Supported by an award from the American Heart Association Ohio Valley Affiliate and an ACSM Foundation Research Grant

1656 *Board #111* **11:00 AM - 12:30 PM**

Acute Stretch-shortening Cycle Contractions Affecting Gene Expression Levels In Old And Young Rat Skeletal Muscle

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The rate at which skeletal muscle recovers from an injury is reduced in aged as compared to young animals. **Purpose:** To investigate age- and exposure-related changes in gene expression using Quantitative Reverse Transcription Polymerase Chain Reaction (qRT-PCR) in rats recovering from an acute exposure to repeated stretch-shortening cycles (SSCs). **Methods:** Fischer 344 x Brown Norway rats, aged 12 weeks (young, n = 6) and 30 months (old, n = 5), were used. The injury protocol consisted of exposing the left limb to 150 total SSC contractions, conducted at 500°/s throughout a 90° - 140° range of motion. Animals were euthanized immediately following an isometric force test performed 10 days after the original SSC exposure. The proximal sections of the left (experimental) and right (non-exposed control) tibialis anterior muscles (LTA, RTA) were excised and flash frozen in liquid nitrogen. Expression levels of transcripts involved in muscle repair and regeneration were determined by qRT-PCR using gene specific primers. **Results:** Levels of an IGF-I splice variant, referred to as mechano growth factor (MGF), were significantly greater in young animals compared to old animals ($p=0.0076$), and greater in the LTA (compared with the RTA ($p=0.0002$). Interleukin-15 (IL15) and Bcl-2 associated X protein (Bax) levels were increased in the LTA compared with the RTA ($p=0.006$) and ($p=0.005$), respectively. β-cell leukemia/lymphoma 2 (Bcl2), was increased in the RTA compared with the LTA ($p=0.02$). The Bax/Bcl2 ratio was also greater in the LTA than the RTA ($p = 0.0001$). Aging did not affect IL-15, Bax or Bcl2 RNA levels. **Conclusions:** Expression levels of a number of mRNAs involved in muscle regeneration and repair are affected by SSC exposure. However, only MGF is affected by age, with transcript levels being higher in young than in old animals. Other investigators have demonstrated that MGF induction in injured muscle is reduced in aged animals. These studies also suggest that MGF plays a role in recovery during the days immediately following the injury. The data from this study indicates that MGF may also play a more long-term role in mediating muscle recovery, and in addition, may be involved in maintaining muscle composition and function.

1657 *Board #112* **9:30 AM - 11:00 AM**

Estrogen Influence On Myogenic Satellite Cells Following Downhill Running In Male Rats

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This study examined the effect of estrogen supplementation in rats on myogenic satellite cell quantities in type I and type II muscles following eccentric exercise. Gonad intact adult male rats divided into four groups, estrogen supplemented (25 mg estrogen pellet) control (EC), estrogen supplemented, exercised (EE), sham (no estrogen) control (SC) and sham, exercised (SE). After 1 wk of estrogen exposure the EE and SE animals performed 90 min of intermittent (5 min running/2 min rest) downhill running (-13.5° incline, 17 m/min). 72 hr later exercised (EE and SE) and control (EC and SC) animals were sacrificed and blood samples and soleus and white (superficial) vastus muscles surgically removed. Histochemical sections of soleus and white vastus muscles were examined for myogenic satellite cell content by use of Pax7 antibody and for neutrophil content by use of hematoxylin and eosin (H and E) staining procedures. Downhill running resulted in significant elevations in satellite cells and neutrophils detected in both soleus and white vastus muscle samples ($P<0.01$). Interestingly, estrogen supplementation resulted in significantly greater ($P<0.01$) post-exercise elevations in satellite cells detected in both soleus and white vastus muscle samples compared to sham (no estrogen) rats. Increases in neutrophils were significantly ($P<0.05$) attenuated in estrogen supplemented rats relative to sham in soleus but not in white vastus muscles. Hence, estrogen supplementation in male rats accentuated the 72 hr post-downhill running increase in Pax7 detected myogenic satellite cell number in both soleus and white vastus muscles relative to unsupplemented rats. The mechanisms and physiological consequences of this effect are yet to be determined.

1658 *Board #113* **11:00 AM - 12:30 PM**

The Effect Of Menstrual Cycle Phase On Indices Of Exercise-induced Muscle Damage In Young Women

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Estrogen has been shown in in vitro studies to have anti-oxidant properties that may provide protection against exercise-induced muscle damage. **PURPOSE**: The purpose of this study was to examine if differences in symptoms of muscle damage exist when it is induced during the follicular phase versus the luteal phase of the menstrual cycle. **METHODS**: Sixteen females between the ages of 18-40, nine in the follicular phase and seven in the luteal phase, completed the study. Each subject completed 75 eccentric-only biceps extensions on their non-dominant arm. Creatine kinase (CK), relaxed elbow extension (REE), range of motion (ROM), strength, and soreness were measured over seven days. **RESULTS**: Estrogen was significantly ($p<0.001$) higher in the luteal phase (187.8±73.5) group than in the follicular phase (77.2±32.2) group. Despite differences in estrogen concentration, neither group or interaction effects were present for the measured variables. Significant time effects were present such that REE and ROM were significantly ($p<0.05$) lower than baseline immediately post, 24, 48, 72, and 96 hours later. CK was significantly ($p<0.05$) higher at 96 hours than at baseline or 48 hours post. Strength was significantly ($p<0.05$) lower than baseline immediately post, 24, 48, 72, 96, and 168 hours later. **CONCLUSIONS**: Signs and symptoms of delayed onset muscle damage were independent of menstrual cycle phase. The estrogen concentration in females, regardless of menstrual cycle phase, may be high enough to offer protection against exercise-induced muscle damage. Alternatively, estrogen may not have any protective effect in healthy female humans.

