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CARDIOVASCULAR AND MUSCULAR RESPONSES TO EIGHT WEEKS OF RESISTANCE EXERCISE TRAINING IN YOUNG AND OLDER WOMEN

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CARDIOVASCULAR AND MUSCULAR RESPONSES TO EIGHT WEEKS OF RESISTANCE EXERCISE TRAINING IN YOUNG AND OLDER WOMEN

A DISSERTATION APPROVED FOR THE
DEPARTMENT OF HEALTH AND EXERCISE SCIENCE

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Abstract

PURPOSE: Resistance training is recommended for all adults of both sexes. The time-course of muscle hypertrophy in young and older women and the arterial stiffness and limb blood flow responses to resistance exercise in young and older women remain to be elucidated. The purpose of this study was to examine the time-course of muscle hypertrophy in young and older women following high-intensity resistance exercise training as well as to examine arterial stiffness and blood flow responses in young and older women to high-intensity resistance exercise training. METHODS: Young (aged 18-25) and older (aged 50-64) women performed full-body high-intensity resistance exercise three times per week for eight weeks. This exercise was performed on six different exercise machines: leg press, chest press, leg extension, shoulder press, leg curl, and lat pull-down. Exercises were alternated so that two lower body exercises or two upper body exercises were never performed together. As the exercise program was meant to be of a high-intensity, subjects began lifting at 80% of their one repetition maximum and training progressed by having subjects perform three sets with ten repetitions performed in the first two sets and the last set being performed to "failure" which was defined as the inability to complete another repetition with good form. All exercise was supervised and performed in the laboratory. At two time points approximately three weeks apart, prior to training, measurements were performed as a control period and no exercise was performed between these measurements. A single post-testing measurement was performed following training. At these three measurement time-points, the following measurements were performed: ultrasound muscle and fat thicknesses at eight body sites (50% and 70% thigh and hamstring,

subscapular, chest, deltoid, and –fat only– visceral), thigh circumference, four 50% thigh skin-folds (anterior, posterior, lateral, and medial), whole body dual energy x-ray absorptiometry, carotid to femoral and femoral to tibialis posterior pulse wave velocity, blood pressure, heart rate, resting forearm blood flow, forearm reactive hyperemia, and two functional assessments (an upper and a lower body questionnaire) were performed. Additionally, once every week, the aforementioned ultrasound assessments of muscle and fat at seven and eight sites (respectively), thigh circumference assessment, and four thigh skinfolds were performed. Also, once every two weeks, strength was assessed on each machine by one repetition maximum. Upper body strength was assessed on the second training day of the week and lower body strength was assessed on the third training day of the week. Data was analyzed with ANOVAs and post-hoc t-tests. Alpha was set at $p<0.05$. Pre values were averaged and the average was used for subsequent analysis if no difference between these values was found. RESULTS: Muscle thickness for all muscles, except at the subscapular site, was found to increase significantly ($p<0.05$) over time. The first increase in muscle thickness was seen at the 50% quadriceps, 50% hamstrings, 70% hamstrings, and deltoid sites followed by the 70% quadriceps and chest sites. Group differences ($p<0.05$) were found for the 70% hamstring site only. Carotid-femoral pulse wave velocity showed a significant ($p<0.05$) group effect only with older subjects having a higher carotid-femoral pulse wave velocity than younger subjects. No significant ($p<0.05$) effects were found for femoral-tibialis posterior pulse wave velocity or for resting forearm blood flow. A significant ($p<0.05$) interaction was found for peak forearm blood flow. Total hyperemia increased significantly ($p<0.05$). Total body mass (kg), total % fat, leg % fat, bone-free lean mass

of the arms (kg), bone-free lean mass of the legs (kg), functional scores, and strength all increased significantly ($p<0.05$) over time. Fat thickness decreased significantly ($p<0.05$) over time at all sites except the chest and subscapular sites. CONCLUSION: In conclusion, an increase in muscle thickness occurred early in training and followed a similar progression in both groups of women. Thus, young and older women had similar muscular responses to the training. Also, eight weeks of high-intensity resistance training improved microvascular forearm function while not changing carotid-femoral or femoral-tibialis posterior arterial stiffness. These vascular responses to training were the same for young and older women with the exception of the greater peak forearm blood flow (non nitric-oxide dependent) response in the older compared to the young women.

CHAPTER I: INTRODUCTION

Resistance training is recommended for both men and women, young and old as a method of increasing strength, improving risk factors for both cardiovascular and metabolic diseases, and improving quality of life both psychologically and physiologically [1]. Although recommended for a wide range of people, the majority of research on resistance exercise has been performed on young men. Although current evidence suggests that the relative quantity of hypertrophic responses do not differ between men and women [2] and that young and older women possess the same relative capacity for hypertrophy [3], information is lacking in specific areas in which younger and older women have not been uniquely examined. Specifically, the time-course of muscle hypertrophy in young and older women has not been well-examined. Also, any change in arterial stiffness and microvascular blood flow following resistance training in young and older women has not been well-studied.

Time-Course of Muscle Hypertrophy

Initial strength increases with resistance training are typically attributed to neural gains as hypertrophy is commonly thought not to occur until six to seven weeks of training [4]. Recent work has challenged this idea. Seynnes et al. [5] found increases in quadriceps muscle hypertrophy following twenty days of training in seven recreationally active young men and two women. DeFreitas et al. [6] observed an increase in muscle cross-sectional area (mCSA) in twenty-five young men as measured by peripheral quantitative computer tomography scan after just two resistance exercise training sessions. DeFreitas et al. [6] acknowledged that this initially observed increase in mCSA may have been influenced by an acute post-exercise muscle swelling effect so

they concluded that skeletal muscle hypertrophy appears to occur around three to four weeks of training. However, later work by Poole [7] has suggested that thigh size in young men returns to baseline levels within twenty-four hours following an intense lower-body resistance training session. This work suggests that DeFreitas et al. [6] may have seen true hypertrophy after the two resistance training sessions as the mCSA measurement was taken approximately forty-eight hours after the last training session.

A major strength of the study of DeFreitas et al. [6] was the performance of weekly hypertrophy and strength assessments. To date, no other study has performed such frequent assessments in analyzing the time-course of muscle hypertrophy. Also, to my knowledge, the time-course of muscle growth in a large group of women has only been examined in one study to date [8]. This study used ultrasound to assess muscle thickness every two weeks in twenty women (aged 25-50 years) resistance training three times per week for six weeks. Abe [8] found increases in upper body and hamstring muscle thickness after four weeks of training. Although a wide age range was used, this study did not compare women by age.

Cannon [3] showed that young (aged 20-30 years) and older women (64-78 years) were capable of similar hypertrophy and strength gains after ten weeks of resistance training. It has also been shown that men and women are capable of hypertrophying to the same relative extent following resistance training [2]. Studies comparing the responses of young and older men and women to resistance exercise training have found a variety of responses: no difference in response between groups [9,10], less hypertrophy at certain sites in older individuals [11], and less hypertrophy in older men but not older women compared to younger men and women [12]. All of these studies

measured responses at baseline and following training. A study with more frequent measurements of muscle size has not been performed with the exception of the aforementioned study by Abe et al. [8]. Thus, a study comparing the time-course of skeletal muscle size increases in younger and older women following resistance exercise training would provide novel knowledge.

Women's Arterial Stiffness and Blood Flow Responses to Resistance Exercise

Few studies have examined the arterial stiffness response to resistance exercise training in women [13-21] and no study to date has directly compared the arterial stiffness response to resistance training between younger and older women. The arterial stiffness response to resistance exercise training has been found to vary with some studies in women showing no change [14,15,18,19], some showing an increase [13,22], and some showing a decrease [16,20,21] in arterial stiffness following resistance exercise training.

Cortez-Cooper et al. [13] found an increase in carotid augmentation index following eleven weeks of high-intensity resistance training in young women. Other studies showing no change in arterial stiffness suggest that the findings of Cortez-Cooper et al. [13] are due to the high-intensity nature of their training program and that high-intensity resistance exercise may be detrimental for the arterial health of women. Although this is a possibility, it is very important to acknowledge that Cortez-Cooper [13] also saw a significant increase in carotid-femoral pulse wave velocity (PWV), the currently accepted most representative measure of central arterial stiffness [23], in *both* the resistance training and the non-exercising control group. Thus, it is questionable whether this study truly showed an increase in arterial stiffness following training. In another study, young women were divided into two groups: a "concentric only" and an

"eccentric only" group. Each group performed one phase only (concentric or eccentric) of the biceps curl and only this phase (concentric or eccentric) was performed for the entire eight weeks of training. The researchers in this study found that brachial-ankle PWV increased in the concentric only group but did not increase in the eccentric only group [22]. Studies reporting a decrease [16,20,21] or no change [14,18,19] in arterial stiffness in women following resistance exercise training reported protocols of varying intensities and thus it is unclear how intensity, or any training variable for that matter, affects women's arterial stiffness responses to resistance exercise training. In men, arterial stiffness following resistance training has been found to increase [17,24,25] or show no change [26,27]. The reasons for these differences in arterial stiffness response to resistance training are not known in men either.

Blood flow responses to resistance exercise training are also variable. Very little work has examined limb microvascular blood flow responses to resistance exercise in women only and both of these studies have shown an improvement in limb microvascular blood flow following training [28,29]. Another study comparing men's and women's microvascular limb blood flow responses to resistance exercise also showed an improvement in women's microvascular limb (forearm) blood flow [19] with training. In men, limb microvascular blood flow has generally been found to improve [27,30] although it has also been shown to decrease [31]. In a study in which sex was not specified, no change in forearm microvascular function was found [32] following resistance exercise training. Femoral artery blood flow has been shown to decrease with age in both men and women [33-35], however, this reduction has been found to be

absent in men who are resistance trained [36]. Age-related differences in women's blood flow responses to resistance training remain to be elucidated.

Study Purpose

The purposes of this study were two-fold: 1) to measure the time-course of muscle hypertrophy following high-intensity whole-body resistance exercise training in young and older women and 2) to examine arterial stiffness and blood flow responses to this type of training in young and older women.

Research Questions

1. During eight weeks of high-intensity resistance training, when would hypertrophy be evident, and at what sites (50% quadriceps and hamstrings, 70% quadriceps and hamstrings, deltoid, chest, and/or subscapular) would it first be evident, in young and older women?
2. Following eight weeks of high-intensity resistance training, would arterial stiffness and blood flow changes occur and would these changes differ between young and older women?

Hypotheses

1. I hypothesized that hypertrophy would be detected three to four weeks into high-intensity resistance training in both young and older women and that this hypertrophy would first be detected in the upper body and hamstrings.
2. I hypothesized that high-intensity resistance training would not increase arterial stiffness and that high-intensity resistance training might have improved blood flow.

Significance of the Study

Resistance training is recommended for both men and women, young and old as a method of increasing strength, improving risk factors for both cardiovascular and metabolic diseases, and improving quality of life both psychologically and physiologically [1]. Although recommended for a wide range of people, the majority of research on resistance exercise has been performed on young men. This study provides useful information on the time-course of muscle hypertrophy in young and older women. It is of interest to know if one group gained muscle more quickly or slowly than the other group. This type of knowledge has the practical application of allowing those individuals performing resistance exercise to know when they may expect to see a change in muscle size. This knowledge may keep women motivated to continue on an exercise program if they were to know that muscle size gains are occurring despite the possibility that the gains may not be visible to them with the naked eye.

Also, no study had previously directly compared young and older women's arterial stiffness and blood flow responses following resistance exercise training. As resistance exercise is recommended for both young and older women, as previously stated, it is important to know how this method of exercise affects the vasculature. Women of all ages are recommended to resistance train in order to improve strength, among other benefits [1]. Thus, if this type of exercise were to negatively affect the vasculature, it would be important to know. Previous work has suggested that high-intensity resistance exercise may be detrimental to the vasculature [13] although, as previously described, this study was flawed. As women may desire to perform high-

intensity resistance exercise, it is important to determine how this type of exercise training affects their large arteries and microvasculature.

Assumptions

1. All subjects would answer all questionnaires truthfully.
2. All subjects would follow guidelines for behavior prior to any testing.
3. Subjects would not embark on extra exercise programs or make large dietary changes during the course of the study.
4. Subjects would adequately nourish themselves during the course of the study.
5. Some subjects would utilize hormonal contraceptives.
6. Older subjects would be post-menopausal and accurately report their lack of hormone replacement therapy use.

Delimitations

1. The results of this study would only be applicable to women 18-25 and 50-64 years of age.
2. Subjects were not resistance trained (defined as >6 months without performing regular resistance exercise).
3. Subjects were not highly endurance trained but may have performed regular low or moderate-intensity endurance exercise (<5 hours per week) which was allowed to be continued during the study.
4. Subjects with known orthopedic or metabolic disorders which would prevent her from participation in the exercise program were not included.
5. Subjects unable to commit to the full time-frame of the study were not included.

6. Only older subjects who were postmenopausal and not on any kind of hormone replacement therapy were included.
7. Only subjects who were not hypertensive (this was allowed to be either naturally or under control with medication) were included.
8. Pregnant women or women who were planning to become pregnant were excluded from the study.

Limitations

1. Diet was not controlled.
2. Women may have attempted to lose weight due to excitement with embarkation on a new exercise program.
3. Women varied in initial cardiovascular and strength profiles.
4. Although they were advised not to do so, women may have changed aerobic exercise quantity/intensity during the study.
5. Medical information and health history were obtained through self-report.

Operational Definitions

Muscle thickness – The thickness of the muscle as assessed by ultrasound imaging and measuring the distance from the bone-muscle interface to the muscle-fat interface.

Fat thickness – The thickness of the fat as assessed by ultrasound imaging and measuring the distance from the muscle-fat interface to the fat-skin interface.

Skinfolds – A bi-layer of skin as measured using standard body composition assessment calipers.

Pulse wave velocity – The gold standard assessment of arterial stiffness; this measures the speed with which the pulse wave travels through the large arteries.

Applanation tonometry – The flattening of the artery in order to obtain a pressure wave; the technique is used to assess pulse wave velocity.

Resting forearm blood flow – The forearm microvascular response at rest to minimal (50 mmHg) intermittent venous occlusion.

Forearm total hyperemia – The total (area under the curve) increase in blood flow seen following deflation of a blood pressure cuff worn on the upper arm and inflated for five minutes.

Forearm peak hyperemia – The peak blood flow value seen following deflation of a blood pressure cuff worn on the upper arm and inflated for five minutes.

Strain-gauge plethysmography – The utilization of a mercury-filled strain-gauge and blood pressure cuffs in order to obtain the measurements of resting blood flow, total hyperemia, and peak hyperemia.

One-repetition maximum – The exercise-specific greatest amount of weight that can be lifted through a full range of motion with proper form.

Dual-energy x-ray absorptiometry – A low energy x-ray device used to quantify fat, bone-free lean body mass, and bone mineral content.

Bone-free lean body mass – Total body mass minus bone mineral content.

CHAPTER II: LITERATURE REVIEW

Introduction

Resistance training is recommended for both men and women, young and old as a method of increasing strength, improving risk factors for both cardiovascular and metabolic diseases, and improving quality of life both psychologically and physiologically [1]. In the following review, the importance of resistance training will first be discussed. The loss of muscle mass with age, known as sarcopenia, makes resistance training extremely important for this population [37,38]. Thus, this condition and resistance training's ability to improve this condition will be the focus of this section (although the benefits of resistance training for young adults will be discussed as well). Next, a review of the relative contributions of neural versus hypertrophic factors to strength gains will be examined. The influence of age and gender on these factors will then be discussed.

The review will then shift from muscular literature to focus on the relevant literature behind the cardiovascular questions of the present study. A brief review of the prevalence of cardiovascular disease and the importance of combating this disease will be presented. Next, the importance of arterial stiffness measurements as they relate to cardiovascular disease will be discussed. Following this, the importance of peripheral blood flow measurements as they also relate to cardiovascular disease will be discussed. Finally, the literature relating to arterial stiffness responses to resistance exercise and peripheral blood flow responses to resistance exercise will be examined.

Importance of Resistance Exercise Training

With age, older adults lose muscle size and strength. It has been estimated that between the second and eighth decade of life, total lean body mass decreases by approximately 18% in men and 27% in women [39]. Others have suggested that muscle mass declines by around 6% per decade after mid-life [40]. Still others report the rate of muscle mass loss as an annual loss of 1-2% starting after age 50 [41]. This loss of lean body mass would clearly impair daily activities of older adults and contributes to a low functional capacity and possibly to recurrent falls [42]. These functional declines are due to loss of muscle mass itself as well as due to neural impairments that occur with aging [43,44]. The term for the loss in muscle mass with age is "sarcopenia" and this condition is generally diagnosed by assessing appendicular skeletal muscle mass (by dual energy x-ray absoptiometry) and dividing the total of this appendicular skeletal muscle mass by height squared [45]. Once this ratio has been determined, various cut-off points, that differ by sex, have been proposed for determining the official diagnosis of sarcopenic [45]. Some have suggested that only the loss of muscle mass be called "sarcopenia" while the loss of muscle strength should be termed "dynapenia;" the reason given for using a separate term for the loss of strength is that the loss of muscle mass and strength with age may follow separate progressions and thus should not be defined as the same condition [46]. As the term "dynapenia" is still not in as common usage as the term "sarcopenia," through the rest of this review, the term "sarcopenia" will be used to mean both the loss of muscle mass and strength. Whatever the term/s given to the loss of muscle mass and strength with aging, it is clear that these are conditions significantly

impacting the well-being of older adults and interventions that could combat these conditions must be tested and implemented if found effective.

Fortunately, effective interventions do exist to assist with delaying the progression of sarcopenia. Exercise has been found to be very beneficial for older adults to perform [1]. It has been suggested that resistance exercise particularly may be most important for delaying the decrements in muscle mass and function seen with age [37,38,47]. One review of sixty-two trials of progressive resistance exercise studies performed in older adults found that in most of the studies examined, progressive resistance exercise improved strength and modestly improved functional abilities (as assessed by measures such as gait speed). This review also noted that, across these sixty-two trials, adverse events were poorly reported; although this may mean that few adverse events occurred, it also leaves those interpreting the results without a clear idea as to the relative safety of these activities for older adults [48]. A Cochrane Database review reported similar findings. This review examined the effects of progressive resistance training on one-hundred and twenty-one studies and found a large, positive effect of this type of training on muscle strength, a modest improvement in gait speed, a moderate to large effect for improvements getting out of a chair, and also reported that adverse events were not well reported in these studies. This review did mention that adverse events that were reported tended to be minor and included generally minor complains such as muscle soreness and joint pain [49]. Thus, it appears that resistance exercise is an effective, and, based on current evidence, generally safe method by which sarcopenia can be positively influenced.

However, it has been suggested that, to most effectively combat sarcopenia, nutritional interventions should be combined with progressive resistance exercise [38,50]. The reason for this suggestion is that older adults may have impaired regulation of appetite [51], the muscles of older adults may be less able to effectively utilize dietary protein, and also older adults may not be able to respond as effectively to resistance exercise as compared to younger adults; thus, it may be beneficial for older adults to consume an elevated amount of dietary protein and/or calories. This resistance to resistance exercise and/or dietary protein induced muscle protein synthesis in older adult has been termed the "anabolic resistance of aging" [50]. To counteract this anabolic resistance of aging, it is recommended that older adults consume approximately 20 g of protein with each of at least three meals throughout the day [52]. It is further recommended that this protein be leucine-rich as this amino acid appears central to the muscle protein synthetic response [50].

Another dietary strategy that may help counteract the anabolic resistance of aging is the increased ingestion of omega-3 fatty acids. Although this is a less well-studied nutritional intervention than increased protein ingestion, it has been shown that increased ingestion of omega-3 fatty acids in the elderly may increase muscle protein synthesis [53]. Supplements added to the diet have also been suggested to delay the progression of sarcopenia; particularly, creatine, in combination with resistance training, has been suggested to improve muscle strength in older adults [54]. Antioxidant supplementation, hormone therapies [38] and/or non-steroidal anti-inflammatory drugs [50] may also prove promising as therapeutic modalities to counteract sarcopenia.

Although by definition, younger adults cannot have sarcopenia, resistance exercise training is also very important for the muscular health of younger adults and can improve muscle size and strength [55]. As, clearly, younger adults will eventually become older adults, it is beneficial for them to develop and maintain muscle mass and strength so as to offset the eventual decline in muscle mass and strength that will occur with old age [56]. Further, increased muscle mass has been proposed to improve immune function, improve glucose uptake, and improve bone development [56].

Similarly to older adults, younger adults can employ certain dietary strategies to enhance their benefits from resistance exercise. Consumption of a high-quality protein source helps with muscle anabolism in younger adults as well as older adults. For example, milk protein has been shown to be superior to soy protein for muscle protein synthesis when consumed in young adults [57]. Also, similarly to older adults, supplemental strategies can help increase muscle mass and function in younger adults. Creatine supplementation has been regularly shown to improve muscle mass and strength [58]. Many other supplements such as beta-hydroxy beta-methyl butyrate, chromium, vanadyl sulfate, boron, dehyoepiandrosterone, and others have been purported to enhance muscle growth with exercise, although findings of the benefits of these supplements are very inconsistent [59].

The Contributions of Neural Factors and Hypertrophy to Strength Gains

Initial strength increases with resistance training are typically attributed to neural gains as hypertrophy is commonly thought not to occur until six to seven weeks of training [4]. These neural gains include adaptations throughout the entire nervous system such as improved synchronicity in motor unit firing, reduced bilateral deficit,

reduced antagonist muscle activity [4,60] and increased activation in supraspinal centers [61]. One study had young men perform isokinetic resistance training nine times over thirteen days by doing ten sets of five maximal isokinetic knee extensions with the right leg only at each training session. Thigh muscle cross-sectional area was assessed by magnetic resonance imaging and quadriceps femoris strength was assessed both isometrically and isokinetically at 60-240 degrees per second on the same dynamometer on which the subjects trained. The authors found significant increases in both isometric and isokinetic strength following training, but found no increases in muscle hypertrophy [62]. Thus, this study suggests that during these thirteen days over which resistance exercise training occurred, the measured increase in strength occurred due to neural factors alone. Another study had young women resistance train for ten weeks performing unilateral concentric only or eccentric only knee extension training. Training was performed for three days each week and consisted of three sets of ten repetitions. Strength was assessed on a dynamometer and thigh muscle cross-sectional area was assessed using magnetic resonance imaging. Electromyography was used to assess neural activation. The study found that increases in muscle hypertrophy were slightly greater following eccentric only compared to concentric only training and that hypertrophy increases are very specific to the type of training performed. This study also found that electromyography activity increased, in the muscle group trained, following training [63]. Thus, from this study it can be concluded that both neural adaptations and hypertrophy contributed to the strength increases seen with training. A further study looking at the relationship between neural and hypertrophic contributions to strength gains with resistance training examined the idea that endurance training may

interfere with gains induced from resistance training [64]. This study used two groups: one group that performed resistance exercise only and one group that performed both resistance and endurance exercise. Both of the resistance exercise groups performed strength/power resistance exercise for two days per week for twenty-one weeks and the resistance exercise consisted of two exercises for the leg extensors and four to five exercises for the other main muscle groups; subjects performed ten to fifteen repetitions per set and performed three to four sets of each exercise. Strength was assessed using one-repetition maximums and isometric assessments; neural activity was assessed with electromyography, and muscle cross-sectional area was assessed using magnetic resonance imaging and muscle fiber size was assessed using muscle biopsies. Assessments were performed every seven weeks. The authors reported large increases in electromyographical activity of the leg extensors (in both groups) as well as increases in strength, muscle cross-sectional area, and muscle fiber areas [64]. The earliest measurements made in this study, after baseline measurements, were at seven weeks of training; thus, it can be concluded that at this stage of training, both neural and hypertrophic adaptations contributed to the increases in strength seen with training. Interestingly, the addition of aerobic training to this resistance training did not appear to greatly influence the results.

Recent work has suggested that muscle hypertrophy may occur earlier than previous thought. Seyennes et al. [5] performed a study to examine the time-course of early muscular adaptations to high-intensity resistance exercise in young men and women. These subjects performed bilateral leg extension three times per week on a flywheel ergometer. Exercise consisted of three sets of seven submaximal warm-up leg

extensions followed by four sets of seven maximal concentric and eccentric contractions. Subjects were measured at baseline, following ten days of training, following twenty days of training, and following the entire thirty-five days of training. Knee extension maximum voluntary contraction, electromyography activity of the vastus lateralis and quadriceps femoris, and whole thigh muscle and individual muscle cross-sectional area as assessed by magnetic resonance imaging were assessed. A significant increase in knee extension maximum voluntary contraction was found after only ten days of training. Electromyographic activity increased progressively throughout the training. Whole thigh muscle, vastus lateralis, vastus medialis, and rectus femoris cross-sectional area increased after twenty days of training while vastus intermedius cross-sectional area increased only after the full thirty-five days of training [5]. This study showed that increases in muscle strength occurred relatively early on in the training program and that both hypertrophy and neural factors contributed to this increase in muscle strength [5].

Another study that examined the time-course over which hypertrophic contributions to strength gains occurred was performed by DeFreitas et al. [6]. In this study, young men performed high-intensity strength training for eight weeks. The strength training consisted of three exercises: incline leg press, leg extension, and bench press. For each of these exercises, three sets to failure were performed with the load set so that subjects would likely reach failure within eight to twelve repetitions. The assessments in this study included peripheral computed tomography scanning of the thigh for assessment of muscle cross-sectional area and isometric strength assessments of the dominant leg's leg extensors performed on a dynamometer. This

study found significant increases in thigh muscle cross-sectional area after just two training sessions although, interestingly, it was not until week four that significant increases above baseline in muscle strength were seen [6]. Increases in muscle cross-sectional area were seen throughout the entire training period. In this study, the authors speculated that muscle swelling may have led to erroneous early detection of hypertrophy, and thus, they concluded that true hypertrophy probably did not occur until three to four weeks of training as that was when the strength increase was seen [6]. From this study, it can be concluded that increases in muscle size are detectable early in a training program although caution must be exercised when determining the true cause of the increase in muscle fiber size.

A recent work supports the idea that the findings of Defreitas et al. [6] may reflect true hypertrophy rather than merely muscle swelling. Poole [7] had young men perform single bouts of intense resistance exercise and then measured, via ultrasound and peripheral quantitative computed tomography, changes in muscle size. In this study, subjects completed three sets of eight to ten repetitions on the leg press, leg extension, and leg curl machines. His findings showed that thigh muscle size in young men returned to baseline levels within twenty-four hours following this intense lower-body resistance training session [7].

The time-course of muscle thickness changes in a group of women was examined by Abe et al. [8]. In this study, both men and women aged 25-50 years were examined as they performed high-intensity strength training three days per week for twelve weeks using either one set or three sets of resistance exercise "until they became fatigued" which it appears was meant to occur between eight and twelve repetitions.

The exercises performed were the knee extension, knee flexion, chest press, seated row, elbow flexion, and elbow extension. One-repetition maximums for the chest press and the knee extension were performed on the exercises on which the subjects trained and muscle thickness was assessed using B-mode ultrasound. In the results, the two groups of men and women (performing one set or performing three sets) are grouped together. Significant increases in chest press strength and knee extension strength were seen in the women following four weeks of training. In the men, a significant increase in chest press strength was seen following six weeks of training and a significant increase in knee extension strength was seen following two weeks of training [8]. Significant increases in muscle thickness for women were as follows: biceps increased at eight weeks, triceps and chest increased at six weeks, 70% hamstrings increased at eight weeks. No other significant muscle thickness increases were seen in women. Significant muscle thickness increases for men were as follows: biceps increased at four weeks, triceps increased at eight weeks, 50% and 70% hamstrings increased at six weeks. No other significant increases in muscle thickness were seen in men [8]. From this study, it can be concluded that significant increases in muscle thickness are detectable early into a training program, even in women, and that these increases in thickness vary importantly by the location of the measurement site.

Influence of Age and Gender on Resistance-Training-Induced Muscle Hypertrophy

Cannon [3] showed that young (aged 20-30 years) and older women (64-78 years) are capable of similar hypertrophy and strength gains after resistance training. In this study, subjects performed ten weeks of resistance exercise three times per week using

three sets of ten repetitions for leg extension and leg flexion at an intensity between 50% and 75% of one-repetition maximum. Muscle strength was assessed every two weeks using peak isometric torque on a dynamometer. Muscle size was assessed with magnetic resonance imaging before and after training and surface electromyography on the vastus lateralis and vastus medialis of the right thigh was used to assess neural activity and was performed every three weeks. In this study, both young and older women showed significant increases in peak isometric torque, muscle cross-sectional area, and neural activation and these responses did not significantly differ between age groups [3]. From this study it can be concluded that young and older women possessed similar capacities to increase muscle size, neural activation, and strength.

It has also been shown that men and women are capable of hypertrophying to the same relative extent following resistance training [2]. This study examined young men and women and had them resistance train three days per week for sixteen weeks using one to three sets of "a variety of weight training exercises involving flexion and extension of the arms and legs performed with free weights and weight machines" [2]. Subjects exercised at between 70% and 90% of one-repetition maximum and performed as many repetitions as possible for each set. One-repetition maximum tests were performed every two weeks to assess strength. Computed axial tomography of the thigh and arm were used to assess muscle cross-sectional area. This study found that increases in muscle size and strength were larger in men than in women following training, but that women had the same relative capacity to hypertrophy [2].

Studies comparing the responses of young and older men and women to resistance exercise training have found a variety of responses. Ivy et al. [65] examined the

muscle quality of young men (20-30 years), young women (20-30 years), older men (65-75 years), and older women (65-75 years) after nine weeks of strength training. Muscle quality was determined as quadriceps one-repetition maximum strength divided by muscle volume as assessed by magnetic resonance imaging. This study found that all groups improved their muscle strength, volume, and quality with training and that muscle quality was most greatly increased in young women compared to the other three groups [65]. Thus, from this study it appears that both age groups and sexes are able to increase muscle quality with resistance exercise training and this improvement may be the greatest in young women as compared to older women, older men, and young men. Another study also examining the question of how young and older men and women increase muscle size in response to strength training was performed by Roth et al. [9]. This study examined young and older men and women of the same ages as in the study by Ivy et al. [65]. These men and women performed a six-month whole body resistance exercise training program where they trained with nine exercises for three days per week. The repetition and set scheme varied through the course of the training program. Thigh and quadriceps muscle volume were assessed using magnetic resonance imaging. All groups increased these measures significantly and no changes were found between groups [9]. This study supports the findings of the study by Ivy et al [65] in showing that all groups were able to hypertrophy in response to resistance exercise training. Another study examining age-related differences in muscular and neural responses to resistance training examined younger men (aged 42$\pm$2 years), younger women (aged 39$\pm$3 years), older men (aged 72$\pm$3 years), and older women (aged 67$\pm$3 years) [12]. These subjects strength trained for six months in a varied program that combined heavy-resistance and

"explosive" strength training. Muscle cross-sectional area of the quadriceps femoris was assessed using an ultrasound scanner; electromyographic activity of the quadriceps muscles was also assessed; strength was assessed using a dynamometer to determine maximal isometric and dynamic strength of the knee extensors [12]. All groups except the older men showed a significant increase in leg extensors muscle cross-sectional area. Both female groups saw greater relative increases in strength compared to the male groups. All groups saw increases in neural activation with training [12]. To summarize, this study saw some differences in responses that seemed to be dependent on age and/or gender. Thus, there is disagreement between studies on how age and gender will affect resistance-training induced muscle hypertrophy.

Cardiovascular Disease

Cardiovascular disease is currently the leading causes of death in both men and women in the United States [66,67]. The term "cardiovascular disease" includes coronary artery disease, cerebrovascular disease, peripheral artery disease, rheumatic heart disease, congential heart disease, deep vein thrombosis, and pulmonary embolism [67]. According to combined statistics by the American Heart Association, the Centers for Disease Control and Prevention, and the National Institutes of Health published in 2012 for the year 2008, greater than 1 in 3 adults (or an estimated 82,600,000 people) currently have cardiovascular disease. These groups also reported that the overall rate of death attributable to cardiovascular disease was 244.8 per 100,000 with rates of 287.2 per 100,000 for white males, 390.4 per 100,000 for black males, 200.5 per 100,000 for white females, and 277.4 per 100,000 for black females [68]. It is estimated that 33.5% of adults (at least 20 years of age) in the United States have hypertension and this

prevalence has been found to be equal between men and women [68]. There are many risk factors for cardiovascular disease including family history and genetics, smoking/tobacco use, abnormal blood lipids, physical inactivity, being overweight or obese, and being diagnosed with diabetes mellitus [68].

Importance of Measuring Arterial Stiffness

Arterial stiffness is known as an independent predictor of cardiovascular disease [69]. It is well-known that increases in resting blood pressure will increase the risk of cardiovascular disease [70,71]. Increased stiffness of the arteries contributes greatly (and may be the greatest contributor) to this increased pressure [23]. As the arteries become detrimentally remodeled and more load is carried by the stiff collagen fibers rather than the more compliant elastin fibers, the stiffness of the arteries increases [72]. With age, both the intima and media layers of the arterial wall change so as to rely more on collagen and less on elastin to bear load and thus these alterations contribute to increases in arterial stiffness seen with age [72]. Also contributing to arterial remodeling, leading to increases in arterial stiffness, are arterial wall calcification and accumulation of advanced glycation end products [73,74]. Arterial stiffness is thus a valuable physiological property to assess.

If arterial stiffness is to be used clinically as a marker of cardiovascular disease, it is important that the measurement of arterial stiffness be performed using a relatively simple (non-invasive) procedure. Many non-invasive methods have been developed and currently exist in order to measure arterial stiffness and, as these methods are not always in agreement with each other [75], a "gold standard" method, known as pulse wave velocity, has been determined [69,76]. Pulse wave velocity is considered the "gold

standard" as it is generally accepted as the most simple, reproducible, and non-invasive method of determining arterial stiffness [76].

Measurement of central pulse wave velocity, also known as carotid-femoral pulse wave velocity, is the most clinically relevant pulse wave velocity measurement as the aorta and aortic branches most directly interact with the left ventricle. (Although carotid-femoral pulse wave velocity is obtained from pressure waves obtained at the carotid pulse and the femoral pulse, the over-body distance measurements are performed so as to provide a pulse wave velocity value for the aortic-iliac pathway) [76]. Difficulties in obtaining an accurate measurement of carotid-femoral pulse wave velocity may occur, however, particularly when a subject has a large bust or suffers from obesity; both of these conditions make obtaining accurate over-body distance measurements as well as femoral tonometry readings more difficult to obtain [76].

Although, as previously stated, elevated central arterial stiffness is an independent predictor of cardiovascular disease risk, the physiological importance of peripheral arterial stiffness is still relatively unknown and debated [75,76]. In an analysis of 2,798 subjects, it was found, perhaps counter intuitively, that increased aortic stiffness was a much greater predictor of even peripheral artery disease than were measurements of peripheral arterial stiffness [75]. Another study showed that only elevated aortic stiffness, and not peripheral arterial stiffness, predicted cardiovascular disease deaths in hemodialysis patients [77]. As would be expected by this lack of cardiovascular disease predictive ability by peripheral stiffness measurements, despite established predictive ability of cardiovascular disease by central stiffness measurements, there is heterogeneity of stiffness throughout the arterial tree: the more

muscular and less elastic peripheral arteries are generally stiffer than the more elastic central arteries. Laurent et al. [76] stated that normal human pulse wave velocity values may change from 4-5 m/s in the ascending aorta to 5-6 m/s in the abdominal aorta to 8-9 m/s in the iliac and femoral arteries. As the arterial tree branches from the more proximal to the more distal arteries, the stiffness of the vessels increases [76]. Although measurement of peripheral arterial stiffness is arguably much less important than measurement of central arterial stiffness, it is still of interest to examine these changes in response to interventions in an attempt to ascertain any regional (arm or leg) beneficial or detrimental effects.

Importance of Peripheral Blood Flow Measurements

Impaired limb blood flow is a contributor to the metabolic syndrome and is implicated in impaired cardiovascular function [78]. Decreased basal limb blood flow has been associated with reduced lipoprotein clearance [78] and appears to contribute to insulin resistance [79]. Depressed ability of the limb microvasculature to vasodilate in response to a stimulus (reactive hyperemia) has also been suggested to be a predictor of cardiovascular disease [80].

The reactive hyperemia response is both dependent on nitric oxide actions on the endothelium and on non-nitric oxide, as yet unknown, factors. It is thought that the late-phase vasodilatory response is nitric oxide dependent while the early response, reflected in the measurement of peak reactive hyperemia, reflects the response due to the as yet unknown mechanisms [81]. Endothelial dysfunction occurs when there is excessive inflammation, abnormal vasomotor function, impaired structural integrity of the endothelium, and impaired nitric oxide synthesis, release, and bioavailablity [82].

Although nitric oxide is the largest contributor to endothelial vasodilation, other factors such as prostacyclin and endothelium-derived hyperpolarizing factor contribute as well [83].

As the cardiovascular system ages, limb blood flow has generally been found to decrease [33] although it appears that resistance exercise training can ameliorate this impaired limb blood flow in older adults [36,84]. These improvements in basal limb blood flow following resistance exercise have been seen even in the absence of increases in limb muscle mass, suggesting that factors other than the need to provide blood flow to a resistance-exercise-induced greater quantity of muscle mass influence the increase in blood flow [85].

Many techniques exist to measure basal limb blood flow and reactivity. The most commonly used technique that is used to assess endothelial function is flow mediated dilation performed with an ultrasound system [83]. Another commonly used technique is strain gauge plethysmography, also known as venous occlusion plethysmography. This is the oldest technique (developed over 100 years ago) used for these purposes [86]. Both vascular ultrasound and strain-gauge plethysmography can also be used to assess basal limb blood flow.

Resistance Exercise Training and Arterial Stiffness

The effects of resistance exercise training on the stiffness of the arteries has been shown to vary with some studies showing an increase in stiffness [13,22,25], some studies showing a decrease in stiffness [16,21] and some studies showing no change in stiffness [18,28] following training. These studies have varied in the age studied, the intensity of the training, the duration of the training, and the arterial stiffness

measurement used. As the present study examined women only, studies performed on women will be the focus of this section.

Cortez-Cooper et al. [13] found an increase in both carotid-femoral pulse wave velocity and carotid augmentation index following eleven weeks of high-intensity resistance training in women aged 29±1 years. They also found no change in femoral-tibialis posterior pulse wave velocity following this training. Other studies showing no change in arterial stiffness suggest that the findings of Cortez-Cooper et al. [13] are due to the high-intensity nature of their training program and that thus high-intensity resistance exercise may be detrimental for the arterial health of women. Although this is a possibility, it is very important to acknowledge that Cortez-Cooper [13] also saw a significant increase in carotid-femoral pulse wave velocity in both the resistance training group and the non-exercising control group. The augmentation index did not increase in the control group as it did in the resistance training group, but pulse wave velocity is considered the "gold standard" in arterial stiffness assessment [23]. Thus, it is questionable whether this study truly showed an increase in arterial stiffness following training. Another study showing an increase in arterial stiffness following training assessed brachial-ankle pulse wave velocity in subjects with a mean age of 19 years who trained at a moderate intensity for eight weeks [22]. In this study one group performed only concentric exercise and one group performed only eccentric exercise. The group that performed the concentric exercise only saw an increase in arterial stiffness while the group that performed the eccentric exercise only saw no change in arterial stiffness [22].

Decreases in arterial stiffness following resistance exercise training have also been found. A study of 42-55 year old women who performed low-intensity home-based resistance exercise training for ten weeks found that brachial-ankle pulse wave velocity decreased [16]. Another study of 60-75 year old women who performed moderate intensity resistance exercise for sixteen weeks showed a decrease in augmentation index [21]. Ho et al. [20] found that, when they examined mean values, augmentation index did not change in overweight and obese women aged 43-59 years who resistance trained at a high intensity for twelve weeks. Interestingly, in this study, the researchers then divided the subjects into "responders" and "non-responders". Eleven out of the sixteen women in the study were "responders" meaning they showed a decreased augmentation index following training. The reasons for the differences between the responders and non-responders was unclear [20].

Finally, several studies have shown no change in arterial stiffness following training. The aforementioned study by Ho et al. [20] found no change in arterial stiffness when mean values were examined. Another study resistance trained women aged 32-59 years at a moderate intensity for twelve weeks and found no change in either carotid-femoral pulse wave velocity or femoral-tibialis posterior pulse wave velocity [18]. Collier et al. [19] had similar findings after resistance training pre-hypertensive and hypertensive women aged 40-60 years at a moderate intensity for four weeks. They found no change in carotid-femoral pulse wave velocity. Another study strength trained overweight and obese 35-50 year old women at a moderate intensity for twelve weeks and found no change in augmentation index following training [28].

The underlying reasons behind the discrepancies in findings related to women's arterial stiffness responses to resistance training are unclear. Men's arterial stiffness responses to resistance training are likewise varied with some studies showing an increase in stiffness [17,24,25] and some showing no change in stiffness [26,27]. Hopefully future research will be able to identify any possible training-related or subject characteristic-related factors contributing to these discrepancies in findings.

Resistance Exercise Training and Peripheral Blood Flow

Blood flow responses to resistance exercise training are also variable. Very little work has examined limb microvascular blood flow responses to resistance exercise in women only and these studies have shown an improvement in limb microvascular blood flow (assessed with strain-gauge plethysmography) following training [28,29]. Egana et al [29] strength trained women aged 59-79 at a moderate intensity for twelve weeks using elastic-band based training. They assessed resting calf blood flow using strain-gauge plethysmography and found an increase in blood flow [29]. Another study strength trained women aged 35-50 for twelve weeks at a moderate intensity and, using strain-gauge plethysmography, found an increase in resting forearm blood flow and peak forearm reactive hyperemia [28].

Another study comparing men's and women's microvascular limb blood flow responses to resistance exercise also showed an improvement in women's microvascular limb (forearm) blood flow [19] with training. This study resistance trained pre-hypertensive and hypertensive women aged 40-60 at a moderate intensity for four weeks and found, using strain-gauge plethysmography, that both resting forearm blood flow, peak forearm blood flow in response to reactive hyperemia, and total blood flow

in response to reactive hyperemia increased following training [19]. In men, limb microvascular blood flow has generally been found to improve [27,30] although it has also been shown to decrease [31]. In a study in which sex was not specified, no change in forearm microvascular function was found [32] following resistance exercise training. Femoral artery blood flow has been shown to decrease with age in both men and women [33-35], however, this reduction has been found to be absent in men who are resistance trained [36]. Age-related differences in women's blood flow responses to resistance training remain to be elucidated

Summary

Research has shown that both young and older individuals are able to respond positively to resistance exercise training. Also, it is possible that hypertrophy induced by resistance exercise training may occur earlier than previous thought. However, studies are inconsistent in their findings of age and gender differences in this hypertrophy in response to resistance exercise training.

Research also shows that central arterial stiffness and peripheral microvascular measurements are reliable indicators of cardiovascular disease risk. In response to resistance exercise training, central arterial stiffness may increase, decrease, or show no change while peripheral microvascular function has generally been shown to improve.

CHAPTER III: METHODOLOGY

The main purpose of this study was 1) to measure the time-course of muscle hypertrophy following whole-body resistance exercise training in young and older women and 2) to examine arterial stiffness and microvascular responses to this type of training in young and older women.

Subjects

Forty-four subjects consented to participate. Six subjects decided to not participate prior to any testing or training. Nine subjects decided not to participate following pre-testing or following some exercise training. The major reason for choosing not to participate following consent and/or testing and training was the time commitment. Twenty-nine subjects (young = 16; older = 13) completed both testing and training. Young subjects were aged 19-25 (mean = 22 years). Older subjects were aged 51-62 (mean = 57 years). Subjects were recruited by fliers, visiting classrooms, and word of mouth. All subjects were screened for inclusion and exclusion criteria and then had a resting blood pressure taken by the investigator to assure their non-hypertensive status. Subjects were thoroughly informed of the details of the study prior to signing an Institutional Review Board approved "Informed Consent" document. Older subjects were required to obtain medical clearance from their physicians prior to signing an "Informed Consent" document. (Young subjects were not required to obtain this clearance). Following consent, subjects participated in a "familiarization." During this visit, subjects were familiarized with the exercise machines on which they would be training, were informed of the 1-RM protocol and were shown the various rooms and machines in which testing would take place; subjects were also encouraged to ask

questions during this visit. This study was approved by the University of Oklahoma Health Sciences Center Institutional Review Board for Human Subjects.

Inclusion Criteria

1. Subjects were women aged 18-25 and 50-64 years.
2. Subjects were not resistance trained (defined as >6 months without performing regular resistance exercise) and were not highly endurance trained but may have performed regular low or moderate-intensity endurance exercise (<5 hours per week) which was allowed to be continued during the study.
3. Subjects had no known orthopedic or metabolic disorders which could have prevented them from participation in the exercise program.
4. As previously stated, women aged 50-64 had to obtain medical clearance from their physician.
5. Older subjects had to be postmenopausal and not on any kind of hormone replacement therapy.
6. Subjects had to be not hypertensive (BP>140/90) either naturally or controlled with medication.
7. Women had to not be pregnant or planning to become pregnant.

Exclusion Criteria

1) Subjects who were outside the age range.
2) Subjects who were regularly engaging in resistance training (>6 months of performing regular resistance exercise) or were endurance-trained (>5 hours per week of moderate or heavy endurance exercise).

3) Subjects with known orthopedic or metabolic disorders which would have prevent them from participation in the exercise program.
4) Subjects with physicians who refused to provide medical clearance.
5) Older subjects who were not postmenopausal.
6) Older subjects who were on any kind of hormone replacement therapy.
7) Subjects who were hypertensive (Blood Pressure >140/90).
8) Subjects who were pregnant or planning to become pregnant.

Experimental Design

Participants first visited the laboratory for a screening and consent visit. Following these visits, subjects came to the laboratory for their first baseline assessment. Approximately three weeks during which no exercise was performed was allowed as a time control to quantify the stability of the measurements. Following the three weeks, a second baseline measurement was performed. The week following the performance of the second baseline measurements, the subjects started the resistance training. Resistance training involved eight weeks of three weekly visits to the laboratory. On the first visit of each week, several body composition measurements were performed. Every other week, strength assessments were performed.

Screening Visit

During the screening visit, subjects were screened for inclusion/exclusion criteria. This was done verbally and by completion of a health status questionnaire and a menstrual history questionnaire. Separate menstrual history questionnaires were given to premenopausal and postmenopausal women. Subjects also had the study explained to them and completed an informed consent and HIPPA form at this time.

Following approximately thirty-five minutes of seated rest during which the medical history was obtained and the study was explained, subjects then had their brachial blood pressure taken using an automatic blood pressure cuff (Omron Healthcare Inc., Vernon Hills, IL). If either systolic or diastolic blood pressure was too high (>140/90), subjects were instructed to relax and, following several minutes, the blood pressure measurement was repeated. If blood pressure remained too high, subjects were excluded from the study. If blood pressure was appropriate for inclusion, subjects were asked to sign the informed consent and HIPPA forms.

Familiarization Visit

During this visit, subjects were familiarized with all six exercise machines on which they would be training (leg press, leg extension, leg curl, chest press, shoulder press, and lat pull-down), and were informed of the 1-RM protocol. Subjects were also shown the various rooms and machines in which testing would take place; subjects were encouraged to ask questions during this visit.

Pre1/Pre2/Post Visits

During these visits, subjects had a variety of measurements performed on them: a full body Dual energy X-ray Absorptiometry scan, 1-RM assessments on all machines, brachial blood pressure, carotid-femoral and femoral-tibialis posterior pulse wave velocity, resting forearm blood flow, forearm reactive hyperemia, an upper body functional scale questionnaire, a lower body functional scale questionnaire, ultrasound assessment of muscle thickness (at seven sites) and fat thickness (at eight sites), thigh circumference, thigh skinfolds (4 sites), and weight. Height was also assessed on the first visit only. The order in which measurements were performed varied, although 1-

RM testing was always performed last as this would affect all other physiological measurements if performed prior to them.

Dual Energy X-ray Absorptiometry (DXA)

Whole body DXA scans were used to determine changes over time in total body and regional lean and fat mass. The scan was analyzed as a whole and by compartment. Prior to each scan, the weight of each subject was recorded. Prior to the first scan only, the height of each subject was also recorded. Young subjects were asked to provide a urine sample for determination of pregnancy status. (No subjects were found to be pregnant). Following this, the subject was then instructed to remove all metal and plastic (if any had been worn to this visit) and to take off her shoes. The subject then lay still on the DXA machine (GE Medical Systems, Lunar Prodigy encore software version 10.50.086, Madison, WI) while the scan was performed. The scanning arm of the DXA machine moved slowly above the subject, systematically scanning her from head to foot. The DXA emits low dose radiation x-rays; the difference in attenuation of these x-rays as they pass through body tissue is used by the DXA to differentiate between bone, fat, and non-bone lean tissue.

One-Repetition Maximum (1RM)

The maximum amount of weight that could be lifted once was assessed on each machine (leg press, leg extension, leg curl, chest press, shoulder press, and lat pull-down) using standard ACSM protocol [87]. This protocol was as follows:

Step 1) The subject performed a light warm-up of five to ten repetitions at an estimated 40-60% of perceived maximum.

Step 2) Following a 1-minute rest with light stretching, the subject did three to five repetitions at 60-80% of perceived maximum.

