

PROGRAM

**Midwest
ACSM
ANNUAL MEETING**



OCTOBER 14-16, 2001

WELCOME TO THE MIDWEST REGIONAL CHAPTER AMERICAN COLLEGE OF SPORTS MEDICINE ANNUAL FALL MEETING

**OCTOBER 14-16, 2001
FAWCETT CENTER HOTEL AND CONVENTION CENTER
COLUMBUS, OHIO**

Welcome to the Annual Regional Chapter Meeting of the Midwest American College of Sports Medicine . The Program Planning Committee has worked diligently to put together a diverse program, providing an array of scientific and clinical presentations applicable to many areas of interest. We are excited to have Dr. John Lombardo, from The Ohio State University Sports Medicine Center and Dr. Chandan Sen from The Ohio State University Medical Center as keynote speakers for this year's meeting. Dr. John Lucas will give a presentation on the history of the Olympics at Monday's banquet luncheon. As well, we have planned various social opportunities this year including a tour of the renovated OSU football stadium and an evening pizza social.

We are excited to have Columbus as the host city for this year's meeting. Columbus is the largest city in Ohio, the 15th largest in the United States and the fastest growing city in the northeast quadrant. Points of interest in the Greater Columbus area include the Ohio Theater, the Martin Luther King Center, the Columbus Zoo, the Ohio Center of Science and Industry, the Wexner Center, the recently renovated State Capitol Building, and the newest downtown hot-spot - the Arena District.

The Fawcett Center, located on The Ohio State University campus, has been established as a national prototype for conference centers on major college campuses and is one of the largest university conference centers under one roof. It is situated just 15 minutes northwest of Port Columbus International Airport and within a 10 minute drive of downtown Columbus. The Fawcett Center is conveniently located for easy access to all of the area's many attractions.

We hope you take full advantage of the of the many programs, events, and social opportunities available at this year's meeting. On behalf of the Midwest Chapter, thank you for your attendance and participation at the MWACSM Annual Conference .

Jeff Betts,
Program Chair



2001 MWACSM BOARD OF DIRECTORS

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TABLE OF CONTENTS

2	WELCOME LETTER
3	MWACSM BOARD OF DIRECTORS
4	TABLE OF CONTENTS
5	PROGRAM ACKNOWLEDGEMENTS
6	CONFERENCE INFORMATION
7	MAP OF THE FAWCETT CONVENTION CENTER
8	FINAL PROGRAM: SCHEDULE OF EVENTS
9	ORAL ABSTRACT PRESENTATIONS/POSTER PRESENTATIONS: SCHEDULED DATES & TIMES
10-16	PROGRAM EVENTS: SUNDAY, OCTOBER 14, 2001
17-33	PROGRAM EVENTS: MONDAY, OCTOBER 15, 2001
34-38	PROGRAM EVENTS: SUNDAY, OCTOBER 16, 2001

PROGRAM ACKNOWLEDGEMENTS

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STUDENT FORUM

The Ohio State University Exercise Science Club

THE MIDWEST REGIONAL CHAPTER OF AMERICAN COLLEGE OF SPORTS
MEDICINE WOULD LIKE TO ACKNOWLEDGE THE GENEROUS FINANCIAL
SUPPORT OF THE FOLLOWING ORGANIZATIONS:



CONFERENCE INFORMATION

OBJECTIVES

The 2001 meeting of the MWACSM is designed to:

- Enhance the scientific and clinical understanding of the physiological, biochemical, and psychological basis for the changes that occur during and following exercise in both normal and pathological states;
- Provide a forum for members and students to present research related to exercise science and sports medicine; and
- Promote interaction among scientists, clinicians, and students in related fields to provide new approaches to, and perspectives on, and problems in exercise science and sports medicine.

TARGET AUDIENCE

MWACSM members, ACSM members, clinicians, professionals, and students interested in the field of sports medicine and exercise science.

ACSM CEC's

The American College of Sports Medicine's Professional Education Committee certifies that this continuing education offering meets the criteria for 15 credit hours of ACSM Continuing Education Credit. CEC forms may be obtained at the registration booth.

NAME BADGES

Badges must be worn at all times to gain admittance in the poster sessions, educational sessions, and ACSM social events. Please hold on to your badge! Replacement badges cost \$5.

MEETING LOCATIONS

All sessions and most other events will be held in the Fawcett Convention Center. Room assignments for educational events are detailed in this program, along with map of the convention center. Signage in the registration area will direct you to special events.

REFRESHMENTS

Refreshments will be available at various sessions throughout the meeting. A luncheon is scheduled for Monday afternoon. A pizza social is scheduled for 7 pm Monday evening at Tommy's Pizza. A student breakfast/forum will be held at 8:00 am Tuesday morning. Additional dining opportunities are steps away at the Oxley's Café. For other dining options ask for information at the Fawcett Center front desk.

PLANNED SOCIAL GATHERINGS

Please plan to join in the tour of the recently renovated OSU football stadium at 6 p.m., Monday evening. At 7 pm plan to join your colleagues at Tommy's Pizza for a fun and appetizing social event.

ANNUAL BUSINESS MEETING

This important business meeting is your opportunity to participate as an active voice in affecting the future of the Midwest Chapter of ACSM. Please plan to attend on Monday afternoon, immediately following the banquet luncheon.