E-26 Free Communication/Poster – Perceived Exertion

FRIDAY, JUNE 3, 2005 9:30 AM - 12:30 PM
ROOM: Ryman C2

1659 *Board #114* **9:30 AM - 11:00 AM**

Comparing Perceptual, Cardiac And Hormonal Markers Of Relative Loads On Eccentric Versus Concentric Resistance Exercises

Daniel B. Hollander[1], Robert R. Kraemer, FACSM[1], Marcus W. Kilpatrick[2], Gregory V. Reeves[1], Zaid Ramadan[1], Michelle Francois[1], James L. Tryniecki[1], V. Daniel Castracane[3]. *[1]Southeastern Louisiana University, Hammond, LA. [2]University of South Florida, Tampa, FL. [3]Texas Tech Women's Hospital, Amarillo, TX.* (Sponsor: Robert R. Kraemer, FACSM)
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Recent investigation noted differences in the acute perceptual, cardiac, and hormonal responses to eccentric (ECC) and concentric (CON) contractions using an absolute resistance loading protocol. To extend this research, we investigated the same responses using similar relative resistance exercises loads. **PURPOSE**: To compare perceptual (RPE and pain), cardiac (heart rate) and endocrine (cortisol, ACTH) responses in an eccentric (ECC) and a concentric (CON) resistance training protocol using a similar workload. It was hypothesized that perceptual, cardiac, and hormonal responses would be similar. **METHODS**: Seven healthy males (M±SE, 25.7± 2.17y) with resistance training experience participated in the study. Two pre-experimental trials were conducted to obtain anthropometric data and a 1-RM for lateral pulldown, leg press, bench press, leg extension, seated military press, and leg curl (Master Trainer, Rayne, LA). Subjects completed two experimental trials consisting of either 65% of CON 1RM for CON contractions or 65% of CON 1RM + 20% for ECC contractions for each of the six exercises. Subjects performed 4 sets of 10 repetitions with a 90s-rest period. A blood sample was taken before, immediately after, and 15-minutes post-exercise. Omni RPE, CR-10 pain rating, and HR measures were recorded after each set. **RESULTS**: Repeated measures ANOVAs demonstrated no between-subjects effects for Omni RPE, pain, cortisol, or ACTH. Significant interaction effects and within-subjects effects were found for RPE ($p<.01$), Pain ($p<.01$), and HR ($p<.01$) but not cortisol or ACTH. Specifically, OMNI RPE and pain responses were higher in the ECC condition for leg extension and leg curl, but lower in the bench press and military press. **CONCLUSIONS**: No between subject differences were apparent for any measures except HR, supporting our hypothesis. However, RPE and pain had different ratings when comparing upper and lower body movements. These different ratings may direct research to explore interactions between interoceptive sensations and metabolic responses to different muscular movements.

	ECC(M±SE)	CON(M±SE)	Within	Between	Interaction
Omni RPE	5.02 ±.66	4.91± .66	F(21, 50), p< 01*	F(0.01), p> 91	F(2, 21), p< 01*
Pain	2.29± .55	2.29± .60	F(13, 52), p< 01*	F(0.00), p> 99	F(2 03), p< 01*
HR (bpm)	104.26±3.15	118.85±3.15	F(32.99), p< 01*	F(10.76), p< 01, *	F(2.04), p< 01*
Cortisol (ug/dL)	22.05±2.22	21.86±2.22	F(1.67), p> 85	F(0.01), p> 95	F(0.64), p> 54
ACTH (pg/mL)	66.38±8.12	71.57±8.12	F(0.33), p> 70	F(0.20), p> 60	F(0.39), p> 65

1660 *Board #115* **11:00 AM - 12:30 PM**

Use Of Estimated Perceived Exertion Ratings To Produce Resistance Exercise Intensity

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Exercise prescriptions based on perceived exertion assume that a target RPE that has been estimated during an exercise test can be used to produce a similar level of

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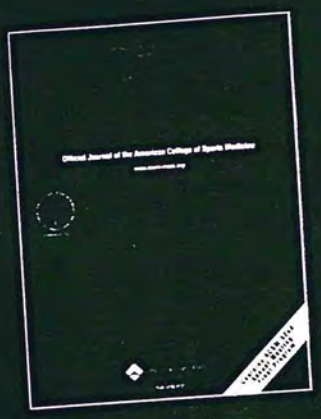

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