Step 3) The subject should have been close to perceived 1-RM in Step 2. A small amount of weight was added, and a 1-RM lift was attempted. If the lift was successful, a rest period of three to five minutes was provided. The goal was to find the 1-RM within three to five maximal efforts. Clear communication regarding the difficulty or ease of each attempt was performed in order to determine the appropriate weight with which to load the machine for the next attempt.

Step 4) The 1-RM for each exercise was recorded as the heaviest weight that could be lifted using a full range of motion and proper form.

The 1-RMs were assessed in the following order: leg press, chest press, leg curl, shoulder press, leg extension, lat pull-down.

Blood Pressure (BP)

Blood pressure was always the first cardiovascular assessment performed. The subject was asked to lie supine and to not move or talk much. (Subjects were always encouraged to ask questions if unsure of what was being performed but they were asked to not attempt to carry on a lively conversation as this would affect cardiovascular measurements). Brachial systolic (SBP) and diastolic (DBP) blood pressures were measured on the right arm, following approximately ten minutes of supine quiet rest, using an automatic BP measuring device (Omron Healthcare Inc., Vernon Hills, IL) while the subject was still supine. Two BP measurements were taken and approximately one minute was allowed between measurements. If SPB measurements were within 5 mmHg of each other, the average of the measurements was used for

analysis. If the first two SBP measurements were not within 5 mmHg, further rest was allowed and, following several minutes, the BP measurement was repeated.

Pulse Wave Velocity (PWV)

Following blood pressure assessment, pulse wave velocity (PWV), an indicator of arterial stiffness, was assessed using applanation tonometry (SphymoCor, AtCor Medical, Sydney, Australia). Both central (carotid-femoral) and regional (femoral-tibialis posterior) PWV were assessed. A high-fidelity strain-gauge transducer (Miller Instruments, Houston, TX, USA) was placed over the right common carotid and the femoral artery, sequentially, to obtain pulse pressure waveforms. Over-body distances from the right common carotid artery to the suprasternal notch and from the suprasternal notch to the femoral artery were measured using a standard tape measure. The carotid to suprasternal notch distance was then subtracted from the suprasternal notch to femoral distance to give an estimate of aortic to femoral artery distance. The over-body distance from the femoral to the tibialis posterior artery was also measured and pulse waves were obtained at these sites as well. Three lead electrocardiographic monitoring (ECG) was used as a timing marker. Pulse wave velocity is derived from these measured distances and the time delay between the ECG obtained R-waves at the proximal and distal measurement sites (SphymoCor, AtCor Medical).

Forearm Blood Flow and Reactive Hyperemia

Next, forearm blood flow and reactive hyperemia were assessed. Forearm blood flow measurements were measured using strain gauge plethysmography as described previously [88]. A cuff was placed on the upper arm and another cuff was placed on the wrist. The wrist was slightly elevated and the upper arm was supported so that the

subject was not using muscular contraction to support her arm. An appropriately sized strain gauge (2 cm less than the circumference of the forearm at its widest point) was placed around the forearm at its widest point. Following this set-up, the wrist cuff was then inflated to a pressure of 200 mmHg for 1 minute. Blood flow was measured using an EC6 strain gauge plethysmograph (DE Hokanson) and analyzed using NIVP3 software. For each measurement, the upper arm cuff was inflated to 50 mmHg for 7 sec followed by an 8 sec deflation (0 mmHg). Six measurements were taken and averaged.

Forearm reactive hyperemia was measured immediately following the blood flow measurements. With the participant in the same position, the cuff on the upper arm was inflated to 220 mmHg for five minutes. Four minutes after upper arm cuff inflation, the wrist cuff was inflated. After the full five minutes were over, the upper arm cuff was rapidly deflated and forearm blood flow measurements were obtained as described above for three minutes following deflation (13 readings). Peak forearm blood flow was recorded as the highest blood flow measured after deflation of the cuff. Area under the curve (AUC) for all 13 measurements was also calculated and represents total forearm reactive hyperemia.

Functional Questionnaires

Subjects completed two functional questionnaires: the "Modified American Shoulder & Elbow Surgeons Rating Scale" and the "Lower Extremity Functional Scale" (reprinted from Brinkley, J.Stafford, P., Lott, S., Ridle, D., & The North American Orthopedic Rehabilitation Research Network, The Lower Extremity Functional Scale: Scale development, measurement properties, and clinical application, Physical Therapy, 1999, 79, 4371-383, with permission of the American Physical Therapy Association).

Both of these questionnaires presented subjects with a list of daily activities (i.e. open a jar of food, getting into or out of bath, rolling over in bed) which they rated on a likert scale. Subjects read each activity and rated, by assigning a number, how difficult it was for them to perform that activity. Subjects were instructed to do their best to rate each activity honestly and to the best of their ability even if they were not used to performing that activity often (i.e. making sharp turns while running). Each individual activity's rating score was then added together to form a total. This total was then divided by the total number of activity assessments in that questionnaire. This value then became their average functional rating for that scale.

Ultrasound Muscle and Fat Thickness

Muscle and fat thickness were measured using B-mode ultrasound (Fukuda Denshi UF-750XT (Tokyo, Japan). Subjects were brought into a private room where they were first measured with a tape measure in order to determine the location at which the ultrasound measurements were to be performed. All measurements were performed on the right side of the body while the subject stood with her body weight evenly distributed on each leg. First the investigator palpated for the greater trochanter. This was done by asking the subject to hold onto the wall and to repeatedly abduct her leg while the investigator palpated in the general area. Once this site was determined, the investigator placed the start of the tape measure on this location and brought the other end of the tape measure towards the knee in order to locate the lateral epicondyle. Once this site was located, the investigator recorded the distance measured. 50% of this distance was then marked with a permanent marker on both the front and the backside of the thigh. 70% of this distance (meaning 70% of the distance upward from the lateral

epicondyle) was also marked both in both the front and the back of the thigh. These locations were the sites of the 50% quadriceps, 50% hamstrings, 70% quadriceps, and 70% hamstrings ultrasound muscle and fat thickness measurements.

The upper body was also measured with a tape measure first in order to determine appropriate ultrasound measuring sites. The subject was asked to abduct her right arm and the distance between the inner fold of the elbow and the acromion process was measured. Two-thirds of this distance, measured upwards from the elbow, was marked. The chest site was measured at two "finger-widths" above the collar bone and the subscapular measurement was measured at two "finger-widths" below the point of the scapula. Subjects were instructed to manipulate their right arm behind their back so as to cause the distal point of the scapula to become apparent and this site was noted. Upper body muscle and fat thickness measurements were performed at the chest, subscapular, and deltoid sites. A visceral fat measurement was also obtained. This measurement was performed at two-thirds of the distance (upward) from the naval to the manubrium. Subjects were encouraged to maintain the ultrasound location marks on their own although they could clearly not be forced to do this. Approximately 60% of the subjects regularly re-marked the sites. For those subjects who did not remark the sites, sites were re-measured at each ultrasound assessment visit.

Once all sites were measured, subjects were instructed to stand relaxed, with their weight balanced, as a probe with a small amount of gel was placed over the various sites. All sites were measured with the probe held horizontally. The investigator was careful to hold the probe lightly and to not depress the tissue as this would have distorted the image. Two images were taken at each site. Images were

stored for later analysis. Muscle thickness was determined as the distance from the bone to the fat layer. Fat thickness was determined as the distance from the muscle to the skin. Measurements were taken once on each image (two images per site) and the two measurements at each site were then averaged.

Skinfolds and Circumference

Four 50% thigh skinfolds (anterior, posterior, lateral, medial) were taken in duplicate using a Lange caliper. A 50% thigh circumference was also measured in duplicate with a standard measuring tape. The 50% location was performed at the same site as the 50% ultrasound measurements and was determined as described in that section (above). Muscle cross-sectional area (CSA) was calculated using two methods: Moritani and deVries:

$$\mathrm{CSA} = \pi \left[\frac{\mathrm{Circumference}}{2\pi} - \frac{\sum_{i=1}^{4} \mathrm{skf}_i}{4} \right]^2,$$

where "Circumference" is 50% thigh circumference and "skf" refers to the thigh skinfold thicknesses at all four sites, and Housh multiple regression:

$$\mathrm{CSA} = (4.68 \times \mathrm{Circumference}) - (0.64 \times \mathrm{skf_A}) - 22.69,$$

where "Circumference" is 50% thigh circumference and "$\mathrm{skf_A}$" was the anterior thigh skinfold [89].

Bi-weekly Measurements

One-Repetition Maximum

Strength was assessed every other week using the same 1-RM procedures as described previously in the "Pre1/Pre2/Post Measurements" section. Upper body

strength was assessed on the second training session of weeks two, four, six, and eight. The strength was assessed on the chest press, shoulder press, and lat-pull down in that order. In between these exercises, on this training day, subjects performed their standard lower body exercises (leg press, leg curl, leg extension) using the repetitions and sets for a normal day of exercise training. Lower body strength was assessed on the third training session of weeks two, four, six, and eight. The strength was assessed on the leg press, leg curl, and leg extension in that order. In between these exercises, on this training day, subjects performed their standard upper body exercises (chest press, shoulder press, lat pull-down) using the repetitions and sets for a normal day of exercise training. Prior to any 1-RM assessment, investigators were careful not to look at any previous 1-RMs for that subject so as not to bias the results. It could not be helped if subjects happened to remember their previous performance, however. Following 1-RM assessment, subjects were told how they had performed. Following all training and testing, subjects were given a copy of their strength progression throughout the course of the study.

Weekly Measurements

Prior to any exercise training, on the first visit of each week, a measurement session was performed. All ultrasound muscle and fat thickness assessments, four thigh skinfolds, and a thigh circumference were performed. The details of these measurements are described above in the Pre1/Pre2/Post Measurements section.

Exercise Training Visits

Eight weeks of progressive resistance exercise were performed. Subjects trained three times per week using six exercise machines: leg extension, leg curl, leg press, lat

pull-down, shoulder press, and chest press. Exercises were not performed in the same order for each session although during each session lower body and upper body exercises were always alternated. Subjects often performed exercises in the same order in which 1-RMs were assessed (leg press, chest press, leg curl, shoulder press, leg extension, lat pull-down), however, due to the need to train multiple subjects during many of the training sessions, this order was not always performed. All exercise sessions were supervised by one or several of the investigators. Sometimes several subjects were trained at once and sometimes a subject was trained alone. All training sessions (repetitions, sets, and any special notes) were recorded by an investigator during the training session.

Each exercise was performed for three total sets with approximately 60 s of rest between sets and between exercises. Subjects were encouraged to push themselves. On the first lower body and the first upper body exercise performed, subjects lifted at a light weight for ten repetitions in order to warm-up. Initially, subjects lifted at 80% of 1-RM. If this weight was too heavy for a subject to complete at least eight repetitions, then the weight was adjusted downwards to a weight that the subject could manage. If the subject completed at least eight repetitions, the weight was kept at this level. The goal of the first two sets was to perform ten repetitions. The third set was performed to "failure" with failure designed to occur around ten repetitions. Subjects were strongly encouraged to keep performing repetitions beyond ten if this was possible for them to do, however. Once a subject's repetitions in this set exceeded 10, weight on that exercise was increased. This progression continued throughout the eight weeks of training. The frequency of increases in weight varied widely by individual subject and

by exercise machine. For example, leg press weights increased for many subjects approximately every three training sessions while chest press weights often increased only two or three times throughout the entire eight weeks. In general, subjects were able to increase weights on the leg exercises more quickly than they were able to increase the weights on the upper body exercises. As these were free-living human subjects prone to day-to-day variations in strength and motivation, occasionally a subject's weight on an exercise would be increased following one training session and then have to be returned to what was previously being worked at for the next training session if the subject could not perform the required repetitions at the new weight. Each training session took approximately thirty-five to forty-five minutes.

Data Analyses

Repeated measures analysis of variance (ANOVA), 2 groups x 2 time-points was first used to assess stability of the measurements. For measurements performed at only three time-points (Pre1, Pre2, Post), Pre1 and Pre2 were the time-points compared. For measurements performed weekly, Pre2 and Week1 (prior to first training session) were the time-points compared. When no significant time effects were found, Pre1 and Pre2 (or Pre2 and Week1) values were averaged. This average Pre value, was then used for all subsequent analyses and is referred to henceforth as simply "Pre". If a significant time effect was found between Pre1 and Pre2 values, the time closest to the start of training, Pre2 for Pre1/Pre2/Post measurements or Week 1 for weekly measurements, was used as "Pre". Reliability calculations were also performed on the cardiovascular assessments, strength assessments, total body DXA assessments, and the

functional assessments using standard error of the measurements, Pearson correlations, and Student's t tests.

The effect of the intervention was assessed using repeated measures ANOVA (2 groups x 2 time-points) or, for variables that were measured weekly, repeated measures ANOVA (2 groups x 9 time-points). 1-RM's were analyzed using repeated measures ANOVA (2 groups x 6 time-points). Post-hoc paired sample and independent sample t-tests were performed as necessary to decompose main effects and interactions. For analyses, alpha was also set at 0.05. All data were analyzed using SPSS for Windows (Chicago, Illinois). For both pulse wave velocities, peak and area under the curve reactive hyperemia, and strength changes, individual responses were also examined.

Multiple regression analysis was also performed to examine predictors of changes in strength from pre to post training. For each for the six exercises, the initial strength on that exercise and the changes in muscle thickness that would be relevant to that exercise (for example, quadriceps muscle thickness as a predictor for leg press strength) were examined as predictors.

CHAPTER IV: RESULTS AND DISCUSSION

Results

The purpose of this study was to compare the time-course of muscle hypertrophy and to examine the arterial stiffness and peripheral blood flow responses in young and older women to high-intensity resistance exercise training.

Subject Characteristics

Forty-four subjects were consented. Six subjects decided to not participate prior to any testing or training. Nine subjects decided not to participate following pre-testing or following some exercise training. The major reason for choosing not to participate following consent and/or testing and training was the time commitment. Twenty-nine subjects (young = 16; older = 13) completed both testing and training. Young subjects were aged 19-25 (mean = 22 years). Older subjects were aged 51-62 (mean = 57 years). All subjects were not resistance trained (defined as >6 months without performing regular resistance exercise) and were not highly endurance trained but may have performed regular low or moderate-intensity endurance exercise (<5 hours per week) which was allowed to be continued during the study. All subjects had no known orthopedic or metabolic disorders which could have prevented them from participation in the exercise program. All older subjects had obtained medical clearance from their physicians and all older subjects were postmenopausal and not on any kind of hormone replacement therapy. The blood pressure of all subjects was below 140/90 on the day of the screening and all women were not pregnant of planning to become pregnant. Four of the older subjects and none of the younger subjects were on blood pressure medication. Two of the younger subjects were taking oral contraceptives.

Further characteristics of the subjects prior to any exercise training are shown in Table 1.

Table 1. Subject Characteristics (Before Exercise Training)

	Young (n = 16)		Older (n = 13)	
Age (years)	22	2	57*	3
Height (m)	167.5	5.8	164.5	4.2
Body Mass (kg)	66.0	11.9	82.7*	17.0
Fat Mass (kg)	22.4	9.0	36.7*	11.5
% Fat	33.3	8.7	43.9*	5.4
Bone-free Lean Mass (kg)	40.0	5.4	42.6	6.1
BMC (kg)	2.7	0.4	2.7	0.3
SBP (mmHg)	108	8	119*	13
DBP (mmHg)	69	6	76*	6
Aerobic Activity (hrs/week)	1.5	1.7	0.9	1.3

SBP, systolic blood pressure; DBP, diastolic blood pressure; BMC, bone mineral content; Results are presented as Mean and Standard Deviation; *$p<0.05$ from young

Pre1 to Pre2 Measurement Stability

Pre1 to Pre2 measurement stability assessments are shown in Table 2. These assessments include standard error of the measurement, Pearson correlations, and Student's t-tests. All of the Pearson *r* values were statistically significant indicating that the Pre1 and Pre2 values were highly correlated. This indicates that the rank of subjects on each value remained fairly constant, however, Pearson *r* values cannot detect systemic error. Student's t tests were used to compare means between Pre1 and Pre2 and it was found that %fat, fat total, and lean total mean values were statistically

significant between Pre1 and Pre2. This shows that these values were subject to variability from Pre1 to Pre2. The standard error of the measurements varied by measurement. The standard error of the measurement quantifies the precision of individual measurements and the value is reported in the units in which the measurement is reported. For example, the standard error of the measurement for heart rate has a value of "1" which represents 1 bpm while the standard error of the measurement for diastolic blood pressure is "5" which represents 5 mmHg. Systolic blood pressure's standard error of the measurement was higher than diastolic blood pressure's standard error of the measurement. Femoral-tibialis posterior pulse wave velocity's standard error of the measurement was higher than carotid-femoral pulse wave velocity's standard error of the measurement. The standard error of the measurement for the three DXA-assessed body composition variables that the Student's t tests showed were statistically significantly different from each other were higher than the standard error of the measurement for bone mineral content total which did not have means that differed from each other as assessed by Student's t test. Regarding strength assessments, leg press strength showed the greatest standard error of the measurement and shoulder press strength showed the smallest standard error of the measurement. The upper body average functional score's standard error of the measurement was slightly lower than the lower body average functional score's standard error of the measurement.

Table 2. Measurement Stability.

		SEM	r	t
Cardiovascular	Systolic Blood Pressure (mmHg)	10	0.763*	0.111
	Diastolic Blood Pressure (mmHg)	5	0.757*	0.888
	Heart Rate (bpm)	1	0.801*	-0.830
	Carotid-Femoral Pulse Wave Velocity (m/s)	0.9	0.916*	1.624
	Femoral-Tibialis Posterior Pulse Wave Velocity (m/s)	1.5	0.225	-0.628
	Resting Forearm Blood Flow (ml/min/100 ml)	1.85	0.524*	0.172
	Forearm Reactive Hyperemia Area Under the Curve (units)	6.55	0.532*	0.048
	Forearm Reactive Hyperemia Peak (ml/min/100 ml)	24.93	0.666*	-0.651
Body Composition	Weight (kg)	1.05	0.998*	-0.053
	% Fat Total	1.19	0.994*	2.247*
	Fat Total (kg)	1.49	0.999*	2.344*
	Lean Total (kg)	1.17	0.983*	-2.268*
	Bone Mineral Content Total (kg)	0.12	0.971*	0.495
Strength (1 RM)	Leg Press (kg)	12.82	0.865*	-0.134
	Chest Press (kg)	3.8	0.891*	-1.537
	Leg Curl (kg)	5.04	0.907*	-1.555
	Shoulder Press (kg)	2.97	0.884*	-1.482
	Leg Extension (kg)	5.78	0.936*	-1.155
	Lat Pull-Down (kg)	3.69	0.999*	-2.016
Function	Lower Body Average Functional Score	0.13	0.938*	-3.547
	Upper Body Average Functional Score	0.1	0.662*	-1.729

Pre1 to Pre2 measurement stability assessments. SEM, standard error of the measurement; *$p<0.05$.

Pre/Post Assessments

The assessments that were performed at only Pre and Post included the cardiovascular assessments (brachial blood pressure, carotid-femoral pulse wave velocity and femoral-tibialis posterior pulse wave velocity, resting forearm blood flow,

and forearm reactive hyperemia), body composition assessment via DXA, and the upper and lower body functional questionnaires.

Cardiovascular Assessments

The mean values for the cardiovascular assessments are presented in Table 3 and in Figures 1, 4, 7, and 10. Systolic blood pressure did not change over time ($p = 0.15$) and no interaction (group x time) in systolic blood pressure response was found ($p = 0.98$). Systolic blood pressure did differ by group, however, as a significant ($p<0.05$) group effect was found ($p = 0.01$); older subjects possessed higher systolic blood pressure than did younger subjects (Table 3). Diastolic blood pressure also did not change over time ($p = 0.84$) and no significant interaction (group x time) was found ($p = 0.18$). Diastolic blood pressure also differed by group; the group effect was significant at $p<0.05$ ($p = 0.04$) with older subjects possessing higher diastolic blood pressure than younger subjects (Table 3). Heart rate showed no significant ($p<0.05$) time effect ($p = 0.93$), group x time interaction ($p = 0.37$) or group effect ($p = 0.72$; Table 3).

Carotid-femoral pulse wave velocity only showed a significant ($p<0.05$) group effect ($p = 0.00$) with older subjects having a higher carotid-femoral pulse wave velocity than younger subjects (Table 3 & Figure 1). No significant ($p<0.05$) carotid-femoral pulse wave velocity interaction ($p = 0.55$) or time effect ($p = 0.08$) was found (Table 3 & Figure 1). No significant ($p<0.05$) effects were found for femoral-tibialis posterior pulse wave velocity (time effect, $p = 0.37$; interaction, $p = 0.24$; group effect, $p = 0.81$; Table 3 & Figure 4). Likewise, no significant ($p<0.05$) effects were found for resting forearm blood flow (time effect, $p = 0.11$; interaction, $p = 0.19$; group effect, $p = 0.25$; Table 3). A significant ($p<0.05$) interaction was found for peak forearm blood

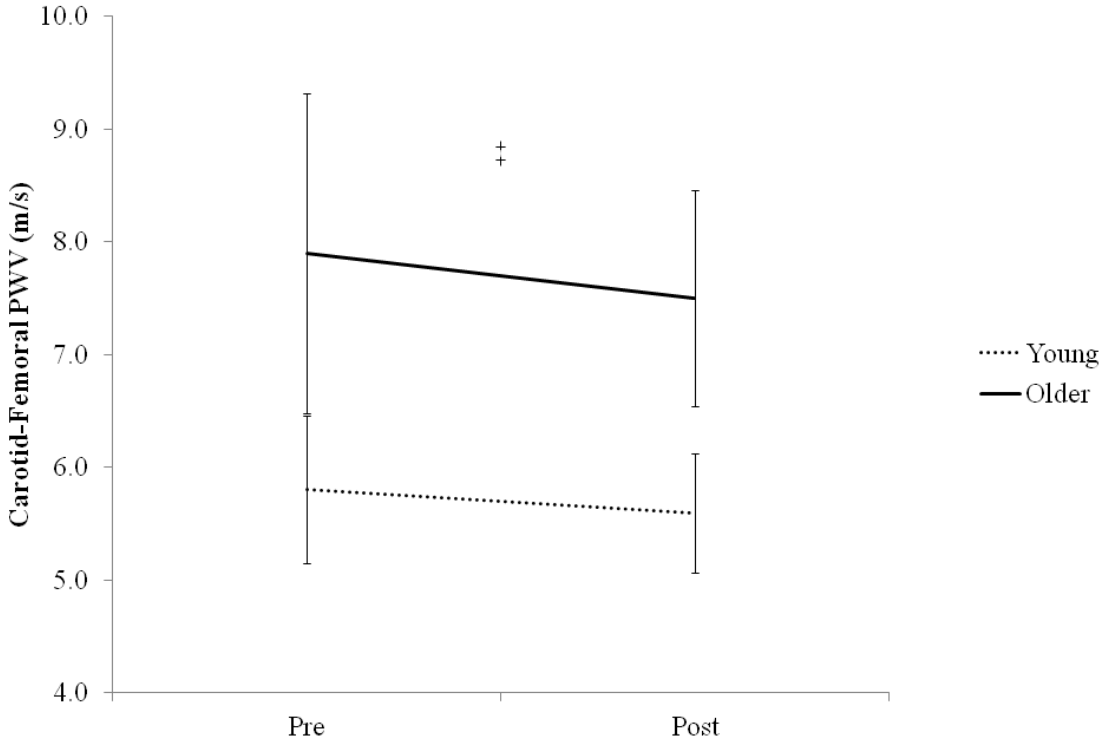
flow ($p = 0.04$). Older subjects saw an increase in peak forearm blood flow following training while no effect was seen in younger subjects (Table 3 & Figure 7). Total hyperemia was found to significantly ($p<0.05$) increase as a time effect was found ($p = 0.00$), however, no group effect ($p = 0.26$) or interaction ($p = 0.25$) was found (Table 3 & Figure 10).

Table 3. Cardiovascular Assessments

			Pre		Post	
Blood Pressure (mmHg)	Systolic‡	Young	108	8	110	10
		Older	119	13	121	14
	Diastolic‡	Young	69	6	71	8
		Older	76	6	74	8
Resting Heart Rate (bpm)		Young	64	8	65	10
		Older	64	10	63	8
Pulse Wave Velocity (m/s)	Carotid-Femoral‡	Young	5.8	0.7	5.6	0.5
		Older	7.9	1.4	7.5	1.0
	Femoral-Tibialis Posterior	Young	8.5	1.2	8.6	1.6
		Older	9.0	1.5	8.3	1.3
Forearm Blood Flow	Resting (ml/min/100 ml)	Young	2.36	0.77	3.27	1.26
		Older	3.20	1.93	3.30	0.96
	Peak Flow (ml/min/100 ml)$	Young	21.72	5.07	21.36#	4.24
		Older	22.61	8.94	26.72†	9.54
	Total Hyperemia (units)*	Young	70.69	17.34	84.18	27.61
		Older	78.87	32.82	104.03	55.48

Cardiovascular Assessments; n = 16 young, n = 13 older; AUC, area under the curve; Results are presented as Mean and Standard Deviation;*p<0.05 time effect; ‡p<0.05 group effect; $p<0.05 time by group interaction; #p<0.05 from Older; †p<0.05 from Pre

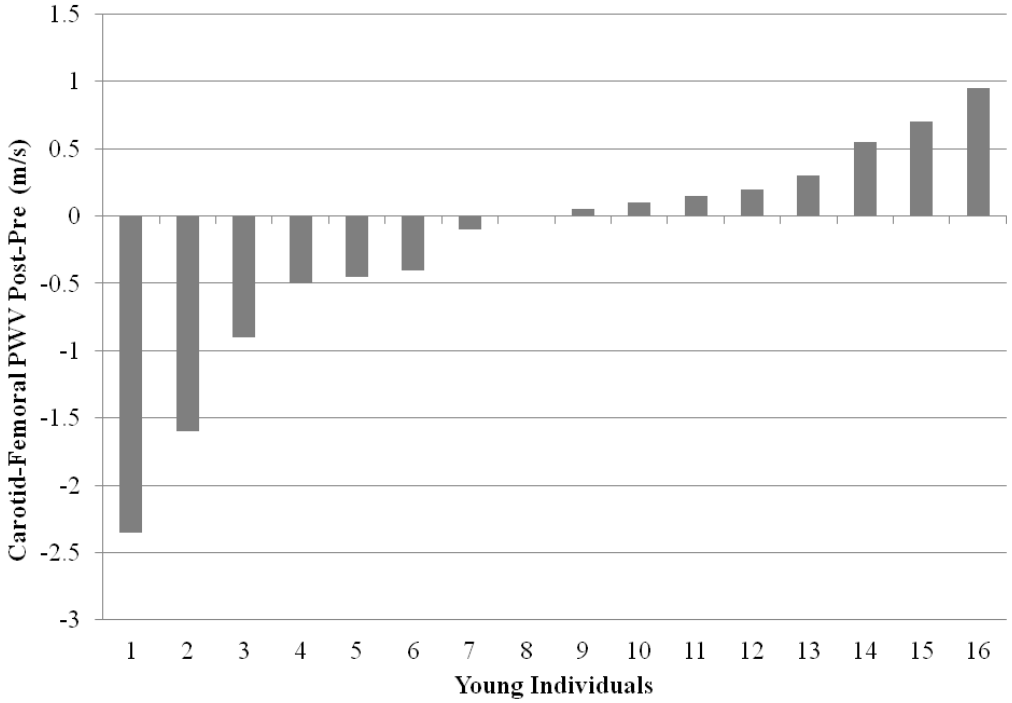
Figure 1. Carotid-Femoral Pulse Wave Velocity



Data are presented as mean and standard deviation; PWV, pulse wave velocity; ‡p<0.05 group effect.

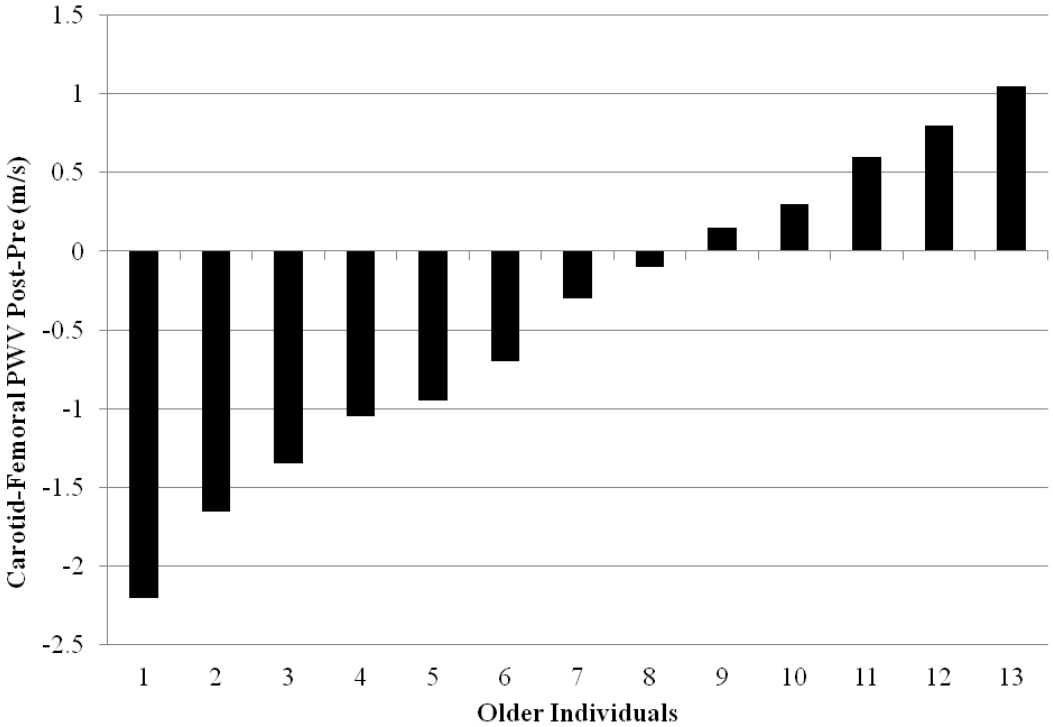
As previously stated, the mean carotid-femoral PWV values show no change from Pre to Post (Figure 1). However, examining individual values shows that the response of each subject differed. Carotid-femoral PWV increased in eight young subjects, decreased in seven young subjects, and did not change in one young subject (Figure 2). Thus, an approximately equal number of young subjects increased as decreased their carotid-femoral PWV. Carotid-femoral PWV increased in five older subjects and decreased in eight older subjects (Figure 3). Thus, a decrease in carotid-femoral PWV was seen slightly more often in older subjects than was an increase in carotid-femoral PWV. In both young and older, the magnitude of the individual decreases appeared greater than the magnitude of the individual increases.

Figure 2. Individual Changes for Young in Carotid-Femoral Pulse Wave Velocity



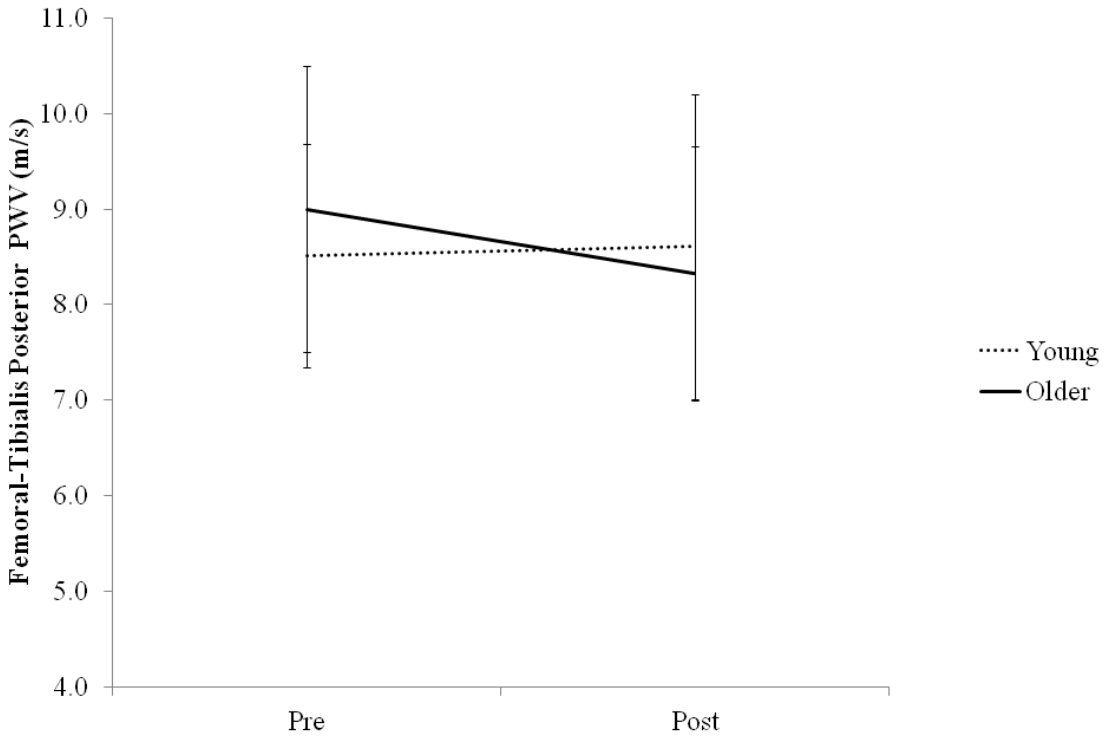
Individual changes from Pre to Post for young. Negative value indicates a decrease in Carotid-Femoral PWV over the course of the training. PWV, pulse wave velocity.

Figure 3. Individual Changes for Older in Carotid-Femoral Pulse Wave Velocity



Individual changes from Pre to Post for older. Negative value indicates a decrease in Carotid-Femoral PWV over the course of the training. PWV, pulse wave velocity.

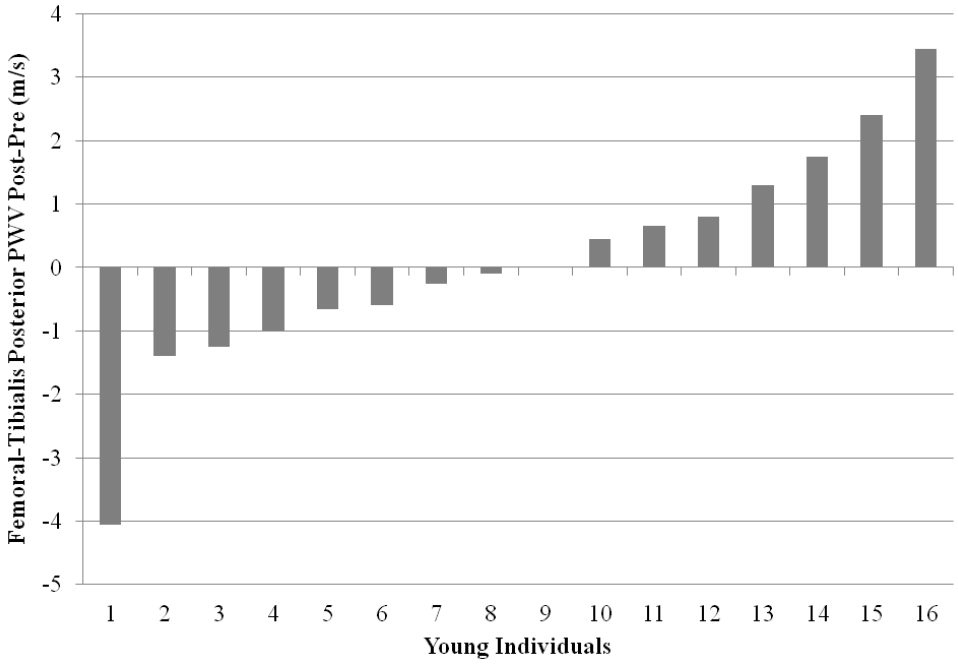
Figure 4. Femoral-Tibialis Posterior Pulse Wave Velocity



Data are presented as mean and standard deviation; PWV, pulse wave velocity.

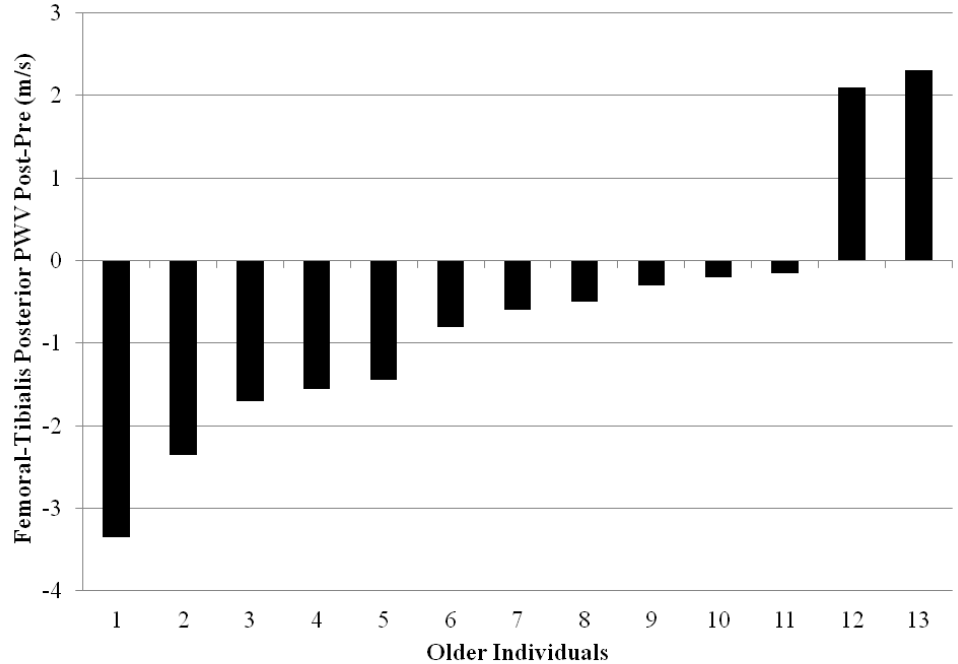
Femoral-tibialis posterior PWV also did not appear to change when looking at mean values (Figure 4). When looking at individual values, femoral-tibialis posterior PWV decreased in eight young subjects, increased in seven young subjects, and did not change in one young subject (Figure 5). Thus, approximately an equal number of young subjects increased as decreased their femoral-tibialis posterior PWV. Femoral-tibialis posterior PWV decreased in eleven older subjects and increased in two older subjects (Figure 6). Thus, the majority of the older subjects decreased their femoral-tibialis posterior PWV.

Figure 5. Individual Changes for Young in Femoral-Tibialis Posterior Pulse Wave Velocity



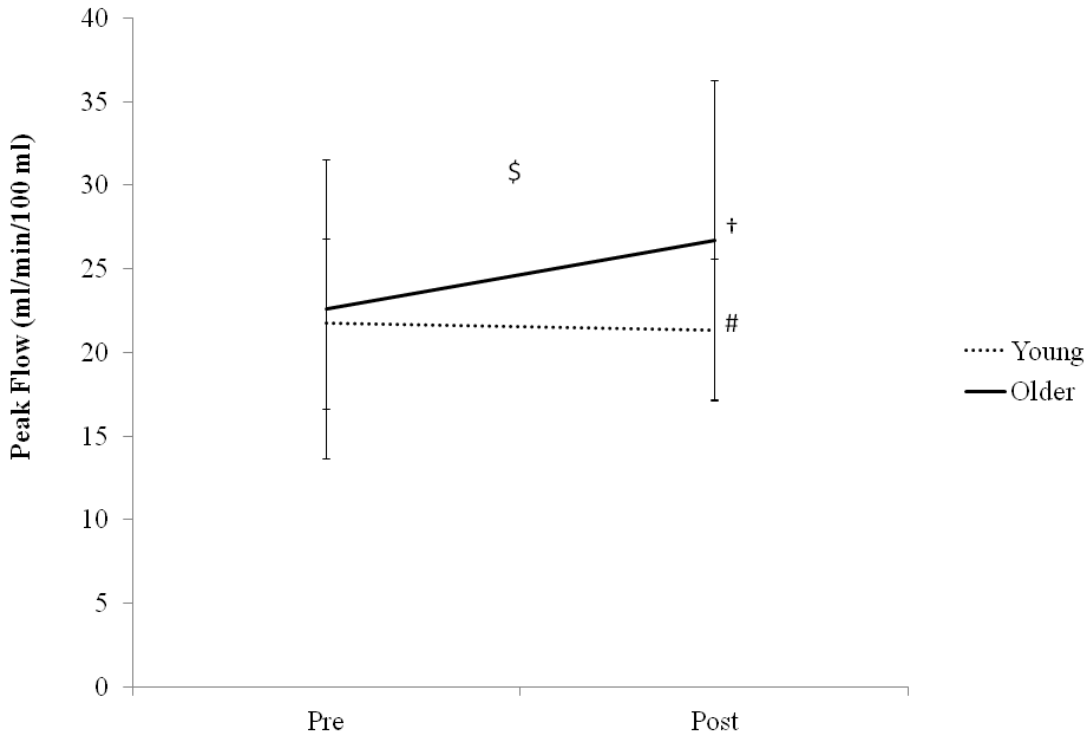
Individual changes from Pre to Post for young. Negative value indicates a decrease in Femoral-Tibialis Posterior PWV over the course of the training. PWV, pulse wave velocity.

Figure 6. Individual Changes for Older in Femoral-Tibialis Posterior Pulse Wave Velocity



Individual changes from Pre to Post for older. Negative value indicates a decrease in Femoral-Tibialis Posterior PWV over the course of the training. PWV, pulse wave velocity.

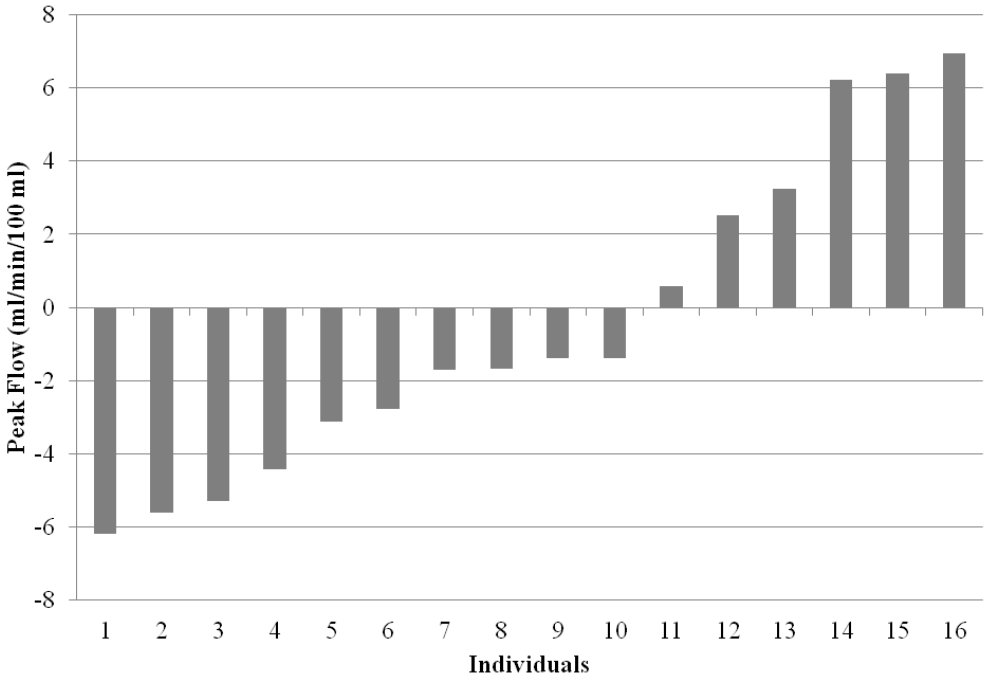
Figure 7. Peak Forearm Blood Flow During Reactive Hyperemia



Data are presented as mean and standard deviation; $p<0.05 group x time interaction; #p<0.05 from older; †p<0.05 from Pre.

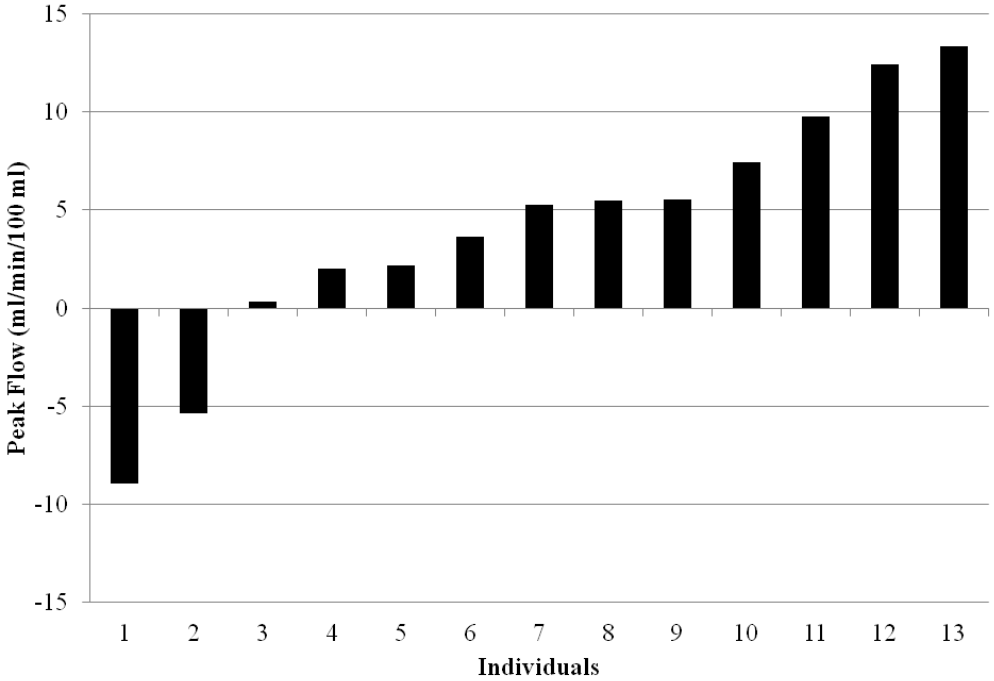
Peak flow mean changes are described in the above paragraph describing Table 3 and are shown graphically in Figure 7. Peak flow decreased in ten young subjects and increased in six young subjects (Figure 8). Thus, slightly more young subjects increased peak flow than decreased peak flow. Peak flow decreased in two and increased in eleven older subjects (Figure 9). Thus, many more older subjects increased peak flow than decreased peak flow.

Figure 8. Individual Changes for Young in Peak Forearm Blood Flow During Reactive Hyperemia



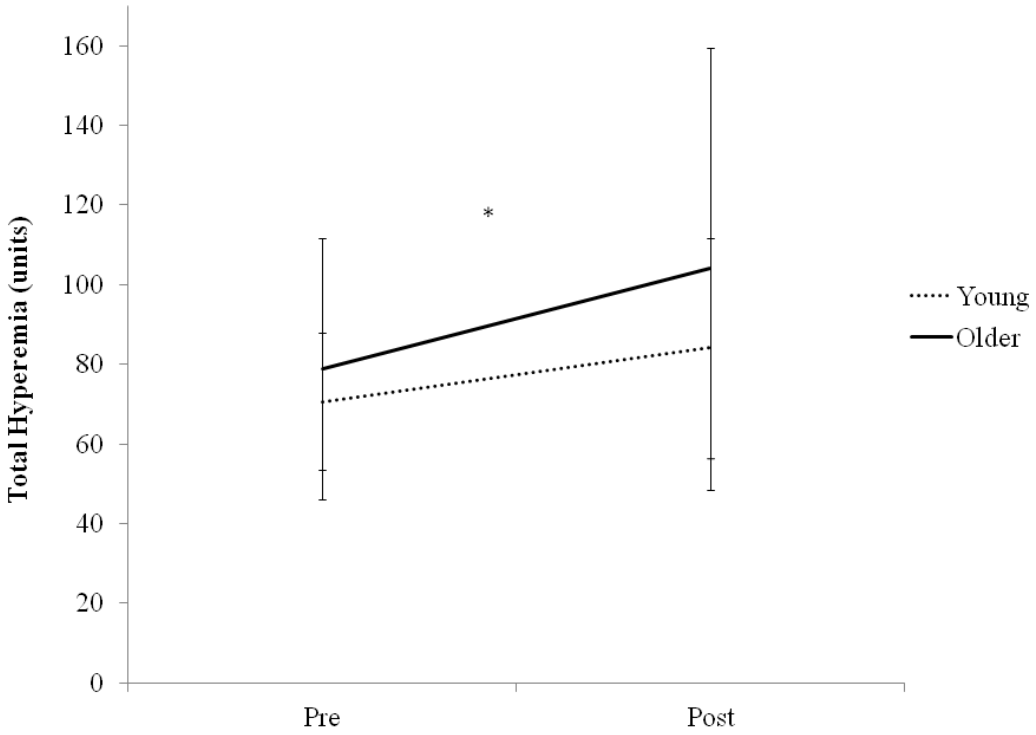
Individual changes from Pre to Post for young. Negative value indicates a decrease in Peak Flow over the course of the training.

Figure 9. Individual Changes for Older in Peak Forearm Blood Flow During Reactive Hyperemia



Individual changes from Pre to Post for older. Negative value indicates a decrease in Peak Flow over the course of the training.