AWARDS ANNOUNCEMENTS

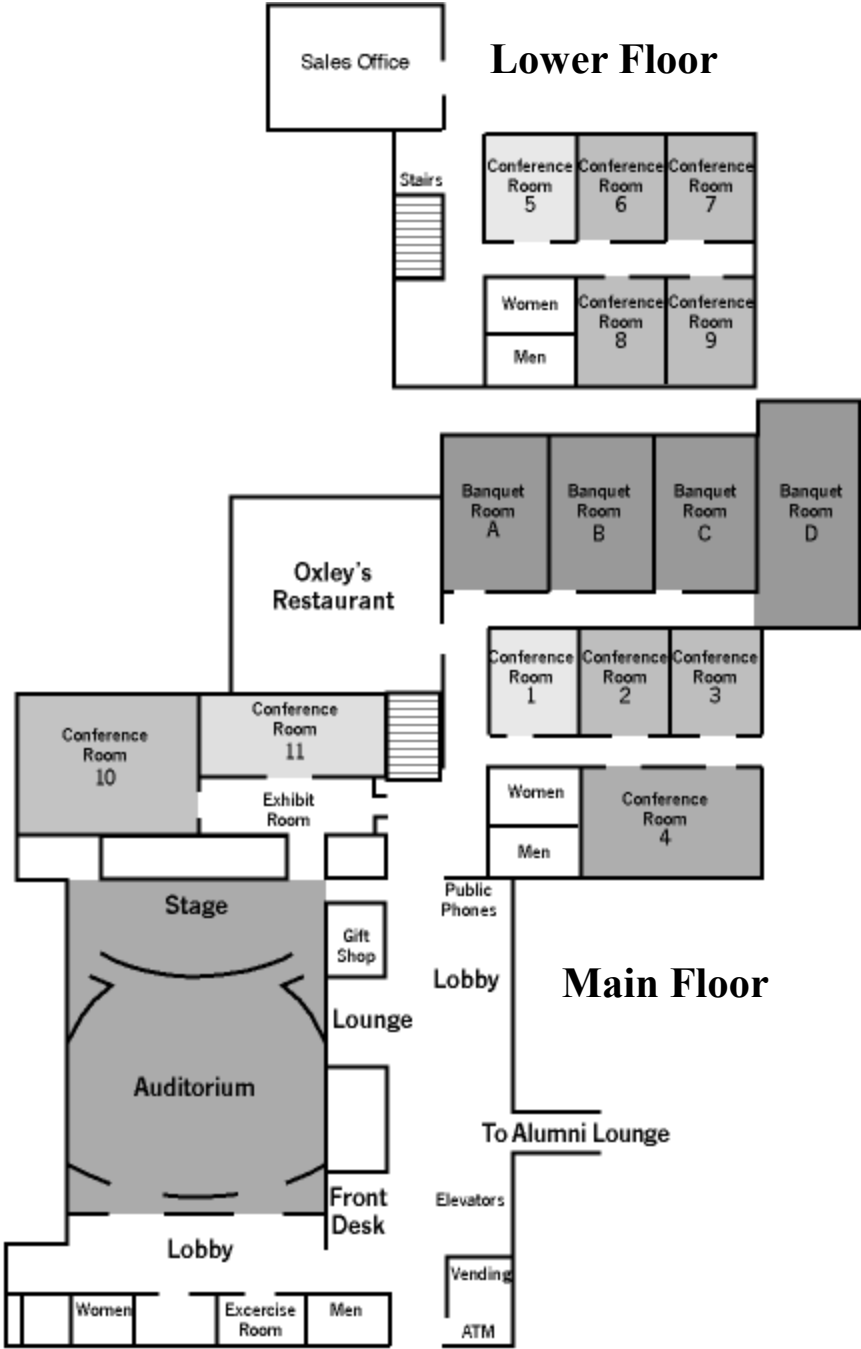
The annual 'Founder's Award' will be announced at the banquet luncheon on Monday. The **Founder's Award** is awarded to an active and contributing member of the MWACSM chapter. This award acknowledges the recipient of his/her dedication and professional contributions to the Midwest Chapter of ACSM.

Awards in the amount of \$150.00 will be made for the outstanding student poster and free communication. This award will be announced in the next issue of MWNews.

FUTURE MEETING SITE

Fall 2002: Detroit Michigan at the Holiday Inn.

THE FAWCETT CONVENTION CENTER FLOOR PLAN



Main Entrance

FINAL PROGRAM

SUNDAY, OCTOBER 14, 2001

TIME	EVENT	ROOM
12:00 pm - 4:00 pm	Registration	Lobby
1:00 pm - 2:00 pm	Tutorial: "What Does it Take to Succeed in the Interview?"	2 & 3
1:00 pm - 2:00 pm	Tutorial: "The Value of Customer Service in a Medically-Based Wellness Facility"	4
1:00 pm - 4:30 pm	Poster session	8 & 9
2:00 pm - 4:00 pm	Symposium: "Personal Training through the Lifespan"	2 & 3
2:00 pm - 4:00 pm	Symposium: "College Campuses: Fitness Opportunities"	4
5:00 pm - 6:00 pm	Keynote Address Dr. John Lombardo, FACSM "When winning becomes THE goal"	Auditorium

MONDAY, OCTOBER 15, 2001

TIME	EVENT	ROOM
8:00 am - 4:00 pm	Registration	Lobby
8:30 am - 9:30 am	Tutorial: "Exercise Treatment for Parkinson's Disease"	2 & 3
8:00 am - 11:00 am	Poster session	8 & 9
9:00 am - 11:30 am	Oral Presentations of Abstracts	4
9:30 am - 10:30 am	Symposium: "Menstrual Cycle & ACL Injuries in Teenage Girls"	2 & 3
10:30 am - 12:00 pm	Symposium: "Treating Chronic Diseases with Exercise: A Look at Evidence-Based Clinical Outcomes"	2 & 3
12:00 pm - 2:00 pm	Luncheon & Business Meeting Speaker: Dr. John Lucas, Olympic Historian	Banquet
1:00 pm - 4:00 pm	Poster session	8 & 9
2:00 pm - 3:30 pm	Symposium: "Resistance Training for the Elderly"	2 & 3
2:00 pm - 4:00 pm	Physician Case Presentations	4
3:30 pm - 5:00 pm	Symposium: "Immunity Challenge: Demystifying Exercise Immunology"	2 & 3
5:00 pm - 6:00 pm	Keynote Address Dr. Chandan Sen, FACSM "Revisiting the Significance of Oxidants and Antioxidants"	Auditorium
6:00 pm	Tour of The Ohio State University Stadium	OSU Stadium
7:00 pm	Social Event - Tommy's Pizza	Tommy's Pizza

