peak (8.7%) at week 13. The drop in heterogeneity thereafter remains relatively stable through 80 weeks of age. However, there is a stepwise decline in the percent heterogeneity from weeks 5-17 (peak 10.3%), weeks 17-44 (peak 4.7 %), and weeks 48-76 (peak 2.8%).

CONCLUSIONS: The data show localized hypertensive regions in muscles of the mdx mouse, which peak near the critical period. Interestingly, there was little change in the T2 signal heterogeneity from mdx muscles at later ages, at a time when muscle histology deteriorates and muscle necrosis continues despite a slight reduction in regeneration. Our findings suggest that researchers need to consider the age of mdx mice when designing imaging studies or evaluating MRI findings.

Supported by grants to RML from the NIH K01AR053235 and 1R01AR059179.

A-29  Thematic Poster - The Aging Cardiovascular System

May 29, 2013, 9:30 AM - 11:30 AM
Room: 209

111  Board #1  May 29, 9:30 AM - 11:30 AM

Heart Rate Recovery After Maximal Exercise is Blunted in Hypertensive Seniors

Tiffany B. Bivens, Qi Fu, Rhonda L. Meier, M. Dean Palmer, Kara N. Boyd, Sheryl A. Livingston, M. Melyn Galbreath, Graeme Carrick-Ranson, Naoki Fujimoto, Shigeki Shibata, Jeffrey L. Hastings, Matthew D. Spencer, Benjamin D. Levine, FACSM. 1Institute for Exercise and Environmental Medicine, Dallas, TX. 2The University of Texas Southwestern Medical Center, Dallas, TX. (No relationships reported)

Abnormal heart rate recovery (HRR) after maximal exercise may indicate autonomic dysfunction and is regarded as a predictor for cardiovascular mortality. Previous studies have shown that HRR is delayed in heart failure patients. It is unknown if HRR is normal in healthy seniors with hypertension.

PURPOSE: To determine HRR response in stage I hypertensive seniors.

METHODS: We tested 10 unmedicated hypertensive seniors (HTN) [5M/5F, 68 ± 5 (mean ± SD) y.o., awake ambulatory blood pressure (BP) 148 ± 10 / 85 ± 8 mmHg] and 10 healthy, age-matched controls (CON) [5M/5F, 67 ± 5 y.o., 123 ± 4 / 73 ± 4 mmHg]. Maximal upright treadmill testing was performed. Heart rate (HR), BP, oxygen uptake (VO2), cardiac output (Qc), stroke volume (SV), and lactates were obtained during two steady states and graded exercise to peak. During 5 minutes of seated recovery HR was obtained every 1 minute and BP every 2 minutes.

RESULTS: The VO2, HR, Qc, SV, TPR, and lactate response at rest and during exercise was not different between groups. During exercise systolic BP was higher in HTN (SBP, group effect p=0.015), and SBP was higher as well in recovery (group effect, p=0.002). Absolute HRR was blunted in HTN (Table 1, interaction effect p=0.028), and ∆HR from peak was significantly reduced in HTN at 1 minute (Table 1, p=0.002). When analyzing HRR as ARR Interval (RRI), there was a trend for HTN to have a blunted response at 1 minute (Table 1, p=0.059).

CONCLUSION: Otherwise healthy seniors with stage I hypertension have a blunted early HRR, indicating an impairment of autonomic function. Whether exercise and/or antihypertensive drug therapy could improve HRR in these patients needs to be determined.

<table>
<thead>
<tr>
<th>Table 1. Heart Rate Recovery</th>
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<tr>
<td>Time Point</td>
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<tr>
<td>Peak HR (bpm)</td>
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<tr>
<td>1 min. recovery HR (bpm)</td>
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<td>∆ HR peak to 1 min. recovery (bpm)</td>
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<td>∆ RRI peak to 1 min. recovery (ms)</td>
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<td>Mean ± SD, *interaction effect p = 0.028 vs. CON, † p = 0.002 vs. CON, ‡ p = 0.059 vs. CON</td>
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</table>
Heart rate recovery (HRR) after exercise is often assessed as a measure of cardiovascular health. A decline in HRR, which has been linked to impaired autonomic function and increased risk of cardiovascular mortality, is often observed in aging and obesity. However, little attention has been given to the relationship between HRR and body composition and body fat distribution in the older adult population.

**PURPOSE:** We determined whether various indices of adiposity are associated with HRR in obese older adults.

**METHODS:** One hundred and twelve adults (27 males, 85 females) from 65-79 years with a BMI between 30-45 kg/m² were assessed. HRR was measured by electrocardiogram at rest, during a graded exercise treadmill test, and for 4 mins of recovery. HRR was defined as the difference between HR at peak exercise and at 1 (HRR1), 2 (HRR2), and 4 mins (HRR4) post-exercise. Anthropometry and dual energy X-ray absorptiometry were used to assess BMI, abdominal circumference, waist circumference, hip circumference, thigh circumference, waist-to-hip ratio, total fat mass and percent body fat.