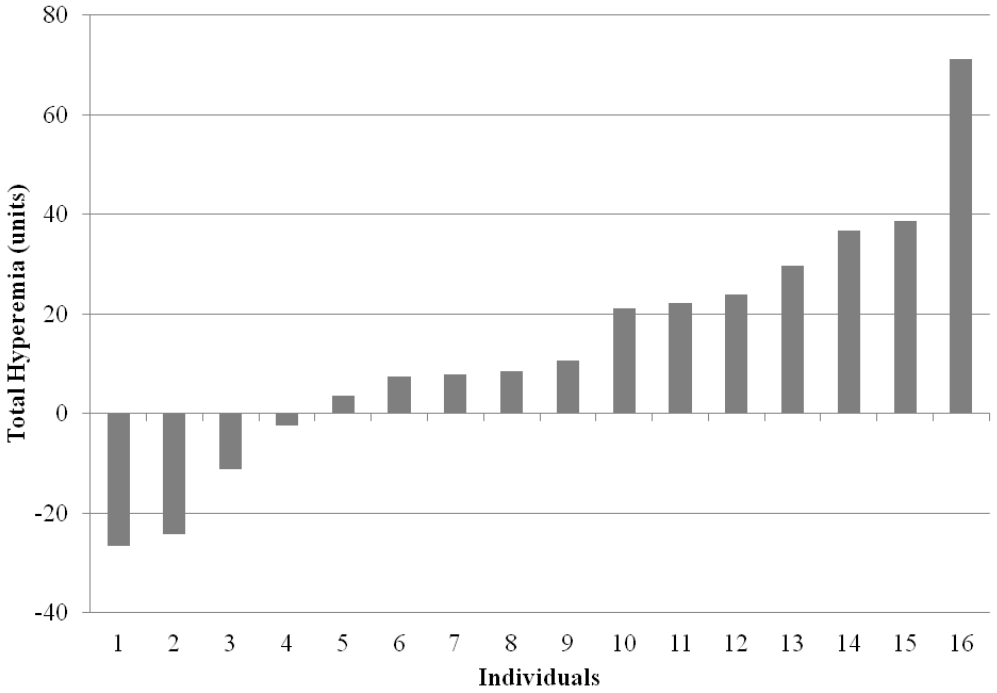
Figure 10. Total (Area Under the Curve) Forearm Hyperemia



Data are presented as mean and standard deviation; *p<0.05 time effect.

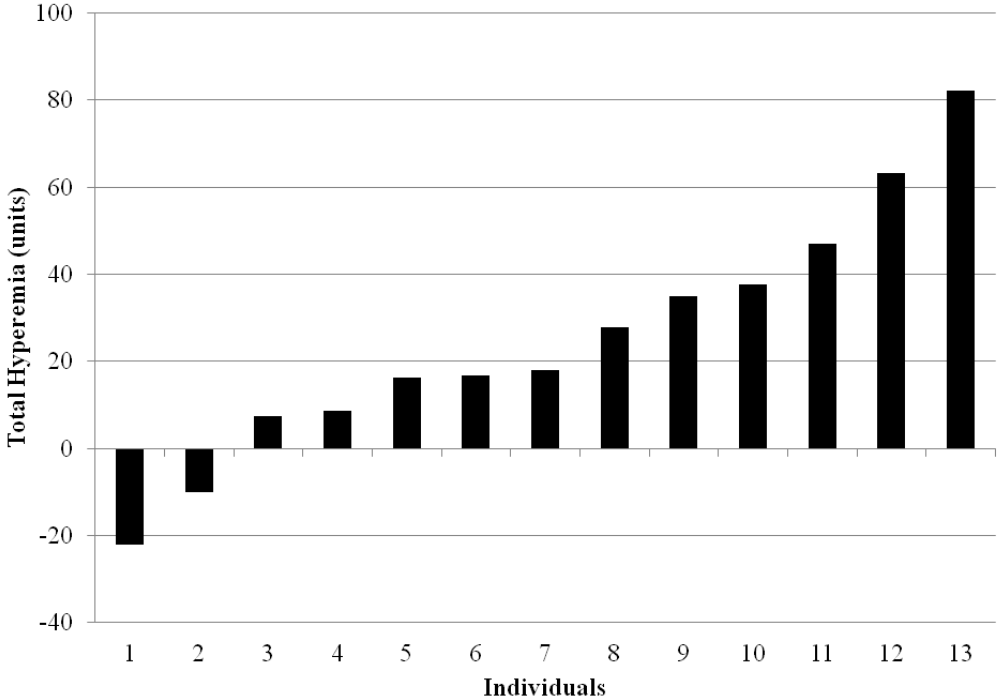
Total hyperemia mean responses are also described in the paragraph describing Table 3 and are shown graphically in Figure 10. Total hyperemia decreased in four young subjects and increased in fourteen young subjects (Figure 11). Thus, many more young subjects increased total hyperemia than decreased total hyperemia. Total hyperemia decreased in two older subjects and increased in eleven older subjects (Figure 12). Thus total hyperemia increased much more often than it decreased in older subjects.

Figure 11. Individual Changes for Young in Total (Area Under the Curve) Forearm Hyperemia



Individual changes from Pre to Post for young. Negative value indicates a decrease in Total Hyperemia over the course of the training.

Figure 12. Individual Changes for Older in Total (Area Under the Curve) Forearm Hyperemia



Individual changes from Pre to Post for older. Negative value indicates a decrease in Total Hyperemia over the course of the training.

DXA-Assessed Body Composition

Body composition, as assessed by DXA, is presented in Table 4. The following DXA-assessed body composition variables changed significantly ($p<0.05$) over time: total body mass (kg) ($p = 0.00$), total fat (%) ($p = 0.04$), leg fat (%) ($p = 0.00$), arm bone-free lean mass (kg) ($p = 0.00$), and leg bone-free lean mass (kg) ($p = 0.00$). Total fat (%) and leg fat (%) decreased over time. Total body mass (kg), arm bone-free lean mass (kg) and leg bone-free lean mass (kg) all increased over time.

The following DXA-assessed body composition variables showed significant ($p<0.05$) differences between groups: total body mass (kg) ($p = 0.00$), total fat (%) ($p = 0.00$), arm fat (%) ($p = 0.00$), leg fat (%) ($p = 0.00$), trunk fat (%) ($p = 0.00$), total fat mass (kg) ($p = 0.03$), arm fat mass (kg) ($p = 0.00$), leg fat mass (kg) ($p = 0.00$), and trunk fat mass (kg) ($p = 0.00$). In all cases, the older group possessed a greater quantity (kg) or greater percentage (%) of fat than did the younger group. No interactions (group x time) were found for any DXA-assessed body composition variable although lean arm mass (kg) almost showed an interaction ($p = 0.054$).

Table 4. DXA-Assessed Body Composition

			Pre		Post	
Body Mass (kg)*‡		Young	66.0	11.9	66.8	11.7
		Older	82.7	17.0	83.4	17.9
Fat (%)	Total*‡	Young	33.3	8.7	32.6	8.2
		Older	43.9	5.4	43.5	5.9
	Arms‡	Young	31.1	9.1	30.3	8.5
		Older	43.2	7.9	42.9	8.3
	Legs*‡	Young	36.2	7.6	35.6	7.4
		Older	45.6	5.8	44.5	6.0
	Trunk‡	Young	33.9	10.3	33.2	9.7
		Older	45.4	5.9	45.4	6.6
Fat Mass (kg)	Total‡	Young	22.4	9.0	22.2	8.6
		Older	36.7	11.5	36.6	11.9
	Arms‡	Young	2.2	1.0	2.2	0.9
		Older	3.8	1.0	3.6	1.2
	Legs‡	Young	8.4	2.7	8.5	2.7
		Older	13.0	4.1	12.8	4.3
	Trunk‡	Young	11.1	5.4	10.8	5.2
		Older	19.1	6.8	19.3	6.9
BMC-Free Lean Mass (kg)	Total	Young	40.0	5.4	39.9	8.4
		Older	42.6	6.1	43.2	6.8
	Arms*	Young	4.2	0.7	4.5	0.8
		Older	4.2	0.4	4.3	0.5
	Legs*	Young	13.5	2.1	14.0	2.4
		Older	14.0	2.4	14.5	2.9
	Trunk	Young	19.3	2.5	19.6	2.4
		Older	21.2	3.8	21.3	3.9
BMC (kg)	Total	Young	2.7	0.4	2.7	0.4
		Older	2.7	0.3	2.7	0.3
	Arms	Young	0.3	0.1	0.3	0.1
		Older	0.3	0.1	0.3	0.1
	Legs	Young	1.0	0.2	1.0	0.2
		Older	1.0	0.1	1.0	0.1
	Trunk	Young	0.9	0.1	0.9	0.1
		Older	0.8	0.2	0.9	0.2

DXA-Assessed Body Composition; BMC, bone mineral content; Results are presented as Mean and Standard Deviation; n = 16 young, 13 older; *p<0.05 time effect; ‡p<0.05 group effect

Table 5. Functional Assessments

		Pre		Post	
Upper Body Average Functional Score*	Young (n = 16)	2.9	0.1	3.0	0.0
	Older (n = 13)	2.8	0.2	2.9	0.1
Lower Body Average Functional Score*‡	Young (n = 16)	3.8	0.2	3.9	0.1
	Older (n = 13)	3.6	0.4	3.8	0.3

Functional Assessments; Results are presented as Mean and Standard Deviation;*p<0.05 time effect; ‡p<0.05 group effect

Functional Assessments

Functional assessments are presented in Table 5. Both young and older subjects improved functional abilities as a significant ($p < 0.05$) time effect was found for both upper ($p = 0.00$) and lower ($p = 0.00$) body function. There were group differences in lower body function ($p = 0.04$) but not upper body function ($p = 0.09$); younger individuals were more functional, as reported by the lower body functional assessment, than were older individuals, and the upper body functional assessment showed similar functional scores between young and older subjects.

Weekly Assessments

The weekly assessments included ultrasound muscle and fat thickness, thigh skinfolds, and a thigh circumference. Results from the seven measured ultrasound muscle sites, the eight measured ultrasound fat sites, the one 50% thigh circumference, and the calculated estimations of muscle CSA (both the method of Moritani and deVries and the Housh multiple regression method) are presented.

Table 6. Muscle Thickness

		Pre	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Post
Q 50 (cm)*	Young	4.93 0.57	5.03† 0.54	5.16# 0.51	5.21# 0.52	5.26 0.53	5.29 0.51	5.42# 0.56	5.41 0.51	5.46 0.51
	Older	4.70 0.51	4.83† 0.48	4.87# 0.48	4.93# 0.49	4.97 0.51	4.97 0.54	5.09# 0.52	5.13 0.36	5.20 0.45
Q 70 (cm)*	Young	3.93 1.04	4.05 0.86	4.29†# 0.82	4.27 0.83	4.32 0.82	4.46# 0.82	4.45 0.88	4.48 0.81	4.45 0.82
	Older	3.60 0.62	3.90 0.47	3.97†# 0.41	4.14 0.53	4.08 0.47	4.11# 0.50	4.17 0.43	4.18 0.40	4.17 0.41
H 50 (cm)*	Young	4.06 0.63	4.27† 0.58	4.34 0.66	4.37# 0.65	4.46 0.70	4.49# 0.78	4.63# 0.73	4.60 0.76	4.66 0.68
	Older	3.74 0.54	3.83† 0.62	3.89 0.58	4.03# 0.55	4.06 0.52	4.19# 0.45	4.27# 0.41	4.33 0.41	4.33 0.42
H 70 (cm)*‡	Young	4.27 0.64	4.37† 0.60	4.52 0.58	4.59 0.59	4.71 0.55	4.72 0.61	4.74 0.62	4.96# 0.51	4.94 0.50
	Older	3.75 0.51	3.86† 0.51	3.88 0.57	3.94 0.58	4.00 0.47	4.05 0.51	4.21 0.57	4.32# 0.57	4.31 0.57
Delt (cm)$	Young	1.82& 0.37	1.96&† 0.31	2.05 0.29	2.04& 0.27	2.12&# 0.30	2.20# 0.31	2.26 0.27	2.23&# 0.30	2.14& 0.30
	Older	2.26 0.61	2.33† 0.62	2.32 0.54	2.45 0.63	2.47 0.55	2.42 0.65	2.48 0.63	2.63# 0.63	2.66 0.53
Chest (cm)*	Young	1.56 0.35	1.61 0.38	1.59† 0.43	1.63 0.35	1.75 0.33	1.82 0.36	1.75 0.47	1.65 0.29	1.56 0.30
	Older	1.65 0.43	1.68 0.45	1.85† 0.48	1.87 0.46	1.95 0.50	1.88 0.55	1.96 0.51	1.89 0.53	1.87 0.45
Sub (cm)	Young	1.88 0.50	1.88 0.44	1.91 0.37	1.87 0.35	1.88 0.41	1.80 0.37	1.85 0.33	1.82 0.39	1.65 0.29
	Older	1.69 0.42	1.77 0.50	1.80 0.45	1.80 0.26	1.89 0.26	1.82 0.34	1.84 0.46	1.80 0.48	1.84 0.46

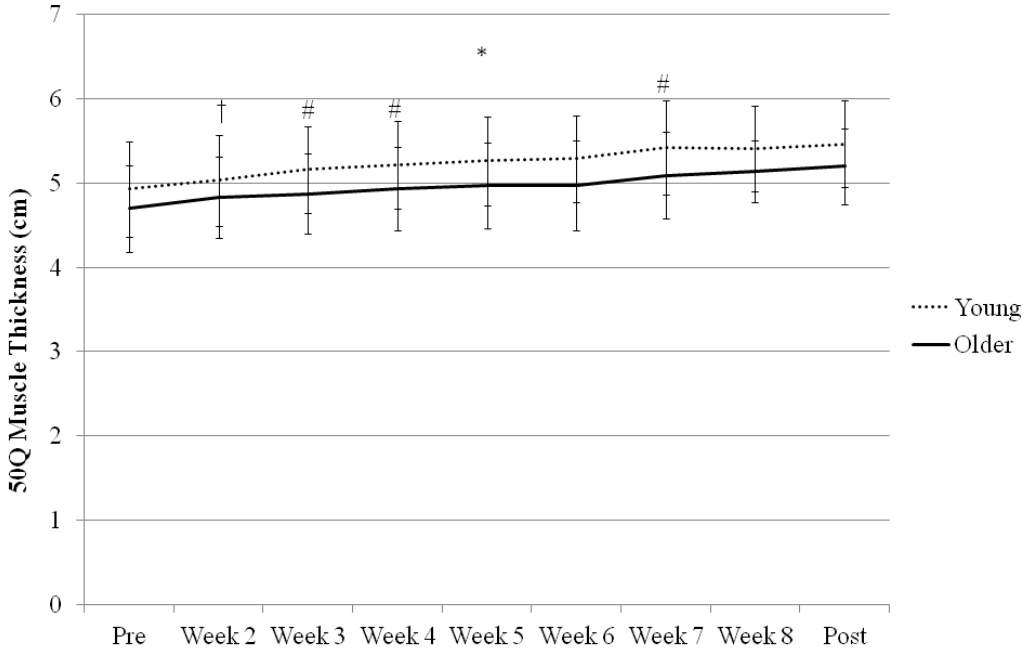
Muscle Thickness; n = 16 young, 13 older; Q, Quadriceps; H, Hamstrings; 50, 50% vertical distance; 70, 70% vertical distance; Results are presented as Mean and Standard Deviation; *p<0.05 time effect; ‡p<0.05 group effect; $p<0.05 time by group interaction; †p<0.05 from Pre (first instance only); #p<0.05 from previous week (pre excluded); &p<0.05 compared to older

Muscle Thickness

Muscle thickness for all muscles examined is presented in Table 6. One lower body muscle thickness, 50 % quadriceps, and one upper body muscle thickness, deltoid, are presented in figures (Figures 13 and 14, respectively).

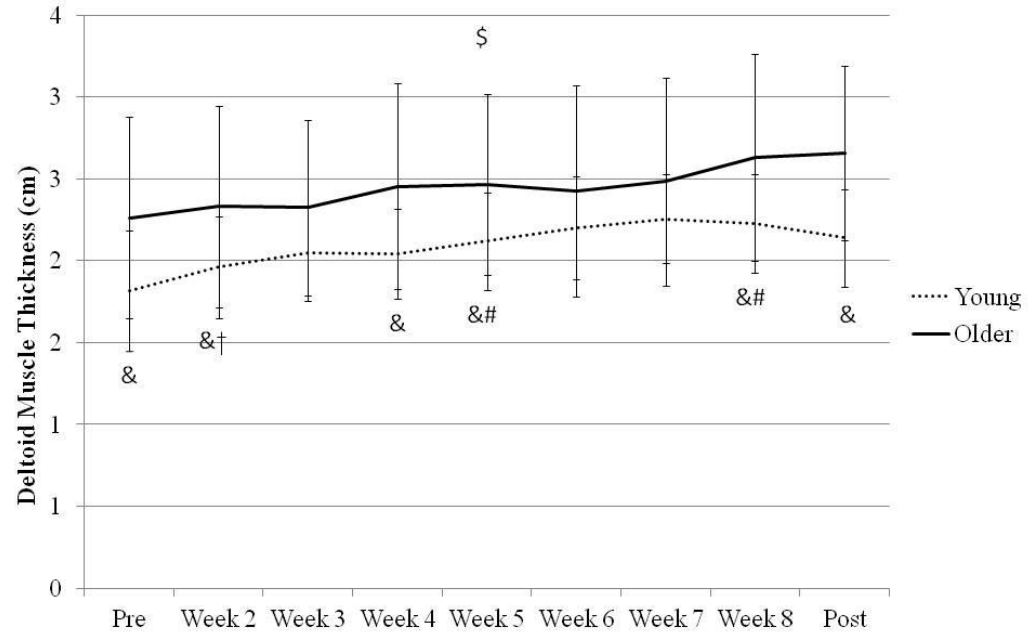
All muscle thicknesses, except for the subscapular muscle thickness, increased significantly ($p<0.05$) over time; the following p values were found for a time effect (or lack of a time effect) at each site: 50% quadriceps ($p = 0.00$), 70% quadriceps ($p = 0.00$), 50% hamstrings ($p = 0.00$), chest ($p = 0.00$) and subscapular ($p = 0.65$). A group effect, with the older group having greater muscle thickness than the young group, was found for the 70% hamstrings muscle thickness ($p = 0.00$). A group x time interaction was found for the change in deltoid muscle ($p = 0.02$); post hoc t-tests revealed many significant ($p<0.05$) differences between young and old at different time points although the increase from Pre to week 2 was significant ($p<0.05$) for both groups at week 2 (Table 6). Post-hoc t-tests revealed that significant ($p<0.05$) increases from Pre were found at week two for the 50% quadriceps ($p = 0.01$), 50% hamstrings ($p = 0.00$), and 70% hamstrings ($p = 0.04$) sites. Significant ($p<0.05$) increases from Pre, also determined with post-hoc t-tests, were seen at week three for the 70% quadriceps ($p = 0.00$) and chest ($p = 0.04$) sites.

Figure 13. 50% Quadriceps Muscle Thickness



Results are presented as Mean and Standard Deviation; Q, Quadriceps; 50, 50% vertical distance; *p<0.05 time effect; †p<0.05 from Pre (first instance only); #p<0.05 from previous week (pre excluded)

Figure 14. Deltoid Muscle Thickness



Results are presented as Mean and Standard Deviation; *p<0.05 time effect; ‡p<0.05 group effect; $p<0.05 time by group interaction; †p<0.05 from Pre (first instance only); #p<0.05 from previous week (pre excluded); &p<0.05 compared to older

Table 7. Fat Thickness

		Pre		Week 2		Week 3		Week 4		Week 5		Week 6		Week 7		Week 8		Post	
Q 50 (cm)*†	Young	1.51	0.53	1.51	0.53	1.54	0.53	1.46†	0.46	1.46	0.45	1.46	0.48	1.39	0.44	1.33#	0.48	1.32	0.47
	Older	2.30	0.74	2.29	0.72	2.22	0.69	2.16†	0.73	2.09	0.69	2.15	0.71	2.10	0.73	2.00#	0.77	2.02	0.78
Q 70 (cm)*†	Young	1.27	0.37	1.24	0.37	1.28	0.38	1.22†	0.42	1.21	0.36	1.15	0.42	1.08	0.37	1.12	0.48	1.02	0.38
	Older	2.09	0.87	2.08	0.76	2.00	0.70	1.90†	0.66	1.95	0.68	1.87	0.62	1.90	0.77	1.87	0.84	1.75	0.84
H 50 (cm)*†	Young	2.47	0.56	2.36	0.57	2.36†	0.66	2.29	0.63	2.19	0.78	2.15	0.70	2.00	0.84	2.07	0.84	2.00	0.69
	Older	3.09	0.93	3.00	0.78	2.96†	0.86	2.94	0.86	2.91	0.81	2.82	0.95	2.98	1.01	2.88	1.16	2.87	1.11
H 70 (cm)*†	Young	1.61	0.48	1.60	0.53	1.60	0.59	1.51	0.52	1.48	0.50	1.38†	0.53	1.44	0.55	1.30	0.42	1.24#	0.46
	Older	2.16	0.68	2.00	0.68	1.83	0.55	1.89	0.56	2.00	0.62	1.92†	0.73	1.92	0.73	1.99	0.74	1.82#	0.72
Delt (cm)*†	Young	0.79	0.49	0.77	0.52	0.80	0.55	0.80	0.57	0.71	0.53	0.81†#	0.54	0.81	0.49	0.72#	0.49	0.68	0.49
	Older	1.26	0.62	1.33	0.63	1.22	0.70	1.25	0.61	1.31	0.70	1.35†#	0.65	1.35	0.69	1.19#	0.64	1.22	0.60
Chest (cm)†	Young	0.38	0.23	0.43	0.28	0.37	0.24	0.46	0.26	0.41	0.26	0.40	0.28	0.42	0.27	0.39	0.25	0.42	0.27
	Older	0.68	0.46	0.72	0.42	0.72	0.35	0.67	0.35	0.66	0.33	0.53	0.25	0.63	0.27	0.55	0.24	0.59	0.29
Sub (cm)†	Young	0.81	0.62	0.73	0.46	0.67	0.39	0.60	0.44	0.65	0.49	0.64	0.58	0.65	0.50	0.64	0.56	0.63	0.48
	Older	1.54	1.03	1.44	1.08	1.58	1.14	1.45	1.05	1.16	0.78	1.48	1.19	1.47	1.14	1.53	1.14	1.41	1.09
Visc (cm)*	Young	1.03	0.64	1.00	0.55	1.04	0.60	0.97	0.50	0.81#	0.56	0.95	0.47	0.95	0.45	0.91	0.46	0.82	0.37
	Older	1.20	0.51	1.26	0.52	1.30	0.52	1.25	0.52	1.24#	0.39	1.10	0.37	1.10	0.42	1.11	0.33	1.18	0.40

Fat Thickness; n = 16 young, 13 older; Q, Quadriceps; H, Hamstrings; 50, 50% vertical distance; 70, 70% vertical distance; , Delt, Deltoid; Sub, Subscapular; Visc, Visceral; Results are presented as Mean and Standard Deviation; *p<0.05 time effect; †p<0.05 group effect; $p<0.05 time by group interaction; †p<0.05 from Pre (first instance only); #p<0.05 from previous week (pre excluded); &p<0.05 compared to older

Fat Thickness

Fat thickness is presented in Table 7. Fat thickness significantly ($p<0.05$) decreased over time for the 50% quadriceps ($p = 0.00$), 70% quadriceps ($p = 0.00$), 50% hamstrings ($p = 0.01$), 70% hamstrings ($p = 0.01$), deltoid ($p = 0.01$), and visceral ($p =$

0.04) fat sites. Fat thickness did not significantly ($p<0.05$) change over time at the chest ($p = 0.08$) or subscapular ($p = 0.106$) sites. Post-hoc tests revealed the following significant ($p<0.05$) changes from Pre at the following weeks: 50% quadriceps fat at week four ($p = 0.02$), 50% hamstrings fat at week three ($p = 0.04$), 70% quadriceps fat at week four ($p = 0.03$), 70% hamstring fat at week six ($p = 0.01$), and deltoid fat at week six ($p = 0.04$). As previously stated, visceral fat showed a time effect over training, however, post-hoc t-tests showed no significant ($p<0.05$) time-point to Pre changes. The older group showed greater fat thickness than the young group as significant ($p<0.05$) group differences in fat thickness were found at all sites (50% quadriceps, $p = 0.00$; 70% quadriceps, $p = 0.00$; 50% hamstrings, $p = 0.00$; 70% hamstrings, $p = 0.02$; deltoid, $p = 0.02$; chest, $p = 0.03$; subscapular, $p = 0.01$) except visceral ($p = 0.15$).

Table 8. Thigh Cross-Sectional Areas and Circumference

		Pre	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Post
50% Thigh Circumference (cm)‡	Young	55.2 4.2	54.8 3.8	55.6 3.9	55.0 3.8	55.3 3.8	55.0 3.8	55.0 3.9	55.7 4.2	55.3 4.5
	Older	60.6 6.1	59.6 5.6	60.5 5.4	60.3 5.5	60.2 6.0	59.9 5.6	60.4 5.6	60.3 5.6	59.5 6.0
M+D CSA (cm^2)$	Young	95.5 29.2	65.2& 38.7	95.8& 30.0	97.7& 24.2	96.7& 28.3	100.8 31.4	88.0# 29.9	104.7 31.3	105.9 36.7
	Older	111.9 17.2	111.7 17.2	110.1 15.1	110.6 12.7	114.8 18.9	105.4 15.1	107.7 14.5	114.3 18.6	111.2 16.7
HMR CSA (cm^2)‡	Young	233.0 19.6	213.6 66.6	234.8 18.3	232.5 17.4	233.8 17.4	232.5 17.7	231.9 18.3	235.6 19.7	233.6 21.0
	Older	258.0 28.0	253.3 25.8	257.8 25.0	256.5 25.6	256.2 27.7	254.7 25.7	257.2 25.9	256.7 25.7	253.0 27.6

Thigh cross-sectional areas (CSA) and circumference; M+D, Moritani and deVries; HMR, Housh multiple regression; n = 13 young, 12 older; Results are presented as Mean and Standard Deviation; ‡p<0.05 group effect; $p<0.05 time by group interaction; #p<0.05 from previous week; &p<0.05 compared to older

Thigh Cross-sectional Area and 50% Circumference

Thigh cross-sectional areas and 50% circumference are presented in Table 8. The 50% thigh circumference of the older subjects was greater than the 50% thigh circumference of the younger subjects. This was seen in the significant ($p<0.05$) group differences in 50% thigh circumference ($p = 0.02$). No time effect ($p = 0.22$) or interaction ($p = 0.59$) for 50% thigh circumference was seen. A significant ($p <0.05$) interaction was found for the Moritani and deVries CSA calculation ($p = 0.03$). Post-hoc t-tests revealed that values for young subjects were significantly ($p<0.05$) different from values for older subjects for weeks two, three, four, and five and young subjects showed a significant ($p = 0.00$) difference from week six to week seven. For the Housh multiple regression calculation, only a significant ($p<0.05$) group effect ($p = 0.01$) was seen (with the older subjects having a greater thigh CSA than the younger subjects) as the tested time effect ($p = 0.26$) and interaction ($p = 0.40$) were not significant ($p<0.05$). The two calculated assessments of cross-sectional area vary greatly between the two calculation methods and are likely not accurate estimates.

Bi-Weekly Assessments

Table 9. One-Repetition Maximums

		Pre		Week 2		Week 4		Week 6		Week 8		Post	
Leg Press (kg)*‡	Young (n = 15)	99.4	13.6	101.5†	13.4	103.9	11.0	108.2	11.4	114.5#	10.6	113.6	14.2
	Older (n = 12)	79.0	13.2	87.1†	18.7	89.8	27.5	94.3	19.9	99.6#	19.9	92.7	24.3
Leg Extension (kg)*‡	Young (n = 15)	54.5	12.2	59.3†	10.8	61.6	11.4	65.9#	12.7	68.8#	12.0	69.8	12.5
	Older (n = 13)	41.3	8.0	45.1†	9.3	47.5	8.7	50.3#	7.8	53.2#	6.6	53.8	8.2
Leg Curl (kg)*‡	Young (n = 15)	52.6	9.5	56.9†	11.2	61.4#	11.4	65.8#	12.8	68.3#	11.3	70.5	9.5
	Older (n = 13)	41.5	6.8	47.3†	7.3	48.8#	8.7	52.3#	8.3	53.8#	8.2	53.8	10.1
Chest Press (kg)*‡	Young (n = 15)	29.3	5.7	29.0	6.0	31.5†#	5.5	34.2#	6.1	34.4	6.0	36.4	5.1
	Older (n = 13)	24.5	5.5	24.0	5.1	26.1†#	4.7	28.4#	4.6	29.9	6.0	28.8	6.4
Shoulder Press (kg)*	Young (n = 15)	22.0	3.9	22.2	3.4	23.9†#	3.9	25.6#	4.8	27.2#	4.7	27.1	5.3
	Older (n = 13)	19.5	5.1	20.4	3.5	21.8†#	5.0	23.4#	4.7	25.7#	5.1	23.8	4.8
Lat Pull-Down (kg)*	Young (n = 15)	39.7	5.2	40.4	6.0	42.1†	7.6	44.3	8.5	47.0#	6.9	45.9	6.5
	Older (n = 13)	36.5	4.4	37.8	3.1	39.3†	5.7	38.4	6.1	42.7#	6.4	42.9	5.7

One-Repetition Maximums; Results are presented as Mean and Standard Deviation; *p<0.05 time effect; ‡p<0.05 group effect; †p<0.05 from Pre (first instance only); #p<0.05 from previous week (pre excluded)

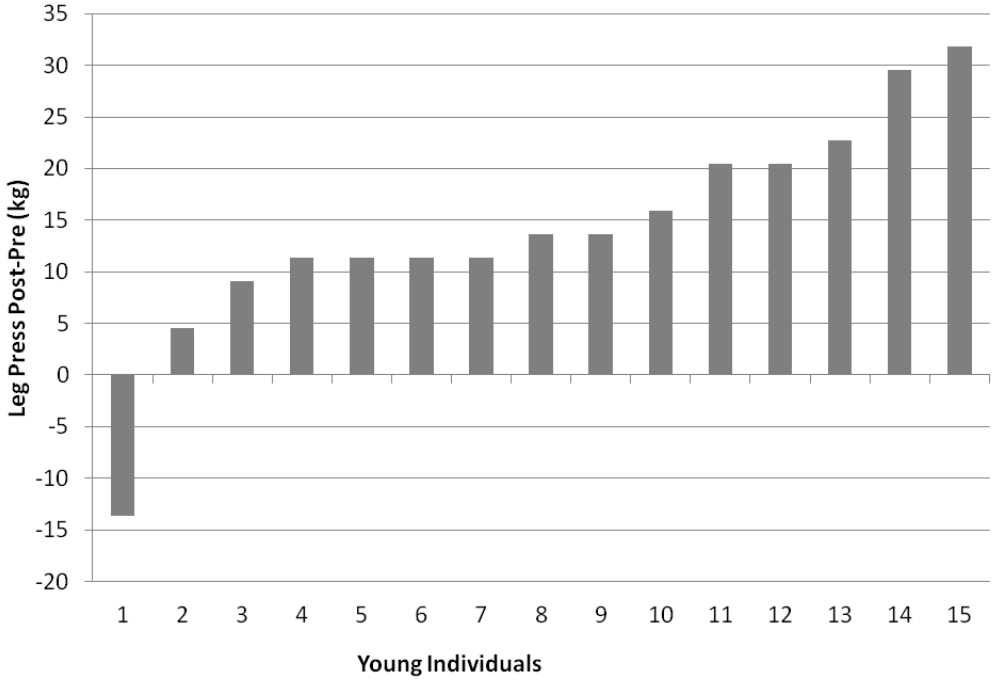
One-Repetition Maximum Strength

1-RM strength assessments are presented in Table 9. One lower body, leg press, and one upper body, lat pull-down, exercise are presented in Figures (Figure 27 and 28, respectively). Individual 1-RM strength responses are presented in Figures 15-26. One older subject could not perform the leg press 1-RM at one time-point and thus older n = 12 for leg press only. One young subject could not perform any 1-RMs at one time-point and thus young n = 15 at all time-points. 1-RMs increased significantly ($p<0.05$) in all exercises as was shown in a time effect with $p = 0.00$ for all exercises. Strength significantly ($p<0.05$) differed by group (with the young individuals being stronger than the older individuals) in the leg press ($p = 0.00$), leg extension ($p = 0.00$), leg curl ($p =$

0.00), and chest press ($p = 0.01$). Strength did not significantly ($p<0.05$) differ by group for the shoulder press ($p =0.12$) and the lat pull-down ($p = 0.09$). Post hoc t-tests revealed that significant ($p<0.05$) increases in strength occurred at week two for the lower body (leg press, $p = 0.02$; leg extension, $p = 0.00$; leg curl, $p = 0.00$) and week three for the upper body (chest press, $p = 0.00$; shoulder press, $p = 0.00$; lat pull-down, $p = 0.01$). Significant ($p<0.05$) differences for each exercise for one week compared to the previous week are shown in Table 9.

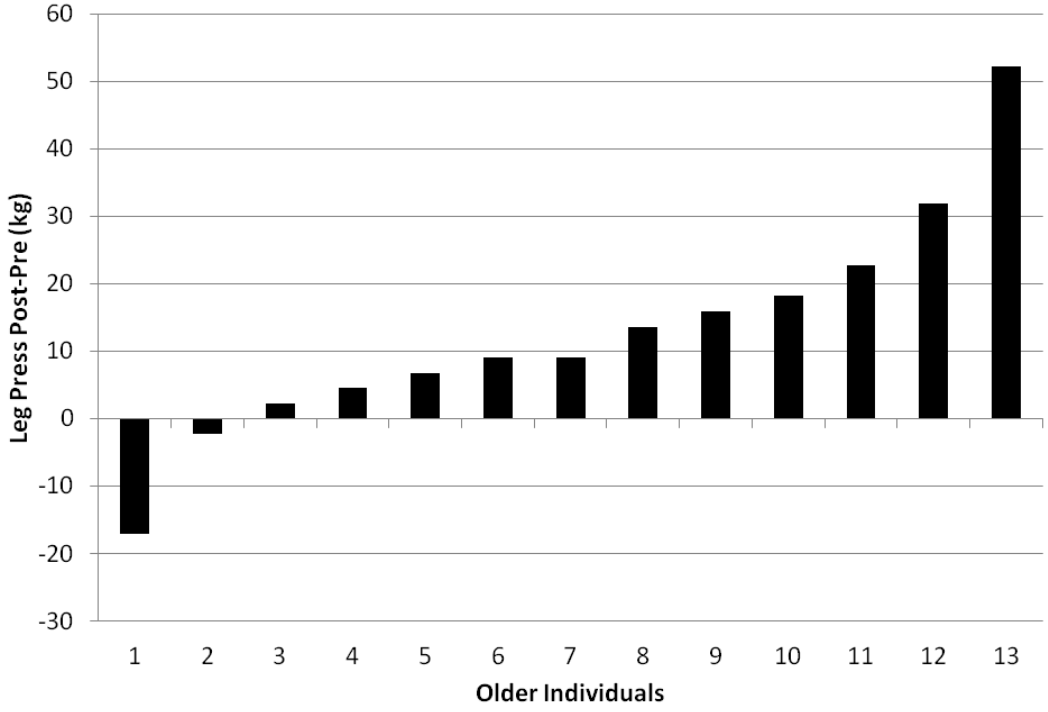
Multiple regression analysis examining initial strength and changes in muscle thickness from pre to post training as predictors of changes in strength from pre to post training showed that only the chest press and shoulder press strength changes were significantly predicted by initial strength on these exercises. Baseline chest press strength significantly ($p = 0.000$ for Beta = -.086) predicted change in chest press strength with training. Baseline shoulder press strength significantly ($p = 0.009$ for Beta = -0.491) predicted change in shoulder press strength with training. No other baseline strength values and no changes in muscle thickness from pre to post predicted changes in strength from pre to post.

Figure 15. Individual Changes in Leg Press Strength for Young



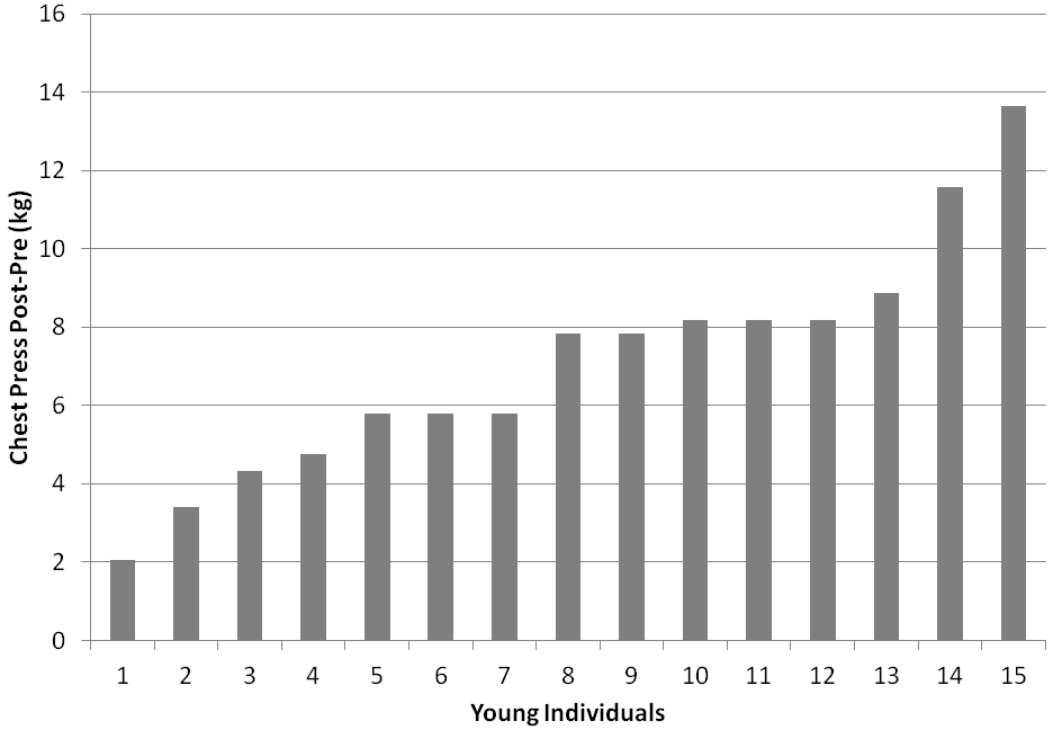
Individual changes in Leg Press 1-Repetition Maximum (1RM) from Pre to Post for young. A negative value indicates a decrease in 1RM over the course of the training.

Figure 16. Individual Changes in Leg Press Strength for Older



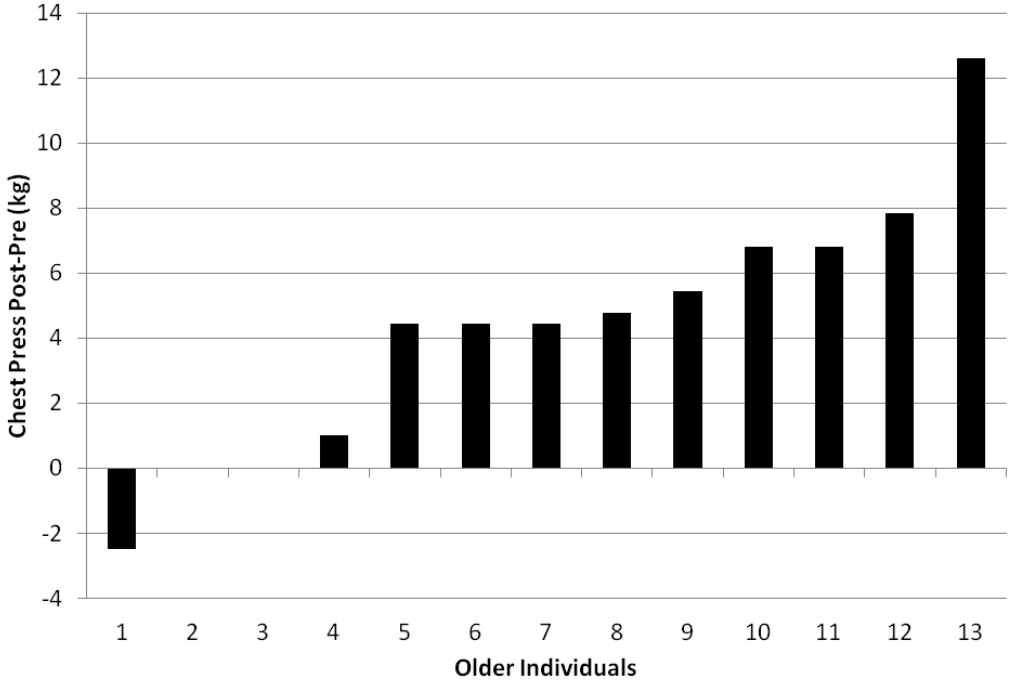
Individual changes in Leg Press 1-Repetition Maximum (1RM) from Pre to Post for older. A negative value indicates a decrease in 1RM over the course of the training.

Figure 17. Individual Changes in Chest Press Strength for Young



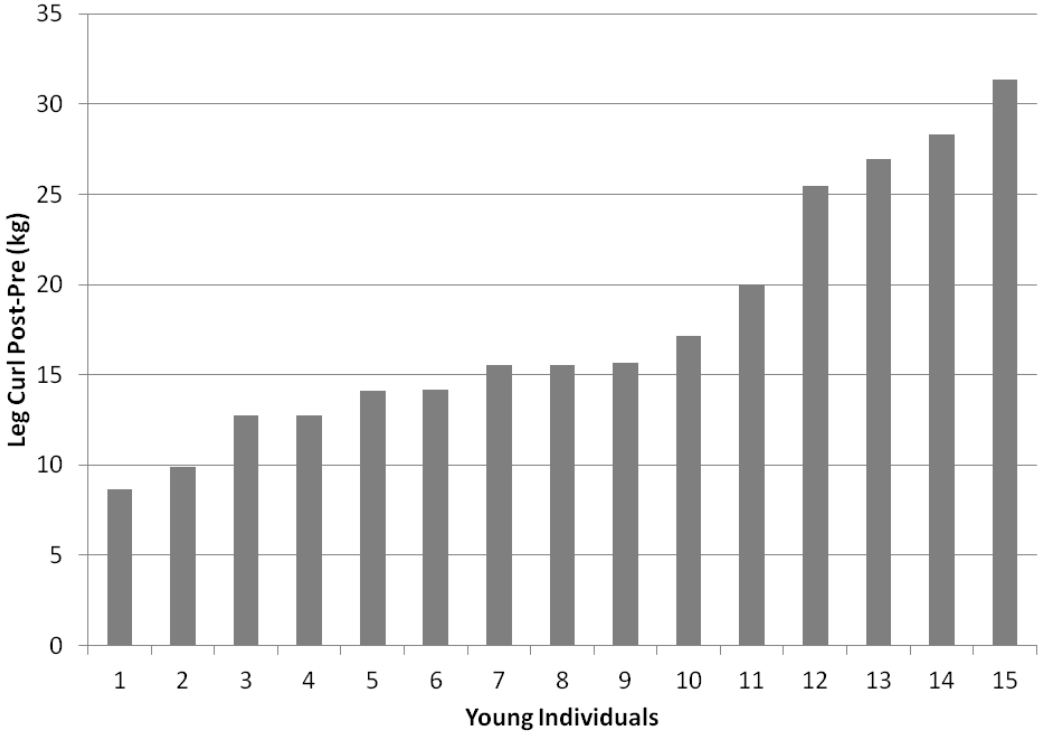
Individual changes in Chest Press 1-Repetition Maximum from Pre to Post for young.

Figure 18. Individual Changes in Chest Press Strength for Older



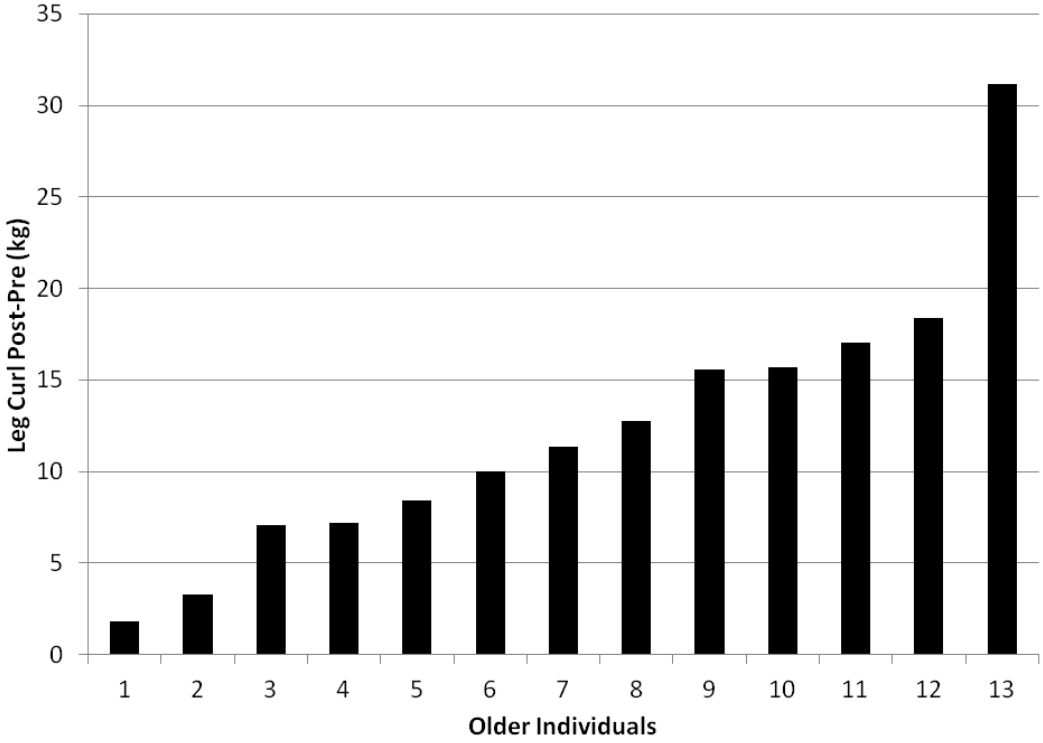
Individual changes in Chest Press 1-Repetition Maximum (1RM) from Pre to Post for older. A negative value indicates a decrease in 1RM over the course of the training.

Figure 19. Individual Changes in Leg Curl Strength for Young



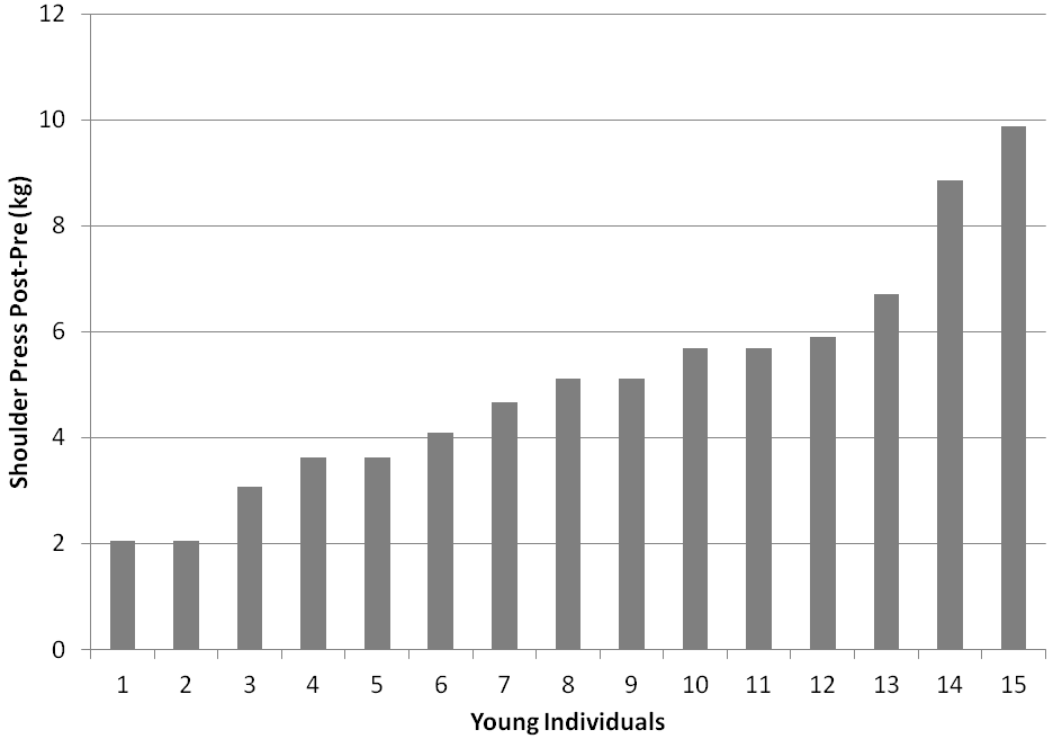
Individual changes in Leg Press 1-Repetition Maximum from Pre to Post for young.