TUESDAY, OCTOBER 16, 2001

TIME	EVENT	ROOM
8:00 am - 10:00 am	Registration	Lobby
8:00 am - 9:00 am	Student Breakfast & Forum	8 & 9
9:00 am - 10:30 am	Symposium: "Arthrogenic Muscle Inhibition: Implications and Interventions in Joint Injury"	2 & 3
9:00 am - 10:30 am	Symposium: "Exercise Behavior Change from the Inside Out"	8 & 9
9:00 am - 10:45 am	Oral Presentations of Abstracts session	4
9:30 am - 10:30 am	Tutorial: "Magnets and Medicine: What's the Attraction?"	2 & 3
11:00 am	Adjourn	

ORAL PRESENTATIONS OF ABSTRACTS

MONDAY	9:00 – 11:00 AM	ROOM 4 (UPPER LEVEL)
9:00 – 9:15	Nagy, et.al. “Glutathione in Rats...”	
9:15 – 9:30	Philip, et al. “BP & BW in Rats...”	
9:30 – 9:45	Roeske, et al. “Spatial Maze in Rats..”	
9:45 – 10:00	Byrnes, et al., “Blood Lipid Profile in Rats...”	
10:00 – 10:15	Krause, et al., “Joint Cryotherapy...Hoffman Reflex”	
10:15 – 10:30	Palmieri, et al., “Artificial Knee Effusion...”	
10:30 – 10:45	Fink, et al. “Hoffman Reflex.. Cycle Ergo...”	
10:45 – 11:00	Moustafa, et al., “Mechanics of Overhead VB...”	
11:00 – 11:15	Kerner, et al. “BMI & Mile Run Time...”	

TUESDAY	9:00 – 11:00 AM	ROOM 4 (UPPER LEVEL)
9:00 – 9:15	Stone et al., “Dose of Gingko Biloba...”	
9:15 – 9:30	Park, et al., “Post-Exercise Metabolic Rate...”	
9:30 – 9:45	Navalta, et al., “Comparison of Two Methods of VO2 Max in Boys...”	
9:45 – 10:00	Mikat, et al., “Total Body Volume without Lung Volume...”	
10:00 – 10:15	Craig, et al., “Hormonal Effects of Androstenedione in Elderly Men...”	
10:15 – 10:30	McGregor, et al., “Gene Expression..Injury...Mice..Microarray Analysis”	
10:30 - 10:45	Wright, et al., “The Effects of Phospholipase C Inhibition....”	

POSTERS

SUNDAY	1:00 TO 4:30 PM	ROOMS 8&9 (LOWER LEVEL)
Gajus, et al.,	The Ohio State University	(P-1)
Tsivitse, et al.	Toledo University	(P-2)
Mylona, et al.	Toledo University	(P-3)
Peterson, et al.	Toledo University	(P-4)
Horn, et al.	Ball State University	(P-5)
Eagan, et al.	Purdue University	(P-6)
Josyula, et al.	Purdue University	(P-7)

MONDAY	8:00 TO 11:30 AM	ROOMS 8&9 (LOWER LEVEL)
Markert, et al.	The Ohio State University	(P-1)
Hall, et al.,	Elmhurst College	(P-2)
Young, et al.	Illinois State University	(P-3)
Fahlman, et al..	Wayne State University	(P-4)
Doherty, et al.	Toledo University	(P-5)
King, et al.	Toledo University	(P-6)
Sobolewski, et al.	Toledo University	(P-7)

MONDAY	1:00 TO 4:30 PM	ROOMS 8&9 (LOWER LEVEL)
Kramp, et al.	Oakland University	(P-1)
Madej, et al.	Oakland University	(P-2)
Cohen, et al.	Indiana State University	(P-3)
Babington, et al.	Indiana State University	(P-4)
Fincher, et al.	Ashland University	(P-5)
Hipp, et al.	Ball State University	(P-6)
Darby, et al.	Bowling Green State University	(P-7)

TUTORIAL

1:00 - 2:00 pm

WHAT DOES IT TAKE TO GET AND SUCCEED IN THE INTERVIEW

Brenda D. Reeves, Ph.D. Grand Valley State University, Allendale, MI 49401.

The resume doesn't get you the job; it gets you the interview. To write a winning resume students need to understand the job search process and how to critically read a position available posting. With this information, the student can begin to organize and write the type of resume and letter of application that will get them past the "first cut" and invited for an interview. On the other hand, a poor resume and letter of application can prevent even the best candidate from getting an interview. The objectives for the first part of the presentation are:

1. Understand how the search committee evaluates resumes
2. Know how to critically read a position available posting to determine what to include in the resume and letter of application
3. Know how to format a winning resume
4. Know the resources on your campus to assist you

Once potential candidates are invited for an interview, there are several things that they need to be aware of to properly prepare for a winning interview, and get the job. The objectives for the second part of the presentation are:

1. Know how to prepare for an interview
2. Know what to include in an interview portfolio
3. Understand what weaknesses can come through in the interview process
4. Know the resources on your campus to assist you

Students with an emphasis in fitness and wellness should begin to prepare for their first professional job search by their sophomore year. They need to seek diverse opportunities both in and out of the classroom in order to develop their knowledge, skills, and abilities as well as build their working portfolio. However, students cannot count on academic and job related experiences alone to them a job; they must have excellent communication skills, both written and verbal. Time and again, potential candidates have been passed over because they could not adequately demonstrated their KSA's and professional experiences in their resume or in the interview. By understanding and properly preparing for the search process, potential candidates can succeed in getting the interview and the job.

TUTORIAL

1:00 - 2:00 pm

THE VALUE OF CUSTOMER SERVICE IN A MEDICALLY-BASED INTEGRATED WELLNESS FACILITY

Michael F. Hyek, Ph.D.