**RESULTS:** Resting and peak HR were similar in men (84 ± 17 bpm, 145 ± 15 bpm) and women (86 ± 15 bpm, 143 ± 13 bpm). After exercise, HRR1 was 13 ± 10 bpm and 12 ± 13 bpm; HRR2 was 34 ± 13 bpm and 32 ± 12 bpm; and HRR4 was 51 ± 15 bpm and 48 ± 11 bpm in men and women, respectively. Overall, higher BMI, abdominal and hip circumferences, and total fat mass were associated with lower HRR4 (p<0.04), but not HRR1 or HRR2. Gender-stratified analyses revealed HRR4 was inversely associated with HRR4 in women only. In women BMI (r=−0.31, p=0.004), waist circumference (r=−0.29, p=0.007), abdominal circumference (r=−0.33, p=0.002), hip circumference (r=−0.33, p=0.002), and total fat mass (r=−0.26, p=0.01) were correlated with HRR4, but not HRR1 or HRR2. After adjusting for peak VO2 and age, abdominal circumference remained associated with HRR4 (β=−0.25 ± 0.12, p=0.04), while associations with hip and waist circumferences were attenuated (p=0.06). In men none of the adiposity indices were significantly associated with HRR at any time point.

**CONCLUSION:** Among obese older adults, abdominal circumference was independently associated with HRR at 4 mins post-exercise in women, but not in men. These results suggest that central adiposity may be an important determinant of HRR in this population.
CONCLUSION: Men and women were pooled in both the Y and O groups, as no sex differences were found. The YGP demonstrated greater C1 and C2 than the OGP (18.5 ± 3.8, 8.0 ± 1.9 vs. 12.8 ± 3.0, 4.6 ± 2.6 ml/mmHg x10, respectively), whereas, the YHA demonstrated greater C2 but not C1 than the OHA (10.4 ± 2.5, 18.2 ± 4.0 vs. 6.9 ± 3.7, 18.5 ± 5.2 ml/mmHg x10, respectively). In regards to age-matched activity level comparisons, YHA demonstrated a greater C2 but not C1 than YGP (10.4 ± 2.5, 18.2 ± 4.0 vs. 8.0 ± 1.9, 18.5 ± 3.8 ml/mmHg x10, respectively), and OHA demonstrated greater C1 and C2 than OGP (18.4 ± 5.2, 6.9 ± 3.7 vs. 12.8 ± 3.0, 4.6 ± 2.6 ml/mmHg x10, respectively).

Supported by the National Institutes of Health (R01 DK077102)

complete physical activity and weight data. Subjects were randomized to UC (N=46) or BLI (N=51) for 6 months prior to approval for surgery. UC completed a non-standardized, physician

METHODS: A systematic literature review (meta-analysis) of 66 echocardiography studies.

RESULTS: In children age (<10-12 years) usually no or a small training effect can be detected. Approximately two years of intensive training are necessary to induce definite training effects. In the adolescent and young athletes (14-18 years), the left ventricle (LV) hypertrophy is already manifest. Left ventricle muscle mass (LVMM) is higher in older (50-80 years) endurance athletes than in age-matched non-athletes but the difference between athletic and non-athletic subjects decrease continuously or disappears during the ageing. The long-lasting, high-intensity endurance trainings are the most effective ways to activate mechanisms, inducing the development of coronary circulation. No difference was shown between athletic and non-athletic children comparing their diastolic function (E/A). In the competitive age (19-35 years) athletes have a higher E/A than non-athletes (1.98 ± 0.37, vs. 1.73 ± 0.31, p = 0.013). In the 36-55 yr. age range physically active persons showed a higher E/A quotient than passive ones (1.57 ± 0.186 vs. 1.383 ± 0.069, p = 0.0327). At the older age in (age≥55 years) active subjects also displayed significantly higher E/A quotients (1.04 ± 0.093) than passive persons (0.917 ± 0.104), p = 0.004. According to the Tissue Doppler Imaging (TDI) the mitral lateral annulus seems to be the most sensitive region to detect difference in the E’/A’ quotient. At the competitive age difference between athletes and non-athletes was significant (3.21 ± 0.64 vs. 2.32 ± 0.55, p = 0.0265) similarly to the result of transmural E/A (1.97 ± 0.37 vs. 1.73 ± 0.31, p = 0.0228; <0.05).

CONCLUSIONS: Different characteristics of the athlete’s heart are manifested uniquely during the lifetime: LV hypertrophy develops at the young age; differences reach the maximum in young adults (36-55 years) and are least marked in older subjects. Coronary capillary network seems to develop mostly in younger athletes, while a difference in diastolic function seems to be more manifest in the competitive age but also appear in older subjects.