Figure 20. Individual Changes in Leg Curl Strength for Older



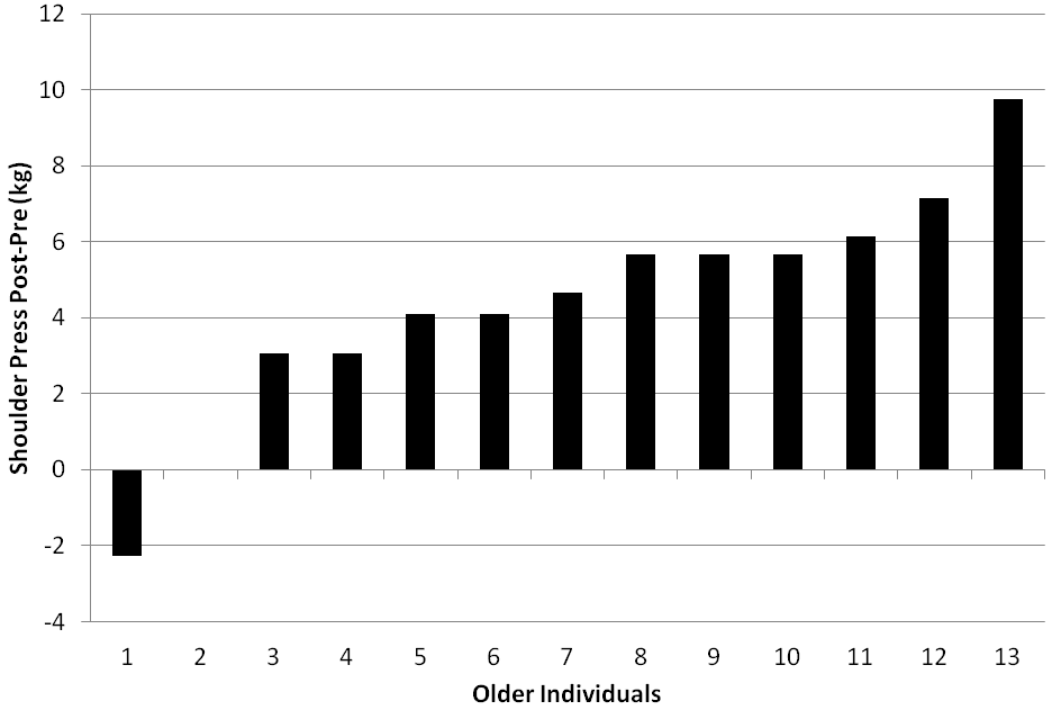
Individual changes in Leg Curl 1-Repetition Maximum (1RM) from Pre to Post for older.

Figure 21. Individual Changes in Shoulder Press Strength for Young



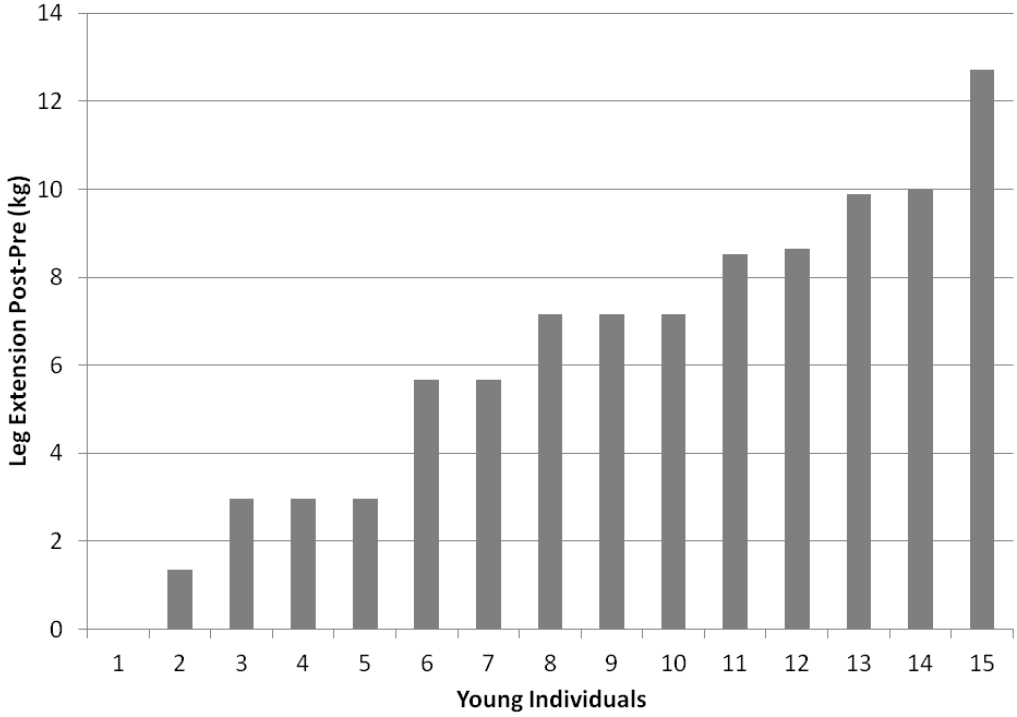
Individual changes in Shoulder Press 1-Repetition Maximum from Pre to Post for young.

Figure 22. Individual Changes in Shoulder Press Strength for Older



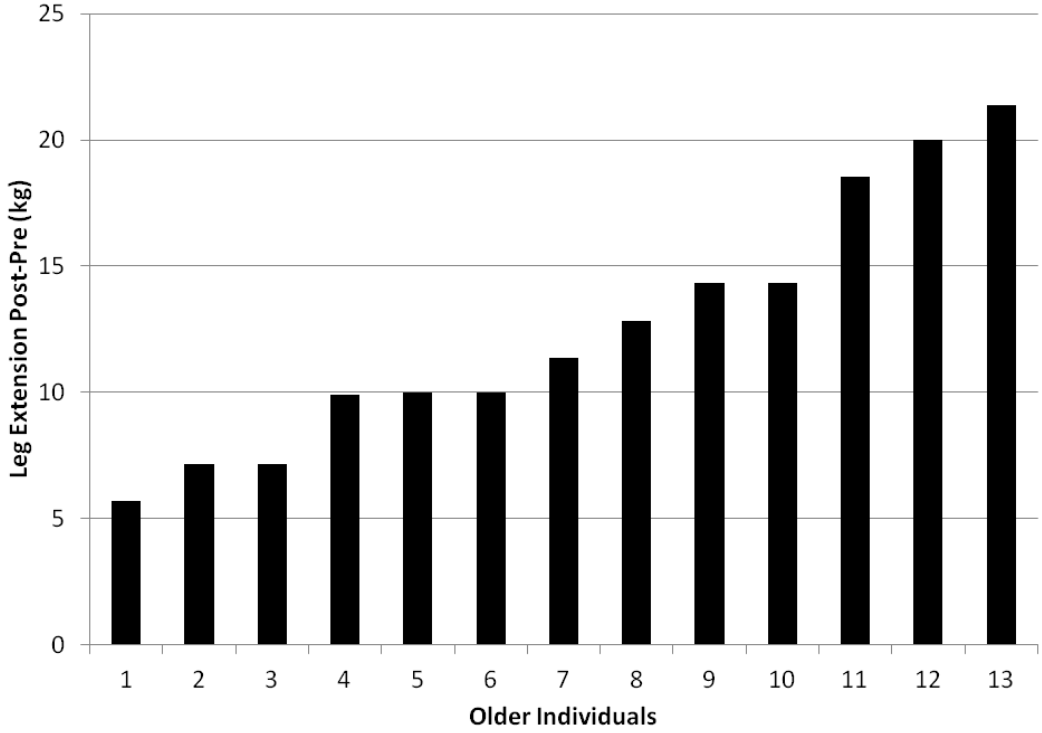
Individual changes in Shoulder Press 1-Repetition Maximum (1RM) from Pre to Post for older. A negative value indicates a decrease in 1RM over the course of the training.

Figure 23. Individual Changes in Leg Extension Strength for Young



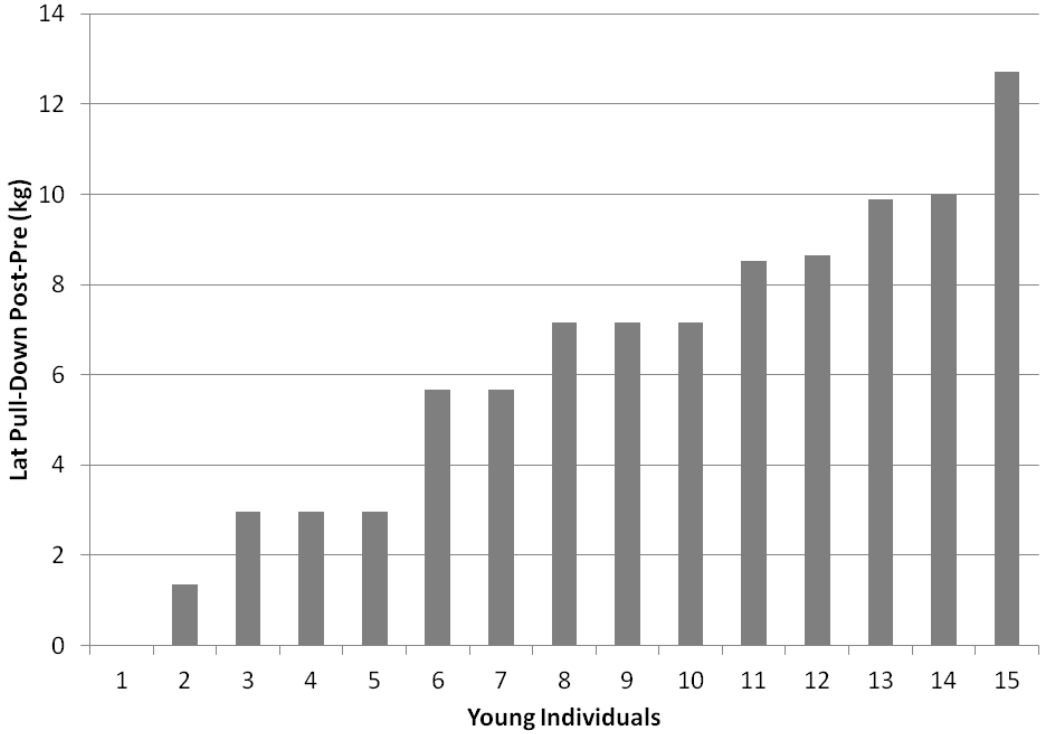
Individual changes in Leg Extension 1-Repetition Maximum from Pre to Post for young.

Figure 24. Individual Changes in Leg Extension Strength for Older



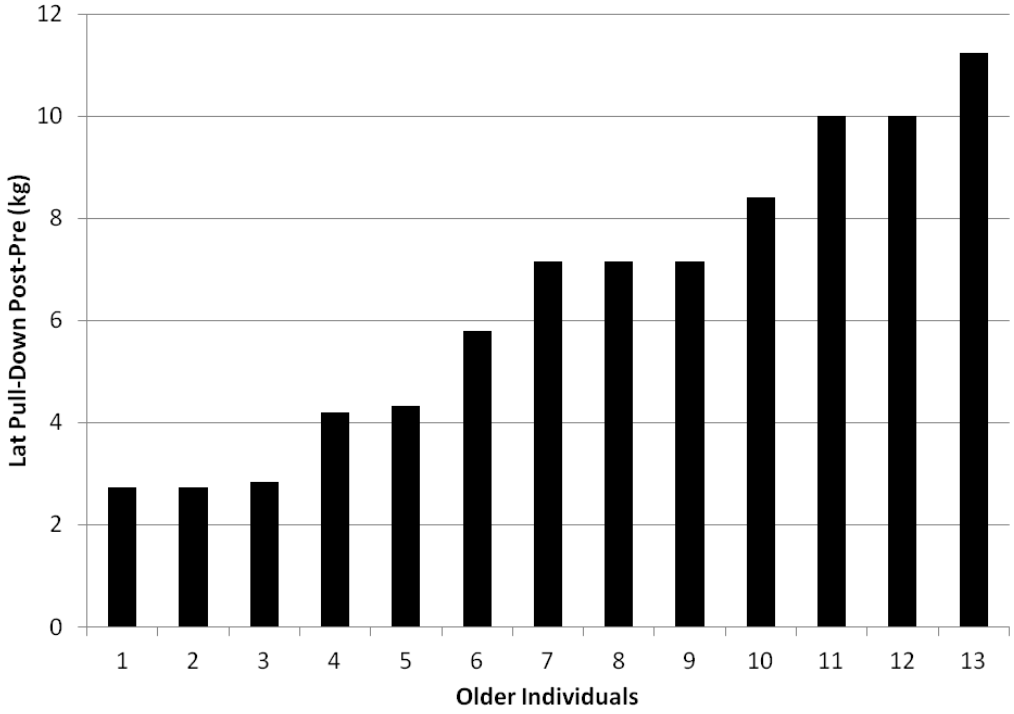
Individual changes in Leg Extension 1-Repetition Maximum from Pre to Post for older.

Figure 25. Individual Changes in Lat Pull-Down Strength for Young



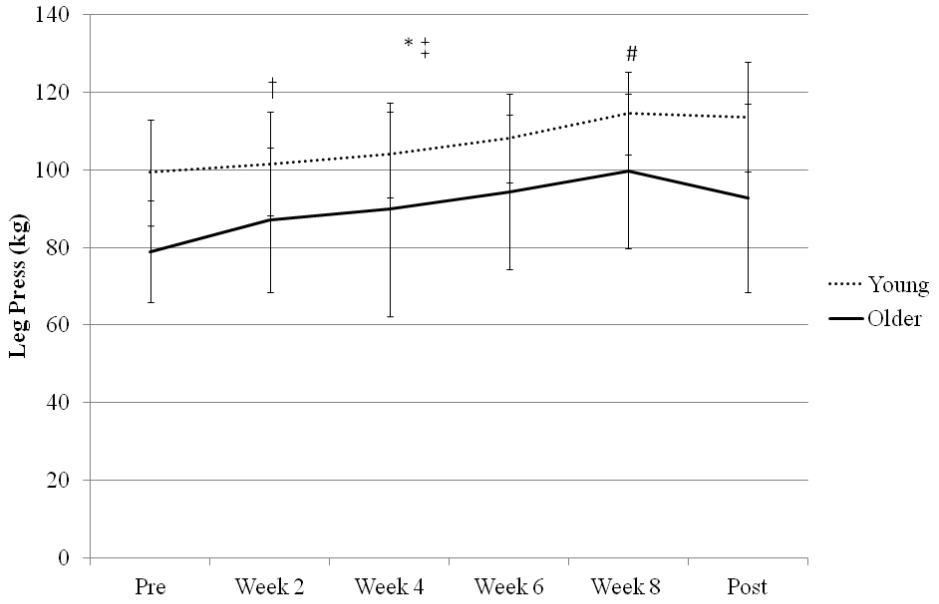
Individual changes in Lat Pull-Down 1-Repetition Maximum from Pre to Post for young.

Figure 26. Individual Changes in Lat Pull-Down Strength for Older



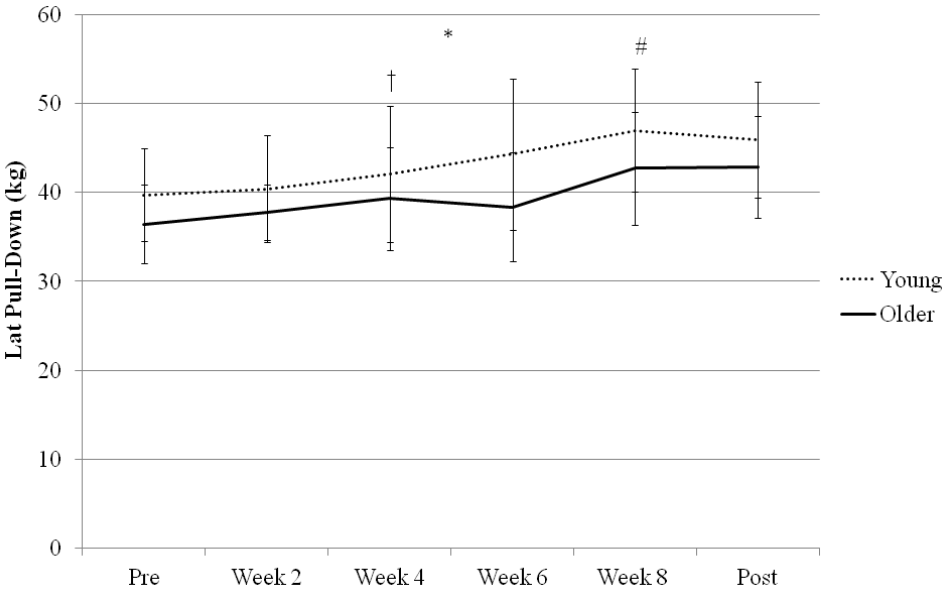
Individual changes in Lat Pull-Down 1-Repetition Maximum from Pre to Post for older.

Figure 27. Leg Press One-Repetition Maximums



Results are presented as Mean and Standard Deviation; *p<0.05 time effect; ‡p<0.05 group effect; †p<0.05 from Pre (first instance only); #p<0.05 from previous week (pre excluded)

Figure 28. Lat Pull-Down One-Repetition Maximums



Results are presented as Mean and Standard Deviation; *p<0.05 time effect; †p<0.05 from Pre (first instance only); #p<0.05 from previous week (pre excluded)

Discussion

The main findings of this study can be divided into two categories: findings related to the time-course of muscle hypertrophy and findings related to arterial stiffness and blood flow. The main findings with regard to muscle thickness were that increases in muscle thickness were found in both young and older women at all measured sites except subscapular; a muscle thickness increase above baseline was first detectable following just one or two weeks of training; and a muscle thickness increase was first evident at the 50% Quadriceps, 50% Hamstrings, 70% Hamstrings, and Deltoid sites. The hypothesis that hypertrophy would be detected three to four weeks into high-intensity resistance training in both young and older women was thus not supported. Also, the hypothesis that hypertrophy would first be detected in the upper body and hamstrings was partially supported. The main findings with regard to arterial stiffness and blood flow were that neither carotid-femoral or femoral-tibialis posterior PWV changed significantly in either young or older subject when looking at mean values; total hyperemia increased in both young and older subjects; and peak flow increased in older subjects only. All arterial stiffness and blood flow measurements showed important variability in subjects' responses. The hypothesis that high-intensity resistance training would not increase arterial stiffness in either young or older women is supported by mean values, but only partially supported when individual responses are examined. The hypothesis that training would improve microvascular blood flow is also partially supported. The muscular and the vascular findings will now be discussed separately.

Time-Course of Muscle Hypertrophy

The increase in muscle size seen in this study occurred earlier than seen in previous studies examining early changes in muscle size with training [5,6,8]. In a study comparable to the present study, Abe et al. [8] found that women aged 25-50 years showed an increase in muscle thickness at the biceps following eight weeks of "intense" whole-body resistance training and at the triceps, chest, and 50% hamstring sites following six weeks of training. No quadriceps or 70% hamstring increase in muscle thickness were seen following the full twelve weeks of training involved in this study [8]. Several possible methodological differences between this study and the present study may explain these discrepancies in findings. First, ten of the twenty women subjects in the study by Abe et al. [8] performed only one set of each of the six exercises used; the remaining ten women performed three sets of each exercise, similar to the present study, however, subjects initially trained at 60-70% 1RM, a lower percentage than the 80% 1RM employed in the present study. Also, Abe et al. [8] required subjects to perform "8-12 repetitions maximum" for each set on each exercise; the present study required each subject to perform two sets that were very close to, if not at, 10RM and to perform as many repetitions as possible, which was often greater than 12 reps, on the last set. Although both types of training would be challenging for subjects, perhaps the rep scheme employed in the present study presented a greater muscular stimulus and thus led to the greater muscle thickness adaptations. Finally, and perhaps most importantly, the exercises employed in the present study generally involved more muscle groups per exercise than in the study by Abe et al. [8]. The study by Abe et al. [8] used only two lower body exercises (leg extension and leg curl, and no leg press as was

used in the present study) and, although four upper body exercises were used, only two of these (chest press and seated row) were multi-joint upper body exercises as compared to the three upper body multi-joint exercises (shoulder press, lat pull-down, and chest press) employed in the present study. Supporting the idea that the resistance training protocol employed by Abe et al. [8] may not have been as muscle stimulating as the protocol employed in the present study are the differences in the increase in strength seen between the two studies. In the present study, strength increased on all lower body exercises by the second week of training (Table 9). Abe et al. [8] only measured lower body strength on the leg extension; this strength did not increase until the fourth week of training.

When DeFreitas et al. [6] examined the time-course of muscle hypertrophy in young men using peripheral computed tomography (pQCT) scanning, they found a detectable increase in muscle CSA following just two training sessions. In this study, muscle CSA was assessed immediately prior to the last training session of a week. The authors speculated that acute fluid accumulation within the muscle influenced this early detection of an increase in CSA and that, due to lack of a strength increase until week four of training, muscle CSA may only have truly increased around weeks three to four [6]. An increase in CSA following three weeks of training was also seen by Seynnes et al. [5].

In the present study, the investigators attempted to account for acute exercise-session-induced fluid accumulation by performing all weekly measurements prior to the first day of training for the week rather than prior to the last, thus allowing subjects an additional twenty-four hours of recovery compared to DeFreitas et al. [6]. It is possible

that this recovery period was not great enough to diminish all acute muscle swelling however. As the increase in muscle thickness seen at the start of the second and third weeks of training was not large, there is a possibility that this small increase in thickness was actually merely edema. Poole et al. [7] showed that 50% quadriceps but not 50% hamstrings muscle thickness was elevated sixty minutes following high-intensity lower-body resistance exercise. However, Poole et al. [7] also found that thigh CSA, as assessed by peripheral quantitative computed tomography, was no different from baseline at twenty-four, forty-eight, seventy-two, or ninety-six hours post-exercise. This suggests that muscle swelling did not account for the increases in muscle thickness seen in the present study when subjects were measured approximately seventy-two hours after their last training session of the week. Also, strength was found to increase in the lower body during the second week of training and in the upper body during the fourth week of training (Table 9), again providing support to the idea that at least the lower body increases in muscle thickness in the present study represented true muscle hypertrophy adaptations (Table 6).

The general lack of a difference in the time-course of the muscle thickness increases between young and older women was not surprising. Literature in this area is conflicting. A study comparing young men and women (aged 20-30 years) and older men and women (65-75 years) found no differences in thigh and quadriceps muscle volume between either men and women or young and older subjects in response to six months of strength training [9]. Another study comparing similar groups training one leg on knee extension for nine weeks also found no difference in the quadriceps muscle volume response between young and older subjects [10]. A study comparing the CSA

response of middle-aged men (42 ± 2 years) and women (39 ± 3 years) and older men (72 ± 3 years) and women (67 ± 3) to six months of strength training found that only older men were unable to significantly increase the CSA of the leg extensors following training [12]. Another study comparing young men and women (22-31 years) and older men and women (62-72 years) did find significant differences in the thigh CSA response to three months of strength training [11]. The findings of the present study, that the time-course of increasing muscle thickness differed only at the deltoid, are in line with the aforementioned conflicting findings from previous research.

Subscapular muscle thickness did not show an increase with training. As this site included muscle that would have been trained on the lat pull-down and lat pull-down strength was found to increase over time (Table 9), the authors speculate that this lack of an increase was due to measurement error. This site was more difficult to measure accurately due to the lack of a clear boney landmark (such as the femur or humerus) from which to measure the muscle thickness, and the diagonal nature of the image obtained. The chest muscle thickness measurements possessed the same short-comings (and chest press strength also increased over time; Table 9) so these measurements should be interpreted cautiously as well.

Strength changes over time generally showed that older adults were not as strong as the younger adults but they were still able to respond positively in strength (as well as in muscle mass increases) to the resistance exercise training as would be expected [37]. For example, in the leg press, young adults started at a 1-RM weight of 99.4 kg at Pre and progressed to a 1-RM weight of 113.6 kg by Post; on this same exercise, older adults started at a 1-RM weight of 79.0 kg at Pre and progressed to a 1-

RM weight of 92.7 kg at Post. Thus, although older adults were not as strong as the younger adults, they still were able to respond positively to the training by improving strength.

Interestingly, in the shoulder press and the lat pull-down, no differences in strength were seen between the two groups. The reasons for this lack of a difference on these exercises are unclear although speculations can be made. As stated previously, it was easier for most subjects to progress (increase weight) on the lower body exercises compared to on the upper body exercises. For example, leg curl strength increased from a Pre value of 52.6 kg (young) and 41.5 kg (older) to a Post value of 70.5 kg (young) and 53.8 kg (older) while shoulder press strength increased from 22.0 kg (young) and 19.5 kg (older) to 27.1 kg (young) and 23.8 kg (older). Thus, the young subjects increased leg curl strength by approximately 18 kg and the older subjects increased leg curl strength by approximately 12 kg while young subjects increased shoulder press strength by approximately 5 kg and the older subjects increased shoulder press strength by approximately 4 kg over the entire course of the training. These differences in strength increases in the upper body compared to the lower body were likely due to the greater strength of the lower body compared to the upper body and the effect of the increments by which weight could be increased on each machine. To illustrate, a two kilogram increase for a lower body exercise such as the leg curl would likely be overcome more easily than a two kilogram increase on an upper body exercise such as the shoulder press. Thus, it is speculated, based on the greater strength of the young subjects on the leg press, leg extension, leg curl, and chest press, that possibly the young subjects could have shown greater strength on the shoulder press and lat pull-

down had small weight increments been available to more effectively distinguish the stronger lifters from the weaker lifters. With large weight increments, someone who could easily lift twenty-two kilograms, for example, but who could not move up to the next weight of twenty-four kilograms was not distinguished from someone who just barely managed to lift the twenty-two kilograms. Another possible explanation for the lack of a group difference in the lat pull-down and shoulder press is simply that it was a real lack of a difference, of course, and the older subjects were just as strong as the young subjects in these exercises. This second idea is supposed by the increase in deltoid muscle thickness (Table 6) seen in the older adults as well as the younger adults. Unfortunately, as it has already been stated, the lack of a subscapular muscle thickness increase is thought to be more a reflection of measurement error and not something of physiological significance.

With regard to DXA-assessed body composition changes, it was not surprising that tremendous changes were not seen as this was only an eight week training study. The results did support the idea that older adults are able to respond positively to strength training similarly to younger adults [3]. Overall, the changes that were seen were in the expected direction of change, however, with fat decreasing and bone-free lean mass increasing. Total % fat slightly decreased in young and old and by region this % fat decrease was only detectable in the legs. These % fat changes support what was seen with the ultrasound with regard to fat thickness where changes from Pre in fat thickness generally occurred earlier in the legs (50% quadriceps at week 4, 70% quadriceps at week 4, 50% hamstrings at week 3) than changes from Pre in the fat thickness of the arms (deltoid at week 6, chest and subscapular at no time-point).

Group differences were found for % fat at all sites with the older subjects possessing a greater % fat than the younger subjects. This difference could be thought of as a confounding factor in interpreting the results of the study as young subjects were in the mid to upper levels of body fatness while older subjects were clearly in the obese category [90]. However, older adults also possessed many other differences, that are generally associated with age, compared to younger adults: for example, they had higher blood pressure, less functional ability, and generally less muscular strength. Thus, to compare older adults who were identical in every physiological measurement to the younger adults would arguably confound the results more greatly by comparing a "standard" young group of women to an exceptionally healthy older group of women.

Bone-free lean mass of the arms and legs only (and not the total body or trunk) increased. This was thought to be due to the "limb-focused" nature of the training program: although subjects were encouraged to keep their body tight and set so as to lift with good form, which would thus engage the core of the body as well as the muscles directly performing the exercise, subjects were not always able to accomplish this. Also, obviously, all training was performed on machines which limits how well the core musculature can be employed in a limb-focused exercise [91]. Thus, it is logical that only the limbs showed an increase in bone-free lean mass and the trunk did not. The lack of group differences in bone-free lean body mass support what was found with the ultrasound muscle thickness measurements where no group differences were found (with the exception of the different response seen at the deltoid site). The lack of a change in BMC is thought to be due to the short nature of the study although as little as

twelve weeks of high-intensity resistance training has been shown to increase BMC in older men and women [92].

Vascular Responses to Exercise Training

The vascular responses to the eight weeks of resistance exercise training are best interpreted by examining both the results of the statistical analyses and the individual responses. Important individual differences in responses were apparent in these measures.

Carotid-femoral and femoral-tibialis posterior PWV did not appear to change over time when mean values are statistically examined (Table 3 and Figures 1 through 4). Individual responses show a varied response to the training in both young and older subjects (Figures 2 and 3). Interestingly, all but two of the older subjects showed a decrease in femoral-tibialis posterior PWV (Figure 6). Previous work on arterial stiffness responses to resistance training is conflicting. In men, resistance training has been shown to increase arterial stiffness [17,24,25] or to show no change [26,27]. In women, resistance training has been shown to cause no change [14,18,19], an increase [13,22], and a decrease [16,20,21] in arterial stiffness. In studies involving both sexes, where no sex comparisons were made, responses likewise varied [15,17,26,93]. As only women were examined in the present study, only studies reporting results for women (as opposed to combined male and female results) will now be discussed.

The studies reporting increases in arterial stiffness examined women who were young only. Cortez-Cooper et al. [13] strength trained young women at a high-intensity for eleven weeks. Following training, carotid-femoral PWV increased by 0.42 m/s; however, carotid-femoral PWV increased by 0.56 m/s in their non-exercising control

group [13]. This suggests that the observed increase in carotid-femoral PWV was mitigated by non-training related factors. No changes were seen in this study with peripheral PWV in either group. Okamoto et al. [22] strength trained young women with either eccentric only or concentric only biceps curls for eight weeks. Following training, brachial-ankle PWV increased in the concentric only group by ~1m/s while no change was seen in the eccentric only group [22]. This interesting finding suggests that other as yet unidentified variables related to resistance training may influence the arterial stiffness response following this type of training.

The three studies showing a decrease in arterial stiffness responses with resistance training involved women of an age comparable to the older women examined in the present study [16,20,21]. Williams et al. [21] strength trained men and women aged 60-75 years at a moderate-intensity and found that only the women (and not the men) showed a decrease in augmentation index, an indicator of arterial stiffness, following sixteen weeks of training. Okamoto et al. [16] strength trained premenopausal women aged 42-55 years in a home-based low-intensity program for ten weeks and found that brachial-ankle PWV decreased by ~0.8m/s following training. The women in the present study were postmenopausal, however, menopausal status does not relate to level of arterial stiffness when age and body mass index are controlled [94]. Ho et al. [20] strength trained overweight and obese women aged 43-59 years at a high-intensity for twelve weeks; similar to the present study's findings, augmentation index did not change in the group as whole, however, when individual responses were examined, eleven out of the sixteen women studied were classified as "responders" who, as a group, did show a significant decrease in augmentation index. This finding is similar to

our finding of eight out of the thirteen older women showing a decrease in carotid-femoral PWV (Figure 3). These findings again suggest that women's arterial stiffness responses to resistance training are highly variable.

The reports of no change in arterial stiffness following resistance exercise training also examined women of an age similar to the older women examined in the present study. Yoshizawa et al. [18] strength trained women aged 32-59 years at a moderate-intensity for twelve weeks and found no change in either carotid-femoral or femoral-tibialis posterior PWV following training. Casey et al. [14] strength trained postmenopausal women aged 52-72 years at a low-intensity and found no change in augmentation index following training. Collier et al. [19] strength trained pre-hypertensive and hypertensive women aged 40-60 at a moderate intensity for four weeks and found no change in carotid-femoral PWV. Kingsley strength trained overweight and obese women aged 35-50 for twelve weeks and found no change in augmentation index [28].

No physiological and/or methodological differences stand out as clear explanations for discrepancies in findings between studies. Based on synthesis of existing evidence, responses appear independent of age, training intensity, training duration or any other obvious factor. As it is clear that the arterial stiffness response to resistance exercise in women is highly variable, future studies should attempt to determine what physiological and/or methodological differences induce this variation.

Changes in blood flow following the resistance exercise training are also best discussed by examining mean values and individual changes. The main blood flow related findings of this study were that resting blood flow did not change in either

young or older women, total hyperemia increased in both groups, and peak blood flow increased in older, but not younger subjects (Table 3 and Figures 7 and 10). If individual responses are examined, the statistical increase in peak flow appears driven by the older individuals as eleven out of thirteen older individuals and only six out of sixteen younger individuals showed an increase in peak flow (Figures 8 and 9). Thus, although peak flow and total hyperemia reflect different aspects of the microvascular reactive response (with total hyperemia reflecting both the early peak flow and the "late phase" nitric-oxide-influenced response [81]), in this case it appears that only a modest difference in peak flow and total hyperemia response existed within each group of subjects.

Very little work has examined forearm blood flow responses to resistance training in women only. Kingsley and Figueroa [28] reported an increase in both resting forearm blood flow and peak forearm blood flow following twelve weeks of resistance exercise training in women aged 35-50 years. A study in older women (aged 59-79 years) examining calf blood flow responses to twelve weeks of elastic-band-based resistance training also found an increase in blood flow in response to training [29]. Studies of blood flow changes in men following resistance exercise training generally also show an improvement in resting blood flow [30] and peak flow and total hyperemia [27] although it has been suggested that improvements may only occur after moderate-intensity and not high-intensity exercise training [95]; a decrease in resting calf blood flow has been found following a short duration (four weeks) of resistance training [31]. Another short-term (five week) resistance training study, where sex was not specified, found no improvement in resting forearm blood flow or peak blood flow following

training [32]. However, Collier et al. [19] also performed a relatively short-term (four week) resistance training study comparing men's and women's forearm blood flow responses and found both groups showed improvements in blood flow following training with the women having a greater resting forearm blood flow response to training than the men and both groups showing similar improvements in peak forearm blood flow. All of the aforementioned blood flow studies used the strain-gauge plethysmography technique employed in the present study.

Studies using ultrasound assessment of femoral artery blood flow have shown that resting femoral blood flow decreases with age in men and women [33-35]. However, this reduction has been found to be absent in men who are resistance trained [36]. Interestingly, the present study found no baseline differences between young and older women in resting forearm blood flow, peak flow, or total hyperemia; this lack of a difference may be due to the age gap employed or to a difference in forearm microvascular (strain-gauge plethysmography assessed) compared to leg macrovascular (femoral ultrasound assessed) changes with aging.

Functional Assessments

Both upper and lower body average functional scores were found to improve following training. The lower body average functional score differed by group pooled across time as well (Table 5). Previous work has shown resistance training to increase functional performance in older adults [96-98]. Functional performance is not usually assessed in younger adults as this outcome is less important to the quality of life of this age group. Nevertheless, it can be concluded from the present study that this type of resistance exercise training was able to improve functional capacity in both young and

older subjects. Although improvements in strength and muscle size are important, as discussed previously, functional improvements may be arguably even more important, particularly in the older population. Improving the ability to open a jar or climb stairs, for example, is likely to provide an important improvement in quality of life.

Thigh CSA Estimates

The thigh CSA estimates in the present study do not appear accurate (Table 8). Acquiring repeated accurate thigh skinfolds and circumferences in this population with large amounts of fat mass on the thighs was difficult. Furthermore, the CSA estimates used have primarily been used on populations different from this study's population [89,99,100]. Thus, these results are not suspected to represent any true physiological changes.

CHAPTER V: CONCLUSIONS

Muscle thickness changes occurred earlier than expected and this response did not greatly differ between young and older women. Both central and peripheral arterial stiffness responses showed variability with an approximately equal number of subjects increasing stiffness and decreasing stiffness. Resting forearm blood flow did not change following training although changes were seen in peak blood flow in the older group and in total hyperemia in both groups. In conclusion, eight weeks of high-intensity resistance training increased muscle size and strength more rapidly than expected; this type of training also improved microvascular function, particularly in older women, while having a varied effect on large artery stiffness.

Answers to Research Questions

First Research Question and Hypothesis

During eight weeks of high-intensity resistance training, when will hypertrophy be evident, and at what sites will it first be evident, in young and older women? It is hypothesized that hypertrophy will be detected three to four weeks into high-intensity resistance training in both young and older women. It is hypothesized that this hypertrophy will first be detected in the upper body and hamstrings.

A significant muscle thickness increase above baseline was first detectable following just one or two weeks of training, depending on the site measured. The first sites where a muscle thickness increase was evident were at the 50% Quadriceps, 50% Hamstrings,70% Hamstrings, and Deltoid sites. The hypothesis that hypertrophy would be detected three to four weeks into high-intensity resistance training in both young and

older women was not supported. The hypothesis that hypertrophy would first be detected in the upper body and hamstrings was partially supported.

Second Research Question and Hypothesis

Following eight weeks of high-intensity resistance training, will arterial stiffness and blood flow changes occur and will these changes differ between young and older women? It is hypothesized that high-intensity resistance training will not increase arterial stiffness but may improve blood flow in young or older women. Neither carotid-femoral or femoral-tibialis posterior PWV, the gold standard of arterial stiffness measurement, changed significantly in either young or older subject when looking at mean values; resting blood flow did not change in either young or older subjects; total hyperemia increased in both young and older subjects; and peak flow increased in older subjects only. All arterial stiffness and blood flow measurements showed variability in subjects' responses. The hypothesis that high-intensity resistance training would not increase arterial stiffness in either young or older women is supported by mean values, but only partially supported when individual responses are examined. The hypothesis that training would improve microvascular blood flow is also partially supported.

Clinical Significance

Resistance training is recommended for both men and women, young and old as a method of increasing strength, improving risk factors for both cardiovascular and metabolic disease, and improving quality of life both psychologically and physiologically [1]. Although recommended for a wide range of people, the majority of research on resistance exercise has been performed on young men. This study provides

useful information on the time-course of muscle hypertrophy in young and older women. Also, no study has directly compared young and older women's arterial stiffness and blood flow responses following resistance exercise training. As resistance exercise is recommended for both young and older women, as previously stated, it is important to know how this method of exercise affects the vasculature. This study provides evidence to support the idea that high-intensity resistance exercise improves forearm microvascular function while not greatly affecting large artery stiffness. Thus, based on this finding, high-intensity resistance exercise appears beneficial for the aspects of cardiovascular health measured in the present study.

Future Research Directions

Future research should attempt to repeat the present study while using more sensitive measures of muscle hypertrophy such as pQCT scanning and/or magnetic resonance imaging. The time-course of hypertrophy in older men could also be examined. Future research building on the cardiovascular findings of this study should examine what causes the variations in arterial stiffness and microvascular blood flow responses to resistance exercise.

Limitations

Several limitations exist in this study. Women were put into arbitrary age groups of 18-25 and 50-64 to represent "young" and "older" respectively. Findings may have changed were the age groups expanded or shrunken. Women were mainly Caucasian although some African American, Asian American, and Native American women participated. Further, the subjects were a self-selected group that was interested in improving their strength and/or muscular appearances. Thus, the findings may not

apply to all women. Another limitation in this study was the lack of dietary control. Changes in strength and/or hypertrophy may have been affected by any dietary changes. Also, measurements were not always performed at the same time of day for each subject; thus, diurnal fluid shifts may have affected the ultrasound measurements and variations in strength, and motivation throughout the day may have affected 1RM assessments. A further limitation was that pulse wave velocity measurements were only performed centrally and on the leg; no arm pulse wave velocity measurements were performed.

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Appendix A: Functional Questionnaires

ID:_____

MODIFIED AMERICAN SHOULDER & ELBOW SURGEONS

RATING SCALE

Please rate your ability to do the following daily activities using the following scale:

0 = unable 1 = very difficult 2=somewhat difficult 3 = not difficult

Get dressed including putting on your coat _____

Wash back/do up bra _____

Comb Hair _____

Reach a high shelf _____

Lift heavy objects _____

Do usual work _____

Do usual sport _____

Sleep on your painful side _____

Throw a ball overhand _____

Open a jar of food _____

Cut with a knife _____

Use a phone _____

Do up buttons _____

Carry shopping bag _____

"THE LOWER EXTREMITY FUNCTIONAL SCALE"

ID:_____ Date:_____

We are interested in knowing whether you are having any difficulty at all with the activities listed below because of your lower limb problem for which you are currently seeking attention. Please provide an answer for each activity.

Today, do you, or would you have any difficulty at all with:

Minimum Level of Detectable Change (90% Confidence): 9 points **SCORE: _____/80**

Reprinted from Brinkley, J.Stafford, P., Lott, S., Ridle, D., & The North American Orthopedic Rehabilitation Reseasch Network, The Lower Extremity Functional Scale: Scale development, measurement properties, and clinical application, Physical Therapy, 1999, 79, 4371-383, with permission of the American Physical Therapy Association

Signature:

	Activities	Extreme Difficulty or Unable to Perform Activity	Quite a Bit of Difficulty	Moderate Difficulty	A Little Bit of Difficulty	No Difficulty
1	Any of your usual work, housework or school activities	0	1	2	3	4
2	Your usual hobbies, recreational or sporting activities	0	1	2	3	4
3	Getting into or out of the bath	0	1	2	3	4
4	Walking between rooms	0	1	2	3	4
5	Putting on your shoes or socks	0	1	2	3	4
6	Squatting	0	1	2	3	4
7	Lifting an object, like a bag of groceries, from the floor	0	1	2	3	4
8	Performing light activities around your home	0	1	2	3	4
9	Performing heavy activities around your home	0	1	2	3	4
10	Getting into or out of a car	0	1	2	3	4
11	Walking 2 blocks	0	1	2	3	4
12	Walking a mile	0	1	2	3	4
13	Going up or down 10 stairs (about 1 flight of stairs)	0	1	2	3	4
14	Standing for 1 hour	0	1	2	3	4
15	Sitting for 1 hour	0	1	2	3	4
16	Running on even ground	0	1	2	3	4
17	Running on uneven ground	0	1	2	3	4
18	Making sharp turns while running fast	0	1	2	3	4
19	Hopping	0	1	2	3	4
20	Rolling over in bed	0	1	2	3	4
	Column Totals:					

Appendix B: Other Forms

Neuromuscular Research Laboratory
OU Department of Health and Exercise Science
Health Status Questionnaire

Instructions Complete each question accurately. All information provided is confidential.
(NOTE: The following codes are for office use only: RF; MC; SLA; SEP)

Part 1. Information about the individual

1. _____
Date

2. _____
Legal name Nickname

3. _____
Mailing address

_____
Home phone Business phone

4. Gender (circle one): Female Male (RF)

5. Year of birth: _____ Age _____

6. Number of hours worked per week: Less than 20 20-40 41-60 Over 60

(SLA) More than 25% of time spent on job (circle all that apply)

Sitting at desk Lifting or carrying loads Standing Walking Driving

Part 2. Medical history

7. (RF) Circle any who died of heart attack before age 50:

Father Mother Brother Sister Grandparent

8. Date of: Last medical physical exam: _____ Last physical fitness test: _____
Year Year

9. Circle operations you have had:

Back (SLA) Heart (MC) Kidney (SLA) Eyes (SLA) Joint (SLA) Neck (SLA)
Ears (SLA) Hernia (SLA) Lung (SLA) Other _____

10. Please circle any of the following for which you have been diagnosed or treated by a physician or health professional:

Alcoholism (SEP)
Anemia, sickle cell (SEP)
Anemia, other (SEP)
Asthma (SEP)
Back strain (SLA)
Bleeding trait (SEP)
Bronchitis, chronic (SEP)
Cancer (SEP)
Cirrhosis, liver (MC)
Concussion (MC)
Congenital defect (SEP)
Diabetes (SEP)
Emphysema (SEP)
Epilepsy (SEP)
Eye problems (SLA)
Gout (SLA)
Hearing loss (SLA)
Heart problems (SLA)
High blood pressure (RF)
Hypoglycemia (SEP)
Hyperlipidemia (RF)
Infectious mononucleosis (MC)
Kidney problem (MC)
Mental illness (SEP)
Neck strain (SLA)
Obesity (RF)
Osteoporosis
Phlebitis (MC)
Rheumatoid arthritis (SLA)
Stroke (MC)
Thyroid problem (SEP)
Ulcer (SEP)
Other _____

11. Circle all medicine taken in last 6 months:

Blood thinner (MC)	Epilepsy medication (SEP)	Nitroglycerin (MC)
Diabetic pill (SEP)	Heart-rhythm medication (MC)	Estrogen
Digitalis (MC)	High-blood-pressure medication (MC)	Thyroid
Diuretic (MC)	Insulin (MC)	Corticosteroids
Asthma	Other _____	

12. Any of these health symptoms that occurs frequently is the basis for medical attention. Circle the number indicating how often you have each of the following:

1 = Practically never 2 = Infrequently 3 = Sometimes 4 = Fairly often 5 = Very often

a. Cough up blood (MC) 1 2 3 4 5
b. Abdominal pain (MC) 1 2 3 4 5
c. Low back pain (SLA) 1 2 3 4 5
d. Leg pain (MC) 1 2 3 4 5
e. Arm or shoulder pain (MC) 1 2 3 4 5
f. Chest pain (RF) (MC) 1 2 3 4 5
g. Swollen joints (MC) 1 2 3 4 5
h. Feel faint (MC) 1 2 3 4 5
I. Dizziness (MC) 1 2 3 4 5
j. Breathless with slight exertion (MC) 1 2 3 4 5

13. Do any of the following apply:

- A sudden death in your biological father or brother, or mother or sister prior to age 55 or 65, respectively? Yes No
- Current smoker or have you quit smoking within the past 6 months? Yes No
- Do you take hypertensive medication or have a confirmed systolic or diastolic blood pressure ≥140 or 90 mmHg, respectively? Yes No
- Take lipid lowering medication or have high blood cholesterol? Yes No
- You have a confirmed fasting blood glucose of ≥100 mg/dL? Yes No
- Have you recently been diagnosed as clinically obese (BMI > 30)? Yes No
- Are you sedentary? Yes No
- Diagnosed Crohn's or Inflammatory Bowel Disease Yes No
- Past fracture of a hip, pelvis, or femur Yes No
- Major Surgery within the last 6 months Yes No
- Been diagnosed with varicose veins Yes No
- Family history of Deep Vein Thrombosis or Pulmonary Embolism Yes No

Part 3. Health-related behavior

14. (RF) Do you now smoke or chew tobacco? Yes No

15. If you are a smoker, indicate number smoked per day:

Cigarettes:	40 or more	20-39	10-19	1-9
Cigars or pipes only:	5 or more or any inhaled		Less than 5, none inhaled	

16. Weight now: _____lb. One year ago: _____lb.. Age 21: _____lb.

17. Thinking about the things you do at work, how would you rate yourself as to the amount of physical activity you get compared with others of your age and sex?

1. Much more active
2. Somewhat more active
3. About the same
4. Somewhat less active
5. Much less active
6. Not applicable

18. Now, thinking about the things you do outside of work, how would you rate yourself as to the amount of physical activity you get compared with others of your age and sex?

1. Much more active
2. Somewhat more active

3. About the same
4. Somewhat less active
5. Much less active
6. Not applicable

19. Do you regularly engage in aerobic (such as running, walking, biking, swimming) exercise?

1. Yes 2. No

20. If you answered "yes" to question #19, how frequently (hours per week) have you engaged in aerobic activities during the past 6 months?

_____

21. Do you regularly engage in strength-training exercise such as lifting weights, using weight-machines or therabands?

1. Yes 2. No

22. If you answered "yes" to question #21, how frequently (times per week) have you engaged in strength-training exercise during the past 6 months?

_____

Bone Density Research Laboratory
Department of Health and Exercise Science
University of Oklahoma

MENSTRUAL HISTORY QUESTIONNAIRE FOR PRE-MENOPAUSAL WOMEN

Subject ID: _____ Date: _____

We are asking you to give us as complete a menstrual history as possible. All information you provide will be strictly confidential.

Are you pregnant? (circle your response below)

YES – Do not complete the rest of this form.

NO – Complete sections A and B of this form.

SECTION A: CURRENT MENSTRUAL STATUS

1. Approximately how many menstrual periods have you had during the past 12 months?

2. Circle the months in which your period occurred. This means from this time last year until the present month.

   JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

3. What is the usual length of your menstrual cycle (first day menses to first day next menses)

   ____ days. Today is day _____ of your present menstrual cycle.

4. What was the date of your last period?

5. When do you expect your next menstrual period?

6. What is the length (number of days) of your menstrual flow on the average?

How many of these days would you term "heavy"

7. Do you experience cramps during menstruation (dysmenorrhea)? If yes, how many days does this last?

8. Do you experience symptoms of premenstrual syndrome (i.e., weight gain, increased eating, depression, headaches, anxiety, breast tenderness)? If yes, list the symptoms.

9. Do you take oral contraceptives or any other medication that includes estrogen and/or progesterone? If no, skip to question 10.

   If yes, how long have you been taking the birth control pill?

   What is the brand name and dosage of the oral contraceptive you are taking?

   Has the pill affected your menstrual cycle (regularity, length and amount of flow, length of cycle)? If yes, indicate changes.

10. Have you taken oral contraceptives in the past? If no, skip to SECTION B.

    If yes, what was the brand name and dosage?

    When did you start taking the pill; for how long; and when did you stop taking it?

11. If you answered yes to 9 or 10, did you experience a weight gain and/or a change in appetite as a result of oral contraceptive use? If so, please indicate amount of weight gain.

12. If you are perimenopausal, are you experiencing menopausal symptoms? Please list your symptoms (i.e., hot flushes, mood swings, headaches etc.)

SECTION B: PAST MENSTRUAL HISTORY

1. At what age did you experience your **first** menstrual period?

2. Were your periods regular (occurring monthly) during the first two years after menstruation began? If no, at what age did your periods eventually become regular?

3. Did you perform any form of athletic training prior to your first menstrual period? If yes, indicate type of training (i.e., gymnastics, track, basketball, etc.) and the number of years you trained for each activity.

4. Has there been any time in the past where your periods were irregular or absent? If no, skip to question 5.

   If yes, did these periods coincide with unusual bouts of training, or with a period of stress?
   How long did this occur?

5. Have you ever consulted a doctor about menstrual problems (specifically, about irregular or missing periods)? If no, skip to question 6.

   If yes, have you ever been diagnosed as having a shortened luteal phase?