Historically, the push to acquire new members has driven the success of traditional exercise and health club facilities. Recently however, the primary focus has shifted to retention of existing members. Perhaps the greatest mechanism available to maximize retention rates is through quality customer service. This presentation will provide the elements of customer service used at the McConnell Heart Health Center. It will begin with historical perspectives on number of members and associated revenue. Next, how the satisfied customer can become the greatest avenue for new members. Then, how customer satisfaction survey scores can be used to identify areas where opportunities for improvement exist will be discussed. Finally, the key criteria for converting customers into advocates will be outlined.

POSTERS

1:00 - 4:00 pm

Gajus, et al.,	The Ohio State University	(P-1)
Tsivitse, et al.	Toledo University	(P-2)
Mylona, et al.	Toledo University	(P-3)
Peterson, et al.	Toledo University	(P-4)
Horn, et al.	Ball State University	(P-5)
Eagan, et al.	Purdue University	(P-6)
Josyula, et al.	Purdue University	(P-7)

FOUR-YEAR TREND IN BODY COMPOSITION IN COLLEGE STUDENTS

S.G. Gajus and N.Y.J.M. Leenders. The Ohio State University, Columbus, OH 43210

Obesity contributes to major health problems such as type 2 diabetes mellitus, hypertension, and coronary artery disease. The prevalence of obesity (defined as body mass index [BMI] ≥ 30.0 kg/m² using self-reported measures of body weight and height) in adults in the U.S. population increased from 12.0% in 1991 to 17.9% in 1998. The highest increase, 70%, was observed among the youngest ages, 18-29 y of age. The purpose of the present study was to retrospectively describe the trends in body weight and body composition in college students from 1996 to 2000. Methods: To monitor trends in body weight and body composition, and to present results from a specific population defined as college students (n=1,178 females, n=990 males) enrolled at a large mid-western university, data was analyzed from the Exercise Physiology Laboratory collected from 1996 to 2000. Body composition was determined by hydrostatic weighing (HW). Height and weight was measured simultaneously. Descriptive statistics were used to describe the distribution of body composition per each academic year. Prevalence of obesity was calculated based upon BMI (BMI ≥ 30 kg/m²). An analysis of variance was used to determine whether body weight and percent body fat was significant different between academic year and sex. Results: Between 1996 and 2000, mean body weight did not change for both sexes, 63 \pm 11 kg in '96-'97 and 63 \pm 11 kg in '99-'00 for females and 78 \pm 12 kg in '96-'97 and 79 \pm 11 kg in '99-'00 for males respectively. Males were significantly heavier compared to females, 79 \pm 11 kg vs. 63 \pm 11 kg respectively (P<.0001). Similarly, percent body fat determined from hydrostatic weighing did not change per year for both sexes, 26 \pm 6% in '96-'97 and 27 \pm 7% in 2000 for females and 17 \pm 6% in '96-'97 and 18 \pm 6% in '99-'00 for males, respectively. Females have a significantly higher percent body fat compared to males, 26 \pm 6% vs. 17 \pm 6% respectively (P<.0001). Overall, 8% of the males and 5% of the females were classified as obese (defined as BMI ≥ 30 kg/m²). Conclusions: These preliminary data document no changes in body weight and percent body fat among college students. Because of the health consequences of obesity, objectives, interventions and awareness activities should be developed targeting college students.

MUSCLE INFLAMMATORY CELL AND MYOD PROTEIN CONCENTRATIONS FOLLOWING

DOWNHILL RUNNING

S.K. Tsivitse, S.J. McGregor, J.M. Peterson, T.J. McLoughlin, E. Mylona, & F.X. Pizza. The University of Toledo, Toledo, OH

Purpose: The purpose of this study was to examine the kinetics of muscle inflammatory cell and MyoD protein concentrations in rat solei following eccentric exercise. **Methods:** Male Wistar rats performed either downhill running (n=43; 17m/min, -16% grade) or normal cage activity (controls; n=6). Solei were obtained at the following post-exercise time points: 0h (n=6), 2h (n=6), 6h (n=5), 24h (n=8), 48h (n=6), and 72h (n=6). Neutrophil (HIS48+), macrophage subpopulations (ED1+ and ED2+) and MyoD protein concentrations were determined using immunohistochemistry. **Results:** Downhill running induced muscle injury as indicated by a significant increase ($P \geq 0.05$) in blood creatine kinase activity and histological signs of injury. Neutrophil and ED1+ macrophage populations were significantly higher at 24h post-exercise relative to controls. ED1+ macrophage concentrations were also significantly elevated at 48h post-exercise relative to control. The percentage of myofibers invaded by ED1+ macrophages, an indicator of necrosis, was also significantly higher at 24h relative to controls. Neither, ED2+ macrophage nor MyoD+ protein concentrations were significantly elevated at any post-exercise time-point. **Conclusion:** The results indicate that downhill running causes a mutual elevation in neutrophil and ED1+ macrophage concentrations but does not influence the concentrations of ED2+ macrophages nor MyoD+ protein concentrations.

CONTRACTION-SPECIFIC CHANGES IN INFLAMMATORY CELLS OF RODENT SKELETAL MUSCLE

E. Mylona, T.J. McLoughlin, T. Hornberger, K. Esser, and F.X. Pizza. The University of Toledo, Toledo, OH and The University of Illinois, Chicago, IL.

Eccentric skeletal muscle contractions are known to cause muscle injury and increase muscle neutrophils and macrophage sub-populations (ED1* and ED2*). However, whether the non-injurious concentric contractions influence these muscle inflammatory cell concentrations is unknown. **Purpose:** The purpose of this study was to assess alterations in muscle inflammatory cell concentrations following eccentric and concentric skeletal muscle contractions. **Methods:** The tibialis anterior (TA), plantaris (PLN), and soleus (SOL) muscles of female Wistar rats (n=12) were exercised at 6, 24, and 72 h following electrical stimulation (ES). The contralateral muscles from each animal were used as controls (CT). **Results:** Both eccentric (TA) and concentric contractions (SOL and PLN) caused a significant elevation ($p \geq 0.05$) of neutrophil and ED1* macrophage concentrations compared to CT. ED2* macrophage concentrations were not elevated following concentric contractions and tended to be elevated ($p=0.057$) following eccentric contractions. **Conclusions:** Injurious eccentric contractions increased neutrophil and ED1* and possibly ED2* macrophage concentrations. The non-injurious concentric contractions appeared to also elicit marked elevations of neutrophils and ED1* but not ED2* macrophages.

