Set 6 (Right Leg)				
Weight Lifted lb.:		30lb		
Repetition:	Mean Force (lb.)	(+) Segmental Weight	Work per Rep: Ft-Lb.	Energy (Kcal) per Rep:
Init Con	7.65	33.07	88.18	0.03
1/1con	19.08	44.49	118.65	0.04
1/1/ecc	28.59	54.00	144.00	0.05
1/2 con	29.76	55.17	147.12	0.05
1/2ecc	27.98	53.39	142.37	0.05
1/3 con	26.04	51.45	137.21	0.04
1/3ecc	29.29	54.71	145.88	0.05
1/4 con	31.02	56.43	150.48	0.05
1/4ecc	29.01	54.43	145.14	0.05
1/5con	27.05	52.47	139.91	0.05
1/5ecc	27.46	52.87	140.99	0.05
1/6con	25.73	51.14	136.37	0.04
1/6ecc	28.65	54.06	144.17	0.05
1/7con	29.97	55.38	147.68	0.05
1/7ecc	27.37	52.78	140.74	0.05
1/8con	28.48	53.89	143.71	0.05
1/8ecc	18.26	43.67	116.46	0.04
		Total per Set:		
		Con:	1209.31	0.39
		Ecc:	1119.75	0.36

SUBJECT:0006				
				Kcal
Total Work per Exercise Session:		Concentric:	49945.07	16.18
	(Ft-Lb.)	Eccentric:	49245.41	15.95
			99190.48	**32.13**

Table 7: Individual Subject Characteristics, Cycle Data

Subject #	Group	Age (yrs)	Height (cm)	Weight (kg)	Gender	VO2pk, ml/kg/min
1	Prime IIA	26	175	69.1	M	46.3
2	Prime IIA	31	182	73.4	M	41.6
3	Prime IIA	33	172	56.4	F	33.2
4	Prime IIA	34	170	82.7	M	38.5
5	Back-up IIA	31	172	61.4	M	41.2
6	Back-up IIA	35	170	56.6	M	42.9
7	Back-up IIA	37	180	76.8	M	44.9
8	Back-up IIA	26	170	56.1	F	33.6
9	Prime III	41	165	68.3	F	33.0
10	Prime III	30	191	81.9	M	34.0
11	Prime III	36	170	56.6	M	43.7
12	Prime III	28	168	66.5	F	34.2
13	Back-up III	38	180	76.5	M	39.3
14	Back-up III	30	178	84.6	M	33.3
MEAN		**33**	**175**	**69.1**		**38.6**
SD		**5**	**7**	**10.5**		**4.9**

Table 8: Individual Subject Characteristics: Treadmill Data

Subject #	Group	Age (yrs)	Height (cm)	Weight (kg)	Gender	VO2pk, ml/kg/min
1	Prime III	40	165	68.3	F	39.0
2	Prime III	30	191	81.9	M	35.4
3	Prime III	36	170	56.6	M	51.3
4	Prime III	28	168	66.5	F	40.6
5	Back-up III	38	180	76.5	M	51.0
6	Back-up III	41	183	86.0	M	51.0
7	Back-up III	30	178	84.6	M	46.4
MEAN		**35**	**176**	**74.3**		**45.0**
SD		**5**	**9**	**10.9**		**6.6**

Table 9: Individual Aerobic Exercise Subject Data

Cycle Ergometer: (n=14)								
Subjects	**Work: (Kcal)**	**GEE: (Kcal)**	**RMR (Kcal)**	**VO2 L/min**	**Peak VO2 L/min**	**Gross Efficiency**	**Heat Loss Kcal**	**BTU**
1	49.8	282.65	36.19	1.89	3.03	17.6%	196.65	780.3
2	44.7	258.72	35.45	1.73	2.68	17.3%	178.56	708.5
3	27.1	171.98	29.25	1.15	1.72	15.8%	115.65	458.9
4	47.6	270.69	34.39	1.81	2.88	17.6%	188.75	748.9
5	40.4	240.78	33.04	1.61	2.55	16.8%	167.33	663.9
6	35.4	221.33	30.25	1.48	2.19	16.0%	155.68	617.8
7	47.6	293.12	39.08	1.96	3.02	16.3%	206.41	819.0
8	24.5	161.51	27.22	1.08	1.8	15.2%	109.79	435.7
9	33.2	186.94	32.90	1.25	1.85	17.8%	120.85	479.5
10	40.0	266.20	34.14	1.78	2.68	15.0%	192.05	762.1
11	37.7	228.81	31.02	1.53	2.42	16.5%	160.13	635.4
12	34.6	201.89	28.49	1.35	2.12	17.1%	138.81	550.8
13	47.4	288.63	40.68	1.93	2.96	16.4%	200.58	795.9
14	38.4	257.23	38.59	1.72	2.62	14.9%	180.29	715.4
Mean	39.16	237.89	33.62	1.59	2.47	16.44%	165.11	655.2
SD	7.80	43.63	4.12	0.29	0.46	1.00	32.73	129.9

Treadmill: (n=7)								
Subjects	**Work: (Kcal)**	**GEE: (Kcal)**	**RMR (Kcal)**	**VO2 L/min**	**Peak VO2 L/min**	**Assumed Efficiency**	**Heat Loss Kcal**	**BTU**
1	97.85	391.4	41.05	2.63	3.55	25%	293.6	1164.8
2	60.28	241.1	32.90	1.62	2.24	25%	180.8	717.5
3	82.3	329.2	34.14	2.19	2.88	25%	246.9	979.7
4	68.23	272.9	31.02	1.82	2.49	25%	204.7	812.2
5	82.05	328.2	40.08	2.20	2.92	25%	246.2	976.7
6	87.45	349.8	38.59	2.35	3.18	25%	262.4	1041.0
7	71.45	285.8	28.49	1.92	2.47	25%	214.4	850.5
Mean	78.51	314.1	35.18	2.10	2.81	25%	235.5	934.6
SD	12.71	50.83	4.80	0.34	0.46		38.1	151.3

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13. ABSTRACT *(Maximum 200 words)*
This investigation's purpose was to determine the amount of heat produced when performing aerobic and resistance exercises planned as part of the exercise countermeasures prescription for the ISS. These data will be used to determine thermal control requirements of the Node 1 and other modules where exercise hardware might reside. To determine heat production during resistive exercise, 6 subjects using the iRED performed 5 resistance exercises which form the core exercises of the current ISS resistive exercise countermeasures. Each exerciser performed a warm-up set at 50% effort, then 3 sets of increasing resistance. We measured oxygen consumption and work during each exercise. Heat loss was calculated as the difference between the gross energy expenditure (minus resting metabolism) and the work performed. To determine heat production during aerobic exercise, 14 subjects performed an interval, cycle exercise protocol and 7 subjects performed a continuous, treadmill protocol. Each 30-min. exercise is similar to exercises planned for ISS. Oxygen consumption monitored continuously during the exercises was used to calculate the gross energy expenditure. For cycle exercise, work performed was calculated based on the ergometer's resistance setting and pedaling frequency. For treadmill, total work was estimated by assuming 25%work efficiency and subtracting the calculated heat production and resting metabolic rate from the gross energy expenditure. This heat production needs to be considered when determining the location of exercise hardware on ISS and designing environmental control systems. These values reflect only the human subject's produced heat; heat produced by the exercise hardware also will contribute to the heat load.

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