   Have you ever been tested to determine if you were ovulating normally?

6. Have you ever consulted a physician about any problems relating to your hormonal system? If so, please explain.

The University of Oklahoma®
Health Sciences Center
INSTITUTIONAL REVIEW BOARD

IRB Number: 16342
Meeting Date: February 20, 2012
Approval Date: March 01, 2012

March 06, 2012

Michael Bemben, Ph.D.
Univ of Oklahoma, Dept of Health & Exercise Sci
1401 Asp Avenue
Norman, OK 73019

RE: The Time-Course of Muscle Hypertrophy in Women

Dear Dr. Bemben:

The University of Oklahoma Health Sciences Center's Institutional Review Board (IRB) reviewed the above-referenced research protocol at its regularly scheduled meeting on February 20, 2012. It is the IRB's judgement that the rights and welfare of the individuals who may be asked to participate in this study will be respected; that the proposed research, including the process of obtaining informed consent, will be conducted in a manner consistent with the requirements of 45 CFR 46 or 21 CFR 50 & 56, as amended; and that the potential benefits to participants and to others warrant the risks participants may choose to incur.

This letter documents approval to conduct the research as described:

IRB Application Dated: February 02, 2012
Protocol Dated: September 01, 2009
Other Dated: February 02, 2012 Health Status Questionnaire
Other Dated: February 02, 2012 Subject Medical Clearance Form
Other Dated: February 02, 2012 Menstrual History Questionnaire - Post-Menopausal
Other Dated: February 02, 2012 Menstrual History Questionnaire - Pre-Menopausal
Other Dated: February 02, 2012 Pre-Screening Subject Recruitment Form
Other Dated: February 02, 2012 Modified ASES rating scale
Other Dated: February 02, 2012 Lower Extremity Functional Scale
Phone Script - Recruitment Dated: February 02, 2012
Recruitment flyer Dated: February 02, 2012
Advertisement - Email Dated: February 02, 2012
Consent form - Subject Dated: September 08, 2010
Priv - Research Auth 1 Dated: January 04, 2012

As principal investigator of this protocol, it is your responsibility to make sure that this study is conducted as approved by the IRB. Any modifications to the protocol or consent form, initiated by you or by the sponsor, will require prior approval, which you may request by completing a protocol modification form.

It is a condition of this approval that you report promptly to the IRB any serious, unanticipated adverse events experienced by participants in the course of this research, whether or not they are directly related to the study protocol. These adverse events include, but may not be limited to, any experience that is fatal or immediately life-threatening, is permanently disabling, requires (or prolongs) inpatient hospitalization, or is a congenital anomaly, cancer or overdose. For multi-site protocols, the IRB must be informed of serious adverse events at all sites.

The approval granted expires on January 31, 2013. Should you wish to maintain this protocol in an active status beyond that date, you will need to provide the IRB with an IRB Application for Continuing Review (Progress Report) summarizing study results to date. The IRB will request a progress report from you approximately three months before the anniversary date of your current approval.

If you have questions about these procedures, or need any additional assistance from the IRB, please call the IRB office at (405) 271-2045 or send an email to irb@ouhsc.edu. Finally, please review your professional liability insurance to make sure your coverage includes the activities in this study.

Sincerely Yours,

Karen J. Beckman, M.D.
Chair, Institutional Review Board

Post Office Box 26901 • 1000 S.L. Young Blvd., Room 176
Oklahoma City, Oklahoma 73126-0901 • (405) 271-2045 • FAX: (405) 271-1677

Consent Form
University of Oklahoma Health Sciences Center (OUHSC)
The Time-Course of Muscle Hypertrophy in Women
Principle Investigator: Dr. Michael Bemben, University of Oklahoma, 405-325-2717

This is a research study. Research studies involve only individuals who choose to participate. Please take your time to make your decision. Discuss this with your family and friends.

Why Have I Been Asked To Participate In This Study?
You are being asked to take part in this trial/study because you meet the inclusion criteria of a female between the ages of 18-25 or 50-64 years who has not performed resistance exercise more than twice per week for the last 6 months and is not taking hormone replacement therapy.

Why Is This Study Being Done?
The purpose of this study is 1) to measure the rate of muscle growth caused by whole-body resistance exercise training in young and older women and 2) to examine artery responses to this type of training in young and older women.

How Many People Will Take Part In The Study?
About 30 people will take part in this study. All of these individuals will participate at this location.

What Is Involved In The Study?
If you take part in this study, you will have the following tests and procedures:
This study involves eight weeks of strength exercise training. If you are aged 50-64, you will need to obtain medical clearance from your physician in order to participate in the study. You will be asked to provide a urine sample for a pregnancy test before having a DEXA scan. Prior to any training or measurements, a familiarization visit will occur. During this visit, you will fill out several forms and your resting blood pressure will be assessed. If you are able to have children, you will have a pregnancy test. You will also be familiarized with the strength training equipment. You will be asked to lift progressively heavier weights on the weight machines in order to familiarize you with the 1RM testing procedures and the machines that will be using for the future exercise training.

Following the familiarization visit, a pre-testing visit will occur in which the following measurements will be performed: pregnancy test, total body DEXA scan, 8-site ultrasound, thigh circumference, thigh skin-folds, weight, height, pulse wave velocity, blood pressure, forearm blood flow, forearm reactive hyperemia, 1RMs, and two functionality questionnaires.

Approximately two to three weeks after this visit, you will visit the lab again for another pre-testing visit where these same measurements will be performed.

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These same measurements will again be performed following eight weeks of resistance exercise training.

In addition to these pre and post measurements, weekly weight taking, thigh circumference, skinfolds and ultrasounds at eight locations on your body will be performed. These weekly measurements will be performed immediately prior to your first training session of the week.

Every other week, your maximal strength on the weight machines on which you are training will be assessed. This assessment is incorporated into your training program. All procedures mentioned above are described below in more detail.

Exercise Training

Eight weeks of progressive strength exercise training will be performed. You will perform training three times per week using six exercise machines: leg extension, leg curl, leg press, lat pull-down, shoulder press, and chest press. Each exercise will be performed for three total sets. Initially, you will lift at 80% of the heaviest amount of weight you can lift. Eight to ten repetitions will be performed for the first two sets. The third set will be performed until you can no longer complete one more repetition with good form. When your repetitions in the last set exceed 10, weight on that exercise will be increased. This progression will continue throughout the eight weeks of training and is intended to maximize any beneficial muscular changes that may occur from training. (~30-45 minutes)

DXA

A DXA scan of your whole body will be performed. This test is non-invasive and only requires that you lie still for the test to be completed. This research study involves exposure to radiation from a total of three DXA scans, which is a type of x-ray procedure. (~10-15 minutes)

8-Site Ultrasound

We will measure your muscle and fat thickness with an ultrasound machine. This procedure is similar to what is done to look at a baby in a women's uterus. A small amount of gel will be placed on a probe and this probe will be positioned on eight different sites on the body. When an appropriate image is obtained, we will print this image from the ultrasound machine and, later, we will be able to analyze this image to determine fat and muscle thickness. The eight sites that will be assessed are mid-quadriceps, lower-quadriceps, mid-hamstrings, lower-hamstrings, deltoid (shoulder), upper chest, subscapular (back), and visceral (belly - at this site only fat is assessed) (~10-15 minutes).

Thigh Skin-folds and Circumference

Four skin-folds will be taken on your mid-thigh; basically, using our fingers, we will gently pull the fat and skin away from the muscle and measure this thickness. We will

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measure the circumference of the middle of your thigh with a measuring tape. (5 minutes).

Weight and Height

We will measure your body weight and height using a wall stadiometer and a digital scale. (~2 minutes)

Pulse Wave Velocity

We will measure the health of your arteries using a small, pen-shaped device that is connected to a machine called a SphymoCor. We will find the pulse at the neck, thigh, and ankle. We will use a measuring tape to measure the distances between these pulses. We will place three sticky electrodes on your chest and will connect wires that are attached to the SphymoCor to these electrodes. We will then place the pen-shaped device over the various pulses to measure "pulse waves". Placing the device over these pulses provides the machine with information about the time it takes the pulse to travel through the blood vessels. These times, combined with the measured distances, allows the machine to calculate the speed with which the "pulse wave" travels through the arteries. This speed provides us with useful information about arterial health. (~15-20 minutes)

Blood Pressure

We will measure your blood pressure in the arm the same way that it is typically measured at a doctor's office. A cuff will be placed around the upper arm; it will inflate quickly, and then deflate slowly. This will be taken following completion of health history and menstrual cycle questionnaires (see below) but prior to any exercise or other physical measurements. (3-5 minutes)

Forearm Blood Flow

We will measure the amount of blood flow in the smaller blood vessels of your forearm. We will prop up your wrist on a foam pad. We will measure the circumference of your forearm at its largest point. We will place two blood pressure cuffs over the arm: one around wrist and one just above the elbow. We will place a mercury-filled strain gauge (similar in appearance and stretchiness to a rubber band) around the forearm. We will inflate the cuff at your wrist for one minute. We will then inflate and deflate the cuff just above the elbow to a low pressure six times. Each inflation will last ~7s and each deflation will last approximately ~8s. The cuff around the wrist stays inflated during this low pressure inflation and deflation of the cuff just above the elbow. This inflation and deflation takes a total time of ~90s leading to a total wrist cuff inflation time of ~2.5 minutes. The amount the strain gauge stretches is sensed by our machine and tells us the extent of the forearm blood flow. During this procedure, both cuffs will be inflated at the same time for a total of 42s (7 seconds x 6 inflations); regular deflations of the cuff above the elbow occur during this time and the pressure of this cuff is very low even when inflated. (~10 minutes)

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Forearm Reactive Hyperemia

This procedure uses the same equipment and set-up as the forearm blood flow procedure. This procedure looks at the responsiveness of the smaller blood vessels of the forearm rather than just the resting abilities. For this procedure, the blood pressure cuff above the elbow is inflated to a pressure of 250mmHg, which is a substantial pressure, for 5 minutes. After 4 out of the 5 minutes, the cuff around the wrist is also inflated. At 5 minutes, the cuff above the elbow is rapidly deflated. Next the cuff above the elbow is inflated to a low pressure for 6s followed by a 7s deflation and this inflation/deflation process is repeated thirteen times; this inflation/deflation procedure is identical to that performed to measure resting blood flow except that it is performed thirteen times. This procedure is uncomfortable and may be painful. (~15-20 minutes)

Strength Assessments (1 Repetition Maximums aka "1RMs")

1RM's will be performed according to the American College of Sports Medicine's Guidelines for Exercise Testing and Prescription. You will perform a light warm-up of 5-10 repetitions at 40-60% of perceived maximum ability. Following a 1-minute rest, you will do 3-5 repetitions at 60-80% of the perceived maximum ability. A small amount of weight will be added and a 1-RM lift will be attempted. If the lift is successful, a rest period of ~3-5 minutes will be provided. The goal is to find the 1-RM within 3-5 maximal efforts. The 1RM is reported as the weight of the last successfully completed lift. At both pre-testing and the post measurements, 1RMs for the six exercises will be performed on the same day. During the bi-weekly 1RMs, three lower body exercise 1RMs will be performed one day in place of the standard leg training that day and the next training day three upper body 1RMs will be performed in place of the standard arm training. (~10 minutes per exercise).

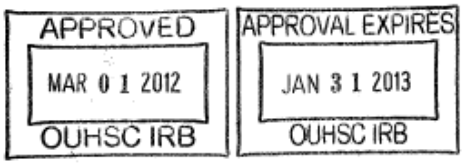
Two Functionality Questionnaires

"The lower extremity functional scale" and the "modified American shoulder and elbow surgeons rating scale" which are two short, one-page questionnaires of functional ability will be given to you to fill out while at the lab. (~5-10 minutes).

Other Forms

During the familiarization visit, you will fill out a Health History Questionnaire and a Menstrual Cycle History Questionnaire. (~15 minutes).

How Long Will I Be In The Study?
You will be in this study for up to twelve weeks. This study involves four "testing" visits to the laboratory and twenty-four (three times per week for eight weeks) strength training visits. The familiarization visit will take approximately 1 hour. The two pre-testing and one post-testing visits will take approximately 2.5 hours each. The strength training visits will take approximately 30-45 minutes each. The first strength training visit of each week, in which some measurements are taken immediately prior to training, will take approximately 45-60 minutes.



There may be anticipated circumstances under which your participation may be terminated by the investigator without regard to your consent.

- He/She feels that it is in your medical best interest.
- You fail to follow study requirements.

You can stop participating in this study at any time. However, if you decide to stop participating in the study, we encourage you to talk to the researcher first.

What Are The Risks of The Study?
This research study involves exposure to radiation from three DEXA scans, which is a type of x-ray procedure. This radiation is not necessary for medical care and is for research purposes only. You will receive radiation exposure of less than 2 mrem from each scan and a total dose of 6 mrem, which is less than the radiation received in 6 days from natural background radiation (~ 300 mrem/yr), such as naturally occurring radioactivity in soil. Any risk from this amount of radiation is too small to measure directly, and is small when compared to every day risks. Although the amount of radiation the subject will receive in this study is minimal, it is important for you to be aware that the risk from radiation exposure is cumulative over the life time.

Pregnant women should not be exposed to radiation. Radiation safety levels for fetuses have not been established and therefore no additional exposure whatsoever can be considered safe.

I verify that I have read and understood the above radiation warning.
INITIALS: _____

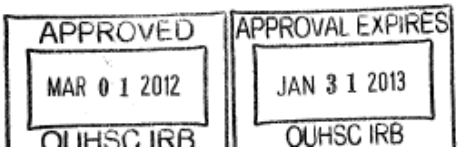
There is always a risk of injury with any exercise program. All attempts will be made to minimize your risk of injury while still allowing you to experience gains from the exercise program. Temporary muscle soreness will likely occur following strength testing and training, particularly at the beginning of the eight weeks. This soreness should be reduced within 24-48 hours following training or strength testing.

Reproductive Risks For Women:

Risks for females:
If you are a female, you must not be and should not become pregnant while on this study. In order to reduce your risk of pregnancy, you or your partner should use one or more of the acceptable methods of birth control listed below, regularly and consistently while you are in this study.

Acceptable methods of birth control (continuing throughout the study) include:

- An approved oral contraceptive (birth control pill)
- Intra-uterine device (IUD)
- Hormone implants
- Contraceptive injection (Depo-Provera)



- Barrier methods (diaphragm with spermicidal gel or condoms)
- Transdermal contraceptives (birth control patch)
- Vaginal contraception ring (birth control ring)
- Sterilization (tubal ligation, hysterectomy or vasectomy)

If you become pregnant or suspect that you are pregnant, during this study, you should immediately inform the study personnel. If you become pregnant or suspect that you are pregnant while on this study, a pregnancy test will be done. No DXA procedures will be performed until the result of the pregnancy test is known. If pregnancy is confirmed, you will be withdrawn from the study. Payment for all aspects of obstetrical, child, or related care will be your responsibility.

Are There Benefits to Taking Part in The Study?

If you agree to take part in this study, there may or may not be direct benefit to you. Strength training has been shown to be an effective method to improve muscle strength and muscle size. Although we cannot promise improvements, previous research suggests these improvements may occur. We also hope that the information learned from this study will benefit others in the future.

What About Confidentiality?

Efforts will be made to keep your personal information confidential. You will not be identifiable by name or description in any reports or publications about this study. We cannot guarantee absolute confidentiality. Your personal information may be disclosed if required by law. You will be asked to sign a separate authorization form for use or sharing of your protected health information.

There are organizations that may inspect and/or copy your research records for quality assurance and data analysis. These organizations include the US Food & Drug Administration and the OUHSC Institutional Review Board.

What Are the Costs?
There is no cost to you for participating in this study.

Will I Be Paid For Participating in This Study?
No.

What if I am Injured or Become Ill While Participating in this Study?
In the case of injury or illness resulting from this study, emergency medical treatment will be available. If injury occurs as a result of participation, you should consult with your personal physician to obtain treatment. However, you or your insurance company will be responsible for the costs associated with this treatment. No funds have been set aside by The University of Oklahoma Health Sciences Center or the Department of Health & Exercise Science to compensate you or pay for the costs associated with treatment in the event of injury.

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What Are My Rights As a Participant?

Taking part in this study is voluntary. You may choose not to participate. Refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. If you agree to participate and then decide against it, you can withdraw for any reason and leave the study at any time. Please be sure to discuss leaving the study with the principal investigator. You may discontinue your participation at any time without penalty or loss of benefits, to which you are otherwise entitled.

You have the right to access the medical information that has been collected about you as a part of this research study. However, you may not have access to this medical information until the entire research study has completely finished and you consent to this temporary restriction. Unfortunately, radiation safety rules will not allow us to disclose to you any results obtained from DXA scans.

Whom Do I Call If I have Questions or Problems?

If you have questions, concerns, or complaints about the study or have a research-related injury, contact the Principle Investigator, Dr. Michael Bemben at mgbemben@ou.edu (405-325-2717) or co-investigator, Lindy Rossow at lindy.rossow@ou.edu (217-766-2273).

If you cannot reach the Investigator or wish to speak to someone other than the investigator, contact the OUHSC Director, Office of Human Research Participant Protection at 405-271-2045.

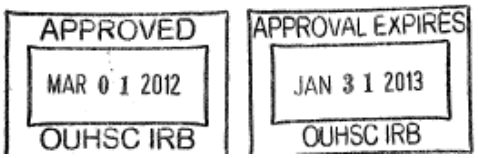
For questions about your rights as a research participant, contact the OUHSC Director, Office of Human Research Participant Protection at 405-271-2045.

Signature:

By signing this form, you are agreeing to participate in this research study under the conditions described. You have not given up any of your legal rights or released any individual or entity from liability for negligence. You have been given an opportunity to ask questions. You will be given a copy of this consent document.

I agree to participate in this study:

PARTICIPANT SIGNATURE (age ≥18)	Printed Name	Date
SIGNATURE OF PERSON OBTAINING CONSENT	Printed Name	Date



AUTHORIZATION TO USE or DISCLOSE
PROTECTED HEALTH INFORMATION FOR RESEARCH
An Informed Consent Document for Research Participation may also be required.
Form 2 must be used for research involving psychotherapy notes.

Title of Research Project: **The Time-Course of Muscle Hypertrophy in Women**

Leader of Research Team: **Michael G. Bemben**

Address: **115 HHC, 1401 Asp Avenue, Norman OK**

Phone Number: **325-2717**

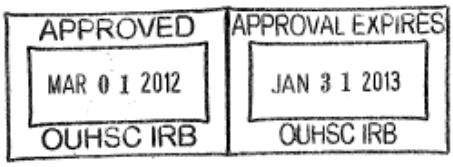
If you decide to join this research project, University of Oklahoma Health Sciences Center (OUHSC) researchers may use or share (disclose) information about you that is considered to be protected health information for their research. Protected health information is information about past, present, and future medical treatment or condition that is identifiable to you. It will be called PHI in this Authorization.

PHI To Be Used or Shared. Federal law requires that researchers get your permission (authorization) to use or share your PHI. If you give permission, the researchers may use or share with the people identified in this Authorization any PHI related to this research from your medical records and from any test results. Information used or shared may include all information relating to any tests, procedures, surveys, or interviews as outlined in the consent form; medical records and charts; name, address, telephone number, date of birth, race, and government-issued identification numbers.

Purposes for Using or Sharing PHI. If you give permission, the researchers may use your PHI to 1) to measure the rate of muscle growth caused by whole-body resistance exercise training in young and older women and 2) to examine artery responses to this type of training in young and older women.

Other Use and Sharing of PHI. If you give permission, the researchers may also use your PHI to develop new procedures or commercial products. They may share your PHI with other researchers, the research sponsor, and its agents, the OUHSC Institutional Review Board, auditors and inspectors who check the research, and government agencies such as the Food and Drug Administration (FDA) and the Department of Health and Human Services (HHS). The researchers may also share your PHI with all researchers collaborating on this project.

Confidentiality. Although the researchers may report their findings in scientific journals or meetings, they will not identify you in their reports. The researchers will try to keep your information confidential, but confidentiality is not guaranteed. The law does not require everyone receiving the information based on this authorization to keep it confidential, so they could release it to others, and federal law may no longer protect it.



YOU UNDERSTAND THAT YOUR PROTECTED HEALTH INFORMATION MAY INCLUDE INFORMATION REGARDING A COMMUNICABLE OR NONCOMMUNICABLE DISEASE.

Voluntary Choice. The choice to give OUHSC researchers permission to use or share your PHI for their research is voluntary. It is completely up to you. No one can force you to give permission. However, you must give permission for OUHSC researchers to use or share your PHI if you want to participate in the research and, if you cancel your authorization, you can no longer participate in this study.

Refusing to give permission will not affect your ability to get routine treatment or health care from OUHSC.

Cancelling Permission. If you give the OUHSC researchers permission to use or share your PHI, you have a right to cancel your permission whenever you want. However, cancelling your permission will not apply to information that the researchers have already used, relied on, or shared.

End of Permission. Unless you cancel it, permission for OUHSC researchers to use or share your PHI for their research will end when all data from the project has been analyzed and all reports have been published. You may cancel your permission at any time by writing to:

Privacy Official University of Oklahoma Health Sciences Center PO Box 26901 Oklahoma City, OK 73190	or	Privacy Board University of Oklahoma Health Sciences Center PO Box 26901 Oklahoma City, OK 73190
If you have questions, call: (405) 271-2511	or	(405 271-2045.

Access to Information. You have the right to access the medical information that has been collected about you as a part of this research study. However, you may not have access to this medical information until the entire research study is completely finished. You consent to this temporary restriction.

Giving Permission. By signing this form, you give OUHSC and OUHSC's researchers led by Michael Bemben, permission to share your PHI for the research project called The Time-Course of Muscle Hypertrophy in Women.

Patient/Participant Name: _____

_____ _____
Signature of Patient-Participant Date
or Parent if Participant is a minor

Or

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Version 01/04/12

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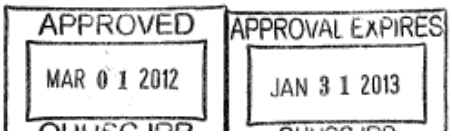
Signature of Legal Representative** Date

**If signed by a Legal Representative of the Patient-Participant, provide a description of the relationship to the Patient-Participant and the Authority to Act as Legal Representative:

OUHSC may ask you to produce evidence of your relationship.

A signed copy of this form must be given to the Patient-Participant or the Legal Representative at the time this signed form is provided to the researcher or his representative.

IRB No.: 16342



Bone Density Research Laboratory
Department of Health and Exercise Science University of Oklahoma

MENSTRUAL HISTORY QUESTIONNAIRE FOR POST-MENOPAUSAL WOMEN

ID: _____ Date: _____

We are asking you to give us as complete a menstrual history as possible. All information you provide will be strictly confidential.

SECTION A. CURRENT MENSTRUAL STATUS

1. At what age did you experience your **final** menstrual period?

2. Have you had a hysterectomy (surgical removal of the uterus)? If yes, at what age did you have this surgery?

3. Have you had your ovaries removed? If yes, at what age did you have this surgery?

4. Are you currently on estrogen and/or progesterone replacement therapy? If no, skip to question 5.

   If yes, how long have you been on hormone replacement therapy?

   What is the brand name, dosage, and type (i.e., pills, cream, patch) of hormone medication you are taking?

5. Have you taken estrogen and/or progesterone replacement in the past? If no, skip to SECTION B.

   If yes, what was the type (i.e, pills, cream, patch) and dosage of the medication?

   At what age did you start taking hormone replacement?

   How long did you continue taking the hormone replacement?

   At what age and why did you stop taking hormone replacement?

6. If you answered yes to questions 4 or 5, did you experience any side effects (i.e., weight gain, mood swings, headaches) while taking hormone replacement?

If yes, please list the side effects.

SECTION B: PAST MENSTRUAL HISTORY

1. At what age did you experience your first menstrual period?

2. Were your periods regular (occurring monthly) during the first two years after menstruation began? If no, at what age did your periods eventually become regular?

3. Did you perform any form of athletic training prior to your first menstrual period? If yes, indicate type of training (i.e., gymnastics, track, basketball, etc.) and the number of years you trained for each activity.

4. Has there been any time in the past where your periods were irregular or absent? If no, skip to question 5.

   If yes, did these periods coincide with unusual bouts of training, or with a period of stress?
   How long did this occur?

5. Have you ever consulted a doctor about menstrual problems (specifically, about irregular or missing periods)? If no, skip to question 7.

   If yes, what was the diagnosis (i.e., shortened luteal phase, amenorrhea)?

   Have you ever been tested to determine if you were ovulating normally?

6. Have you ever consulted a physician about any problems relating to your hormonal system? If so, please explain.

Subject Medical Clearance Form

University of Oklahoma Neuromuscular Laboratory

To the Attending Physician of: _____

The above-named individual has indicated that she wishes to participate in a research study investigating the time-course of muscle hypertrophy and muscle strength and arterial stiffness responses to high-intensity resistance exercise in women aged 18-25 and 50-64. Prior to participation, subjects in the 50-64 years age group are required to obtain medical clearance from their personal physician(s).

This study requires testing sessions that involves three (total) whole body DXA scans, ultrasound muscle and fat thickness assessments, blood pressure assessment, forearm blood flow and reactive hyperemia assessment as measured by strain-gauge plethysmography (non-invasive), pulse wave velocity assessment as measured by applanation tonometry (non-invasive), strength assessment using standard American College of Sports Medicine one-repetition maximum procedures, and health history, menstrual cycle history, and functional performance questionnaires.

Participants in this study will strength train three times per week (~30-45 minutes per session) for eight weeks. The strength training will be performed on standard exercise machines. The following exercises will be performed: chest press, lat pull-down, shoulder press, leg press, leg extension, and leg curl.

Specific inclusion and exclusion criteria apply to the subjects recruited for this study. Below are the exclusion criteria. Please check any boxes that apply to the above-named individual.

- ☐ Uncontrolled hypertension
- ☐ Weight over 300lbs
- ☐ Orthopedic disability or injury that would prevent her from performing weight-machine resistance exercises
- ☐ Metabolic disorder that would prevent her from participation in the program
- ☐ Other: _____

- ☐ I recommend that the above-named individual be allowed to participate in the study.
- ☐ **I do not** recommend that the above-named individual be allowed to participate in the study.

MEDICATIONS/NOTES: _____

_____

Physician Name: _____ Contact Number: _____
(please print)

Physician Signature: _____ Date: _____

This study has been approved by the University of Oklahoma Institutional Review Board. *For questions, please contact Michael G. Bemben, Ph.D. at mgbemben@ou.edu.*

Pre-Screening Subjects Recruitment Form

University of Oklahoma Neuromuscular Laboratory

"The Time-Course of Muscle Hypertrophy in Women"

NAME: _____ PHONE NUMBER: _____

Inclusion Criteria- The inclusion criteria for this study requires that each subject:

☐ is a female aged 18-25 OR aged 50-64 (postmenopausal and not on HRT)

☐ is not resistance trained (defined as >6 months without performing regular - 2x per week or greater- resistance exercise)

☐ is not highly endurance trained (may perform regular low to moderate-intensity endurance exercise <5 hours per week)

☐ has no known orthopedic disorders which would prevent participation in the exercise program

☐ is under the DXA weight limit (300lbs)

☐ is not hypertensive (SBP >140 and/or DBP >90) – this can be either naturally or under control with medication

Exclusion Criteria-The exclusion criteria for this study require that each subject:

☐ Is outside the age range

☐ Is premenopausal in the 50-64 age range or on HRT

☐ Is resistance trained (defined as >6 months without performing regular - 2x per week or greater- resistance exercise)

☐ Is highly endurance trained (may perform regular low to moderate-intensity endurance exercise <5 hours per week)

☐ Has known orthopedic disorders which would prevent participation in the exercise program

☐ Is over the DXA weight limit (300lbs)

☐ Is hypertensive (SBP >140 and/or DBP >90) – this can be either naturally or under control with medication

☐ Is pregnant or planning to become pregnant

Appendix C: Data

Blood Flow

	ID	Code1y...	V3	Resting_PRE1	Resting_PRE2	Resting_POST	PEAKrh_PRE1	PEAKrh_PRE2	PEAKrh_POST	FilterforPostHoc	AUCrh_PRE1
1	LD01	1	.	3	1	4	21	22	22	4.00	73
2	LD02	1	.	1	1	2	19	19	18	4.00	43
3	LD03	1	.	2	2	.	24	24	.	.	56
4	LD04	1	.	3	3	3	24	24	27	4.00	70
5	LD05	1	.	2	1	2	23	13	12	4.00	77
6	LD06	1	.	2	2	3	11	11	18	4.00	51
7	LD07	1	.	2	2	.	20	20	.	.	61
8	LD08	1	.	2	2	8	31	30	25	4.00	78
9	LD30	1	.	2	4	3	17	20	25	4.00	62
10	LD10	1	.	4	4	4	15	16	14	4.00	115
11	LD11	1	.	2	2	3	19	22	18	4.00	60
12	LD12	1	.	1	2	3	30	26	25	4.00	60
13	LD13	1	.	5	2	.	27	24	.	.	88
14	LD14	2	.	2	2	.	10	10	.	.	36
15	LD16	2	.	3	3	3	14	11	18	4.00	83
16	LD17	2	.	3	3	.	.	.	.	.	.
17	LD18	2	.	3	4	.	19	21	.	.	93
18	LD19	2	.	5	6	4	16	17	24	4.00	98
19	LD20	2	.	2	3	3	20	19	14	4.00	67
20	LD21	2	.	11	4	3	38	23	40	4.00	154
21	LD22	2	.	2	2	.	19	16	.	.	66
22	LD23	2	.	3	3	5	19	19	23	4.00	94
23	LD24	2	.	2	4	.	11	20	.	.	38
24	LD25	2	.	2	4	4	25	28	39	4.00	58
25	LD26	2	.	1	1	1	18	18	24	4.00	57
26	LD31...	2	.	3	2	3	16	17	30	4.00	88
27		.	.	.	.	.	.	.	.	.	.
28		.	.	.	.	.	.	.	.	.	.
29	LD40	2	.	2	4	.	14	29	.	.	80
30	LD41	2	.	2	2	3	19	19	19	4.00	50
31	LD42	2	.	1	1	4	17	10	19	4.00	48
32	LD43	1	.	2	2	4	18	17	24	4.00	54
33	LD44	1	.	2	4	3	21	30	21	4.00	94
34	LD45	1	.	3	3	3	18	32	23	4.00	94

	AUCrh_PRE2	AUCrh_POST	RestingPreAverage	PeakRHPreAverage	AUCrhPreAverage
1	56	88	2.28	21.43	64.11
2	43	51	1.18	19.38	42.51
3	56	.	1.75	24.23	55.62
4	70	77	2.71	24.47	69.54
5	43	36	1.52	18.18	60.25
6	51	72	1.67	11.07	50.88
7	61	.	1.84	20.30	60.54
8	63	107	2.11	30.30	70.39
9	92	99	3.06	18.77	76.78
10	68	65	3.85	15.38	91.53
11	65	73	1.99	20.77	62.43
12	86	144	1.85	28.11	72.81
13	84	.	3.56	25.70	85.89
14	36	.	2.04	10.05	36.14
15	56	97	2.95	12.74	69.16
16	.	.	2.64	.	.
17	119	.	3.91	19.76	106.17
18	93	112	5.59	16.56	95.34
19	66	75	2.06	19.38	66.41
20	180	230	7.64	30.24	166.72
21	57	.	2.17	17.77	61.38
22	94	112	3.33	19.38	93.98
23	92	.	2.86	15.07	64.87
24	96	124	3.06	26.56	77.03
25	57	35	1.45	18.45	56.99
26	54	106	2.51	16.66	71.14
27	.	.	.	.	.
28	.	.	.	.	.
29	121	.	3.29	21.65	100.41
30	50	88	1.62	18.65	50.33
31	33	48	1.27	13.53	40.64
32	86	78	1.79	17.61	70.05
33	126	99	3.33	25.43	110.12
34	95	98	3.32	24.70	94.34

Other Cardiovascular Variables

Cardiovascular.sav

	ID	Code1young	SBPPre1	DBPPre1	HeartRate	cPWVPre1	legPWVPre1	V8	SBPPre2	DBPPre2	HeartRate_A
1	LD01	1	97	66	66	7	9	.	100	64	78
2	LD02	1	107	69	64	6	8	.	107	69	64
3	LD03	1	116	73	66	6	7	.	.	.	.
4	LD04	1	119	66	51	5	9	.	119	66	51
5	LD05	1	98	66	64	8	5	.	98	61	67
6	LD06	1	101	67	66	6	5	.	108	63	71
7	LD07	1	107	62	68	4	9	.	.	.	.
8	LD08	1	102	64	68	5	8	.	112	69	56
9	LD30	1	109	69	71	5	10	.	105	73	74
10	LD10	1	121	82	82	7	10	.	123	82	83
11	LD11	1	100	67	64	6	9	.	128	75	73
12	LD12	1	98	64	58	7	9	.	100	61	62
13		.	.	.	.	.	.	.	.	.	.
14	LD13	1	104	64	68	6	7	.	104	63	65
15	LD14	2	119	78	59	8	11	.	.	.	.
16	LD15	2	143	81	58	8	9	.	141	76	54
17	LD16	2	104	72	88	8	7	.	113	78	89
18	LD17	2	117	78	64	7	10	.	.	.	.
19	LD18	2	124	72	75	13	17	.	118	64	79
20	LD19	2	141	79	67	9	7	.	132	73	66
21	LD20	2	121	81	69	.	11	.	120	78	63
22	LD21	2	117	73	52	8	8	.	121	75	53
23	LD22	2	116	69	62	8	11	.	115	65	65
24	LD23	2	116	77	53	7	8	.	110	74	52
25	LD24	2	120	79	72	8	11	.	127	81	71
26	LD25	2	113	68	63	8	9	.	101	64	74
27	LD26	2	110	76	56	8	12	.	110	76	56
28		.	.	.	.	.	.	.	.	.	.
29		.	.	.	.	.	.	.	.	.	.
30	LD36	2	136	87	67	9	10	.	122	79	74
31	LD38	2	90	58	56	6	8	.	106	71	53
32	LD39	2	123	82	80	8	8	.	114	77	67
33	LD40	2	148	86	72	10	9	.	121	77	80
34	LD41	2	133	83	62	10	8	.	135	83	63
35	LD42	2	114	73	61	7	9	.	110	72	59

	cPWV Pre2	legPWV Pre2	V14	SBP Post	DBPPost	HeartRatePost	cPWVPost	legPWVPost	SBPpreAVERAGEnew
1	6	9.9000	.	101	68	72	6.2000	10.2000	98.50
2	6	7.8000	.	105	66	62	5.8000	10.2000	107.00
3	.	.	.	.	.	.	.	.	.
4	5	9.3000	.	106	62	45	5.4000	8.3000	119.00
5	6	9.8000	.	103	65	57	5.0000	10.8000	98.00
6	7	7.6000	.	106	64	72	6.5000	7.3000	104.50
7	.	.	.	.	.	.	.	.	.
8	6	8.5000	.	120	69	76	5.3000	4.4000	107.00
9	5	9.1000	.	105	72	65	6.0000	9.6000	107.00
10	7	11.3000	.	131	91	84	4.4000	9.1000	122.00
11	6	12.1000	.	119	78	74	5.8000	9.5000	114.00
12	7	7.7000	.	104	61	62	6.3000	8.7000	99.00
13	.	.	.	.	.	.	.	.	.
14	6	8.3000	.	.	.	.	.	.	104.00
15	.	.	.	.	.	.	.	.	.
16	7	10.0000	.	137	88	53	7.5000	5.9000	142.00
17	8	7.2000	.	120	82	83	7.1000	9.3000	108.50
18	.	.	.	.	.	.	.	.	.
19	.	6.4000	.	.	.	.	.	.	121.00
20	11	8.2000	.	150	80	64	8.3000	9.8000	136.50
21	6	11.4000	.	117	69	58	7.0000	8.8000	120.50
22	8	6.8000	.	115	71	55	6.5000	7.2000	119.00
23	8	9.7000	.	.	.	.	.	.	115.50
24	7	8.7000	.	107	70	62	6.8000	7.7000	113.00
25	8	11.1000	.	.	.	.	.	.	123.50
26	7	8.5000	.	113	66	58	8.1000	7.4000	107.00
27	8	12.2000	.	114	68	60	7.7000	10.5000	110.00
28	.	.	.	.	.	.	.	.	.
29	.	.	.	.	.	.	.	.	.
30	9	11.1000	.	137	89	62	9.3000	9.6000	129.00
31	6	8.1000	.	101	62	63	5.9000	6.6000	98.00
32	8	9.4000	.	121	77	74	7.2000	8.3000	118.50
33	10	10.7000	.	.	.	.	.	.	134.50
34	11	9.1000	.	132	75	65	8.6000	8.6000	134.00
35	6	8.9000	.	107	69	58	7.0000	8.6000	112.00

	DBPpreAVERAGEnew	HRpreAVERAGEnew	CPWVpreAVERAGEnew	PPWVpreAVERAGEnew
1	65.00	72.00	6.30	9.55
2	69.00	64.00	5.60	7.80
3	.	.	.	.
4	66.00	51.00	4.70	9.30
5	63.50	65.50	6.60	7.35
6	65.00	68.50	6.20	6.50
7	.	.	.	.
8	66.50	62.00	5.25	8.45
9	71.00	72.50	5.05	9.60
10	82.00	82.50	6.75	10.50
11	71.00	68.50	5.80	10.75
12	62.50	60.00	6.75	8.25
13	.	.	.	.
14	63.50	66.50	6.05	7.40
15	.	.	.	.
16	78.50	56.00	7.20	9.25
17	75.00	88.50	8.15	7.20
18	.	.	.	.
19	68.00	77.00	.	11.45
20	76.00	66.50	9.95	7.50
21	79.50	66.00	6.20	11.15
22	74.00	52.50	7.85	7.50
23	67.00	63.50	8.40	10.15
24	75.50	52.50	7.10	8.30
25	80.00	71.50	7.70	10.95
26	66.00	68.50	7.05	8.85
27	76.00	56.00	8.40	12.20
28	.	.	.	.
29	.	.	.	.
30	83.00	70.50	9.15	10.40
31	64.50	54.50	6.00	8.15
32	79.50	73.50	8.15	8.80
33	81.50	76.00	10.10	9.70
34	83.00	62.50	10.80	8.75
35	72.50	60.00	6.40	8.80

	ID	Code1young	SBPPre1	DBPPre1	HeartRate	cPWVPre1	legPWVPre1	V8	SBPPre2	DBPPre2	HeartRate_A
36	LD43	1	95	60	69	6	7	.	102	65	58
37	LD44	1	120	78	52	6	7	.	120	82	61
38	LD45	1	110	71	55	7	9	.	114	74	53
39	LD46	1	102	71	70	6	8	.	97	72	66
40	LD47	1	105	66	50	6	9	.	105	67	56
41	LD48	1	121	70	57	5	8	.	114	61	61

DXA

	ID	Code1young	Age	Height	Weight
1	LD01	1	21	176.0	55.3000
2	LD02	1	22	159.0	52.0000
3	LD03	1	19	166.0	68.7000
4	LD04	1	19	169.0	67.8000
5	LD05	1	20	162.0	52.0000
6	LD06	1	21	168.0	67.5000
7	LD07	1	22	168.0	62.4000
8	LD08	1	19	172.0	69.1000
9	LD30	1	23	160.5	70.1000
10	LD10	1	25	163.5	92.5000
11	LD11	1	22	173.0	59.2000
12	LD12	1	24	172.0	55.6000
13	LD13	1	23	163.5	59.5000
14	LD14	2	60	174.5	109.8000
15	LD15	2	57	165.0	84.1000
16	LD16	2	62	163.0	98.4000
17	LD17	2	55	167.0	71.2000
18	LD18	2	62	156.5	85.3000
19	LD19	2	61	171.5	111.1000
20	LD20	2	55	170.0	100.7000
21	LD21	2	56	164.5	97.2000
22	LD22	2	61	161.5	78.6000
23	LD23	2	56	155.0	80.4000
24	LD24	2	52	166.5	75.6000
25	LD25	2	57	162.5	69.9000
26	LD26	2	56	164.5	59.2000
27	LD36	2	54	167.5	73.0000
28	LD38	2	51	164.0	63.9000
29	LD39	2	51	160.0	70.8000
30	LD40	2	62	162.5	82.3000
31	LD41	2	61	167.5	99.4000
32	LD42	2	58	166.0	66.7000
33	LD43	1	20	166.0	70.3000
34	LD44	1	22	166.0	67.1000
35	LD45	1	20	167.5	69.9000
36	LD46	1	22	160.0	58.1000

DXA.sav

	BMI	FatRegionTotal	FatArms	FatLegs
1	17.9000	20.5000	20.8000	23.2000
2	20.6000	23.4000	17.0000	29.9000
3	24.9000	30.4000	25.4000	32.4000
4	23.7000	36.0000	35.3000	41.1000
5	19.8000	29.0000	23.6000	34.3000
6	23.9000	42.4000	41.8000	46.6000
7	22.1000	34.1000	25.1000	38.4000
8	23.4000	37.9000	33.9000	42.0000
9	27.2000	45.3000	38.5000	45.5000
10	34.6000	50.6000	48.1000	50.0000
11	19.8000	21.7000	20.6000	27.4000
12	18.8000	24.4000	20.8000	29.7000
13	22.3000	28.9000	18.1000	36.4000
14	36.1000	48.7000	51.6000	48.7000
15	30.9000	49.5000	45.6000	51.8000
16	37.0000	48.6000	52.6000	52.5000
17	25.5000	37.7000	32.8000	35.6000
18	34.8000	40.5000	45.5000	33.4000
19	37.8000	48.8000	50.9000	48.3000
20	34.8000	49.0000	50.1000	44.7000
21	36.9000	49.6000	51.0000	53.2000
22	30.1000	49.9000	52.3000	48.0000
23	33.5000	46.2000	46.4000	47.3000
24	27.3000	44.8000	42.1000	49.3000
25	26.5000	36.3000	37.5000	34.7000
26	21.9000	37.5000	29.2000	46.5000
27	26.0000	38.8000	38.2000	40.9000
28	23.8000	43.8000	41.9000	50.2000
29	27.7000	37.4000	37.1000	36.3000
30	31.2000	46.0000	47.8000	44.9000
31	35.4000	51.1000	49.7000	50.7000
32	24.2000	37.2000	32.5000	41.2000
33	25.5000	40.5000	38.8000	42.7000
34	24.4000	31.7000	27.2000	34.3000
35	24.9000	31.4000	34.0000	32.4000
36	22.7000	38.7000	39.5000	40.0000

	FatTrunk	FatTotalg	FatArmsg	FatLegg
1	20.0000	11344	1036	4716
2	21.8000	120983	834	5384
3	32.2000	20763	1899	8457
4	35.0000	23410	2691	9747
5	28.1000	14911	1117	6458
6	42.3000	28256	2849	11654
7	35.1000	21058	1488	8726
8	38.4000	25927	2418	10562
9	49.6000	31077	2748	10872
10	54.2000	46061	4324	14615
11	19.3000	12831	1190	5827
12	23.4000	13512	1028	5811
13	27.8000	17031	1038	8057
14	50.6000	53083	4537	18880
15	51.6000	41142	3790	15863
16	47.1000	47553	5031	19118
17	42.8000	26577	2409	8489
18	45.6000	34594	4037	8450
19	50.8000	53917	4993	17191
20	53.1000	48948	3970	13266
21	49.5000	47957	5065	17993
22	53.5000	38750	4338	11755
23	48.2000	36828	3833	12948
24	44.9000	33522	3370	13662
25	39.4000	25165	2704	7405
26	35.0000	21850	4653	10345
27	40.4000	28108	3111	9535
28	42.6000	27554	2930	11633
29	41.1000	26322	2831	7851
30	49.4000	37420	3980	10971
31	54.0000	50402	4210	17468

32	38.5000	24425	2219	9097
33	42.0000	28137	3022	10662
34	33.5000	21211	1867	8451
35	32.3000	21838	2662	8292
36	41.2000	22218	2515	7416

	FatTrunkg	LeanTotalg	LeanArmsg	LeanLegsg
1	5152	41426	3656	14683
2	5368	37059	3787	11762
3	9728	44625	5207	16554
4	10973	37256	4623	13025
5	6788	34146	3342	11470
6	12876	35944	3670	12474
7	10148	38105	4116	13001
8	12127	36409	4363	13501
9	16534	34820	4088	12146
10	26024	42190	4347	13540
11	5303	43586	4244	14509
12	6041	39190	3607	12801
13	7331	39147	4363	13173
14	28575	52947	4003	18666
15	20417	38806	4161	13573
16	22344	47972	4277	16230
17	14862	41489	4612	14451
18	21024	48790	4602	16013
19	30679	53553	4530	17232
20	30694	48179	3715	15301
21	23764	45811	4601	14680
22	21611	36358	3708	11917
23	19038	40392	4162	13545
24	15518	38836	4291	12995
25	14262	42021	4220	13119
26	9113	34205	3745	11097
27	14561	41646	4664	12727
28	12054	32482	3695	10613
29	14805	41118	4447	12865
30	21320	41086	4027	12527
31	27688	45641	4036	15920
32	12213	38460	4287	12020
33	13694	38440	4364	13252
34	10120	42135	4611	14928
35	10254	44759	4787	16193
36	11410	32735	3558	10303

	LeanTr	BMC	BMCA	BMCLegsg
1	19768	2503.0	290.0	937
2	18384	2430.0	274.0	842
3	19454	2936.3	355.0	1090
4	19608	2464.1	317.4	936
5	16577	2360.0	266.0	873
6	16811	2393.0	303.0	890
7	17843	2611.0	316.0	973
8	18545	2814.6	356.9	1081
9	15751	2712.0	296.0	893
10	21099	2754.0	322.0	1086
11	21386	2609.0	343.0	924
12	18963	2698.0	309.0	951
13	18161	2716.0	328.0	919
14	26973	2889.0	257.0	1216
15	18001	3184.0	355.0	1199
16	24495	2404.0	258.0	1097
17	19135	2465.0	312.0	913
18	24492	2022.0	233.0	823
19	28678	3075.0	291.0	1188
20	26168	2753.0	246.0	1080
21	23283	2899.0	257.0	1117
22	17894	2504.0	245.0	813
23	19583	2525.0	266.0	881
24	18464	2392.0	344.0	1070
25	21337	2082.0	284.0	817
26	16312	2196.0	268.0	805
27	20714	2678.0	363.0	1047
28	15251	2934.0	370.0	945
29	20300	2852.0	342.0	910
30	20951	2769.0	311.0	916
31	22767	2589.0	219.0	1075
...	18727	2764.0	326.0	978
33	17920	2936.0	411.0	1084
34	18988	3480.0	418.0	1295
35	20590	2861.0	369.0	1078
36	15530	2409.0	294.0	839

	BMCTrunkg	PRE2	Weight_A	BMI_A	FatRegionTotal_A
1	788.0	.	56.0000	18.1000	19.6000
2	901.0	.	52.0000	20.6000	23.4000
3	991.7	.	68.7000	24.9000	30.4000
4	787.0	.	67.8000	23.7000	36.0000
5	798.0	.	52.2000	19.9000	28.3000
6	768.0	.	68.2000	24.2000	41.4000
7	898.0	.	62.3000	22.1000	33.4000
8	883.1	.	69.6000	23.5000	39.2000
9	1068.0	.	69.8000	27.1000	41.7000
10	912.0	.	89.1000	33.3000	48.4000
11	812.0	.	59.7000	19.9000	20.9000
12	844.0	.	56.2000	19.0000	24.1000
13	885.0	.	60.7000	22.7000	28.7000
14	884.0	.	109.8000	36.1000	48.7000
15	1118.0	.	84.1000	30.9000	48.1000
16	597.0	.	98.8000	37.2000	46.9000
17	728.0	.	71.2000	25.5000	37.7000
18	572.0	.	84.8000	34.6000	41.2000
19	1038.0	.	111.8000	38.8000	46.8000
20	980.0	.	100.7000	34.8000	47.6000
21	969.0	.	98.9000	36.5000	49.1000
22	881.0	.	78.2000	30.0000	49.8000
23	867.0	.	80.9000	33.7000	45.3000
24	547.0	.	74.4000	26.8000	44.5000
25	617.0	.	68.3000	25.9000	38.0000
26	618.0	.	59.2000	21.9000	37.5000
27	754.0	.	73.7000	26.3000	38.7000
28	967.0	.	65.3000	24.3000	43.7000
29	932.0	.	70.5000	27.5000	37.7000
30	876.0	.	82.7000	31.3000	46.2000
31	779.0	.	98.2000	35.0000	51.3000
32	791.0	.	66.1000	24.0000	37.5000
33	966.0	.	71.2000	25.8000	42.3000
34	1085.0	.	67.7000	24.6000	31.8000
35	951.0	.	69.3000	24.7000	31.5000
36	734.0	.	58.6000	22.9000	37.8000