IBUPROFEN AND ACETAMINOPHEN: EFFECT ON MUSCLE INFLAMMATION FOLLOWING ECCENTRIC CONTRACTIONS

J.M. Peterson, T.A. Trappe, E. Mylona, F.White, C.P. Lambert, W.J. Evans, F.X. Pizza. The University of Toledo, Toledo, OH and University of Arkansas for Medical Sciences, Little Rock, AK

Ibuprofen and acetaminophen are commonly used to reduce pain and inflammation after skeletal muscle injury. Ibuprofen but not acetaminophen is known to possess anti-inflammatory properties. Prior research using indirect measurements of muscle inflammation has produced conflicting results on whether a non-steroidal anti-inflammatory drug (e.g. ibuprofen) or an analgesic (e.g. acetaminophen) reduces muscle inflammation following novel eccentric contractions. **Purpose:** To examine the influence of ibuprofen and acetaminophen on intra
(continued...)

muscular neutrophil and macrophage concentrations following a novel bout of eccentric exercise. **Methods:**

Twenty-four males (25±3 y) were divided into three groups which received the maximal over-the-counter (OTC) dose of ibuprofen (1200 mg d⁻¹) or acetaminophen (4000 mg d⁻¹) or a placebo following 10-14 sets of 10 eccentric contractions at 120% of their concentric one-repetition maximum using the knee extensors. Biopsies were taken before and 24h after exercise from the vastus lateralis. **Results:** Macrophage and total inflammatory cell concentrations (neutrophils + macrophages) were elevated (P<0.01) after exercise but neutrophil concentrations were not (P>0.05). Acetaminophen or ibuprofen treatment did not blunt the intramuscular inflammatory cell response when compared to placebo (P>0.05). **Conclusions:** These results suggest maximal OTC doses of acetaminophen or ibuprofen do not affect muscle concentrations of neutrophils or macrophages 24h after a novel bout of eccentric exercise.

Supported in part by McNeil Consumer Products Co. and NIH grant AG-00831.

SPECIFIC FACTORS IN TRAINING ELITE SKI JUMPING ATHLETES

B.Horn, S.Higgins, A.Walsh, R. Newton. Ball State University, Muncie, IN 47306

The purpose of this study was to determine the changes in impulse produced by three U.S. Olympic Ski Jumping Team Athletes as a result of a highly specific training program. The specific training exercises included the performance of an isometric squat for 5 seconds at the approximate knee and hip angles assumed prior to the jump. The other exercise involved concentric only squat jumps from the same body position and with 85% of 1RM back squat strength supported on the shoulders. Athletes were tested in May, June, July, August of 2001 for impulse produced during a concentric only squat jump which is highly specific to the takeoff phase.

Athlete	May	June	July	August
1	67.6	85.6	146.1	166.4
2	79.3	96.7	103.2	103.5
3	119.0	146.4	143.6	119.0

Although it cannot be directly attributed to the innovative exercises implemented in training, all three skiers greatly improved their world ranking over the training period. It should be noted that athlete 2 was injured prior to the July testing session so this may have affected his impulse values for the July and August testing. Obviously the statistical power of this study is limited by the small sample size but this data shows a correlation between this specific training program and performance, as indicated by increased impulse generation and a higher world ranking.

A COMPREHENSIVE HISTORICAL ACTIVITY QUESTIONNAIRE (HAQ) FOR YOUNG WOMEN: DEVELOPMENT AND EVALUATION

M.S. Eagan, R. Lyle, D. Teegarden, Purdue University, West Lafayette, IN 47907

The purpose of this study was to evaluate the intrasubject reliability of a self-administered Historical Activity Questionnaire(HAQ) designed to estimate lifetime activity for female subjects (18–30 yrs). The HAQ examines activity participation divided by time periods(elementary, middle, high school, post high school/college), activity categories (occupation, athletics, leisure, exercise), pre-assigned activity impact levels (1-3), and amount of lifting and carrying associated with the selected activities. For a specific time period, the average number of hours per day spent for each activity was calculated, and the hours for all activities were summed

(continued...)

to obtain a composite estimate for that period (expressed as h/d). Also, h/d was totaled by activity category, impact level, across time periods, and for lifting and carrying. In addition, h/d of each activity was multiplied by an estimate of the metabolic cost of that activity (expressed as METs). Thirty-one volunteers (age 20.6 ± 2.7 yrs) from a calcium intervention study repeated a duplicate portion of the questionnaire (elementary through high school) at 6 pm. Pearson r of Spearman rank order correlations (if data were not normally distributed), as well as Cronbach's Alpha Coefficient (α) were used to analyze several of the activity variables. Overall cumulative activity recall repeatability in MET - h/d was $r=0.61$, $\alpha=0.75$, $p=0.0001$. Reliability of athletic participation recall was particularly high ($r=0.82$, $\alpha=0.92$, $p=0.0001$). H/d recall results were similar. Also,

with the exception of impact level 1, activities broken down by impact level, yielded consistent results. Results suggest that the HAQ is a reliable instrument for evaluating lifetime activity in 18-30 year old women. Since the weakest recall occurred for middle school and occupation, more time should be dedicated to clarifying instructions for these sections of the questionnaire.

This project was funded under the Dairy Calcium and Women's Health Study grant provided by Dairy Management, Inc.

HISTORICAL ACTIVITY AS IT RELATES TO CURRENT ACTIVITY, FITNESS, AND BODY COMPOSITION IN WOMEN.