A-30 Free Communication/Slide - Determinants of Body Weight and Weight Loss

May 29, 2013, 9:30 AM - 11:00 AM
Room: Wabash 3

Effect of a Lifestyle Intervention Prior to Bariatric Surgery on Objectively Measured Physical Activity in Severely Obese Adults


It is common for obese adults to be required to engage in a weight loss intervention prior to undergoing bariatric surgery. Few studies have quantified the effect that this requirement has on changes in objectively measured physical activity prior to bariatric surgery.

PURPOSE: To examine the effect of a 6-month behavioral lifestyle intervention (BLI) on physical activity compared to usual care (UC) prior to bariatric surgery.

METHODS: Data from 97 severely obese adults (BMI=47.0±5.9 kg/m2) seeking bariatric surgery were used for this study. These 97 subjects are a subset from a larger trial who provided complete physical activity and weight data. Subjects were randomized to UC (N=46) or BLI (N=51) for 6 months prior to approval for surgery. UC completed a non-standardized, physician supervised diet and activity program in the context of routine pre-surgical care. BLI consisted of 12 in-person sessions and 12 telephone contacts delivered over 6 months, and a diet and physical activity prescription of 1200-1400 kcal/d and 30 minutes per day, 5 days per week. Weight and objectively measured physical activity (SenseWear Pro Armband) were assessed at 0 and 6 months. Moderate-to-vigorous intensity physical activity (MVPA) was defined as bouts that were ≥10 minutes in duration and ≥3.0 METS (MVPA-10) and total minutes ≥3 METS (MVPA-TOT). Light physical activity (LPA) was defined as total minutes of activity between 1.5 to <3.0 METS.

RESULTS: In the adolescents (age=14-18 years), the left ventricle hypertrophy is already manifest. Left ventricle muscle mass (LVMM) is higher in older (50-80 years) endurance athletes than in age-matched non-athletes but the difference between athletic and non-athletic subjects decrease continuously or disappears during the ageing. The long-lasting, high-intensity endurance trainings are the most effective ways to activate mechanisms, inducing the development of coronary circulation. No difference was shown between athletic and non-athletic children comparing their diastolic function (E/A). In the competitive age (19-35 years) athletes have a higher E/A than non-athletes (1.98 ± 0.37, vs. 1.73 ± 0.31, p = 0.013). In the 36-55 yr. age range physically active persons showed a higher E/A quotient than passive ones (1.574 ± 0.186 vs. 1.383 ± 0.069, p = 0.0327). At the older age in (age≥55 years) active subjects also displayed significantly higher E/A quotients (1.04 ± 0.093) than passive persons (0.917 ± 0.104), p = 0.004. According to the Tissue Doppler Imaging (TDI) the mitral lateral annulus seems to be the most sensitive region to detect difference in the E’/A’ quotient. At the competitive age difference between athletes and non-athletes was significant (3.21 ± 0.64 vs. 2.32 ± 0.55, p = 0.0265) similarly to the result of transmural E/A (1.97 ± 0.37 vs. 1.73 ± 0.31, p = 0.0228; <0.05).

CONCLUSIONS: Different characteristics of the athlete’s heart are manifested uniquely during the lifetime: LV hypertrophy develops at the young age; differences reach the maximum in young adults (36-55 years) and are least marked in older subjects. Coronary capillary network seems to develop mostly in younger athletes, while a difference in diastolic function seems to be more manifest in the competitive age but also appear in older subjects.

A-30 Free Communication/Slide - Determinants of Body Weight and Weight Loss

May 29, 2013, 9:30 AM - 11:00 AM
Room: Wabash 3

Energy Intake, Non-exercise Physical Activity And Successful Weight Loss: The Midwest Exercise Trial-2 (met-2)

Stephen D. Herrmann, Jeffery J. Honas, Erik A. Willis, Richard A. Washburn, FACSM, Joseph E. Donnelly, FACSM. University of Kansas Medical Center, Kansas City, KS.

Changes in energy intake (EI) or non-exercise physical activity (NEPA) may affect the weight loss response to aerobic exercise training.

PURPOSE: To evaluate differences in EI and NEPA between responders (RS; weight loss ≥ 5%) and non-responders (NR; weight loss < 5%) performing 10 months of supervised aerobic exercise training.

METHODS: Seventy-four overweight/obese (BMI 25-39.9) sedentary young adults (18-30 years) completed a 10-month trial (i.e., ≥ 90% scheduled exercise sessions) of treadmill exercise (5 d.wk-1, 1.8-20% max heart rate, supervised ≥4 d.wk-1) at either 2,000 (n = 37; 19 females) or 3,000 (n = 37; 18 females) kcal.wk-1. EI (kcal.d-1) was measured by picture-plate-waste and NEPA (min.d-1 of sedentary and moderate-to-vigorous activity [MVPA]) were assessed by Actigraph GT1M accelerometer over 7 consecutive days at baseline, and at months 3, 5, 7, and 10. Participants were instructed to maintain baseline EI and NEPA during the 10 month intervention. T tests for independent samples and Chi Squares were used to assess statistical significance.