	FatArms_A	FatLegs_A	FatTrunk_A	FatTotalg_A
1	20.7000	23.2000	18.3000	10818
2	17.0000	29.9000	21.8000	120983
3	25.4000	32.4000	32.2000	20763
4	35.3000	41.1000	35.0000	23410
5	24.4000	33.7000	27.1000	14601
6	42.3000	46.9000	39.7000	27915
7	25.0000	37.8000	34.4000	20577
8	34.9000	44.3000	39.1000	26927
9	38.4000	43.8000	43.8000	28757
10	47.4000	46.6000	52.4000	42594
11	20.8000	27.4000	17.5000	12341
12	22.5000	29.0000	23.1000	13430
13	18.0000	36.8000	26.7000	17278
14	51.6000	48.7000	50.6000	53083
15	46.7000	49.8000	50.3000	39994
16	54.4000	50.1000	45.3000	46142
17	32.8000	35.6000	42.8000	26577
18	46.9000	33.3000	46.9000	34844
19	49.6000	47.9000	47.5000	51938
20	50.5000	44.0000	51.3000	47505
21	49.9000	51.3000	50.1000	48018
22	51.7000	49.5000	52.5000	38489
23	46.3000	46.8000	46.8000	36338
24	40.1000	49.3000	44.7000	32671
25	37.3000	33.9000	43.1000	25655
26	29.2000	46.5000	35.0000	21850
27	37.6000	40.5000	40.4000	28207
28	39.1000	49.8000	43.8000	28127
29	36.0000	37.0000	41.3000	26253
30	46.0000	44.7000	50.2000	37858
31	50.9000	49.4000	55.2000	49802
32	32.8000	41.4000	38.7000	24552
33	38.6000	43.1000	45.5000	29731
34	26.8000	34.0000	33.8000	21417
35	33.8000	32.4000	32.4000	21646
36	38.3000	38.3000	40.7000	21881

	FatArmsg_A	FatLegg_A	FatTrunkg_A	LeanTotalg_A
1	1034	4295	5067	41943
2	834	5384	5368	37059
3	1899	8457	9728	44625
4	2691	9747	10973	37256
5	1225	6298	6537	34703
6	2989	11721	12345	37215
7	1575	8367	9980	38421
8	2478	11517	12089	38984
9	2694	10456	14790	37742
10	3864	13216	24418	42818
11	1293	5792	4764	44085
12	1160	5389	6276	39708
13	1111	8840	6701	40082
14	4537	18880	28575	52947
15	4065	14962	19902	39947
16	4817	18398	21901	49923
17	2409	8489	14862	41489
18	4501	8562	20634	47583
19	5069	19568	26342	56040
20	3718	13853	28854	49552
21	5338	17549	23941	46922
22	4236	11866	21313	36371
23	3980	12576	18744	41255
24	3163	13425	15118	38277
25	2678	7135	15045	39793
26	4653	10345	9113	34205
27	2988	9284	15045	41997
28	2760	11432	12993	33249
29	2678	7908	14836	40579
30	3845	11550	21301	41133
31	4068	17266	27416	44724
32	2253	9294	12114	38210
33	3022	10623	15256	37441
34	1882	8302	10507	42429
35	2568	7893	10550	44281
36	2328	7323	11367	33685

	LeanArmsg_A	LeanLegsg_A	LeanTrunkg_A	BMCtotalg_A
1	3684	13292	21814	2507.0
2	3787	11762	18384	2430.0
3	5207	16554	19454	2936.3
4	4623	13025	19608	2464.1
5	3513	11541	16819	2374.0
6	3782	12394	17971	2376.0
7	4408	12809	18153	2628.0
8	4277	13410	18017	2779.7
9	4035	12581	18181	2418.0
10	4001	14139	21292	2641.0
11	4571	14462	21639	2599.0
12	3684	12242	20033	2688.0
13	4720	14215	17605	2778.0
14	4003	18666	26973	2889.0
15	4238	13972	18615	3122.0
16	3796	17245	25812	2323.0
17	4612	14451	19135	2465.0
18	4856	16320	22696	2085.0
19	4857	20026	28232	2893.0
20	3404	16482	26458	2712.0
21	5010	15573	22923	2909.0
22	3712	11299	18438	2467.0
23	4372	13417	20346	2583.0
24	4372	12753	18103	2419.0
25	4209	13120	19212	2090.0
26	3745	11097	16312	2196.0
27	4613	12605	21337	2744.0
28	3941	10615	15651	2945.0
29	4408	12525	20175	2862.0
30	4217	13328	20161	2876.0
31	3705	16672	21396	2640.0
32	4285	12154	18402	2755.0
33	4408	12930	17135	3111.0
34	4741	14810	19421	3568.0
35	4673	15404	21026	2871.0
36	3465	10985	15808	2377.0

	BMCArmsg_A	BMCLegsg_A	BMCTrunkg_A	POST	Weight_B
1	286.0000	925.0000	806.0	.	55.3000
2	274.0000	842.0000	901.0	.	53.5000
3	355.0000	1090.3000	991.7	.	.
4	317.4000	936.3000	787.0	.	69.8000
5	278.0000	854.0000	809.0	.	54.3000
6	303.0000	884.0000	741.0	.	69.9000
7	324.0000	980.0000	899.0	.	.
8	351.4000	1085.4000	847.7	.	70.5000
9	282.0000	850.0000	829.0	.	69.3000
10	284.0000	1035.0000	881.0	.	90.0000
11	361.0000	912.0000	790.0	.	59.5000
12	311.0000	929.0000	812.0	.	56.3000
13	347.0000	940.0000	826.0	.	.
14	257.0000	1216.0000	884.0	.	.
15	394.0000	1134.0000	1079.0	.	84.2000
16	235.0000	1069.0000	582.0	.	100.5000
17	312.0000	913.0000	728.0	.	.
18	240.0000	818.0000	632.0	.	.
19	299.0000	1232.0000	848.0	.	114.2000
20	233.0000	1115.0000	911.0	.	101.4000
21	342.0000	1098.0000	914.0	.	101.3000
22	244.0000	817.0000	857.0	.	.
23	245.0000	903.0000	935.0	.	81.6000
24	346.0000	1075.0000	577.0	.	.
25	292.0000	794.0000	640.0	.	69.3000
26	268.0000	805.0000	618.0	.	58.0000
27	352.0000	1043.0000	840.0	.	73.4000
28	353.0000	919.0000	1033.0	.	64.6000
29	343.0000	917.0000	949.0	.	70.5000
30	301.0000	942.0000	974.0	.	.
31	222.0000	1042.0000	856.0	.	98.2000
32	322.0000	981.0000	802.0	.	66.4000
33	405.0000	1083.0000	1139.0	.	69.9000
34	411.0000	1275.0000	1132.0	.	68.1000
35	362.0000	1096.0000	987.0	.	68.8000
36	288.0000	805.0000	733.0	.	60.9000

	BMI_B	FatRegionTotal_B	FatArms_B	FatLegs_B
1	17.9000	19.6000	20.2000	23.9000
2	21.2000	26.7000	21.4000	32.3000
3	.	.	.	.
4	24.4000	37.5000	35.4000	41.8000
5	20.7000	27.7000	22.0000	33.3000
6	24.8000	42.4000	41.8000	47.9000
7	.	.	.	.
8	23.8000	39.3000	33.7000	44.2000
9	26.9000	41.3000	38.8000	45.1000
10	33.7000	47.0000	43.9000	44.5000
11	19.9000	20.0000	18.4000	26.0000
12	19.0000	24.5000	20.5000	29.2000
13	.	.	.	.
14	.	.	.	.
15	30.9000	49.4000	45.9000	50.7000
16	37.8000	46.2000	54.7000	48.4000
17	.	.	.	.
18	.	.	.	.
19	38.8000	47.3000	50.6000	48.0000
20	35.1000	48.7000	48.1000	42.5000
21	37.4000	48.6000	50.9000	49.7000
22	.	.	.	.
23	34.0000	46.6000	45.7000	48.3000
24	.	.	.	.
25	26.2000	37.2000	34.2000	33.2000
26	21.4000	36.4000	29.1000	44.5000
27	26.1617	38.9000	39.4000	39.3000
28	24.0184	43.4000	40.4000	49.5000
29	27.5391	35.8000	34.7000	35.1000
30	.	.	.	.
31	35.0011	51.1000	51.0000	49.3000
32	24.0964	35.3000	32.8000	39.5000
33	25.3665	38.8000	36.2000	40.3000
34	24.7133	29.7000	26.1000	32.2000
35	24.5222	29.1000	31.5000	30.9000
36	23.7891	36.9000	38.5000	37.0000

	FatTrunk_B	FatTotalg_B	FatArmsg_B	FatLegg_B
1	18.1000	11018	1084	4352
2	25.9000	14156	1227	6122
3	.	.	.	.
4	37.3000	25924	2720	10799
5	26.5000	14866	1149	6577
6	41.2000	29232	3165	12376
7	.	.	.	.
8	39.7000	27456	2451	11485
9	41.8000	28285	2740	11064
10	51.6000	41881	3598	12365
11	17.0000	11813	1202	5615
12	24.1000	13705	1050	5638
13	.	.	.	.
14	.	.	.	.
15	52.3000	41036	4102	14843
16	45.4000	46065	4160	18103
17	.	.	.	.
18	.	.	.	.
19	48.1000	53757	5089	19233
20	54.3000	48945	4055	13523
21	50.1000	48690	5757	17802
22	.	.	.	.
23	48.3000	37723	4283	13194
24	.	.	.	.
25	42.3000	25581	2346	6959
26	35.0000	20761	1730	9164
27	41.2000	28212	3288	9174
28	42.9000	27673	2831	11290
29	39.3000	25035	2553	7607
30	.	.	.	.
31	54.9000	49687	4036	17261
32	35.8000	23211	2355	8705
33	41.1000	26905	2869	10456
34	31.1000	20152	1948	8044
35	29.1000	19931	2628	7477
36	39.8000	22296	2657	7251

	FatTrunkg_B	LeanTotalg_B	LeanArmsg_B	LeanLegsg_B
1	5141	42767	3991	12945
2	6274	36402	4190	11983
3	.	.	.	.
4	11559	40700	4654	14080
5	6600	36374	3809	12331
6	12831	37286	4093	12558
7	.	.	.	.
8	12706	39503	4474	13412
9	13739	37902	4029	12593
10	24823	44630	4314	14399
11	4507	44686	4979	15081
12	6403	39586	3767	12710
13	.	.	.	.
14	.	.	.	.
15	21054	38780	4426	13297
16	22782	51459	3256	18238
17	.	.	.	.
18	.	.	.	.
19	28454	57001	4680	19553
20	30304	48768	4122	17148
21	23944	48632	5243	16914
22	.	.	.	.
23	19190	40609	4792	13183
24	.	.	.	.
25	15464	41081	4235	13193
26	9163	34117	3938	10659
27	14857	41599	4688	13107
28	12639	33163	3819	10572
29	14078	42019	4479	13128
30	.	.	.	.
31	27360	44855	3657	16679
32	11298	39907	4485	12356
33	12864	39432	4665	14417
34	9420	44157	5071	15657
35	9213	45736	5321	15639
36	11567	35698	3945	11530

	LeanTrunkg_B	BMCtotalg_B	BMCArmsg_B	BMCLegsg_B
1	22479	2490	292	930
2	17101	2438	312	832
3	.	.	.	.
4	18622	2502	310	938
5	17428	2407	267	869
6	17583	2347	305	892
7	.	.	.	.
8	18399	2832	354	1090
9	18416	2328	293	882
10	22443	2606	278	1008
11	21212	2638	360	932
12	19370	2689	310	948
13	.	.	.	.
14	.	.	.	.
15	18062	3212	400	1136
16	26755	2285	192	1034
17	.	.	.	.
18	.	.	.	.
19	29806	3000	287	1261
20	24427	2857	259	1118
21	23039	2808	311	1109
22	.	.	.	.
23	19542	2689	296	928
24	.	.	.	.
25	20405	2130	281	791
26	16425	2157	278	791
27	20356	2781	366	1041
28	15838	2932	361	940
29	20862	2798	333	910
30	.	.	.	.
31	21589	2627	219	1038
32	19546	2692	342	969
33	17428	2964	400	1068
34	19828	3512	436	1302
35	21545	2846	392	1100
36	16824	2352	304	813

	BMCTrunkg_B	WeightPreAverage	PercentFatTotalPreAverage1
1	787	55.65	20.05
2	892	52.00	23.40
3	.	68.70	30.40
4	831	67.80	36.00
5	833	52.10	28.65
6	727	67.85	41.90
7	.	62.35	33.75
8	898	69.35	38.55
9	707	69.95	43.50
10	871	90.80	49.50
11	803	59.45	21.30
12	815	55.90	24.25
13	.	60.10	28.80
14	.	109.80	48.70
15	1170	84.10	48.80
16	620	98.60	47.75
17	.	71.20	37.70
18	.	85.05	40.85
19	930	111.45	47.80
20	1034	100.70	48.30
21	837	98.05	49.35
22	.	78.40	49.85
23	961	80.65	45.75
24	.	75.00	44.65
25	694	69.10	37.15
26	577	59.20	37.50
27	868	73.35	38.75
28	1003	64.60	43.75
29	898	70.65	37.55
30	.	82.50	46.10
31	850	98.80	51.20
32	748	66.40	37.35
33	1017	70.75	41.40
34	1066	67.40	31.75
35	905	69.60	31.45
36	703	58.35	38.25

	PercentFatArmsPreAverage1	PercentFatLegsPreAverage1
1	20.75	23.20
2	17.00	29.90
3	25.40	32.40
4	35.30	41.10
5	24.00	34.00
6	42.05	46.75
7	25.05	38.10
8	34.40	43.15
9	38.45	44.65
10	47.75	48.30
11	20.70	27.40
12	21.65	29.35
13	18.05	36.60
14	51.60	48.70
15	46.15	50.80
16	53.50	51.30
17	32.80	35.60
18	46.20	33.35
19	50.25	48.10
20	50.30	44.35
21	50.45	52.25
22	52.00	48.75
23	46.35	47.05
24	41.10	49.30
25	37.40	34.30
26	29.20	46.50
27	37.90	40.70
28	40.50	50.00
29	36.55	36.65
30	46.90	44.80
31	50.30	50.05
32	32.65	41.30
33	38.70	42.90
34	27.00	34.15
35	33.90	32.40
36	38.90	39.15

	PercentFatTrunkPreAverage	FatTotalPreAverage
1	19.15	11081.00
2	21.80	120983.00
3	32.20	20763.00
4	35.00	23410.00
5	27.60	14756.00
6	41.00	28085.50
7	34.75	20817.50
8	38.75	26427.00
9	46.70	29917.00
10	53.30	44327.50
11	18.40	12586.00
12	23.25	13471.00
13	27.25	17154.50
14	50.60	53083.00
15	50.95	40568.00
16	46.20	46847.50
17	42.80	26577.00
18	46.25	34719.00
19	49.15	52927.50
20	52.20	48226.50
21	49.80	47987.50
22	53.00	38619.50
23	47.50	36583.00
24	44.80	33096.50
25	41.25	25410.00
26	35.00	21850.00
27	40.40	28157.50
28	43.20	27840.50
29	41.20	26287.50
30	49.80	37639.00
31	54.60	50102.00
32	38.60	24488.50
33	43.75	28934.00
34	33.65	21314.00
35	32.35	21742.00
36	40.95	22049.50

	FatArmsPreAverage	FatLegsPreAverage
1	1035.00	4505.50
2	834.00	5384.00
3	1899.00	8457.00
4	2691.00	9747.00
5	1171.00	6378.00
6	2919.00	11687.50
7	1531.50	8546.50
8	2448.00	11039.50
9	2721.00	10664.00
10	4094.00	13915.50
11	1241.50	5809.50
12	1094.00	5600.00
13	1074.50	8448.50
14	4537.00	18880.00
15	3927.50	15412.50
16	4924.00	18758.00
17	2409.00	8489.00
18	4269.00	8506.00
19	5031.00	18379.50
20	3844.00	13559.50
21	5201.50	17771.00
22	4287.00	11810.50
23	3906.50	12762.00
24	3266.50	13543.50
25	2691.00	7270.00
26	4653.00	10345.00
27	3049.50	9409.50
28	2845.00	11532.50
29	2754.50	7879.50
30	3912.50	11260.50
31	4139.00	17367.00
32	2236.00	9195.50
33	3022.00	10642.50
34	1874.50	8376.50
35	2615.00	8092.50
36	2421.50	7369.50

	FatTrunkPreAverage	LeanTotalPreAverage
1	5109.50	41684.50
2	5368.00	37059.00
3	9728.00	44625.00
4	10973.00	37256.00
5	6662.50	34424.50
6	12610.50	36579.50
7	10064.00	38263.00
8	12108.00	37696.50
9	15662.00	36281.00
10	25221.00	42504.00
11	5033.50	43835.50
12	6158.50	39449.00
13	7016.00	39614.50
14	28575.00	52947.00
15	20159.50	39376.50
16	22122.50	48947.50
17	14862.00	41489.00
18	20829.00	48186.50
19	28510.50	54796.50
20	29774.00	48865.50
21	23852.50	46366.50
22	21462.00	36364.50
23	18891.00	40823.50
24	15318.00	38556.50
25	14653.50	40907.00
26	9113.00	34205.00
27	14803.00	41821.50
28	12523.50	32865.50

29	14820.50	40848.50
30	21310.50	41109.50
31	27552.00	45182.50
32	12163.50	38335.00
33	14475.00	37940.50
34	10313.50	42282.00
35	10402.00	44520.00
36	11388.50	33210.00

	LeanArmsPreAverage	LeanLegsPreAverage
1	3670.00	13987.50
2	3787.00	11762.00
3	5207.00	16554.00
4	4623.00	13025.00
5	3427.50	11505.50
6	3726.00	12434.00
7	4262.00	12905.00
8	4320.00	13455.50
9	4061.50	12363.50
10	4174.00	13839.50
11	4407.50	14485.50
12	3645.50	12521.50
13	4541.50	13694.00
14	4003.00	18666.00
15	4199.50	13772.50
16	4036.50	16737.50
17	4612.00	14451.00
18	4729.00	16166.50
19	4693.50	18629.00
20	3559.50	15891.50
21	4805.50	15126.50
22	3710.00	11608.00
23	4267.00	13481.00
24	4331.50	12874.00
25	4214.50	13119.50
26	3745.00	11097.00
27	4638.50	12666.00
28	3818.00	10614.00
29	4427.50	12695.00
30	4122.00	12927.50
31	3870.50	16296.00
32	4286.00	12087.00
33	4386.00	13091.00
34	4676.00	14869.00
35	4730.00	15798.50
36	3511.50	10644.00

	LeanTrunkPreAverage	BMCTotalPreAverage
1	20791.00	2505.00
2	18384.00	2430.00
3	19454.00	2936.30
4	19608.00	2464.10
5	16698.00	2367.00
6	17391.00	2384.50
7	17998.00	2619.50
8	18281.00	2797.15
9	16966.00	2565.00
10	21195.50	2697.50
11	21512.50	2604.00
12	19498.00	2693.00
13	17883.00	2747.00
14	26973.00	2889.00
15	18308.00	3153.00
16	25153.50	2363.50
17	19135.00	2465.00
18	23594.00	2053.50
19	28455.00	2984.00
20	26313.00	2732.50
21	23103.00	2904.00
22	18166.00	2485.50
23	19964.50	2554.00
24	18283.50	2405.50
25	20274.50	2086.00
26	16312.00	2196.00
27	21025.50	2711.00
28	15451.00	2939.50
29	20237.50	2857.00
30	20556.00	2822.50
31	22081.50	2614.50
32	18564.50	2759.50
33	17527.50	3023.50
34	19204.50	3524.00
35	20808.00	2866.00
36	15669.00	2393.00

	BMCArmsPreAverage	BMCLegsPreAverage
1	288.00	931.00
2	274.00	842.00
3	355.00	1090.30
4	317.40	936.30
5	272.00	663.50
6	303.00	887.00
7	320.00	976.50
8	354.15	1083.20
9	289.00	871.50
10	303.00	1060.50
11	352.00	918.00
12	310.00	940.00
13	337.50	929.50
14	257.00	1216.00
15	374.50	1166.50
16	246.50	1083.00
17	312.00	913.00
18	236.50	820.50
19	295.00	1210.00
20	239.50	1097.50
21	299.50	1107.50
22	244.50	815.00
23	255.50	892.00
24	345.00	1072.50
25	288.00	805.50
26	268.00	805.00
27	357.50	1045.00
28	361.50	932.00
29	342.50	913.50
30	306.00	929.00
31	220.50	1058.50
32	324.00	979.50
33	408.00	1083.50
34	414.50	1285.00
35	365.50	1087.00
36	291.00	822.00

	BMCTrunkPreAverage
1	797.00
2	901.00
3	991.70
4	787.00
5	803.50
6	754.50
7	898.50
8	865.40
9	948.50
10	896.50
11	801.00
12	828.00
13	855.50
14	884.00
15	1098.50
16	589.50
17	728.00
18	602.00
19	943.00
20	945.50
21	941.50
22	869.00
23	901.00
24	562.00
25	628.50
26	618.00
27	797.00
28	1000.00
29	940.50
30	925.00
31	817.50
32	796.50
33	1052.50
34	1108.50
35	969.00
36	733.50

	ID	Code1young	Age	Height	Weight
37	LD47	1	22	168.5	57.9000
38	LD48	1	23	179.0	92.4000

	BMI	FatRegionTotal	FatArms	FatLegs
37	20.4000	27.3000	23.0000	30.8000
38	28.8000	35.3000	33.5000	32.5000

	FatTrunk	FatTotalg	FatArmsg	FatLegg
37	27.8000	15672	1248	5956
38	39.9000	32510	3522	10025

DXA.sav

	FatTrunkg	LeanTotalg	LeanArmsg	LeanLegsg
37	7806	39146	3866	12377
38	18007	56036	6550	19475

	LeanTrunkg	BMCtotalg	BMCArmsg	BMCLegsg
37	19468	2637.0	304.0	996
38	25869	3538.0	438.0	1340

DXA.sav

	BMCTrunkg	PRE2	Weight_A	BMI_A	FatRegionTotal_A
37	766.0	.	57.0000	20.1000	27.2000
38	1206.0	.	91.6000	28.9000	34.4000

DXA.sav

	FatArms_A	FatLegs_A	FatTrunk_A	FatTotalg_A
37	24.2000	30.7000	27.7000	15409
38	33.5000	31.6000	38.7000	31343

	FatArmsg_A	FatLegg_A	FatTrunkg_A	LeanTotalg_A
37	1311	5824	7619	38557
38	3446	9798	17257	56266

	LeanArmsg_A	LeanLegsg_A	LeanTrunkg_A	BMCtotalg_A
37	3805	12156	19127	2622.0
38	6403	19857	26176	3458.0

	BMCArmsg_A	BMCLegsg_A	BMCTrunkg_A	POST	Weight_B
37	309.0000	990.0000	761.0	.	58.8000
38	429.0000	1319.0000	1182.0	.	93.9000

DXA.sav

	BMI_B	FatRegionTotal_B	FatArms_B	FatLegs_B
37	20.7099	27.0000	24.2000	30.8000
38	29.3062	34.1000	32.4000	30.6000

DXA.sav

	FatTrunk_B	FatTotalg_B	FatArmsg_B	FatLegg_B
37	27.1000	15766	1410	5970
38	39.4000	31890	3463	10132

	FatTrunkg_B	LeanTotalg_B	LeanArmsg_B	LeanLegsg_B
37	7728	15766	4109	12451
38	17424	57950	6800	21665

DXA.sav

	LeanTrunkg_B	BMCtotalg_B	BMCArmsg_B	BMCLegsg_B
37	20039	2643	316	987
38	25566	3564	434	1335

	BMCTrunkg_B	WeightPreAverage	PercentFatTotalPreAverage1
37	767	57.45	27.25
38	1259	92.00	34.85

DXA.sav

	PercentFatArmsPreAverage1	PercentFatLegsPreAverage1
37	23.60	30.75
38	33.50	32.05

	PercentFatTrunkPreAverage	FatTotalPreAverage
37	27.75	15540.50
38	39.30	31926.50

	FatArmsPreAverage	FatLegsPreAverage
37	1279.50	5890.00
38	3484.00	9911.50

	FatTrunkPreAverage	LeanTotalPreAverage
37	7712.50	38851.50
38	17632.00	56151.00

	LeanArmsPreAverage	LeanLegsPreAverage
37	3635.50	12266.50
38	6476.50	19666.00

	LeanTrunkPreAverage	BMCTotalPreAverage
37	19297.50	2629.50
38	26022.50	3498.00

DXA.sav

	BMCArmsPreAverage	BMCLegsPreAverage
37	306.50	993.00
38	433.50	1329.50

	BMCTrunkPreAverage
37	763.50
38	1194.00

CSAs and Circumference

CSAs and Circumference.sav

	ID	Code1young	@50CircPRE1	MDCSA	HMRCSA	PRE2	@50CircPRE2
1	LD01	1	49.0	81	205	.	51.0
2	LD02	1	53.5	.	.	.	53.5
3	LD04	1	.	.	.	.	56.0
4	LD05	1	51.0	40	213	.	53.5
5	LD06	1	51.5	.	.	.	53.5
6	LD08	1	54.0	.	.	.	55.0
7	LD30	1	57.0	63	241	.	58.0
8	LD10	1	59.5	.	.	.	61.0
9	LD11	1	49.0	84	205	.	50.0
10	LD12	1	53.0	74	223	.	51.0
11	LD15	2	62.5	113	267	.	65.0
12	LD16	2	63.0	79	269	.	61.0
13	LD19	2	71.0	132	306	.	70.5
14	LD20	2	57.0	67	241	.	59.0
15	LD21	2	62.0	61	264	.	67.0
16	LD23	2	61.0	87	259	.	67.0
17	LD25	2	51.5	113	217	.	52.5
18	LD26	2	.	.	.	.	53.5
19	LD36	2	52.5	76	220	.	53.0
20	LD38	2	60.0	88	255	.	60.5
21	LD39	2	57.0	102	242	.	58.0
22	LD40	2	53.5	95	225	.	59.5
23	LD41	2	63.0	122	269	.	65.0
24	LD42	2	52.5	76	221	.	51.5
25	LD43	1	56.0	96	237	.	57.0
26	LD44	1	58.0	122	246	.	58.0
27	LD45	1	56.5	104	239	.	56.5
28	LD46	1	47.5	71	197	.	51.0
29	LD47	1	46.5	66	193	.	48.0
30	LD48	1	59.0	149	252	.	62.5
31		.	.	.	.	.	.
32		.	.	.	.	.	.

CSAs and Circumference.sav

	M	H S	WEEK 3	@50Circ_B	MDCSA_D	HMRCSA_D
1	.	.	.	55.5	0	.
2	93	214	.	51.5	0	.
3	73	234	.	58.5	84	248
4	68	220	.	52.0	57	218
5	.	225	.	55.5	.	234
6	60	229	.	56.5	85	239
7	90	246	.	58.0	65	245
8	0	253	.	58.5	88	248
9	78	209	.	50.0	76	209
10	75	214	.	52.0	79	218
11	149	269	.	63.0	104	269
12	112	285	.	64.5	127	276
13	141	299	.	70.5	106	304
14	101	242	.	57.5	88	243
15	107	239	.	64.5	113	276
16	107	273	.	63.5	106	271
17	112	219	.	54.0	123	228
18	57	229	.	54.5	74	229
19	100	223	.	54.5	106	230
20	95	241	.	59.5	114	253
21	103	246	.	59.0	122	251
22	142	252	.	57.0	130	242
23	120	274	.	64.0	131	274
24	94	230	.	52.0	81	218
25	123	249	.	57.5	129	244
26	112	244	.	61.0	132	260
27	0	0	.	56.0	106	237
28	83	218	.	52.5	97	221
29	71	202	.	49.5	83	207
30	14	259	.	60.5	164	259
31	.	.	.	.	.	.
32	.	.	.	.	.	.

	WEEK4	@50Circ_C	MDCSA_E	HMRCSA_E	WEEK5
1	.	56.5	0	.	.
2	.	51.5	81	216	.
3	.	56.5	77	239	.
4	.	51.5	78	216	.
5	.	56.5	.	239	.
6	.	56.0	89	237	.
7	.	59.5	83	253	.
8	.	57.5	90	244	.
9	.	50.0	80	209	.
10	.	51.5	80	216	.
11	.	64.5	106	276	.
12	.	65.0	100	278	.
13	.	69.5	123	300	.
14	.	56.5	97	239	.
15	.	65.5	117	281	.
16	.	62.0	109	264	.
17	.	53.0	110	223	.
18	.	54.5	100	230	.
19	.	54.5	107	230	.
20	.	57.5	113	244	.
21	.	58.0	114	246	.
22	.	58.0	131	246	.
23	.	64.0	139	274	.
24	.	53.0	90	223	.
25	.	58.0	114	246	.
26	.	58.0	135	247	.
27	.	57.0	114	241	.
28	.	51.5	90	216	.
29	.	49.0	86	205	.
30	.	59.5	154	254	.
31	.	.	.	.	.
32	.	.	.	.	.

	@50Circ_D	MDCSA_F	HMRCSA_F	WEEK6	@50Circ_E
1	57.0	91	241	.	56.5
2	51.5	88	216	.	52.0
3	56.0	85	237	.	59.5
4	52.5	81	221	.	51.0
5	57.0	91	241	.	56.5
6	55.5	84	234	.	56.0
7	59.0	81	250	.	58.0
8	58.0	83	246	.	59.0
9	50.5	74	211	.	50.5
10	51.5	73	216	.	52.5
11	64.5	106	276	.	63.5
12	63.0	105	269	.	63.5
13	70.5	128	304	.	69.5
14	57.5	97	244	.	57.0
15	66.5	149	286	.	65.0
16	63.0	132	269	.	62.0
17	53.5	117	226	.	52.5
18	54.0	86	227	.	53.0
19	52.5	100	221	.	54.0
20	57.5	113	244	.	56.0
21	59.0	133	251	.	59.5
22	58.5	157	249	.	.
23	63.5	118	272	.	64.0
24	51.0	80	214	.	52.0
25	57.5	102	243	.	56.0
26	59.5	141	254	.	58.0
27	57.0	122	242	.	55.5
28	52.0	86	219	.	51.5
29	49.5	81	207	.	48.5
30	61.0	164	261	.	59.5
31	.	.	.	.	.
32	.	.	.	.	.

CSAs and Circumference.sav

	MDCSA_G	HMRCSA_G	WEEK7	@50Circ_F	MDCSA_H
1	0	.	.	56.5	66
2	83	218	.	54.0	78
3	92	253	.	56.0	62
4	68	213	.	51.5	69
5	.	239	.	56.5	66
6	77	236	.	56.5	68
7	98	246	.	59.5	80
8	82	251	.	58.0	70
9	81	212	.	50.5	60
10	75	221	.	52.0	74
11	107	271	.	64.0	103
12	91	271	.	64.0	105
13	123	299	.	70.5	120
14	77	241	.	57.0	84
15	106	278	.	65.5	106
16	117	264	.	64.5	121
17	107	221	.	52.5	94
18	77	222	.	.	45
19	97	227	.	55.0	124
20	89	237	.	57.5	101
21	124	253	.	57.5	135
22	0	-23	.	.	0
23	123	274	.	63.5	97
24	104	218	.	53.5	103
25	123	237	.	56.5	110
26	128	247	.	57.0	112
27	115	235	.	58.5	134
28	106	216	.	52.0	92
29	81	202	.	47.0	61
30	184	254	.	59.5	152
31	.	.	.	.	.
32	.	.	.	.	.

CSAs and Circumference.sav

	MDCSA_G	HMRCSA_G	WEEK7	@50Circ_F	MDCSA_H
1	0	.	.	56.5	66
2	83	218	.	54.0	78
3	92	253	.	56.0	62
4	68	213	.	51.5	69
5	.	239	.	56.5	66
6	77	236	.	56.5	68
7	98	246	.	59.5	80
8	82	251	.	58.0	70
9	81	212	.	50.5	60
10	75	221	.	52.0	74
11	107	271	.	64.0	103
12	91	271	.	64.0	105
13	123	299	.	70.5	120
14	77	241	.	57.0	84
15	106	278	.	65.5	106
16	117	264	.	64.5	121
17	107	221	.	52.5	94
18	77	222	.	.	45
19	97	227	.	55.0	124
20	89	237	.	57.5	101
21	124	253	.	57.5	135
22	0	-23	.	.	0
23	123	274	.	63.5	97
24	104	218	.	53.5	103
25	123	237	.	56.5	110
26	128	247	.	57.0	112
27	115	235	.	58.5	134
28	106	216	.	52.0	92
29	81	202	.	47.0	61
30	184	254	.	59.5	152
31	.	.	.	.	.
32	.	.	.	.	.

CSAs and Circumference.sav

	HMRCSA_H	WEEK8	@50Circ_G	MDCSA_I	HMRCSA_I
1	239	.	58.5	.	.
2	227	.	53.0	78	223
3	236	.	59.0	95	251
4	215	.	52.5	70	220
5	239	.	58.5	.	248
6	239	.	57.0	92	241
7	253	.	58.0	93	246
8	246	.	58.0	85	246
9	211	.	49.5	73	207
10	218	.	52.0	82	218
11	274	.	64.0	105	274
12	274	.	62.5	114	267
13	304	.	69.5	124	299
14	241	.	58.0	104	246
15	281	.	66.0	133	283
16	276	.	64.5	155	276
17	221	.	52.0	85	219
18	-25	.	54.0	82	227
19	232	.	54.0	116	228
20	243	.	58.0	93	246
21	244	.	57.5	119	244
22	-23	.	.	.	.
23	271	.	64.0	122	274
24	225	.	53.5	103	225
25	239	.	60.0	146	256
26	242	.	58.0	128	247
27	249	.	57.5	135	244
28	219	.	53.0	106	223
29	195	.	48.0	84	200
30	254	.	61.5	173	263
31	.	.	.	.	.
32	.	.	.	.	.

	POST	@50Circ_H	MDCSA_J	HMRCSA_J
1	.	50.5	78	211
2	.	54.0	85	227
3	.	58.0	111	246
4	.	51.0	59	213
5	.	57.0	.	242
6	.	58.5	83	248
7	.	58.0	81	245
8	.	58.5	99	248
9	.	49.5	78	207
10	.	51.5	100	217
11	.	64.0	122	274
12	.	62.5	103	266
13	.	68.0	122	292
14	.	57.0	116	241
15	.	66.5	121	285
16	.	63.0	141	269
17	.	51.0	94	214
18	.	53.0	72	223
19	.	53.0	93	223
20	.	59.0	111	250
21	.	57.0	108	242
22	.	.	.	.
23	.	63.0	124	269
24	.	50.0	80	209
25	.	59.0	134	251
26	.	57.0	142	242
27	.	55.0	104	232
28	.	53.0	107	224
29	.	47.0	78	195
30	.	62.5	201	268
31	.	.	.	.
32				

	CircumferencePreAVERAGE	MDPreAVERAGE	MHRPreAVERAGE
1	52.50	96.49	213.91
2	53.00	85.43	225.48
3	55.50	72.16	234.17
4	52.75	78.11	221.88
5	53.75	.	225.79
6	54.50	71.51	229.59
7	58.00	75.21	245.63
8	60.00	99.55	255.07
9	49.75	94.15	208.43
10	51.50	70.05	216.28
11	63.00	138.20	269.46
12	62.00	86.64	263.93
13	71.00	115.06	306.07
14	58.25	97.95	246.78
15	66.25	105.26	284.08
16	66.30	107.19	284.28
17	52.25	119.92	220.10
18	54.75	71.31	230.47
19	53.25	104.09	224.44
20	60.00	123.27	255.52
21	58.50	125.30	248.88
22	59.50	138.95	253.79
23	64.25	134.30	275.22
24	51.75	85.36	216.84
25	58.25	115.35	247.36
26	58.50	111.24	248.47
27	57.25	122.85	242.81
28	51.25	86.10	214.86
29	48.00	73.96	199.68
30	61.75	171.67	264.32
31	.	.	.
32	.	.	.

Functional

	ID	Code1ycung	PRE1	TotalScor...	AverageScoreLower	TotalScoreonUpperBodyPRE1
1	.	1	.	78	4	40
2	.	1	.	.	4	.
3	.	1	.	77	4	39
4	.	1	.	.	3	.
5	.	1	.	76	4	42
6	.	1	.	80	4	42
7	.	1	.	79	4	42
8	.	1	.	75	4	37
9	.	1	.	76	4	39
10	.	1	.	65	3	42
11	.	1	.	77	4	40
12	.	1	.	80	4	42
13	.	1	.	79	4	42
14	.	2	.	78	4	40
15	.	2	.	74	4	41
16	.	2	.	62	3	36
17	.	2	.	63	3	40
18	.	2	.	47	2	36
19	.	2	.	64	3	40
20	.	2	.	75	4	39
21	.	2	.	66	3	40
22	.	2	.	63	3	34
23	.	2	.	76	4	41
24	.	2	.	75	4	39
25	.	2	.	78	4	42
26	.	2	.	.	4	.
27	.	2	.	59	3	37
28	.	2	.	69	3	36
29	.	2	.	80	4	42
30	.	2	.	69	3	38
31	.	2	.	59	3	38
32	.	2	.	77	4	42
33	.	1	.	76	4	42
34	.	1	.	80	4	42

	AverageScoreUpper	PRE2	TotalScoreonLowerBodyPRE2	AverageScoreLower_A	TotalScoreonUpperBodyPRE2
1	3	.	79	4	42
2	3	.	80	4	42
3	3	.	.	4	.
4	3	.	65	3	39
5	3	.	78	4	42
6	3	.	80	4	42
7	3	.	.	4	.
8	3	.	75	4	39
9	3	.	76	4	41
10	3	.	70	4	41
11	3	.	77	4	40
12	3	.	80	4	42
13	3	.	79	4	41
14	3	.	.	4	.
15	3	.	79	4	42
16	3	.	63	3	35
17	3	.	.	3	.
18	3	.	45	2	36
19	3	.	67	3	41
20	3	.	78	4	42
21	3	.	66	3	40
22	2	.	71	4	41
23	3	.	80	4	42
24	3	.	80	4	42
25	3	.	79	4	41
26	3	.	75	4	40
27	3	.	60	3	37
28	3	.	68	3	37
29	3	.	80	4	42
30	3	.	73	4	39
31	3	.	70	4	42
32	3	.	76	4	41
33	3	.	75	4	40
34	3	.	80	4	42

Functional.sav

	AverageScoreUpper_A	POST	TotalScoreonLowerBodyPOST	AverageScoreLower_B	TotalScoreonUpperBodyPOST
1	3	.	79	4	42
2	3	.	80	4	42
3	3	.	.	.	.
4	3	.	74	4	42
5	3	.	77	4	42
6	3	.	80	4	42
7	3	.	.	.	.
8	3	.	74	4	42
9	3	.	80	4	42
10	3	.	70	4	42
11	3	.	78	4	42
12	3	.	80	4	42
13	3	.	.	.	.
14	3	.	.	.	.
15	3	.	80	4	42
16	3	.	74	4	42
17	3	.	.	.	.
18	3	.	.	.	.
19	3	.	69	3	42
20	3	.	78	4	42
21	3	.	68	3	40
22	3	.	.	.	.
23	3	.	80	4	42
24	3	.	.	.	.
25	3	.	79	4	42
26	3	.	80	4	42
27	3	.	68	3	37
28	3	.	70	4	39
29	3	.	80	4	42
30	3	.	.	.	.
31	3	.	70	4	41
32	3	.	80	4	42
33	3	.	78	4	42
34	3	.	80	4	42

	AverageScoreUpper_B	LowerPreAverage	UpperPreAverage
1	3	3.93	2.93
2	3	4.00	3.00
3	.	3.85	2.79
4	3	3.25	2.79
5	3	3.85	3.00
6	3	4.00	3.00
7	.	3.95	3.00
8	3	3.75	2.71
9	3	3.85	2.86
10	3	3.38	2.96
11	3	3.85	2.86
12	3	4.00	3.00
13	.	3.95	2.96
14	.	3.90	2.86
15	3	3.83	2.96
16	3	3.13	2.54
17	.	3.15	2.86
18	.	2.30	2.57
19	3	3.28	2.89
20	3	3.83	2.89
21	3	3.30	2.86
22	.	3.35	2.68
23	3	3.90	2.96
24	.	3.88	2.89
25	3	3.93	2.96
26	3	3.75	2.86
27	3	2.98	2.64
28	3	3.43	2.61
29	3	4.00	3.00
30	.	3.55	2.75
31	3	3.23	2.86
32	3	3.83	2.96
33	3	3.78	2.93
34	3	4.00	3.00

	ID	Code1ycung	PRE1	TotalScor...	AverageScoreLower	TotalScoreonUpperBodyPRE1
35	.	1	.	76	4	42
36	.	1	.	72	4	39
37	.	1	.	80	4	42
38	.	1	.	76	4	41
39	.	.	.	.	.	.
40	.	.	.	.	.	.

	AverageScoreUpper	PRE2	TotalScoreonLowerBodyPRE2	AverageScoreLower_A	TotalScoreonUpperBodyPRE2
35	3	.	80	4	41
36	3	.	76	4	37
37	3	.	80	4	42
38	3	.	76	4	41
39	.	.	.	.	.
40	.	.	.	.	.

	AverageScoreUpper_A	POST	TotalScoreonLowerBodyPOST	AverageScoreLower_B	TotalScoreonUpperBodyPOST
35	3	.	80	4	42
36	3	.	79	4	40
37	3	.	80	4	42
38	3	.	79	4	42
39	.	.	.	.	.
40	.	.	.	.	.

	AverageScoreUpper_B	LowerPreAverage	UpperPreAverage
35	3	3.90	2.96
36	3	3.70	2.71
37	3	4.00	3.00
38	3	3.80	2.93
39	.	.	.
40	.	.	.

Strength

Strength.sav

	ID	Code1young	LegPressPre1	ChestPressPre1
1	LD01	1	190	45
2	LD02	1	230	75
3	LD03	1	230	85
4	LD04	1	200	45
5	LD05	1	230	45
6	LD06	1	210	55
7	LD07	1	113	75
8	LD08	1	210	70
9	LD30	1	250	60
10	LD10	1	190	60
11	LD11	1	190	75
12	LD12	1	160	55
13	LD13	1	310	90
14	LD14	2	200	60
15	LD15	2	180	45
16	LD16	2	190	40
17	LD17	2	210	60
18	LD18	2	120	45
19	LD19	2	210	60
20	LD20	2	190	70
21	LD21	2	170	70
22	LD22	2	170	45
23	LD23	2	190	75
24	LD25	2	160	60
25	LD26	2	150	45
26		.	.	.
27	LD36	2	140	45
28	LD38	2	130	30
29	LD39	2	170	60
30	LD40	2	140	30
31	LD41	2	170	55
32	LD42	2	130	55
33	LD43	1	240	60
34	LD44	1	250	60
35	LD45	1	250	85

Strength.sav

	LegCurlPre1
1	113
2	94
3	131
4	94
5	75
6	113
7	113
8	138
9	100
10	88
11	94
12	100
13	138
14	107
15	94
16	100
17	94
18	63
19	100
20	107
21	113
22	63
23	69
24	100
25	88
26	.
27	82
28	55
29	92
30	69
31	88
32	88
33	125
34	144
35	132

	ShoulderPressPre1	LegExtensionPre1	LatPullDownPre1	PRE2	LegPressPre2
1	45	69	75	.	180
2	58	107	88	.	230
3	.	157	894	.	230
4	45	107	107	.	200
5	36	107	75	.	260
6	45	113	88	.	210
7	62	113	107	.	113
8	58	125	82	.	220
9	50	113	88	.	240
10	50	113	88	.	200
11	50	125	82	.	190
12	36	100	75	.	190
13	62	144	119	.	340
14	32	138	94	.	200
15	32	113	82	.	190
16	36	94	82	.	180
17	50	88	82	.	210
18	27	69	69	.	140
19	32	113	82	.	210
20	50	113	94	.	180
21	45	100	94	.	140
22	27	63	69	.	150
23	62	69	94	.	270
24	50	100	75	.	180
25	63	63	69	.	150
26	.	.	.	.	.
27	36	100	69	.	150
28	23	69	57	.	120
29	50	82	75	.	190
30	32	75	75	.	140
31	27	57	63	.	170
32	36	88	75	.	150
33	41	138	88	.	250
34	50	132	88	.	230
35	59	150	100	.	230

Strength.sav

	ChestPressPre2	LegCurlPre2	ShoulderPressPre2	LegExtensionPre2
1	60	113	45	113
2	75	94	58	107
3	85	131	.	157
4	45	94	45	107
5	45	113	36	119
6	55	119	41	100
7	75	113	62	113
8	75	125	41	125
9	75	119	50	94
10	60	94	50	113
11	70	107	50	125
12	55	100	45	88
13	90	125	62	144
14	60	107	32	138
15	55	100	41	119
16	45	107	45	88
17	60	94	50	88
18	45	69	32	69
19	55	107	32	113
20	60	113	50	113
21	55	107	45	100
22	55	88	32	69
23	75	69	58	75
24	71	100	50	100
25	45	88	63	63
26	.	.	.	.
27	45	82	41	94
28	30	69	23	88
29	60	100	50	88
30	30	63	27	75
31	60	82	41	75
32	45	82	41	94
33	75	132	54	157
34	71	125	54	132

Strength.sav

	LatPullDownPre2	WEEK2	LegPressWeek2	ChestPressWeek2	LegCurlWeek2
1	82	.	200	60	144
2	88	.	280	92	119
3	894	.	.	.	.
4	107	.	190	60	113
5	88	.	280	55	107
6	88	.	240	55	107
7	107	.	.	.	.
8	82	.	230	60	138
9	82	.	220	70	113
10	88	.	210	60	100
11	88	.	200	45	119
12	75	.	180	45	100
13	113	.	.	.	.
14	94	.	.	.	.
15	82	.	240	45	107
16	75	.	220	55	100
17	82	.	.	.	.
18	69	.	.	.	.
19	94	.	230	60	132
20	88	.	200	60	107
21	88	.	180	60	119
22	69	.	.	.	.
23	94	.	270	75	125
24	88	.	190	45	107
25	69	.	150	55	88
26	.	.	.	.	.
27	82	.	170	45	100
28	63	.	140	30	69
29	82	.	170	60	100
30	69	.	150	30	75
31	82	.	160	55	107
32	94	.	150	45	94
33	94	.	230	75	125
34	88	.	270	60	150
35	107	.	210	75	132

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Strength.sav

	ShoulderPressWeek2	LegExtensionWeek2	LatPullDownWeek2	WEEK4	LegPressWeek4
1	41	132	69	.	210
2	50	113	88	.	220
3	.	.	.	.	.
4	50	113	100	.	210
5	41	125	75	.	310
6	45	125	82	.	230
7	.	.	.	.	.
8	50	144	88	.	230
9	50	113	82	.	230
10	50	107	88	.	210
11	50	144	94	.	220
12	50	119	75	.	200
13	.	.	.	.	.
14	.	.	.	.	.
15	36	125	82	.	200
16	45	107	88	.	200
17	.	.	.	.	.
18	.	.	.	.	.
19	41	125	88	.	230
20	50	138	88	.	200
21	41	88	88	.	170
22	.	.	.	.	.
23	62	69	94	.	370
24	50	100	75	.	200
25	50	88	75	.	150
26	.	.	.	.	.
27	45	107	82	.	170
28	32	75	69	.	130
29	50	88	88	.	180
30	36	88	75	.	160
31	45	88	82	.	170
32	41	94	88	.	170
33	50	138	100	.	290
34	50	144	88	.	240
35	59	163	107	.	220

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Strength.sav

	ChestPressWeek4	LegCurlWeek4	ShoulderPressWeek4	LegExtensionWeek4
1	60	150	45	125
2	92	119	62	119
3	.	.	.	.
4	60	119	50	119
5	60	119	41	138
6	60	132	45	119
7	.	.	.	.
8	75	157	50	132
9	75	113	50	125
10	60	113	50	113
11	75	138	58	138
12	60	113	45	119
13	.	.	.	.
14	.	.	.	.
15	45	107	36	132
16	55	107	50	100
17	.	.	.	.
18	.	.	.	.
19	60	132	36	119
20	70	132	58	125
21	60	107	50	74
22	.	.	.	.
23	75	138	75	107
24	60	107	50	119
25	55	82	50	69
26	.	.	.	.
27	60	100	50	119

Strength.sav

	LatPullDownWeek4	WEEK6	LegPressWeek6	ChestPressWeek6	LegCurlWeek6
1	75	.	200	60	157
2	107	.	220	100	119
3	.	.	.	.	.
4	107	.	220	75	144
5	88	.	310	60	125
6	74	.	260	60	113
7	.	.	.	.	.
8	74	.	260	75	157
9	82	.	230	75	132
10	88	.	230	75	144
11	107	.	220	85	138
12	72	.	200	60	113
13	.	.	.	.	.
14	.	.	.	.	.
15	88	.	190	60	113
16	88	.	260	60	119
17	.	.	.	.	.
18	.	.	.	.	.
19	74	.	240	75	132
20	74	.	190	60	138
21	100	.	190	75	125
22	.	.	.	.	.
23	107	.	280	75	138
24	88	.	240	70	119
25	69	.	190	55	100
26	.	.	.	.	.
27	88	.	.	55	107
28	69	.	140	40	69
29	88	.	190	70	113
30	88	.	.	.	.
31	88	.	200	60	119
32	107	.	160	60	107
33	107	.	270	75	144
34	94	.	250	70	163
35	113	.	250	90	169

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Strength.sav

	ShoulderPressWeek6	LegExtensionWeek6	LatPullDownWeek6	WEEK8	LegPress8
1	50	138	82	.	210
2	62	125	100	.	260
3	.	.	.	.	.
4	58	138	107	.	220
5	45	138	88	.	340
6	45	119	74	.	280
7	.	.	.	.	.
8	50	150	100	.	240
9	62	125	88	.	260
10	58	125	74	.	230
11	58	150	107	.	250
12	41	119	75	.	230
13	.	.	.	.	.
14	.	.	.	.	.
15	41	125	74	.	200
16	58	119	88	.	300
17	.	.	.	.	.
18	.	.	.	.	.
19	45	125	107	.	250
20	50	144	74	.	220
21	50	113	100	.	240
22	.	.	.	.	.
23	75	107	74	.	280
24	50	119	74	.	240
25	50	100	69	.	180
26	.	.	.	.	.
27	50	119	88	.	160
28	36	82	69	.	160
29	50	94	88	.	190
30	.	.	.	.	.
31	69	88	88	.	200
32	50	107	107	.	170
33	62	163	113	.	280
34	58	163	100	.	290
35	68	169	125	.	270

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Strength.sav

	ChestPress8	LegCurl8	ShoulderPress8	LegExtension8
1	60	182	50	144
2	100	125	70	132
3	.	.	.	.
4	75	157	58	144
5	60	132	50	144
6	75	125	50	138
7	.	.	.	.
8	75	169	62	157
9	75	132	62	132
10	75	144	58	157
11	90	157	62	169
12	60	119	55	119
13	.	.	.	.
14	.	.	.	.
15	60	119	63	125
16	60	119	62	125
17	.	.	.	.
18	.	.	.	.
19	75	132	63	132
20	75	150	70	144
21	90	125	62	119
22	.	.	.	.
23	85	138	75	119
24	60	125	62	125
25	70	107	50	94
26	.	.	.	.
27	55	107	50	119
28	40	75	32	100
29	70	119	50	113
30	.	.	.	.
31	60	119	50	94
32	60	107	50	113
33	85	150	62	163
34	75	169	62	163
35	60	163	68	175

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Strength.sav

	LatPullDown8	POST	LegPress8_A	ChestPress8_A	LegCurl8_A
1	88	.	200	70	182
2	107	.	250	85	125
3	.	.	.	.	.
4	113	.	210	75	150
5	88	.	.	.	.
6	107	.	280	75	150
7	.	.	.	.	.
8	100	.	250	85	169
9	94	.	270	85	138
10	94	.	260	85	150
11	107	.	220	90	163
12	82	.	200	60	119
13	.	.	.	.	.
14	.	.	.	.	.
15	100	.	180	60	119
16	94	.	300	70	119
17	.	.	.	.	.
18	.	.	.	.	.
19	107	.	250	75	138
20	113	.	138	75	150
21	100	.	190	75	138
22	.	.	.	.	.
23	94	.	280	90	138
24	94	.	250	60	138
25	75	.	180	60	113
26	.	.	.	.	.
27	88	.	150	55	100
28	63	.	140	30	69
29	88	.	190	60	100
30	.	.	.	.	.
31	94	.	190	60	119
32	113	.	160	60	100
33	119	.	290	75	150
34	100	.	290	75	169
35	125	.	270	100	169

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Strength.sav

	ShoulderPress8_A	LegExtension8_A	LatPullDown8_A	V51
1	50	144	94	.
2	62	132	94	.
3	.	.	.	.
4	58	150	107	.
5	.	.	.	.
6	50	132	107	.
7	.	.	.	.
8	62	157	94	.
9	58	132	88	.
10	58	157	94	.
11	62	157	107	.
12	50	119	82	.
13	.	.	.	.
14	.	.	.	.
15	45	132	100	.
16	62	132	94	.
17	.	.	.	.
18	.	.	.	.
19	45	144	113	.
20	62	138	107	.
21	58	113	100	.
22	.	.	.	.
23	70	119	100	.
24	62	144	94	.
25	58	94	75	.
26	.	.	.	.
27	45	119	82	.