L. Josyula, M.S. Eagan, R. Lyle, D. Teegarden, Purdue University, West Lafayette, Indiana, 47907

The purpose of this study was to examine baseline fitness and body composition in relation to self-reported historical activity in 153 women, age 20.1 ± 2.3 yrs, enrolled in the Dairy Calcium and Women's Health Study (DCWHS). We measured lifetime activity divided into time periods, activity categories, and impact levels using the Historical Activity Questionnaire (HAQ). Fitness and body composition parameters included resting heart rate (RHR), systolic and diastolic blood pressure, weight, body mass index (BMI), waist and hip circumference, and as measured by dual energy X-ray absorptiometry (DXA), body fat % (Bfat %), body fat (g) (FatG), and lean tissue (g) (LEAN). Spearman rank-order correlations were calculated. Activity values were in units of MET-h/d unless otherwise specified. Significant relationships ($p < 0.05$) for historical activity time periods included middle school activity with Lean ($r=0.24$); high school activity with RPE ($r=0.45$), RHR (-0.19) and Lean (0.30); and lifetime activity with Lean ($r=0.26$) and RPE ($r=0.34$). Significant relationships for historical activity categories included lifetime athletics with RPE ($r=-0.41$), Bfat% ($r=-0.30$), FatG ($r=-0.21$), and Lean ($r=0.30$); lifetime leisure activity with RPE ($r=-0.17$); lifetime exercise with RPE ($r=-0.34$) and Bfat% ($r=-0.20$). Significant regression models included high school activity as the best time period predictor for RPE and Lean. Lifetime athletic activity was the best activity category predictor for RPE. Also, h/d of activity in past years significantly predicted total post-high school activity h/d. Within regression models, the highest impact activities consistently had favorable relationships with the physiological components compared to lower impact activities. Results suggest that women who were active in childhood remain active in early adulthood. Additionally, past activity appears to provide prolonged fitness and body composition benefits. In particular, previous athletic participation may play an important role in helping women maintain a healthier lifestyle in the post-high school years.

This project was funded under the DCWHS grant provided by Dairy Management, Inc.

SYMPOSIUM

2:00 - 4:00 pm

PERSONAL TRAINING IN A COMMERCIAL FITNESS SETTING

Mark Myhal, Ph.D., Chair

Purpose: To expose the members of ACSM to a broad spectrum of personal training methodologies and issues related to personal training for various populations. Objectives: 1. To provide the members of ACSM with an overview of the personal training business as conducted in a commercial fitness setting; and 2. To outline training modalities for the general population; beginning and advanced lifters, and an aging population.

Rationale: Personal training programs are developed based upon the following: 1. The medical history of the client; 2. The specific goals/needs of the client; 3. The age of the client; and 4. The current fitness level of the client.

This symposium will address all aspects of personal training including training modalities for select populations, the business and administrative aspects of personal training, client management and recruitment, and perspectives related to personal training in a commercial fitness setting.

Presenters

Mark Myhal, Ph.D., The Ohio State University, Columbus, OH

Linda Wilkin, M.A., The Ohio State University, Columbus, OH

Jaimy Lekan, B.S. The Ohio State University, Columbus, OH

SYMPOSIUM

2:00 - 4:00 pm

COLLEGE CAMPUSES: OPPORTUNITIES TO ENGAGE IN HEALTHY BEHAVIORS

W.M. Sherman, Ph. D., Chair

Purpose/Rationale: In the United States, approximately 14 million students attend either 2- or 4-year colleges or universities. The university setting provides ample opportunities to participate in regular physical activity or exercise through sport and fitness programs, physical education classes and/or intramural sports programs.

This is especially important because health beliefs and practices are still developing during these years. We will share perspectives on opportunities that exist on college campuses to engage in physical activity and what we know about this population with regard to their health behaviors.

Objectives: to raise awareness of opportunities that exist to engage in physical activity and other healthy behaviors in this population. To provide information in such that objectives, interventions and awareness activities could be developed targeting college students that can be applied to secondary educational settings throughout the nation.

Presenters

Mike Sherman, Ph.D., The Ohio State University, Columbus, OH

Opportunities to engage in healthy behaviors on college campuses

Nicole Y.J.M. Leenders, Ph.D. The Ohio State University, Columbus, OH

College students and their health behaviors

KEYNOTE ADDRESS

5:00 - 6:00 pm

When winning becomes THE goal

John Lombardo, MD, FACSM THE OHIO STATE UNIVERSITY SPORTS MEDICINE CENTER

Dr. John Lombardo is an 11th year member of The Ohio State University (OSU) Sports Medicine Center staff, and 8th year Head Team Physician for the OSU Department of Athletics.

Dr. Lombardo is a native of Brooklyn, New York. He did his undergraduate work at the University of Dayton. He graduated from Ohio State's College of Medicine in 1977 and completed his residency in family medicine in 1980 at St. Elizabeth Medical Center in Dayton.

From 1981-1990 Lombardo served as Medical Director of Sports Medicine at the Cleveland Clinic. During that time, he served as Team Physician for the Cleveland Cavaliers and medical consultant for the Cleveland Browns and the Cleveland Ballet.

Lombardo has had extensive involvement in several international competitions, including serving as Head Team Physician for the USA delegations at the World University Games in Yugoslavia in 1987 and the Winter Olympic Games in Calgary in 1988.

Lombardo returned to OSU in 1990 as Chairman of the Department of Family Medicine, Medical Director of the OSU Sports Medicine Center and team physician for the Athletic Department.

Lombardo also serves as an advisor for anabolic/androgenic steroids and related substances to the National Football League, and he is the past President of the American Medical Society for Sports Medicine.