Strength.sav

	LegPressPreAVERAGE	LegExtPreAVERAGE	LegCurlPreAVERAGE
1	175.00	90.75	112.50
2	230.00	106.50	94.00
3	230.00	156.50	131.00
4	200.00	106.50	94.00
5	245.00	112.75	93.75
6	210.00	106.25	115.75
7	112.50	112.50	112.50
8	215.00	125.00	131.25
9	245.00	103.25	109.50
10	195.00	112.50	90.75
11	190.00	125.00	100.25
12	175.00	93.75	100.00
13	325.00	144.00	131.25
14	200.00	137.50	106.50
15	185.00	115.75	97.00
16	185.00	90.75	103.25
17	210.00	87.50	94.00
18	130.00	69.00	65.75
19	210.00	112.50	103.25
20	175.00	112.50	109.50
21	155.00	100.00	109.50
22	160.00	65.75	75.00
23	230.00	72.00	69.00
24	180.00	100.00	100.00
25	150.00	62.50	87.50
26	.	.	.
27	145.00	97.00	81.50
28	125.00	78.25	61.75
29	180.00	84.50	96.00
30	140.00	75.00	65.75

Strength.sav

	ChestPressPreAVERAGE	ShoulderPressPreAVERAGE
1	52.00	45.00
2	74.50	57.50
3	85.00	.
4	44.50	45.00
5	44.50	36.00
6	55.00	42.75
7	74.50	62.00
8	72.25	49.00
9	67.00	49.50
10	59.50	49.50
11	72.25	49.50
12	55.00	40.50
13	89.50	62.00
14	59.50	31.50
15	49.75	36.00
16	42.25	40.50
17	59.50	49.50
18	44.50	29.25
19	57.25	31.50
20	64.75	49.50
21	62.50	45.00
22	49.75	29.25
23	74.50	59.75
24	65.00	49.50
25	44.50	62.50
26	.	.
27	44.50	38.25
28	29.50	22.50
29	59.50	49.50
30	29.50	29.25
31	57.25	33.75
32	49.75	38.25
33	67.00	47.25
34	65.00	51.75
35	87.25	63.00

Strength.sav

	LatPullDownPreAVERAGE
1	78.25
2	87.50
3	894.00
4	106.50
5	81.25
6	87.50
7	106.50
8	81.50
9	84.50
10	87.50
11	84.50
12	75.00
13	115.75
14	94.00
15	81.50
16	78.25
17	81.50
18	69.00
19	87.75
20	90.75
21	90.75
22	69.00
23	94.00
24	81.25
25	69.00
26	.
27	75.25
28	59.50
29	78.25
30	72.00
31	72.00
32	84.50
33	90.75
34	87.50
35	103.25

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47		.	.	.
48		.	.	.
49		.	.	.
50		.	.	.
51		.	.	.
52		.	.	.
53		.	.	.
54		.	.	.
55		.	.	.
56		.	.	.
57		.	.	.
58		.	.	.
59		.	.	.
60		.	.	.
61		.	.	.
62		.	.	.
63		.	.	.
64		.	.	.
65		.	.	.
66		.	.	.
67		.	.	.
68		.	.	.
69		.	.	.
70		.	.	.

Strength.sav

	LegCurlPre1
36	100
37	125
38	169
39	.
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Strength.sav

	ShoulderPressPre1	LegExtensionPre1	LatPullDownPre1	PRE2	LegPressPre2
36	41	94	75	.	190
37	32	113	75	.	260
38	68	200	107	.	230
39	.	.	.	.	.
40	.	.	.	.	.
41	.	.	.	.	.
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Strength.sav

	ChestPressPre2	LegCurlPre2	ShoulderPressPre2	LegExtensionPre2
36	55	100	36	100
37	60	119	36	113
38	85	163	63	188
39	.	.	.	.
40	.	.	.	.
41	.	.	.	.
42	.	.	.	.
43	.	.	.	.
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Strength.sav

	LatPullDownPre2	WEEK2	LegPressWeek2	ChestPressWeek2	LegCurlWeek2
36	63	.	200	60	100
37	82	.	260	60	125
38	113	.	230	85	194
39	.	.	.	.	.
40	.	.	.	.	.
41	.	.	.	.	.
42	.	.	.	.	.
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2/5/13 9:45 AM 20/60

Strength.sav

	ShoulderPressWeek2	LegExtensionWeek2	LatPullDownWeek2	WEEK4	LegPressWeek4
36	41	94	82	.	210
37	36	125	75	.	270
38	68	188	119	.	240
39	.	.	.	.	.
40	.	.	.	.	.
41	.	.	.	.	.
42	.	.	.	.	.
43	.	.	.	.	.
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2/5/13 9:45 AM 21/60

Strength.sav

	ChestPressWeek4	LegCurlWeek4	ShoulderPressWeek4	LegExtensionWeek4
36	60	119	50	113
37	60	119	41	144
38	90	207	68	207
39	.	.	.	.
40	.	.	.	.
41	.	.	.	.
42	.	.	.	.
43	.	.	.	.
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2/5/13 9:45 AM 22/60

Strength.sav

	LatPullDownWeek4	WEEK6	LegPressWeek6	ChestPressWeek6	LegCurlWeek6
36	82	.	220	70	132
37	88	.	280	62	125
38	125	.	260	100	225
39	.	.	.	.	.
40	.	.	.	.	.
41	.	.	.	.	.
42	.	.	.	.	.
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2/5/13 9:45 AM 23/60

Strength.sav

	ShoulderPressWeek6	LegExtensionWeek6	LatPullDownWeek6	WEEK8	LegPress8
36	50	119	88	.	240
37	45	150	94	.	260
38	83	225	138	.	260
39	.	.	.	.	.
40	.	.	.	.	.
41	.	.	.	.	.
42	.	.	.	.	.
43	.	.	.	.	.
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2/5/13 9:45 AM 24/60

Strength.sav

	ChestPress8	LegCurl8	ShoulderPress8	LegExtension8
36	75	132	50	125
37	62	125	45	132
38	100	207	87	225
39	.	.	.	.
40	.	.	.	.
41	.	.	.	.
42	.	.	.	.
43	.	.	.	.
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2/5/13 9:45 AM 25/60

Unfiled Notes Page 25

Strength.sav

	LatPullDown8	POST	LegPress8_A	ChestPress8_A	LegCurl8_A
36	88	.	240	75	144
37	94	.	280	70	150
38	138	.	240	100	200
39	.	.	.	.	.
40	.	.	.	.	.
41	.	.	.	.	.
42	.	.	.	.	.
43	.	.	.	.	.
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2/5/13 9:45 AM 26/60

Strength.sav

	ShoulderPress8_A	LegExtension8_A	LatPullDown8_A	V51
36	50	125	88	.
37	45	150	94	.
38	67	225	138	.
39	.	.	.	.
40	.	.	.	.
41	.	.	.	.
42	.	.	.	.
43	.	.	.	.
44	.	.	.	.
45	.	.	.	.
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68	.	.	.	.
69	.	.	.	.
70	.	.	.	.

2/5/13 9:45 AM 27/60

Strength.sav

	LegPressPreAVERAGE	LegExtPreAVERAGE	LegCurlPreAVERAGE
36	195.00	97.00	100.00
37	255.00	112.50	122.00
38	270.00	193.75	165.75
39	.	.	.
40	.	.	.
41	.	.	.
42	.	.	.
43	.	.	.
44	.	.	.
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56	.	.	.
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58	.	.	.
59	.	.	.

Strength.sav

	ChestPressPreAVERAGE	ShoulderPressPreAVERAGE
36	57.25	38.25
37	52.00	33.75
38	87.25	65.25
39	.	.
40	.	.
41	.	.
42	.	.
43	.	.
44	.	.
45	.	.
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Strength.

	LatPullDownPreAVERAGE
36	68.75
37	78.25
38	109.50
39	.

Ultrasound

Ultrasound.sav

	ID	Code1young	FilterPostHocsN28	MUSCLE	@50QPRE1
1		.	5.00	.	.
2	LD01	1	8.00	.	.
3	LD02	1	8.00	.	.
4	LD03	1	5.00	.	.
5	LD04	1	8.00	.	.
6	LD05	1	8.00	.	.
7	LD06	1	8.00	.	.
8	LD07	1	5.00	.	.
9	LD08	1	8.00	.	.
10	LD30	1	8.00	.	.
11	LD10	1	8.00	.	.
12	LD11	1	8.00	.	.
13	LD12	1	8.00	.	.
14	LD13	1	5.00	.	.
15	LD14	2	5.00	.	.
16	LD15	2	8.00	.	.
17	LD16	2	8.00	.	.
18	LD17	2	5.00	.	.
19	LD18	2	5.00	.	.
20	LD19	2	8.00	.	.
21	LD20	2	8.00	.	.
22	LD21	2	8.00	.	.
23	LD22	2	5.00	.	.
24	LD23	2	8.00	.	.
25	LD24	2	5.00	.	.
26	LD25	2	8.00	.	.
27	LD26	2	8.00	.	.
28		.	5.00	.	.
29	LD36	2	8.00	.	4.38
30	LD38	2	8.00	.	3.90
31	LD39	2	8.00	.	4.58
32	LD40	2	5.00	.	4.45
33	LD41	2	8.00	.	5.78
34	LD42	2	8.00	.	4.08
35	LD43	1	8.00	.	4.65

Ultrasound.sav

	@50QuadPre2	@50Qw1	@50Qw2	@50Qw3
1	.	.	.	.
2	5	5.08	5.2	5.36
3	5	4.98	4.8	4.98
4	.	.	.	.
5	4	4.25	4.5	4.78
6	5	4.98	5.0	5.18
7	4	4.18	4.3	4.70
8	.	.	.	.
9	5	4.70	4.8	4.88
10	5	4.98	5.0	5.26
11	5	4.40	4.9	4.73
12	5	4.65	4.9	4.88
13	5	4.83	5.3	5.15
14	6	5.18	5.3	.
15	.	.	.	.
16	5	4.68	4.8	4.58
17	4	4.35	4.7	4.78
18	.	.	.	.
19	4	4.48	4.4	4.38
20	5	4.75	4.9	4.95
21	4	4.03	4.6	4.65
22	4	4.70	5.1	5.06
23	4	3.68	.	.
24	6	5.50	5.5	5.58
25	4	4.48	4.6	4.86
26	5	4.95	5.0	5.08
27	4	4.35	4.4	4.45
28	.	.	.	.
29	5	4.68	4.5	4.58
30	4	4.35	4.1	4.13
31	5	5.38	5.4	5.58
32	5	4.70	5.0	4.70
33	6	5.53	5.7	5.50
34	4	4.30	4.4	4.35
35	5	5.22	5.2	5.35

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Unfiled Notes Page 2

Ultrasound.sav

	@50Qw4	@50Qw5	@50Qw6	@50Qw7
1	.	.	.	.
2	5.23	5.25	5.20	5.43
3	5.00	5.25	5.45	5.63
4	.	.	.	.
5	4.63	4.80	4.85	4.83
6	5.10	4.98	5.25	5.22
7	4.70	4.60	4.75	4.88
8	.	.	.	.
9	5.10	4.95	5.01	5.28
10	5.38	5.76	5.68	5.53
11	4.98	5.00	5.18	5.13
12	4.78	4.93	4.90	4.93
13	5.10	5.35	5.30	5.35
14	.	.	.	.
15	.	.	.	.
16	4.95	4.90	5.00	5.30
17	4.78	4.85	4.85	4.93
18	.	.	.	.
19	4.43	.	.	.
20	4.88	5.05	5.15	5.18
21	4.75	4.70	4.78	4.93
22	5.08	5.22	5.23	5.43
23	.	.	.	.

Ultrasound.sav

	@50Qw8	@50QPOST	@70QPRE1	@70QuadPre2
1	.	.	.	0
2	5.60	5.58	.	4
3	5.58	5.73	.	4
4	.	.	.	0
5	4.78	5.08	.	0
6	5.45	5.68	.	4
7	5.00	5.10	.	3
8	.	.	.	0
9	5.25	5.40	.	4
10	5.45	5.43	.	4
11	5.23	5.23	.	3
12	5.03	4.98	.	4
13	5.30	5.35	.	4
14	.	.	.	5
15	.	.	.	0
16	5.25	5.63	.	4
17	5.05	5.20	.	2
18	.	.	.	0

Ultrasound.sav

	@70	@70Qw2	@70Qw3	@70Qw4
1	.	.	.	.
2	4.0800	4.1800	4.13	4.3500
3	4.1800	4.1800	4.20	4.1000
4	.	.	.	.
5	2.8500	2.9800	3.83	3.5800
6	4.1000	4.3600	4.49	4.3300
7	2.9300	2.8300	3.28	3.4800
8	.	.	.	.
9	3.7300	3.8500	3.90	3.8000
10	3.8500	3.7300	4.30	4.3800
11	3.0500	3.0500	3.30	2.9800
12	4.0300	4.3000	4.50	4.4500
13	4.3500	4.5800	4.53	4.4000
14	5.0000	4.7800	.	.
15	.	.	.	.
16	4.0300	4.2800	4.33	4.3800
17	2.7000	3.2300	3.53	3.6800
18	.	.	.	.
19	4.3800	4.7300	4.46	4.6200
20	3.6800	3.6800	3.63	3.8000
21	3.4500	3.4800	3.88	3.9500
22	4.0800	4.1800	4.15	4.0500
23	2.5300	.	.	.
24	4.9300	4.7800	4.80	4.8500
25	3.8300	3.5000	3.78	3.6300
26	4.2800	3.9300	3.98	4.0300
27	3.5500	3.5500	3.65	3.5800
28	.	.	.	.
29	3.8500	3.8300	3.98	4.1300

Ultrasound.sav

	@70Qw5	@70Qw6	@70Qw7	@70Qw8
1	.	.	.	.
2	4.1800	4.0800	4.0500	4.0000
3	4.5500	4.6000	4.7300	4.7300
4	.	.	.	.
5	3.6000	4.2300	4.1300	4.1000
6	4.4800	4.6800	4.5800	4.8500
7	3.3500	3.4000	3.3800	3.5500
8	.	.	.	.
9	3.8500	3.8300	3.9800	3.8300
10	4.4000	4.3300	4.5600	4.6100
11	3.1200	3.5300	3.3000	3.3000
12	4.5500	4.5300	4.4000	4.5500
13	4.6800	4.8800	4.9500	4.9500
14	.	.	.	.
15	.	.	.	.
16	4.6300	5.0000	4.8800	4.9000
17	3.6000	3.6800	3.9300	3.7500
18	.	.	.	.
19	.	.	.	.
20	3.6800	3.7300	3.8800	3.7000
21	3.9300	4.0300	4.1500	4.5300
22	4.1300	4.3000	4.5000	4.3000
23	.	.	.	.
24	4.7000	4.6000	4.6500	4.6800
25	3.6300	3.5300	3.5000	.
26	4.1000	4.1500	4.0800	3.9300
27	3.5500	3.3000	3.5000	3.7800
28	.	.	.	.

Ultrasound.sav

	@70QPOST	@50QPRE1_A	@50HarmPre2	@50Hw1
1	.	.	.	.
2	3.98	.	5	4.8300
3	4.68	.	3	3.6000
4	.	.	.	.
5	4.13	.	4	4.3800
6	4.70	.	3	2.9500
7	3.45	.	4	3.2500
8	.	.	.	.
9	3.75	.	4	4.1500
10	4.53	.	4	3.7800
11	3.23	.	5	5.2000
12	4.62	.	3	3.5800
13	4.95	.	3	3.7800
14	.	.	4	3.4800
15	.	.	.	.
16	4.95	.	4	3.5800
17	3.63	.	3	3.4300
18	.	.	.	.
19	.	.	3	2.4300
20	4.13	.	5	5.2000
21	4.40	.	3	2.6000
22	4.35	.	3	3.7300
23	.	.	3	3.1500
24	4.55	.	4	3.9800
25	.	.	4	3.6300
26	3.68	.	4	4.1500
27	3.48	.	4	3.8800
28	.	.	.	.
29	4.43	3.53	4	3.6500
30	3.95	3.08	3	3.4800
31	4.23	3.38	3	3.4000
32	.	4.10	4	3.5500
33	4.30	3.45	4	4.1800
34	4.13	3.38	3	3.6500
35	4.77	3.98	4	3.8000

Ultrasound.sav

	@50Hw2	@50Hw3	@50Hw4	@50Hw5
1	.	.	.	.
2	4.95	5.0300	4.9300	4.9000
3	3.98	4.7500	4.8800	4.7500
4	.	.	.	.
5	4.95	5.4800	5.2300	5.1800
6	3.08	3.0300	3.0800	3.0500
7	4.03	4.0100	4.0000	4.0800
8	.	.	.	.
9	4.33	4.4000	4.6300	5.3500
10	3.78	3.7000	3.6800	3.7500
11	5.20	5.1500	5.2000	5.1300
12	3.60	3.6300	3.6500	3.5000
13	3.93	3.7600	3.8000	3.9000
14	4.18	.	.	.
15	.	.	.	.
16	3.63	3.5800	4.0300	3.7000
17	3.55	3.6500	3.8000	3.9000
18	.	.	.	.
19	3.10	2.8500	2.8000	.
20	5.55	5.5100	5.6000	5.3500
21	3.38	3.5800	3.9500	3.7800
22	3.73	3.9300	3.8800	4.2800
23	.	.	.	.
24	4.18	4.0600	4.1500	4.2800
25	3.73	4.0600	4.1000	4.3000
26	4.15	4.3000	4.3000	4.5500
27	4.13	4.0500	4.2000	4.3300
28	.	.	.	.
29	3.80	3.8800	4.1000	4.1500
30	3.23	3.2000	3.3000	3.4800
31	3.23	3.5300	3.8300	3.6300
32	3.45	3.6000	3.2500	.
33	3.85	4.0000	3.8800	3.9000
34	3.33	3.3000	3.4300	3.4600
35	4.33	4.2800	4.3500	4.2300

Ultrasound.sav

	@50Hw6	@50Hw7	@50Hw8	@50HPOST
1	.	.	.	.
2	4.85	5.33	5.31	5.20
3	4.93	4.75	4.63	4.88
4	.	.	.	.
5	5.55	5.98	5.93	5.85
6	3.03	3.50	3.36	3.55
7	4.15	4.10	4.05	4.10
8	.	.	.	.
9	5.40	5.48	5.48	5.50
10	3.63	3.85	3.90	3.80
11	5.45	5.43	5.53	5.45
12	3.55	3.90	3.78	4.41
13	3.78	4.01	3.91	3.90
14	.	.	.	.
15	.	.	.	.
16	4.28	4.23	4.30	4.40
17	3.83	4.15	4.20	3.95
18	.	.	.	.
19	.	.	.	.
20	5.46	5.30	5.48	5.40
21	4.05	3.93	3.98	4.03
22	4.13	4.28	4.33	4.28
23	.	.	.	.
24	4.13	4.23	4.28	4.55
25	4.20	4.23	.	.
26	4.45	4.60	4.53	4.45
27	4.15	4.53	4.48	4.63
28	.	.	.	.
29	4.50	4.38	4.43	4.58
30	3.71	3.66	3.70	3.80
31	4.01	4.15	4.08	3.98
32	.	.	.	.
33	3.95	4.30	4.23	4.05
34	3.78	3.80	4.28	4.18
35	4.30	4.55	4.48	4.38

Ultrasound.sav

	@70QPRE1_A	@70HamPre2	@70Hw1	@70Hw2
1	.	.	.	.
2	.	5.3300	4.9600	5.3000
3	.	4.1000	4.4500	4.3300
4	.	.	.	.
5	.	4.0000	3.6800	3.5500
6	.	3.6300	4.0300	4.1800
7	.	3.3800	3.3500	4.1800
8	.	.	.	.
9	.	4.2300	3.6200	4.3300
10	.	4.5800	4.1000	4.1000
11	.	5.2500	5.6300	5.4800
12	.	3.9000	4.0000	4.0300
13	.	3.5000	3.9800	4.0000
14	.	4.2800	4.0300	4.4300
15	.	.	.	.
16	.	3.7800	4.0000	4.0300
17	.	3.1700	3.3800	3.5300
	.	.	.	.
19	.	2.7000	3.0000	3.0300
20	.	3.6600	3.7300	3.7300
21	.	2.7000	3.3300	2.9300
22	.	3.3100	3.5000	3.8800
23	.	3.3000	3.5800	.
24	.	3.9300	4.0300	4.1800
25	.	3.2800	3.4100	3.4300
26	.	4.3600	3.9000	4.3800
27	.	3.0800	2.7000	3.2500
28	.	.	.	.
29	4.8600	4.6300	4.9800	4.7300
30	3.9300	3.9300	3.9800	3.9800
31	3.6800	4.0000	4.1000	4.4800
32	5.0000	3.5000	4.1300	3.5800
33	3.0300	4.2500	3.7000	3.5000
34	3.8300	3.7500	3.5500	3.8000
35	4.6000	4.3800	4.1000	4.3000

Ultrasound.sav

	@70Hw3	@70Hw4	@70Hw5	@70Hw6
1	.	.	.	.
2	5.5300	5.48	5.2000	5.2300
3	4.2800	4.95	4.6300	4.7300
4	.	.	.	.
5	4.1500	4.10	4.7000	4.7000
6	4.3300	4.53	4.6000	4.7800
7	4.8300	4.80	4.8300	4.8300
8	.	.	.	.
9	4.6000	5.08	5.7800	5.8500
10	4.1300	4.28	4.4000	4.0500
11	5.5800	5.50	5.5800	5.6300
12	4.0800	4.10	4.1300	4.0000
13	3.9000	3.83	4.1300	4.3300
14	.	.	.	.
15	.	.	.	.
16	3.6100	4.18	4.1000	4.4600
17	3.3000	3.30	3.6500	3.6800
18	.	.	.	.
19	2.7500	2.98	.	.
20	3.8000	4.13	4.2000	4.3500
21	3.0300	3.18	3.0800	3.3000
22	3.6800	3.55	3.7800	4.0300
23	.	.	.	.
24	4.3000	4.20	4.1200	4.1200
25	3.5500	3.63	3.5800	3.5500
26	4.6000	4.53	4.6000	4.5500
27	3.0800	3.18	3.6000	3.4500
28	.	.	.	.
29	4.8000	4.95	4.7800	4.7000
30	3.8800	4.13	3.6300	3.8300
31	4.5300	4.63	4.5300	4.8600
32	3.5000	3.42	3.8300	.
33	4.1800	3.88	4.1000	3.8500
34	3.4800	3.43	3.8300	3.4800
35	4.3500	4.28	4.3800	4.3800

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Ultrasound.sav

	@70Hw7	@70Hw8	@70HPOST	DeltPRE1
1	.	.	.	.
2	5.2	5.28	5.13	.
3	4.8	5.13	4.95	.
4	.	.	.	.
5	4.5	4.60	4.58	.
6	4.8	4.75	4.73	.
7	4.8	5.05	5.03	.
8	.	.	.	.
9	6.1	5.88	5.98	.
10	4.0	4.35	4.40	.
11	5.9	5.88	5.83	.
12	4.1	4.38	4.95	.
13	4.2	4.20	4.28	.
14	.	.	.	.
15	.	.	.	.
16	5.1	4.73	4.93	.
17	4.0	4.18	3.85	.
18	.	.	.	.
19	.	.	.	.
20	4.3	4.28	4.23	.
21	3.3	3.48	3.70	.
22	4.1	4.03	3.92	.
23	.	.	.	.
24	4.2	4.35	4.50	.
25	3.6	.	.	.
26	4.7	4.48	4.68	.
27	3.7	3.58	3.48	.
28	.	.	.	.
29	4.8	5.26	5.28	2.0300
30	4.4	4.61	4.85	1.8500
31	5.0	5.28	4.88	2.3000
32	.	.	.	2.0800
33	3.4	4.18	3.93	2.6500
34	3.9	3.71	3.85	1.8300
35	4.6	4.85	4.97	1.6000

Ultrasound.sav

	DeltoidPre2	DeltW1	DeltW2	DeltW3
1	.	.	.	.
2	1.3000	1.2800	1.5000	1.5500
3	1.0300	1.4300	1.6300	1.6500
4	.	.	.	.
5	2.0000	1.9300	2.0500	2.0000
6	1.4500	1.7300	1.8800	2.1600
7	1.7000	1.8800	1.9300	1.8500
8	.	.	.	.
9	1.7000	1.8000	2.0000	2.0300
10	2.1300	2.3500	2.5300	2.4300
11	1.7300	1.9000	1.7500	2.1300
12	1.5800	1.4300	1.6500	1.9000
13	1.4300	1.7800	1.9800	1.9500
14	1.7800	1.4300	1.4800	.
15	.	.	.	.
16	1.8500	1.4300	1.8500	1.8000
17	2.1000	2.3300	2.0800	2.5000
18	.	.	.	.
19	2.5800	2.4300	2.8000	2.7300
20	2.5300	2.3800	2.2500	2.2800
21	2.6300	2.5500	3.2500	2.9800
22	3.7500	4.1000	3.8300	3.6000
23	1.9500	2.2000	.	.
24	2.6300	2.6800	2.6800	2.7300
25	2.0800	1.7500	2.0300	2.1300
26	1.9000	1.8000	1.6300	1.9300
27	1.5800	1.6800	1.7500	1.7300
28	.	.	.	.
29	2.2300	2.0300	2.2800	2.1000
30	2.1500	1.8300	2.1000	1.8000
31	2.2500	2.0300	2.1800	2.2300
32	1.8300	1.9500	2.2500	2.0000
33	2.5300	2.5000	2.4200	2.4800
34	1.8800	1.4800	1.9800	2.0500
35	1.8500	1.8000	1.5500	1.8800

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Ultrasound.sav

	DeltW4	DeltW5	DeltW6	DeltW7
1	.	.	.	.
2	1.5200	1.4800	2.0500	1.8300
3	2.1000	2.4800	2.2000	2.4300
4	.	.	.	.
5	2.1300	2.1500	2.2500	2.3000
6	1.8800	1.9800	2.0300	2.2800
7	1.9800	2.0000	2.2800	2.4500
8	.	.	.	.
9	1.9800	2.0000	2.0000	2.1800
10	2.4500	2.3800	2.6500	2.5000
11	2.0500	2.1500	2.6800	2.2500
12	1.8000	1.8500	1.8300	2.0300
13	1.8500	2.1700	2.2800	2.4300
14	.	.	.	.
15	.	.	.	.
16	1.9500	2.0500	2.0800	2.1000
17	2.3800	2.9000	2.3800	2.3500
18	.	.	.	.
19	2.6000	.	.	.
20	2.2800	2.5300	2.6000	2.5300
21	3.0800	3.0500	2.9800	3.0800
22	4.2300	3.7800	4.1800	4.1800
23	.	.	.	.
24	2.7500	2.6000	2.7800	2.6800
25	3.2300	2.1300	2.0300	2.0300
26	2.3000	2.1000	2.1800	2.5500
27	1.7800	1.8000	1.7500	1.7500
28	.	.	.	.
29	2.2800	2.2800	2.5300	2.4500
30	2.3000	1.9800	2.0800	1.8500
31	2.1500	2.3500	1.9800	2.2500
32	1.9800	2.2500	.	.
33	2.3800	2.4300	2.2300	2.3300
34	2.0300	2.0000	1.7500	1.9800
35	1.8500	2.0800	2.0000	1.8300

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Ultrasound.sav

	DeltW8	DELTPOST	ChestPRE1	ChestPre2
1	.	.	.	.
2	1.60	1.65	.	2
3	2.38	2.33	.	1
4	.	.	.	.
5	2.15	2.13	.	2
6	2.28	1.88	.	1
	2.30	2.28	.	2
8	.	.	.	.
9	2.13	2.13	.	1
10	2.55	2.40	.	2
11	2.30	2.25	.	2
12	1.88	2.05	.	2
13	2.30	2.00	.	2
14	.	.	.	2
15	.	.	.	.
16	2.80	2.28	.	3
17	2.53	2.48	.	2
18	.	.	.	.
19	.	.	.	1
20	2.40	2.55	.	2
21	3.45	3.40	.	2
22	4.20	4.03	.	2
23	.	.	.	2
24	3.08	2.93	.	2
25	.	.	.	2
26	2.50	2.40	.	2
27	1.98	2.15	.	1
28	.	.	.	.
29	2.33	2.48	2.38	2
30	1.95	2.28	0.93	1
31	2.12	2.43	0.98	1
32	.	.	0.95	2
33	2.55	2.80	1.80	2
34	2.30	2.33	1.12	1
35	1.90	1.69	1.20	1

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Ultrasound.sav

	ChestW1	ChestW2	ChestW3	ChestW4
1	.	.	.	.
2	1.4000	1.4000	1.3000	1.5300
3	2.0000	1.7000	1.8000	1.9500
4	.	.	.	.
5	2.2300	2.2800	2.6300	1.8300
6	1.1000	1.0500	1.1500	1.3000
7	1.9800	2.1800	2.0400	1.9800
8	.	.	.	.
9	1.1800	1.3000	1.6000	1.4300
10	1.3000	1.5200	1.8800	1.2800
11	1.7800	1.8800	1.7500	1.8800
12	2.0000	1.7500	1.8100	1.8500
13	1.9000	1.7800	1.6800	1.5000
14	2.2300	2.1000	.	.
15	.	.	.	.
16	2.4000	2.5000	2.8300	2.8500
17	2.1000	1.8000	1.7000	2.0500
18	.	.	.	.
19	1.3000	1.0500	1.1500	1.1300
20	1.5500	1.6300	1.7800	1.7500
21	1.7800	1.7500	1.9000	1.7500
22	2.5800	2.4000	2.5600	2.6000
23	1.6300	.	.	.
24	1.6500	1.6800	1.9800	2.0000
25	1.6300	1.9500	1.6500	1.8000
26	1.7800	1.7000	1.5500	1.4300
27	1.9300	1.7800	1.8600	1.8000
28	.	.	.	.
29	1.1500	1.2000	1.3800	1.2500
30	0.9500	0.9300	1.0200	1.4800
31	1.1800	1.7000	2.2500	2.0500
32	1.6000	1.5800	1.3000	1.5800
33	1.7000	1.5500	1.6500	1.8300
34	1.1200	1.0800	1.6200	1.4300
35	0.8800	1.1300	0.9500	1.2000

Ultrasound.sav

	ChestW5	ChestW6	ChestW7	ChestW8
1	.	.	.	.
2	1.60	1.33	1.50	1.3
3	1.88	1.73	1.88	2.0
4	.	.	.	.
5	2.43	2.23	2.00	1.4
6	1.45	1.18	1.43	1.6
7	2.23	2.63	2.71	1.9
8	.	.	.	.
9	1.55	1.60	1.55	1.7
10	1.85	2.05	2.03	1.5
11	2.03	1.93	1.93	1.9
12	1.70	1.73	1.30	1.2
13	1.58	1.68	1.58	1.6
14	.	.	.	.
15	.	.	.	.
16	2.85	2.80	2.90	2.9
17	2.25	2.30	1.93	1.8
18	.	.	.	.
19	.	.	.	.
20	2.20	2.30	2.55	2.5
21	2.13	1.93	1.80	1.9
22	2.73	2.68	2.68	2.6
23	.	.	.	.
24	1.90	2.08	2.03	1.8
25	2.18	2.18	1.95	.
26	1.75	1.65	2.13	1.7
27	1.83	1.90	2.08	1.5
28	.	.	.	.
29	1.50	1.30	1.33	1.2
30	1.05	1.05	1.27	1.2
31	1.48	1.40	1.50	1.6
32	2.10	.	.	.
33	1.95	1.88	1.80	1.8
34	1.68	1.23	1.48	2.2
35	1.40	2.15	1.45	1.5

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Ultrasound.sav

	CHESTPOST	SUBPRE1	SubscapPre2
1	.	.	.
2	1.30	.	3
3	1.80	.	3
4	.	.	.
5	1.43	.	2
6	1.40	.	2
7	1.83	.	1
8	.	.	.
9	1.78	.	3
10	1.30	.	2
11	1.68	.	2
12	1.23	.	1
13	1.50	.	2
14	.	.	2
15	.	.	.
16	2.75	.	2
17	1.43	.	2
18	.	.	.
19	.	.	2
20	2.25	.	2
21	1.55	.	2
22	2.38	.	2
23	.	.	2
24	1.75	.	2
25	.	.	2
26	1.93	.	1
27	2.05	.	2
28	.	.	.
29	1.03	3.05	2
30	1.63	1.25	1
31	1.50	0.88	1
32	.	1.88	2
33	1.95	2.20	2
34	2.05	0.95	1
35	1.15	1.48	1

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Ultrasound.sav

	SubW1	SubW2	SubW3	SubW4
1	.	.	.	.
2	3	2.75	2.4600	2.45
3	3	2.40	2.2800	2.18
4	.	.	.	.
5	2	1.95	1.9500	1.70
6	2	1.65	1.8000	1.93
7	2	2.38	2.2300	2.05
8	.	.	.	.
9	3	2.35	2.3100	2.25
10	2	2.25	2.4000	2.13
11	2	1.73	1.4500	1.90
12	2	1.40	1.6800	1.38
13	2	2.18	2.0300	2.15
14	2	2.05	.	.
15	.	.	.	.
16	2	1.70	2.1100	1.93
17	2	1.83	2.1800	2.00
18	.	.	.	.
19	3	2.81	2.5800	2.63
20	2	1.90	2.0500	2.00
21	2	2.05	2.0300	2.13
22	2	2.10	2.3000	1.83
23	2	.	.	.
24	2	1.58	1.6500	1.85
25	2	2.45	2.3800	2.45
26	2	2.08	1.6800	2.03
27	1	1.40	1.4800	1.58
28	.	.	.	.
29	2	1.45	2.0000	1.90
30	1	1.28	0.9000	1.43
31	1	1.05	0.9500	1.25
32	2	1.50	1.6500	1.35
33	3	3.05	2.0300	1.88
34	1	1.58	2.0500	1.55
35	1	1.40	1.9000	1.20

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Ultrasound.sav

	SubW5	SubW6	SubW7	SubW8
1	.	.	.	.
2	2.25	2.50	2.1	2.26
3	2.03	1.55	1.8	1.43
4	.	.	.	.
5	2.30	1.78	1.6	2.00
6	1.52	1.45	1.6	1.68
7	1.85	1.88	2.0	1.98
8	.	.	.	.
9	2.38	2.25	2.4	2.10
10	2.05	2.18	2.2	2.60
11	1.75	1.85	1.7	1.95
12	1.68	1.63	1.8	1.80
13	2.15	1.93	1.9	2.15
14	.	.	.	.
15	.	.	.	.
16	2.05	1.93	2.3	2.08
17	2.08	2.00	2.0	1.78
18	.	.	.	.
19	.	.	.	.
20	1.90	2.05	2.2	1.95
21	2.25	2.38	2.4	2.38
22	2.18	1.93	2.3	1.55
23	.	.	.	.
24	1.83	1.83	2.0	2.38
25	2.40	2.43	2.2	.
26	2.08	2.08	2.3	2.45
27	1.43	1.48	1.5	1.68
28	.	.	.	.
29	1.95	1.90	1.3	1.28
30	1.53	1.08	1.2	1.00
31	1.55	1.56	1.1	1.38
32	1.30	.	.	.
33	1.98	1.98	1.9	2.18
34	1.78	1.45	1.5	1.30
35	1.63	1.30	1.6	0.93

2/5/13 9:47 AM 20/108

Ultrasound.sav

	SUBPOST	FAT	@50QPRE1_B	@50QuadPre2_	@50Qw1
1	.	.	.	.	.
2	1.5	.	.	0.8000	0.95
3	1.6	.	.	0.9000	1.05
4	.	.	.	.	.
5	1.8	.	.	2.0000	2.03
6	1.5	.	.	1.5000	1.55
7	1.9	.	.	1.7500	1.68
8	.	.	.	.	.
9	1.3	.	.	1.5500	1.63
10	1.8	.	.	2.0500	2.43
11	1.8	.	.	2.1000	2.25
12	1.4	.	.	0.7000	0.80
13	1.9	.	.	1.2300	1.20
14	.	.	.	1.4000	2.00
15	.	.	.	.	.
16	2.2	.	.	2.6500	2.80
17	1.9	.	.	2.3300	2.63
18	.	.	.	.	.
19	.	.	.	1.1800	1.53
20	2.1	.	.	3.3300	3.25
21	2.4	.	.	1.6300	1.78
22	1.5	.	.	2.1800	2.40
23	.	.	.	3.0500	3.23
24	1.5	.	.	2.8500	2.40
25	.	.	.	2.0800	1.98
26	2.5	.	.	0.9000	1.10
27	1.5	.	.	2.0300	2.08
28	.	.	.	.	.
29	1.6	.	1.4	1.4500	1.30
30	1.3	.	3.3	3.0500	3.30
31	1.5	.	1.6	1.7800	1.85
32	.	.	1.7	1.2300	1.38
33	2.6	.	3.5	3.1300	3.28
34	1.3	.	1.8	1.7500	1.68
35	1.1	.	1.8	2.0300	2.23

2/5/13 9:47 AM 21/108

Ultrasound.sav

	@50Qw2_A	@50Qw3_A	@50Gw4	@50Qw5_A
1	.	.	.	.
2	0.8500	0.9800	0.95	0.8800
3	0.9800	1.1000	1.15	1.1800
4	.	.	.	.
5	1.7800	1.8000	1.80	1.8000
6	1.7800	1.6300	1.53	1.5000
7	1.7800	1.7000	1.85	1.7800
8	.	.	.	.
9	1.6500	1.6800	1.65	1.7000
10	2.3800	2.4300	2.28	2.2000
11	2.0000	2.1500	2.05	1.9300
12	0.7300	0.6000	0.68	0.5700
13	1.2700	1.2800	1.23	1.2500
14	1.5300	.	.	.
15	.	.	.	.
16	2.6500	2.6500	2.83	2.9500
17	2.8500	2.7500	2.48	2.3800
18	.	.	.	.
19	1.2500	1.2500	1.13	.
20	3.3000	3.1000	3.05	3.0800
21	1.8500	1.7000	1.95	1.5300
22	2.5300	2.3300	2.20	2.3000
23	.	.	.	.
24	2.5800	2.6000	2.08	2.0500
25	1.7500	1.9000	2.00	1.9300
26	0.8300	1.1000	0.70	0.9300
27	2.2800	2.2500	2.20	2.0800
28	.	.	.	.
29	1.3500	1.3000	1.25	1.3800
30	3.1000	2.8300	3.20	3.0000
31	1.7500	1.4800	1.68	1.6200
32	1.5200	1.3300	1.33	1.0800
33	2.8300	3.1000	2.80	2.5000
34	1.8800	1.6500	1.65	1.4000
35	2.3000	2.1800	1.85	1.9000

Ultrasound.sav

	@50Qw6_A	@50Qw7_A	@50Qw8_A	@50QPCST_A
1	.	.	.	.
2	0.85	0.9	0.7300	0.7300
3	1.18	1.1	0.9000	1.0000
4	.	.	.	.
5	2.28	1.7	1.5200	1.8000
6	1.50	1.5	1.5800	1.4800
7	1.68	1.8	1.8300	1.6500
8	.	.	.	.
9	1.78	1.8	1.6500	1.5200
10	2.18	2.1	2.0500	2.0800
11	1.88	2.0	2.0300	1.9300
12	0.68	0.7	0.5500	0.5300
13	1.35	1.3	1.1000	1.0000
14	.	.	.	.
15	.	.	.	.
16	2.83	3.0	2.6000	2.5800
17	2.43	2.5	2.3500	2.1800
18	.	.	.	.
19	.	.	.	.
20	3.20	3.3	3.2300	3.3800
21	1.73	1.8	1.6300	1.4000
22	2.38	2.3	2.0500	2.4500
23	.	.	.	.
24	2.08	2.1	2.0500	2.1500
25	1.83	1.8	.	.
26	1.00	0.9	0.7000	0.7300
27	2.08	1.9	1.7500	2.0000
28	.	.	.	.
29	1.33	1.3	1.1500	1.1500
30	3.05	2.9	2.7800	2.6500
31	1.53	1.4	1.2500	1.2300
32	.	.	.	.
33	2.83	2.7	2.9800	2.8500
34	1.48	1.5	1.4300	1.4500
35	1.88	1.6	1.8800	1.8700

Ultrasound.sav

	@70QPRE1_B	@70QuadPre2_A	@70Qw1_A	@70Qw2_A
1	.	.	.	.
2	.	1	0.82	0.8200
3	.	1	1.05	1.0800
4	.	.	.	.
5	.	2	1.52	1.6500
6	.	1	1.48	1.4300
7	.	2	2.03	1.5800
8	.	.	.	.
9	.	2	1.50	1.4500
10	.	2	1.48	1.4000
11	.	2	1.88	1.6300
12	.	1	0.60	0.6500
13	.	1	0.88	0.8500
14	.	1	1.45	1.3800
15	.	.	.	.
16	.	3	2.40	2.5500
17	.	3	3.40	2.8000
18	.	.	.	.
19	.	1	1.73	1.3300
20	.	3	2.60	2.5800
21	.	1	1.75	1.6800
22	.	2	1.98	1.9500
23	.	3	2.58	.
24	.	2	2.00	2.1300
25	.	2	1.80	1.7300
26	.	1	0.45	0.8000
27	.	2	2.03	2.1000
28	.	.	.	.
29	1.23	1	1.38	1.1500
30	2.58	3	3.00	2.8500
31	1.10	1	1.40	1.4500
32	1.10	1	1.38	1.3300
33	3.13	3	3.75	3.4800
34	1.55	2	1.48	1.5300
35	1.70	2	1.87	1.9000

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Ultrasound.sav

	@70Qw3_A	@70Qw4_A	@70Qw5_A	@70Qw6_A
1	.	.	.	.
2	0.6800	0.6500	0.8000	0.63
3	1.1300	1.3000	0.9800	1.10
4	.	.	.	.
5	1.6000	1.6500	1.5500	1.93
6	1.3500	1.3300	1.2000	1.27
7	1.7300	1.7800	1.7000	1.73
8	.	.	.	.
9	1.4300	1.5500	1.5000	1.48
10	1.6000	1.8000	1.5800	1.50
11	1.6300	1.5300	1.6300	1.38
12	0.6500	0.5500	0.5700	0.50
13	0.9000	0.8500	1.1300	0.78
14	.	.	.	.
15	.	.	.	.
16	2.3000	1.9300	2.1800	2.10
17	2.6300	2.5300	2.5500	2.20
18	.	.	.	.
19	1.1000	0.8500	.	.
20	2.6500	2.4800	2.6000	2.65
21	1.7500	1.7000	1.8300	1.73
22	2.0100	1.8800	1.9300	1.93
23	.	.	.	.
24	2.1500	1.6800	2.0300	1.68
25	1.6800	1.6800	1.6000	1.53
26	0.7800	0.4000	0.6000	0.70
27	1.7500	1.9000	1.7800	1.65
28	.	.	.	.
29	1.1800	1.4300	1.2800	0.98
30	2.7300	2.7300	2.6800	2.83
31	1.3500	1.8800	1.5000	1.53
32	1.2800	1.1800	1.3300	.
33	3.1800	2.8000	3.0500	2.55
34	1.5000	1.1800	1.3000	1.58
35	1.9000	1.6800	1.4300	1.55

2/5/13 9:47 AM 26/108

Ultrasound.sav

	@70Qw7_A	@70Qw6_A	@70QPOST_A	@50HPRE1
1	.	.	.	.
2	0.60	0.9	0.5	.
3	1.05	0.8	1.0	.
4	.	.	.	.
5	0.93	0.8	1.2	.
6	1.05	1.3	1.1	.
7	1.73	1.7	1.7	.
8	.	.	.	.
9	1.28	1.2	1.1	.
10	1.68	1.7	1.5	.
11	1.38	1.3	1.5	.
12	0.43	0.4	0.4	.
13	0.85	0.7	0.6	.
14	.	.	.	.
15	.	.	.	.
16	2.03	2.3	2.1	.
17	2.78	2.9	3.2	.
18	.	.	.	.
19	.	.	.	.
20	2.93	2.8	2.4	.
21	1.38	1.1	1.4	.
22	1.93	1.7	1.8	.
23	.	.	.	.
24	2.43	2.4	1.7	.
25	1.50	.	.	.
26	0.53	0.5	0.3	.
27	1.60	1.6	1.5	.
28	.	.	.	.
29	1.08	0.9	0.9	3.2
30	2.58	2.7	2.5	5.0
31	1.35	1.3	1.3	2.5
32	.	.	.	1.4
33	2.85	3.0	2.9	3.7
34	1.25	1.3	0.9	3.4
35	1.28	2.4	1.4	3.6

Ultrasound.sav

	@50HamPre2_A	@50hw1_A	@50hw2_A	@50hw3_A
1	.	.	.	.
2	1	1.33	1.3000	1.2000
3	3	2.25	2.1000	1.9300
4	.	.	.	.
5	2	2.75	2.2800	2.1300
6	3	3.40	3.2000	3.3300
7	3	3.03	2.7500	2.8500
8	.	.	.	.
9	2	2.75	2.5800	2.7500
10	2	2.43	2.4800	2.4300
11	3	3.00	2.7800	2.6500
12	2	2.03	1.9800	2.0300
13	3	2.63	2.2300	2.1000
14	2	1.68	1.5500	.
15	.	.	.	.
16	4	3.48	3.3500	3.4300
17	4	3.93	3.2000	3.6500
18	.	.	.	.
19	1	1.30	0.8000	0.7500
20	3	2.70	2.9000	2.5000
21	1	1.20	1.3400	1.3300
22	3	3.05	3.1300	3.1500
23	3	3.85	.	.
24	3	2.95	2.8000	2.2000
25	3	2.90	2.9300	2.6000
26	2	2.00	1.9300	2.1300
27	2	2.30	2.4000	2.1000
28	.	.	.	.
29	4	3.38	3.0000	3.0300
30	5	4.30	4.0300	3.8100
31	3	3.50	3.1300	3.3800
32	3	3.60	3.8500	3.6800
33	5	4.25	4.2500	4.4300
34	3	2.92	3.5000	3.3500
35	3	2.81	3.0000	3.4000

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Ultrasound.sav

	@50Hw4_A	@50Hw5_A	@50Hw6_A	@50Hw7_A
1	.	.	.	.
2	1.38	1.4500	1.6	0.65
3	1.43	1.8000	1.9	1.73
4	.	.	.	.
5	2.25	2.0000	2.1	1.50
6	3.28	3.3500	3.5	3.03
7	2.85	3.1000	2.8	3.08
8	.	.	.	.
9	2.80	1.3300	1.7	1.20
10	2.65	2.7300	3.0	3.05
11	2.83	2.7500	2.7	2.45
12	1.98	1.6000	1.5	1.45
13	2.05	1.7500	1.6	1.10
14	.	.	.	.
15	.	.	.	.
16	3.60	3.5500	4.1	4.43
17	3.23	3.3500	3.3	3.55
18	.	.	.	.
19	1.28	.	.	.
20	2.93	2.9500	2.9	3.00
21	1.23	1.2500	1.2	1.20
22	3.00	3.1500	3.2	3.10
23	.	.	.	.
24	2.50	2.4800	2.7	2.70
25	2.70	2.5500	2.3	2.48
26	1.90	2.0500	1.6	1.50
27	2.18	2.3300	2.1	2.08
28	.	.	.	.
29	3.08	3.1500	2.6	2.78
30	4.20	3.1800	4.1	4.23
31	2.88	2.9300	2.9	2.85
32	4.12	.	.	.
33	4.30	4.6800	4.1	4.33
34	3.18	2.7500	2.0	3.05
35	3.20	3.3300	3.0	3.06

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Ultrasound.sav

	@50Hw8_A	@50HPOST_A	@70HPRE1	@70HamPre2_A
1	.	.	.	.
2	0.93	0.9800	.	0.7300
3	1.93	1.2300	.	0.7300
4	.	.	.	.
5	1.50	1.7700	.	1.8600
6	3.13	2.8500	.	2.2300
7	3.43	2.9800	.	1.7000
8	.	.	.	.
9	1.00	1.0800	.	1.6500
10	3.15	3.0000	.	1.1800
11	2.30	2.2500	.	1.6000
12	1.58	1.5000	.	1.3300
13	1.10	1.6300	.	1.1000
14	.	.	.	1.4800
15	.	.	.	.
16	4.35	4.1500	.	2.6800
17	3.45	3.2300	.	3.0000
18	.	.	.	.
19	.	.	.	1.3300
20	2.90	3.3500	.	1.7500
21	1.10	1.1200	.	1.3300
22	2.85	2.9300	.	1.8000
23	.	.	.	2.7300
24	2.73	2.5800	.	1.8000
25	.	.	.	2.2500
26	1.28	1.4300	.	0.9300
27	1.83	1.5200	.	1.8300
28	.	.	.	.
29	2.23	2.5300	1.43	1.7300
30	4.73	4.6000	3.15	2.8500
31	3.05	3.1300	1.45	2.0300
32	.	.	1.10	1.7300
33	4.53	4.3500	2.95	3.1000
34	2.43	2.3300	1.83	1.8300
35	2.31	2.3400	2.45	2.2800

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Ultrasound.sav

	@70Hw1_A	@70Hw2_A	@70Hw3_A	@70Hw4_A
1	.	.	.	.
2	0.8800	0.8000	0.68	0.7800
3	0.6300	0.9300	1.15	1.2000
4	.	.	.	.
5	2.1300	2.0000	2.23	2.1500
6	1.9000	2.1300	1.73	1.5300
7	2.3000	2.1800	2.05	2.0800
8	.	.	.	.
9	2.2300	2.2300	2.35	2.2500
10	1.5800	1.2700	1.28	1.2300
11	1.8500	1.8500	1.70	1.6800
12	1.5500	1.5200	1.43	1.3500
13	1.7500	1.0000	1.15	0.9300
14	1.5500	1.4500	.	.
15	.	.	.	.
16	2.7000	2.5800	2.26	2.5300
17	3.2000	2.5800	2.90	2.5500
18	.	.	.	.
19	1.1000	0.6000	1.03	1.1000
20	1.8000	1.6800	1.83	1.8500
21	1.6800	1.1000	1.03	1.1200
22	2.1300	1.8800	1.78	1.7500
23	2.3500	.	.	.
24	1.9000	2.0800	1.95	1.6200
25	2.4300	2.4500	2.33	2.3300
26	1.0200	1.0800	1.10	1.1000
27	2.2500	2.0500	1.50	1.8600
28	.	.	.	.
29	1.2500	1.5200	1.25	1.2800
30	3.0000	2.8500	1.93	2.4800
31	2.3000	1.5000	1.73	1.6000
32	1.8500	1.8000	1.88	2.2000
33	3.0300	3.3500	2.65	2.7800
34	1.8500	1.7800	1.85	2.0500
35	1.0800	2.5500	2.75	2.6300

2/5/13 9:47 AM 30/108

	@70Hw5_A	@70Hw6_A	@70Hw7_A	@70Hw8_A
1	.	.	.	.
2	0.78	0.8	0.58	0.68
3	1.28	0.7	1.20	1.20
4	.	.	.	.
5	2.33	2.3	2.13	1.75
6	1.65	1.6	1.73	1.43
7	2.10	2.1	2.25	1.95
8	.	.	.	.
9	1.78	1.5	1.40	1.33
10	1.33	1.2	1.20	1.40
11	1.63	1.6	1.27	1.25
12	1.45	1.5	1.38	1.30
13	0.73	0.7	0.65	0.60
14	.	.	.	.
15	.	.	.	.
16	2.68	3.0	2.40	2.60
17	2.91	3.2	3.38	3.43
18	.	.	.	.
19	.	.	.	.
20	1.85	1.7	1.80	1.80
21	1.10	1.0	0.95	0.93
22	1.93	1.7	1.90	2.25
23	.	.	.	.
24	1.63	1.9	2.00	2.15
25	2.28	2.0	2.13	.
26	1.23	1.0	0.75	0.70
27	1.85	1.7	1.63	1.62
28	.	.	.	.
29	1.25	1.2	1.18	1.53
30	2.45	2.6	2.65	2.43
31	2.05	2.0	1.78	1.63
32	2.38	.	.	.
33	2.95	2.6	2.60	2.70
34	2.13	1.6	1.95	2.13
35	2.40	2.4	1.93	1.83

Ultrasound.sav

	@70HPOST_A	DeltPRE1_A	DeltoidPre2_A	DeltW1_A
1	.	.	.	.
2	0.7	.	0.4000	0.4700
3	0.9	.	0.1500	0.1500
4	.	.	.	.
5	2.0	.	0.9500	0.9500
6	1.1	.	0.2300	0.3000
7	1.7	.	0.6300	1.0300
8	.	.	.	.
9	1.5	.	0.7000	0.9800
10	1.2	.	0.9800	1.1000
11	1.4	.	2.7300	2.1000
12	1.2	.	0.4700	0.6200
13	0.7	.	0.2500	0.3800
14	.	.	0.3800	0.5500
15	.	.	.	.
16	1.9	.	0.9800	1.3000
17	3.5	.	1.1000	1.0500
18	.	.	.	.
19	.	.	0.8000	0.9500
20	1.9	.	1.5500	1.8500
21	0.7	.	2.3300	2.5800
22	2.1	.	2.1000	2.2500
23	.	.	1.5800	1.9500
24	2.0	.	1.2000	1.5000
25	.	.	1.0300	1.1300
26	0.9	.	0.8800	0.7500
27	1.5	.	0.4700	0.7000
28	.	.	.	.
29	1.4	1.05	1.1500	0.8800
30	2.2	0.95	1.0000	0.6800
31	1.3	0.95	0.7000	0.8800
32	.	1.30	1.2500	1.3800
33	2.6	0.88	1.0800	1.0500
34	1.8	0.78	0.6800	0.8500
35	1.9	1.13	1.0500	1.1000

Ultrasound.sav

	DeltW2_A	DeltW3_A	DeltW4_A	DeltW5_A
1	.	.	.	.
2	0.5300	0.3500	0.5300	0.6000
3	0.2000	0.2800	0.2500	0.2000
4	.	.	.	.
5	0.8000	0.9800	1.0800	0.7800
6	0.3500	0.3800	0.4000	0.4300
7	1.0300	0.8300	1.0300	0.8000
8	.	.	.	.
9	1.0800	1.0500	1.0500	1.1000
10	1.1500	1.2100	1.2000	1.0500
11	2.3500	2.4500	2.5000	2.3800
12	0.6200	0.4500	0.4000	0.3300
13	0.3800	0.2300	0.1500	0.2300
14	0.5000	.	.	.
15	.	.	.	.
16	1.5800	1.0000	1.3500	1.3300
17	1.3800	1.4000	1.6800	2.3000
18	.	.	.	.
19	1.0300	1.0500	1.1800	.
20	1.8800	1.9300	1.4000	1.9000
21	2.6500	2.7800	2.4300	2.6300
22	2.2300	2.2300	2.4000	2.1000
23	.	.	.	.
24	1.4000	1.2300	1.2700	1.2800
25	1.1800	1.1800	1.2000	1.0500
26	1.0000	0.7800	0.6500	0.5300
27	0.5500	0.4500	0.5500	0.5300
28	.	.	.	.
29	0.8000	0.8800	0.9500	1.1500
30	1.3000	1.0300	0.8000	0.8500
31	0.7500	0.7800	0.8000	0.8300
32	1.2300	1.1500	1.3800	1.4500
33	1.0200	0.8800	1.1300	0.9300
34	0.7000	0.5000	0.8500	0.6800
35	0.9000	1.0000	0.8200	0.8300

Ultrasound.sav

	DeltW6_A	DeltW7_A	DeltW8_A	DELTPOST_A
1	.	.	.	.
2	0.50	0.40	0.33	0.3300
3	0.18	0.17	0.11	0.1500
4	.	.	.	.
5	1.00	0.88	0.90	1.0200
6	0.60	0.57	0.45	0.5300
7	0.78	0.83	0.65	0.5800
8	.	.	.	.
9	1.40	1.18	1.30	0.9500
10	1.08	1.12	0.85	0.8000
11	2.45	2.25	2.20	2.2000
12	0.45	0.53	0.50	0.4700
13	0.43	0.40	0.33	0.1500
14	.	.	.	.
15	.	.	.	.
16	1.33	1.35	1.40	1.1000
17	2.05	2.05	1.65	1.5200
18	.	.	.	.
19	.	.	.	.
20	2.00	2.05	2.00	1.8000
21	2.38	2.48	2.43	2.3000
22	2.28	2.45	1.95	2.3000
23	.	.	.	.
24	1.43	1.38	1.15	1.1000
25	1.23	0.80	.	.
26	0.78	0.82	0.70	0.5500
27	0.43	0.56	0.45	0.5000
28	.	.	.	.
29	1.43	1.18	0.93	1.1300
30	0.88	1.05	0.73	0.9000
31	0.70	0.73	0.73	0.8500
32	.	.	.	.
33	1.13	0.80	0.88	0.9500
34	0.70	0.65	0.48	0.8000
35	0.95	1.23	0.82	0.8300

Ultrasound.sav

	ChestPRE1_A	ChestPre2_A	ChestW1_A	ChestW2_A
1	.	.	.	.
2	.	0.1500	0.3000	0.2000
3	.	0.3500	0.2300	0.1200
4	.	.	.	.
5	.	0.3800	0.1500	0.3000
6	.	0.4300	0.2800	0.3000
7	.	0.8300	0.6800	0.7000
8	.	.	.	.
9	.	0.5000	0.4300	0.6000
10	.	0.4000	0.3500	0.4000
11	.	1.2000	1.0200	1.2500
12	.	0.2300	0.3500	0.2300
13	.	0.2300	0.2000	0.2300
14	.	0.2500	0.1500	0.2300
15	.	.	.	.
16	.	1.9500	1.8500	1.6000
17	.	0.6000	0.7500	0.9500
18	.	.	.	.
19	.	0.7000	0.9000	0.9800
20	.	1.2300	0.9300	1.1800
21	.	1.3000	0.9800	1.0500
22	.	1.0300	0.9800	0.9800
23	.	0.6000	0.5500	.
24	.	0.7500	0.6300	0.8000
25	.	0.8000	0.7300	0.6800
26	.	0.3800	0.2300	0.4000
27	.	0.2000	0.2500	0.2300
28	.	.	.	.
29	0.25	0.4300	0.2300	0.2000
30	0.35	0.3500	0.3500	0.3300
31	0.53	0.7000	0.6800	0.5000
32	0.98	0.9000	0.8000	1.6000
33	0.60	0.7800	0.7500	0.7500
34	0.18	0.2500	0.1700	0.4500
35	0.70	0.6000	0.1100	0.6800

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Ultrasound.sav

	ChestW3_A	ChestW4_A	ChestW5_A	ChestW6_A
1	.	.	.	.
2	0.20	0.2000	0.1700	0.17
3	0.28	0.3500	0.2300	0.15
4	.	.	.	.
5	0.10	0.3800	0.3800	0.28
6	0.10	0.2500	0.2000	0.20
7	0.45	0.7500	0.4500	0.38
8	.	.	.	.
9	0.43	0.5300	0.5800	0.40
10	0.35	0.4000	0.3800	0.35
11	1.15	1.2500	1.2000	1.25
12	0.23	0.2300	0.2000	0.28
13	0.33	0.2300	0.1800	0.25
14	.	.	.	.
15	.	.	.	.
16	0.98	0.4500	0.6500	0.25
17	0.63	0.9000	0.8000	0.65
18	.	.	.	.
19	0.82	0.7800	.	.
20	1.03	1.1300	1.1000	1.05
21	1.20	1.2000	1.3500	0.63
22	1.13	1.1300	0.9000	0.25
23	.	.	.	.
24	0.86	0.5800	0.5800	0.75
25	0.62	0.7300	0.7500	0.38
26	0.50	0.4300	0.4700	0.38
27	0.25	0.2000	0.1800	0.23
28	.	.	.	.
29	1.08	0.8300	0.4000	0.65
30	0.28	0.2800	0.4300	0.35
31	0.48	0.8300	0.6000	0.68
32	1.00	0.8500	0.6500	.
33	0.73	0.5500	0.7800	0.70
34	0.23	0.2500	0.2800	0.30
35	0.53	0.6200	0.6500	0.75

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Ultrasound.sav

	ChestW7_A	ChestW8_A	CHESTPOST_A	SubPRE1_A
1	.	.	.	.
2	0.18	0.3	0.2	.
3	0.15	0.1	0.2	.
4	.	.	.	.
5	0.33	0.4	0.6	.
6	0.18	0.1	0.2	.
7	0.65	0.7	0.9	.
8	.	.	.	.
9	0.30	0.5	0.4	.
10	0.35	0.4	0.3	.
11	1.23	1.1	1.2	.
12	0.25	0.2	0.2	.
13	0.30	0.2	0.2	.
14	.	.	.	.
15	.	.	.	.
16	0.65	0.7	0.6	.
17	0.63	0.7	0.6	.
18	.	.	.	.
19	.	.	.	.
20	1.15	0.9	0.8	.
21	0.90	0.8	1.0	.
22	0.90	0.7	1.1	.
23	.	.	.	.
24	0.62	0.6	0.5	.
25	0.40	.	.	.
26	0.45	0.3	0.2	.
27	0.23	0.2	0.1	.
28	.	.	.	.
29	0.73	0.5	0.8	0.5800
30	0.43	0.3	0.5	0.5700
31	0.68	0.6	0.6	0.7800
32	.	.	.	2.0000
33	0.70	0.7	0.7	2.0500
34	0.18	0.1	0.2	0.4500
35	0.55	0.6	0.4	0.7800

Ultrasound.sav

	SubscapPre2_A	SubW1_A	SubW2_A	SubW3_A
1	.	.	.	.
2	0.3500	0	0.23	0.28
3	0.2500	0	0.23	0.23
4	.	.	.	.
5	0.7000	0	0.88	0.45
6	0.8500	1	0.40	0.43
7	1.1000	2	1.00	1.00
8	.	.	.	.
9	1.7300	2	1.53	1.25
10	0.8800	1	1.03	1.08
11	2.2300	3	1.78	1.55
12	0.1700	0	0.30	0.20
13	0.2800	0	0.35	0.45
14	0.8800	1	0.47	.
15	.	.	.	.
16	1.3000	1	0.55	0.63
17	2.1300	2	1.93	1.63
18	.	.	.	.
19	1.2000	1	1.03	1.15
20	1.7000	2	1.80	1.55
21	3.0800	4	4.08	3.50
22	3.2300	3	2.85	3.00
23	1.8300	2	.	.
24	2.1000	2	1.73	1.48
25	1.4300	1	1.68	1.68
26	1.6800	2	1.05	1.38
27	0.4000	0	0.25	0.20
28	.	.	.	.
29	0.6800	1	0.83	0.75
30	0.5000	0	0.47	1.05
31	0.8000	1	1.03	0.75
32	1.3000	2	2.48	1.73
33	1.7800	2	1.58	3.78
34	0.3500	1	0.60	0.90
35	0.9300	1	0.88	0.60

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Ultrasound.sav

	SubW4_A	SubW5_A	SubW6_A	SubW7_A
1	.	.	.	.
2	0.2800	0.3000	0.23	0.28
3	0.2300	0.1700	0.10	0.20
4	.	.	.	.
5	0.4000	0.5700	0.38	0.65
6	0.1700	0.1300	0.30	0.40
7	0.9000	0.8000	0.90	0.80
8	.	.	.	.
9	0.9500	0.7300	0.82	0.93
10	1.1800	0.9500	1.30	1.13
11	1.7500	2.1500	2.45	2.20
12	0.1000	0.1500	0.08	0.10
13	0.3800	0.3800	0.40	0.20
14	.	.	.	.
15	.	.	.	.
16	0.5500	0.7300	0.53	0.73
17	1.5500	1.4500	1.75	1.73
18	.	.	.	.
19	1.1200	.	.	.
20	1.2000	1.5200	1.55	1.68
21	3.8500	3.1800	4.20	3.78
22	3.3300	1.8500	3.03	1.65
23	.	.	.	.
24	1.3800	1.0800	2.08	1.78
25	1.7500	1.7800	2.10	1.65
26	0.9500	0.8000	0.75	0.75
27	0.2800	0.2000	0.17	0.30
28	.	.	.	.
29	1.1500	1.0200	0.62	0.88
30	0.6300	0.4000	0.55	0.55
31	0.6800	0.6500	0.57	0.63
32	1.7500	2.0500	.	.
33	1.8500	1.5500	2.40	3.78
34	1.4800	0.7000	0.98	0.90
35	0.5300	0.9500	0.68	0.70

Ultrasound.sav

	SubW8_A	SUBPOST_A	ViscPRE1	VisceralPre2
1	.	.	.	6
2	5.58	0.38	.	1
3	0.17	0.15	.	1
4	.	.	.	.
	0.45	0.43	.	1
6	0.38	0.55	.	0
7	0.78	0.80	.	1
8	.	.	.	.
22	0.80	0.80	.	1
10	1.08	0.78	.	2
11	2.48	2.20	.	3
12	0.15	0.16	.	1
13	0.23	0.25	.	1
14	.	.	.	1
15	.	.	.	.
16	0.65	0.53	.	1
17	1.43	1.90	.	1
18	.	.	.	.
19	.	.	.	1
20	1.85	2.05	.	1
21	3.65	3.50	.	2
22	2.40	3.30	.	1
23	.	.	.	2
24	1.62	1.58	.	2
25	.	.	.	2
26	0.85	0.57	.	1
27	0.33	0.33	.	1
28	.	.	.	.
29	0.73	0.78	0.78	1
30	0.80	0.45	1.23	1
31	0.55	0.68	0.40	0
32	.	.	1.60	2
33	3.83	2.05	1.03	1
34	1.15	0.55	0.43	1
35	0.58	0.63	0.80	1

Ultrasound.sav

	ViscW1	ViscW2	ViscW3	ViscW4
1	.	.	.	.
2	0.6800	0.7300	0.6800	0.7500
3	1.0300	0.8800	1.0300	1.2000
4	.	.	.	.
5	1.4500	1.5000	1.4300	1.3000
6	0.4800	0.4800	0.4500	0.5000
7	0.8000	0.6500	1.1300	1.1800
8	.	.	.	.
9	1.1000	0.8300	0.8800	0.7300
10	1.6300	1.4300	1.5000	1.5800
11	3.5500	2.5000	2.7500	2.3800
12	0.8800	0.8800	0.8800	0.9300
13	0.4500	0.5000	0.5300	0.5500
14	0.6500	0.7300	.	.
15	.	.	.	.
16	1.6000	1.6500	1.2500	1.2700
17	1.3500	1.4500	1.4300	1.4500
18	.	.	.	.
19	1.3500	1.3800	1.4000	1.6000
20	1.2300	1.1500	1.7300	1.6500
21	2.0800	2.3000	2.4300	2.4000
22	1.7800	1.3800	1.4000	1.6200
23	2.1300	.	.	.
24	1.9500	1.8000	1.7500	1.6500
25	2.1500	2.2800	2.2500	2.1000
26	1.5500	1.5500	1.4300	1.3300
27	1.1800	1.2500	1.3300	1.1000
28	.	.	.	.
29	0.8500	0.7800	0.7500	0.9000
30	0.6500	1.1500	1.1000	0.8800
31	0.4700	0.4700	0.3800	0.4300
32	1.9800	1.9800	1.7500	1.6000
33	0.6800	0.9500	1.1500	1.0500
34	0.4800	0.4500	0.7300	0.5800
35	1.5300	1.5800	1.6000	0.7500

Ultrasound.sav

	ViscW5	ViscW6	ViscW7	ViscW8
1	.	.	.	.
2	0.5500	0.73	1	0.95
3	0.8200	0.85	1	0.73
4	.	.	.	.
5	1.3800	1.35	1	1.28
6	0.4500	0.80	1	0.55
7	0.6800	1.13	1	0.50
8	.	.	.	.
9	0.8000	0.68	1	1.05
10	1.5300	1.63	2	1.62
11	2.4800	2.30	2	2.13
12	0.8800	0.80	1	0.85
13	0.5500	0.65	1	0.65
14	.	.	.	.
15	.	.	.	.
16	1.0000	0.35	0	1.05
17	1.5000	1.05	1	1.25
18	.	.	.	.
19	.	.	.	.
20	1.4000	1.48	1	1.43
21	1.9500	1.55	1	1.40
22	1.5000	1.53	2	1.20
23	.	.	.	.
24	1.6800	1.50	2	1.55
25	2.2000	2.05	2	.
26	1.3800	1.33	1	1.43
27	1.1800	1.23	1	1.33
28	.	.	.	.
29	0.8300	0.78	1	0.75
30	1.1300	0.93	1	0.73
31	0.5000	0.90	1	0.73
32	1.7500	.	.	.
33	1.1500	0.95	1	1.10
34	0.9000	0.75	1	0.53
35	0.5300	0.95	1	0.58

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Ultrasound.sav

	VISCERALPOST	V170	V171	V172	V173	V174
1	.	.	.	.	.	.
2	0.70	.	.	.	.	.
3	0.73	.	.	.	.	.
4	.	.	.	.	.	.
5	0.96	.	.	.	.	.
6	0.63	.	.	.	.	.
7	0.75	.	.	.	.	.
8	.	.	.	.	.	.
9	0.85	.	.	.	.	.
10	0.93	.	.	.	.	.
11	2.05	.	.	.	.	.
12	0.60	.	.	.	.	.
13	0.48	.	.	.	.	.
14	.	.	.	.	.	.
15	.	.	.	.	.	.
16	0.68	.	.	.	.	.
17	1.58	.	.	.	.	.
18	.	.	.	.	.	.
19	.	.	.	.	.	.
20	1.43	.	.	.	.	.
21	2.08	.	.	.	.	.
22	1.23	.	.	.	.	.
23	.	.	.	.	.	.
24	1.45	.	.	.	.	.
25	.	.	.	.	.	.
26	1.33	.	.	.	.	.
27	0.93	.	.	.	.	.
28	.	.	.	.	.	.
29	0.85	.	.	.	.	.
30	0.93	.	.	.	.	.
31	0.65	.	.	.	.	.
32	.	.	.	.	.	.
33	1.18	.	.	.	.	.
34	1.05	.	.	.	.	.
35	0.74	.	.	.	.	.

Ultrasound.sav

	V199	SevQpreAVERAGE	SevHapreAVERAGE
1	.	.	.
2	.	3.86	5.15
3	.	4.14	4.28
4	.	.	.
5	.	1.43	3.84
6	.	4.17	3.83
7	.	3.16	3.37
8	.	.	.
9	.	3.82	3.93
10	.	3.93	4.34
11	.	3.13	5.44
12	.	4.04	3.95
13	.	4.42	3.74
14	.	4.85	4.16
15	.	.	.
16	.	4.13	3.89
17	.	2.40	3.28
18	.	.	.
19	.	4.36	2.85
20	.	3.52	3.70
21	.	3.23	3.02
22	.	3.91	3.41
23	.	2.76	3.44
24	.	2.47	3.98
25	.	3.18	3.34
26	.	4.18	4.13
27	.	3.65	2.89
28	.	.	.
29	.	3.82	4.81
30	.	3.38	3.96
31	.	4.49	4.05
32	.	3.47	3.82
33	.	3.94	3.98
34	.	3.71	3.65
35	.	4.04	4.24

Ultrasound.sav

	DeltpreAVERAGE	FATFifQPreAVG	FATSeventyHamPreAVG
1	.	.	.
2	1.29	0.88	0.80
3	1.23	0.98	0.68
4	.	.	.
5	1.96	2.01	2.00
6	1.59	1.53	2.07
7	1.79	1.71	2.00
8	.	.	.
9	1.75	1.59	1.94
10	2.24	2.24	1.38
11	1.82	2.18	1.73
12	1.51	0.75	1.44
13	1.61	1.21	1.43
14	1.61	1.70	1.52
15	.	.	.
16	1.64	2.72	2.69
17	2.22	2.48	3.10
18	.	.	.
19	2.51	1.36	1.22
20	2.46	3.29	1.78
21	2.59	1.71	1.51
22	3.93	2.29	1.96
23	2.08	3.14	2.54
24	2.66	2.63	1.85
25	1.92	2.03	2.34
26	1.85	1.00	0.98
27	1.63	2.05	2.04
28	.	.	.
29	2.13	1.38	1.49
30	1.99	3.18	2.93
31	2.14	1.82	2.17
32	1.89	1.31	1.79
33	2.51	3.21	3.07
34	1.68	1.71	1.84
35	1.83	2.13	1.68

Ultrasound.sav

	FATDeltPreAVERAGE	FATChestPreAVERAGE
1	.	.
2	0.44	0.22
3	0.15	0.29
4	.	.
5	0.95	0.27
6	0.27	0.36
7	0.83	0.76
8	.	.
9	0.84	0.46
10	1.04	0.38
11	2.42	1.11
12	0.54	0.29
13	0.32	0.22
14	0.47	0.20
15	.	.
16	1.14	1.90
17	1.08	0.68
18	.	.
19	0.88	0.80
20	1.70	1.08
21	2.46	1.14
22	2.18	1.01
23	1.77	0.58
24	1.35	0.69
25	1.08	0.77
26	0.82	0.31
27	0.59	0.23
28	.	.
29	1.02	0.33
30	0.84	0.35
31	0.79	0.69
32	1.32	0.85
33	1.07	0.77
34	0.77	0.21
35	1.08	0.36

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Ultrasound.sav

	ChestMusclePreAVERAGE	SubSclMusclePreAVERAGE
1	.	.
2	1.58	2.82
3	1.57	2.72
4	.	.
5	2.16	2.03
6	1.05	1.87
7	1.96	1.64
8	.	.
9	1.23	2.73
10	1.50	2.22
11	1.96	1.86
12	1.98	1.52
13	1.79	2.01
14	2.18	1.82
15	.	.
16	2.57	1.73
17	1.85	1.70
18	.	.
19	1.35	2.20
20	1.57	1.90
21	1.93	2.13
22	2.24	2.04
23	1.68	2.11
24	1.58	1.54
25	1.63	2.45
26	1.71	1.56
27	1.56	1.42
28	.	.
29	1.38	2.32
30	1.02	1.24
31	1.19	1.09
32	1.80	1.75
33	1.74	2.24
34	1.19	1.09
35	1.01	1.38

Ultrasound.sav

	FiftyHamMusclePreAVERAGE	FiftyQuadMusclePreAVERAGE
1	.	.
2	4.99	5.06
3	3.42	4.88
4	.	.
5	4.26	4.17
6	2.98	4.98
7	3.42	4.21
8	.	.
9	4.19	4.74
10	3.76	5.09
11	5.33	4.54
12	3.52	4.64
13	3.58	4.96
14	3.55	5.37
15	.	.
16	3.73	4.74
17	3.46	4.39
18	.	.
19	2.47	4.48
20	4.96	4.75
21	2.78	4.03
22	3.61	4.52
23	3.04	3.82
24	3.98	5.50
25	3.69	4.41
26	4.25	4.83
27	3.83	4.22
28	.	.
29	3.60	4.65
30	3.34	4.34
31	3.29	5.36
32	3.55	4.62
33	4.21	5.60
34	3.55	4.13
35	4.03	5.18

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Ultrasound.sav

	SubscapFATPreAVERAGE	VisceralFATPreAVERAGE
1	.	.
2	0.32	0.79
3	0.29	0.86
4	.	.
5	0.54	1.38
6	0.77	0.45
7	1.65	0.84
8	.	.
9	1.69	1.05
10	0.99	1.63
11	2.41	3.04
12	0.29	0.88
13	0.28	0.54
14	0.89	0.75
15	.	.
16	0.95	1.32
17	1.87	1.33
18	.	.
19	1.25	1.42
20	1.70	1.29
21	3.54	2.11
22	3.26	1.54
23	1.71	2.11
24	1.93	1.95
25	1.43	2.13
26	1.81	1.45
27	0.30	1.28
28	.	.
29	0.89	0.77
30	0.45	0.70
31	0.82	0.47
32	1.82	1.83
33	2.07	0.77
34	0.49	0.63
35	0.86	1.44

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Ultrasound.sav

	ID	Code1young	FilterPostHocsN26	MUSCLE	@50QPRE1
36	LD44	1	8.00	.	5.65
37	LD45	1	8.00	.	5.35
38	LD46	1	8.00	.	3.65
39	LD47	1	8.00	.	4.20
40	LD48	1	8.00	.	5.90
41		.	.	.	.
42		.	.	.	.
43		.	.	.	.
44		.	.	.	.
45		.	.	.	.
46		.	.	.	.
47		.	.	.	.
48		.	.	.	.
49		.	.	.	.
50		.	.	.	.
51		.	.	.	.
52		.	.	.	.
53		.	.	.	.
54		.	.	.	.
55		.	.	.	.
56		.	.	.	.
57		.	.	.	.
58		.	.	.	.

Ultrasound.sav

	@50QuadPre2	@50Qw1	@50Qw2	@50Qw3
36	6	6.05	5.9	5.90
37	6	5.63	5.2	5.85
38	4	4.35	4.3	4.38
39	5	4.38	4.9	4.83
40	6	6.28	6.4	6.33
41	.	.	.	.
42	.	.	.	.
43	.	.	.	.
44	.	.	.	.
45	.	.	.	.
46	.	.	.	.
47	.	.	.	.
48	.	.	.	.
49	.	.	.	.
50	.	.	.	.
51	.	.	.	.
52	.	.	.	.
53	.	.	.	.
54	.	.	.	.
55	.	.	.	.
56	.	.	.	.
57	.	.	.	.
58	.	.	.	.

Ultrasound.sav

	@50Qw4	@50Qw5	@50Qw6	@50Qw7
36	5.85	6.00	6.00	6.03
37	6.00	5.70	5.70	6.43
38	4.65	4.55	4.58	4.70
39	4.88	4.98	4.83	4.93
40	6.45	6.50	6.58	6.60
41	.	.	.	.
42	.	.	.	.
43	.	.	.	.
44	.	.	.	.

Ultrasound.sav

	@50Qw8	@50QPOST	@70QPRE1	@70QuadPre2
36	5.98	6.43	4.85	6
37	5.97	5.93	4.53	5
38	4.71	4.68	2.73	3
39	4.80	4.90	2.60	3
40	6.60	6.53	5.25	6
41	.	.	.	.
42	.	.	.	.

Ultrasound.sav

	@70Qw1	@70Qw2	@70Qw3	@70Qw4
36	5.8300	5.7300	6.13	6.0500
37	4.8000	4.4000	5.08	4.9000
38	3.3000	3.3800	3.45	3.6500
39	3.2800	3.5000	3.48	3.5300
40	5.8300	5.8500	5.80	5.8800
41	.	.	.	.
42	.	.	.	.

Ultrasound.sav

	@70Qw5	@70Qw6	@70Qw7	@70Qw8
36	5.9600	6.3300	6.1800	6.0300
37	5.0800	4.9300	5.4800	4.8800
38	3.5000	3.8300	3.6000	3.7800
39	3.6300	3.6800	3.6000	3.6300
40	5.8500	6.0300	6.1100	6.0300
41	.	.	.	.
42	.	.	.	.

Ultrasound.sav

	@70QPOST	@50QPRE1_A	@50HamPre2	@50Hw1
36	6.00	3.96	4	4.3500
37	4.93	5.43	5	4.4000
38	3.85	3.73	4	3.6300
39	3.53	3.63	4	4.2000
40	6.05	4.90	5	4.5000
41	.	.	.	.
42	.	.	.	.
43	.	.	.	.
44	.	.	.	.

Ultrasound.sav

	@50Hw2	@50Hw3	@50Hw4	@50Hw5
36	4.33	4.3500	4.4000	4.5000
37	4.83	4.6300	5.1500	5.3800
38	3.78	3.7800	3.7800	3.9500
39	4.70	4.8300	4.6800	4.6800
40	4.55	4.6800	4.4800	4.9800
41	.	.	.	.

Ultrasound.sav

	@50Hw6	@50Hw7	@50Hw8	@50HPOST
36	4.35	4.38	4.50	4.73
37	5.33	5.15	5.28	4.98
38	3.83	3.88	3.78	3.90
39	4.83	4.78	4.93	5.03
40	4.90	5.07	4.75	4.88
41	.	.	.	.
42	.	.	.	.
43	.	.	.	.
44	.	.	.	.
45	.	.	.	.
46	.	.	.	.

Ultrasound.sav

	@70QPRE1_A	@70HamPre2	@70Hw1	@70Hw2
36	4.4600	4.6500	4.5500	4.5300
37	4.9800	4.6000	4.7800	4.4100
38	3.2300	3.4800	3.2800	3.3800
39	4.5000	4.2000	4.0800	4.2800
40	4.5500	5.5300	5.2800	5.5000
41	.	.	.	.

Ultrasound.sav

	@70Hw3	@70Hw4	@70Hw5	@70Hw6
36	4.4300	4.45	5.0000	4.7800
37	4.6800	5.03	4.9000	5.1800
38	3.6800	3.55	3.8000	3.5000
39	4.3000	4.25	4.1500	4.4300
40	5.5000	5.25	5.1500	5.0800
41	.	.	.	.

Ultrasound.sav

	@70Hw7	@70Hw8	@70HPOST	DeltPRE1
36	4.4	5.33	4.78	2.2300
37	5.1	5.18	4.88	1.9800
38	3.8	4.30	4.10	2.1500
39	5.0	5.18	5.33	1.8000
40	4.8	5.03	5.15	2.3800
41	.	.	.	.
42	.	.	.	.
43	.	.	.	.

Ultrasound.sav

	DeltoidPre2	DeltW1	DeltW2	DeltW3
36	2.4300	2.5800	2.4800	2.4500
37	1.6000	1.7800	2.1000	1.9800
38	2.1800	2.2800	2.2000	2.2500
39	1.6500	1.7500	1.8000	1.9000
40	2.4800	2.3000	2.2500	2.6500
41	.	.	.	.
42	.	.	.	.
43	.	.	.	.
44	.	.	.	.
45	.	.	.	.
46	.	.	.	.
47	.	.	.	.
48	.	.	.	.

Ultrasound.sav

	DeltW8	DELTPOST	ChestPRE1	ChestPre2
36	2.63	2.50	1.45	2
37	2.38	2.18	1.38	2
38	2.23	2.40	1.18	1
39	1.93	1.70	1.20	1
40	2.78	2.65	1.53	2
41	.	.	.	.
42	.	.	.	.
43	.	.	.	.

Ultrasound.sav

	ChestW1	ChestW2	ChestW3	ChestW4
36	1.3500	1.1800	1.1300	1.2800
37	1.2500	1.5500	1.5500	1.3000
38	1.4800	1.6800	1.7000	2.1000
39	1.2000	1.2500	1.0500	1.3000
40	1.7500	2.0500	1.4500	2.3000
41	.	.	.	.

	ChestW5	ChestW6	ChestW7	ChestW8
36	1.48	1.60	1.18	1.5
37	1.48	1.55	1.45	1.6
38	1.93	1.80	1.88	2.2
39	1.25	1.80	1.40	1.6
40	2.12	2.18	2.78	2.1

Ultrasound.sav

	CHESTPOST	SUBPRE1	SubscapPre2
36	1.60	1.12	2
37	1.68	2.08	1
38	1.88	1.25	1
39	1.23	0.80	2
40	2.23	1.28	1
41	.	.	.
42	.	.	.

Ultrasound.sav

	SubW1	SubW2	SubW3	SubW4
36	2	1.50	1.3800	1.35
37	2	1.60	1.3500	1.80
38	1	1.38	1.6500	1.95
39	1	1.63	1.6000	1.98
40	1	1.52	2.0300	1.55
41	.	.	.	.
42	.	.	.	.

Ultrasound.sav

	SubW5	SubW6	SubW7	SubW8
36	1.80	1.88	1.9	1.75
37	1.30	1.50	2.4	1.70
38	1.18	1.15	1.2	1.50
39	2.68	2.28	1.4	1.83
40	1.48	1.73	2.0	1.50
41	.	.	.	.
42	.	.	.	.
43	.	.	.	.

Ultrasound.sav

	DeltW4	DeltW5	DeltW6	DeltW7
36	2.5500	2.4500	2.5800	2.7000
37	2.0300	2.0500	1.8000	2.0800
38	2.2000	2.3300	2.2800	2.3800
39	1.8000	1.7000	1.7000	1.8500
40	2.4500	2.6300	2.6300	2.5800
41	.	.	.	.
42	.	.	.	.
43	.	.	.	.

Ultrasound.sav

	SubW5	SubW6	SubW7	SubW8
36	1.80	1.88	1.9	1.75
37	1.30	1.50	2.4	1.70
38	1.18	1.15	1.2	1.50
39	2.68	2.28	1.4	1.83
40	1.48	1.73	2.0	1.50
41	.	.	.	.
42	.	.	.	.

Ultrasound.sav

	SUBPOST	FAT	@50QPRE1_B	@50QuadPre2_A	@50Qw1_A
36	1.8	.	1.8	1.9000	1.80
37	1.9	.	1.5	1.2500	1.25
38	1.2	.	1.1	1.5800	1.50
39	2.2	.	1.0	0.9800	0.90
40	1.7	.	0.9	1.0000	0.95
41	.	.	.	.	.
42	.	.	.	.	.

Ultrasound.sav

	@50Qw2_A	@50Qw3_A	@50Gw4	@50Qw5_A
36	2.0300	2.0800	1.58	1.6000
37	1.2300	1.6500	1.35	1.6300
38	1.4500	1.5500	1.50	1.4000
39	1.0000	0.8300	0.93	1.1000
40	0.8800	1.0500	0.90	0.9000

Ultrasound.sav

	@50Qw6_A	@50Qw7_A	@50Qw8_A	@50QPOST_A
36	1.70	1.5	1.3000	1.1800
37	1.13	1.4	1.1000	1.1800
38	1.40	1.4	1.2500	1.4000
39	0.90	0.9	0.8800	0.9000
40	0.95	0.8	0.9300	0.8000
41	.	.	.	.
42	.	.	.	.
43	.	.	.	.
44	.	.	.	.

Ultrasound.sav

	@70QPRE1_B	@70QuadPre2_A	@70Qw1_A	@70Qw2_A
36	1.15	1	1.40	1.3500
37	1.18	1	1.18	1.3000
38	1.27	1	1.18	0.9500
39	1.05	1	0.95	1.0800
40	0.70	1	0.85	0.7000
41	.	.	.	.

Ultrasound.sav

	@70Qw3_A	@70Qw4_A	@70Qw5_A	@70Qw6_A
36	1.5000	0.8500	1.4800	0.82
37	1.1800	1.1000	1.1500	1.08
38	1.2300	1.1800	1.1200	1.08
39	1.1500	0.9300	0.8200	0.85
40	0.8000	0.7500	0.6800	0.70
41	.	.	.	.
42	.	.	.	.

Ultrasound.sav

	@70Qw7_A	@70Qw8_A	@70QPOST_A	@50HPRE1
36	1.15	1.1	1.0	2.2
37	1.28	0.9	0.8	1.5
38	1.10	1.0	1.0	1.7
39	0.63	0.9	0.9	1.1
40	0.80	0.9	0.7	1.6
41	.	.	.	.

Ultrasound.sav

	@50HamPre2_A	@50Hw1_A	@50Hw2_A	@50Hw3_A
36	3	3.23	3.0800	3.2500
37	2	2.78	1.5800	2.1000
38	2	2.50	2.4300	2.1800
39	2	1.52	1.4300	1.1800
40	2	2.40	2.5000	2.3000
41	.	.	.	.

Ultrasound.sav

	@50Hw4_A	@50Hw5_A	@50Hw6_A	@50Hw7_A
36	2.75	3.2000	2.8	3.03
37	1.80	1.1500	1.3	1.55
38	1.80	2.1000	2.0	2.13
39	1.43	1.3000	1.3	1.13
40	2.13	2.0800	1.7	1.78
41	.	.	.	.

Ultrasound.sav

	@50Hw8_A	@50HPOST_A	@70HPRE1	@70HamPre2_A
36	2.83	2.6100	1.48	1.5000
37	1.70	1.9800	1.02	1.1500
38	2.90	2.4500	1.03	1.4500
39	1.08	1.1000	0.78	1.0800
40	2.23	2.2000	0.78	1.0500
41	.	.	.	.
42	.	.	.	.

Ultrasound.sav

	@70Hw1_A	@70Hw2_A	@70Hw3_A	@70Hw4_A
36	2.1000	1.8800	2.35	1.0800
37	1.4500	1.0800	1.00	1.2000
38	1.6800	1.4500	1.38	1.3500
39	1.3300	1.3300	1.35	1.4300
40	1.3000	1.3300	1.03	1.2300
41	.	.	.	.
42	.	.	.	.
43	.	.	.	.

Ultrasound.sav

	@70Hw5_A	@70Hw6_A	@70Hw7_A	@70Hw8_A
36	1.63	1.3	2.00	1.20
37	0.83	1.0	1.05	0.85
38	1.18	1.4	1.35	1.73
39	1.38	0.9	0.68	0.70
40	1.23	1.1	2.21	1.58
41	.	.	.	.

Ultrasound.sav

	@70HPOST_A	DeltPRE1_A	DeltoidPre2_A	DeltW1_A
36	0.8	0.38	0.3300	0.3500
37	1.1	0.78	0.5700	0.7300
38	1.9	0.80	1.1000	1.1300
39	0.6	0.38	0.3300	0.2800
40	1.2	0.93	0.8000	0.9000
41	.	.	.	.
42	.	.	.	.
43	.	.	.	.
44	.	.	.	.

Ultrasound.sav

	DeltW2_A	DeltW3_A	DeltW4_A	DeltW5_A
36	0.3500	0.4500	0.4300	0.1700
37	0.5500	0.6500	0.6300	0.5300
38	0.8500	0.9500	1.0800	0.7800
39	0.3000	0.3300	0.2500	0.3500
40	0.9000	1.1300	0.9300	0.8000
41	.	.	.	.
42	.	.	.	.
43	.	.	.	.

Ultrasound.sav

	DeltW6_A	DeltW7_A	DeltW8_A	DELTPOST_A
36	0.53	0.65	0.47	0.2500
37	0.43	0.53	0.57	0.5300
38	0.95	0.90	0.83	0.7500
39	0.43	0.43	0.35	0.4000
40	0.85	0.93	0.93	0.9000
41	.	.	.	.
42	.	.	.	.

Ultrasound.sav

	ChestPRE1_A	ChestPre2_A	ChestW1_A	ChestW2_A
36	0.18	1.2000	0.3500	0.2800
37	0.28	0.2800	0.4000	0.3500
38	0.30	0.6500	0.5700	0.3800
39	0.30	0.4300	0.2300	0.3500
40	0.58	0.6200	0.4700	0.5300
41	.	.	.	.
42	.	.	.	.

Ultrasound.sav

	ChestW3_A	ChestW4_A	ChestW5_A	ChestW6_A
36	0.38	0.3800	0.2500	0.30
37	0.43	0.5000	0.4300	0.33
38	0.25	0.5300	0.4500	0.53
39	0.33	0.3300	0.2800	0.20
40	0.35	0.3800	0.6000	0.63
41	.	.	.	.
42	.	.	.	.

Ultrasound.sav

	ChestW7_A	ChestW8_A	CHESTPOST_A	SubPRE1_A
36	0.45	0.2	0.3	0.3000
37	0.28	0.4	0.3	0.7800
38	0.50	0.5	0.5	0.4000
39	0.43	0.3	0.3	0.4700
40	0.63	0.4	0.5	0.9800
41	.	.	.	.

Ultrasound.sav

	SubscapPre2_A	SubW1_A	SubW2_A	SubW3_A
36	0.5700	1	0.83	0.53
37	0.5000	0	0.47	0.43
38	0.4500	1	0.45	0.68
39	0.2500	0	0.43	0.78
40	1.0800	1	0.90	0.83
41	.	.	.	.

Ultrasound.sav

	SubW4_A	SubW5_A	SubW6_A	SubW7_A
36	0.6500	0.7500	0.70	0.57
37	0.3000	0.5000	0.40	0.60
38	0.3300	0.5700	0.43	0.40
39	0.5800	0.3800	0.30	0.43
40	0.8800	0.8500	0.80	0.83
41	.	.	.	.
42	.	.	.	.

Ultrasound.sav

	SubW8_A	SUBPOST_A	ViscPRE1	VisceralPre2
36	0.40	0.60	0.60	0
37	0.68	0.43	0.68	1
38	0.50	0.53	0.43	1
39	0.48	0.38	1.23	1
40	0.90	0.95	0.58	1
41	.	.	.	.

Ultrasound.sav

	ViscW1	ViscW2	ViscW3	ViscW4
36	0.6800	0.5000	0.4300	0.3500
37	0.9300	1.1800	1.0000	0.8300
38	0.3800	0.5300	0.5000	0.7300
39	0.7800	1.2500	1.3000	1.0800
40	0.5500	0.5500	0.5800	0.6800
41	.	.	.	.
42				

Ultrasound.sav

	ViscW5	ViscW6	ViscW7	ViscW8
36	0.3300	0.35	1	0.55
37	0.6000	0.75	1	0.73
38	0.3300	0.75	1	0.40
39	0.6300	0.70	1	1.10
40	0.4300	0.80	1	0.95
41				

	VISCERALPOST	V170	V171	V172	V173	V174
36	0.60	.	.	.	.	.
37	0.65	.	.	.	.	.
38	0.48	.	.	.	.	.
39	1.05	.	.	.	.	.
40	0.98	.	.	.	.	.

Ultrasound.sav

	V199	SevQpreAVERAGE	SevHapreAVERAGE
36	.	5.81	4.60
37	.	4.76	4.69
38	.	3.25	3.38
39	.	3.30	4.14
40	.	5.71	5.41
41	.	.	.
42	.	.	.
43	.	.	.

Ultrasound.sav

	DeltpreAVERAGE	FATFifQPreAVG	FATSeventyHamPreAVG
36	2.51	1.85	1.80
37	1.69	1.25	1.30
38	2.23	1.54	1.57
39	1.70	0.94	1.21
40	2.39	0.98	1.18
41	.	.	.
42	.	.	.
43	.	.	.
44	.	.	.

Ultrasound.sav

	FATDeltPreAVERAGE	FATChestPreAVERAGE
36	0.34	0.77
37	0.65	0.34
38	1.12	0.61
39	0.31	0.33
40	0.85	0.54
41	.	.
42	.	.
43	.	.
44	.	.

Ultrasound.sav

	ChestMusclePreAVERAGE	SubSclMusclePreAVERAGE
36	1.60	1.52
37	1.40	1.70
38	1.36	1.28
39	1.15	1.69
40	1.63	1.33
41	.	.
42	.	.

Ultrasound.sav

	FiftyHamMusclePreAVERAGE	FiftyQuadMusclePreAVERAGE
36	4.28	5.89
37	4.53	5.72
38	3.73	4.29
39	4.24	4.54
40	4.69	6.03
41	.	.

Ultrasound.sav

	SeventyQuadFATPreAVERAGE	FiftyHamFATPreAVERAGE
36	1.27	3.21
37	1.23	2.36
38	1.15	2.32
39	0.93	1.55
40	0.83	2.09
41	.	.

Ultrasound.sav

	SubscapFATPreAVERAGE	VisceralFATPreAVERAGE
36	0.68	0.56
37	0.45	0.87
38	0.48	0.47
39	0.32	1.04
40	0.99	0.65
41	.	.
42	.	.
43	.	.
44	.	.
45	.	.