TUTORIAL

8:30 - 9:30 am

EXERCISE TREATMENT FOR PARKINSON'S DISEASE

Shel Levine, Eastern Michigan University

The purpose of this presentation is to discuss the role of exercise in the management of Parkinson's disease. Along with medications, exercise is an essential ingredient in maintaining functional capacity and activities of daily living. Therefore, patients with Parkinson's disease are encouraged to exercise on a regular basis. As a student or working Exercise Physiologist, you may come across a patient with Parkinson's disease in a cardiac rehabilitation program, hospital wellness center, corporate fitness center, or even as a personal training client. It is essential to understand the fundamentals of exercise testing and prescription for patients with Parkinson's disease.

Objectives: Upon completion of this presentation the attendee will:

1. Learn acute and chronic effects of exercise in Parkinson's disease.
2. Learn pre-exercise recommendations for patients with Parkinson's disease.
3. Learn essential exercise prescription techniques for Parkinson's disease.
4. Learn how chronic exercise affects symptoms of Parkinson's disease as well as quality of life indicators.

POSTERS

8:00 - 11:00 am

Markert, et al.	The Ohio State University	(P-1)
Hall, et al.	Elmhurst College	(P-2)
Young, et al.	Illinois State University	(P-3)
Fahlman, et al.	Wayne State University	(P-4)
Doherty, et al.	Toledo University	(P-5)
King, et al.	Toledo University	(P-6)
Sobolewski, et al.	Toledo University	(P-7)

MICROGRAVITY-INDUCED DECONDITIONING AND ATROPHY OF UPPER-EXTREMITY MUSCLE IN HUMANS

C.D. Markert & W.J. Armstrong. Eastern Michigan University, Ypsilanti, MI

Previous ground-based studies of skeletal muscle atrophy due to microgravity have investigated the effects of microgravity simulations on animal hindlimbs. This investigation used a model of partial immobilization and suspension of the upper extremity in human subjects. Study objectives were to determine the effects of upper-extremity atrophy on anthropometry and both strength and energy output in an assortment of exercises. Six males (mean±SD) aged 26.8±6.8 years, height 180.25±6.6 cm, weight 77.5±14.6 kg, wore a bi-valve plaster

orthosis on the non-dominant arm for 2 weeks, before and after which the following anthropometric and strength assessments were taken: arm girth, arm volume, arm extracellular and intracellular fluid (ECF/ICF) volume, peak biceps and triceps strength, mean biceps and triceps strength, hand grip strength, and ergometry peak and minimum power output. It was hypothesized that girth and strength in the experimental arm would decrease relative to the control arm. Arm girth was measured by tape measure at mid-humerus, and arm volume was determined by water immersion. Arm ECF/ICF volumes were measured using bioelectrical impedance. Upper arm strength was measured using Cybex II isokinetic equipment. Grip strength was established by hand-grip dynamometry. A novel single-arm ergometry protocol was used to measure power output. A dependent t-test found no significant difference (ECF $p=0.448$ and ICF $p=0.765$) in fluid compartment values due to immobilization, and MANOVA found no significant ($p<0.05$) differences between pre- and post-treatment values for any of the measurements; however, non-significant trends of losses in mean biceps and triceps strength, peak triceps strength, and hand grip strength were noted. Compliance of subjects with the immobilization protocol, as well as other limitations, may have impacted these results.

FITNESS SCORES, KNOWLEDGE AND BELIEFS DIFFER BY RACE IN 4TH AND 5TH GRADE STUDENTS

H.L. Hall, M.M. Fahlman, A. Kliber, C. Boyle. Wayne State University, Detroit, MI

There is a clear disparity in health in the United States such that African Americans and Hispanics are more likely to suffer from morbidity and mortality related to chronic disease than their White counterparts. While chronic disease does not manifest itself until late in life, the health behaviors that contribute to it begin in childhood and have a cumulative effect. Thus, direct intervention strategies aimed at high risk populations are appropriate. The purpose of this study was to determine if 4th and 5th grade African American and Hispanic students differ from White students in fitness levels, or fitness attitudes and beliefs. The study populations consisted of 612 students drawn from schools in a large Midwestern city and suburb. Students were given the Fitnessgram fitness test and completed a 46 item questionnaire designed to elicit responses regarding knowledge, attitudes and beliefs about physical activity. 432 students completed all aspects of the study and were used in the final analysis. Comparisons between races and genders were conducted using analysis of variance with a Tukey post hoc. A sample of descriptive statistics is as follows: White ($n=228$); weight= 85.39 ± 22.45 pounds; mile run = 679.64 ± 154.89 seconds; curl up = 36.51 ± 23.24 ; pushups = 12.80 ± 9.55 . African American ($n=107$); weight = 98.07 ± 35.48 pounds; mile run = 769.97 ± 195.00 seconds; curl up = 26.28 ± 17.74 ; pushups = 8.51 ± 8.6 . Hispanic ($n=97$); weight = 93.6 ± 26.5 pounds; mile run = 860.79 ± 231.67 seconds; curl up = 12.59 ± 12.35 ; pushups = 6.25 ± 7.47 . There were significant race and gender differences in the one mile run ($p = 0.00$); curl ups ($p = 0.00$); push-ups ($p = 0.00$); and weight in pounds ($p = 0.001$). In general, White students scored better than African Americans who in turn scored better than Hispanic students. There were also significant differences in knowledge and beliefs about fitness with White students being more knowledgeable than their minority counterparts. Since minorities in the United States are at an increased risk of death due to disease caused in part by lack of activity, and some of these deficits manifest themselves as early as 4th grade, minority students need to be targeted for special interventions.

RATINGS OF PERCEIVED EXERTION AND HEART RATE DURING RESISTANCE EXERCISE IN TRAINED AND UNTRAINED LIFTERS

G. Young, K.M. Lagally, S.T. McCaw, FACSM, H. Medema, D.Q. Thomas, FACSM. Illinois State University, Normal, IL

This study examined ratings of perceived (RPE) and heart rate (HR) during resistance exercise in untrained and trained female weight lifters. Ten untrained and ten trained (recreationally) female volunteers (age= 21.8 ± 17 yrs) performed the bench press exercise for eight repetitions at 60% of their one-repetition maximum (1-R) and for six repetitions at 80% 1-RM. Total work was held constant by varying the number of repetitions performed during each intensity. The two intensities were performed in random order. Both an active muscle RPE (RPE-AM) and an overall body RPE (REP-O) were assessed immediately following each intensity. HR was also assessed following each intensity. A three-factor (Training X RPE (region) X Intensity) ANOVA with repeated

measures on the RPE and Intensity factors revealed significant ($p < 0.01$) main effects for RPE and Intensity. No significant differences were found between trained and untrained individuals. There were no significant two-way or three-way interactions.

	60% 1-RM		80% 1-RM	
	RPE-AM	RPE-O	RPE-AM	RPE-O
Trained	11.8+1.6	11.3+1.4	14.6+1.1	13.4+1.6
Untrained	12.5+2.2	11.2+1.4	14.5+1.8	13.2+1.4

A three-factor (Training X Time X Intensity) ANOVA with repeated measures on the Time and Intensity factors revealed a significant ($p < 0.01$) Training X Time interaction. HR increased significantly ($p < 0.01$) in both groups from pre- to post-exercise, but the magnitude of the increase was significantly ($p < 0.01$) higher in the trained group. HR for the two groups did not differ at either pre- or post-exercise in either intensity. These results indicate that both trained and untrained females perceive the intensity of resistance exercise similarly when performing exercise at the same relative percentage of the one-repetition maximum. This information supports the use of RPE as a method of monitoring resistance exercise intensity. In addition, the results suggest that HR is not related to perceptual responses during resistance exercise.

THE EFFECTS OF ENDURANCE TRAINING AND RESISTANCE TRAINING ON PLASMA LIPO-PROTEIN PROFILES IN ELDERLY WOMEN

M.M. Fahlman, D. Boardley, C.P. Lambert, M.G. Flynn, FACSM. Wayne State University, Detroit, MI.

It has been shown that high levels of high-density lipoprotein cholesterol (HDL cholesterol) and low levels of low density lipoprotein cholesterol (LDL cholesterol) are associated with health maintenance in older women. Studies examining the relationship between exercise training and lipoprotein levels are equivocal and thus the effects of exercise training on plasma lipoprotein levels in the elderly remains unclear. The purpose of this research was to examine the effects of endurance and resistance exercise on plasma lipoprotein levels in elderly women who were active but non-exercising prior to the study. A total of 45 healthy, active women, aged 70-87, were randomly assigned to either an aerobic training (AT, 76 ± 5 yr, N=15), resistance training (RT 73 ± 3 yr, N=15) or control (C, 74 ± 5 yr, N=15) group. AT walked 3d/wk at 70% heart rate reserve. The duration on day one was 20 minutes and it was increased by five minutes each day until subjects were walking for 50 minutes (week 3). The exercise training session for RT consisted of one to three sets of eight repetitions of eight different exercises at 8RM, while C maintained normal activity. Weight and diet were unchanged across groups. Blood samples were obtained from all subjects at week 0 and week 11. Training resulted in a significant decrease in One Mile Walk times (pre = 20.2 ± 2.0 min; post = 17.1 ± 1.0 min) and heart rate at completion of the walk (pre = 108 ± 3 BPM; post = 98 ± 3 BPM) for AT and a significant increase in 8 RM of all RT exercise. Both AT and RT experienced increased HDL cholesterol (AT pre = 45.4 ± 3.5 mg/dl, post = 54.5 ± 2.9 mg/dl; RT pre = 47.1 ± 3.3 mg/dl, post = 57.4 ± 2.0 mg/dl) and decreased triglycerides (AT pre = 149.9 ± 10.9 mg/dl, post = 128.9 ± 15.2 mg/dl; RT pre = 113.5 ± 13.0 mg/dl, post = 84.6 ± 13.0 mg/dl) at week 11 compared to week 0. Control lipoproteins remained unchanged. RT also had significantly lower LDL cholesterol and total cholesterol compared to controls at week 11, (RT LDL = 89.0 ± 11.2, C = 132.1 ± 8.5 mg/dl; RT TC = 162.7 ± 12.2, C = 196.7 ± 8.2 mg/dl). Both resistance training and endurance training resulted in favorable changes to plasma lipoprotein levels for elderly women in only ten weeks. The fact that this occurred without concurrent changes in weight or diet is an indication that high intensity exercise alone can be used to modify lipoproteins in populations of healthy elderly.

A COMPARISON BETWEEN A STRENGTH AND A COMBINED STRENGTH AND AEROBIC TRAINING PROGRAM

Doherty, K.D., Morgan, A.L., Topp, R., McNevin, N., Fahlman, M.M., Boardley, D., King, K.L.
The University of Toledo, Toledo, OH

Resistance training has been shown to improve strength and the ability to perform daily activities in the functionally limited. The purpose of this study was to determine if there was a difference in strength gains between a combined resistance and walking group (RWG) (n=12), a resistance-training group (RG) (n=15), and a control group (n=10) following 16 weeks of training in a functionally limited population. Thirty-seven functionally limited men and women (65-87 yr.) volunteered to participate in a 16-week program. The RG and RWG trained using Theraband®. The strength training protocol started at one set of eight repetitions three times a week and repetitions were increased by two every two weeks until two sets of twelve were reached. Subjects started training at a self-determined moderate tension (60-70% effort, RPE of 10-13) and were encouraged to increase their Theraband® color (i.e., resistance) as needed. Subjects in the RWG performed the same protocol as above for resistance training. The RWG also participated in a walking program that started at 10 minutes and increased by two minutes each week until reaching a 20-minute walk time. The subjects were tested at baseline and 16-weeks for maximal elbow extension and flexion, and knee extension and flexion strength (Kincom 500H). After subtracting baseline scores from 16-week scores, a T-score was calculated for each variable within each group. Elbow extension increased in the RG (p=.046, Δ =5.19 lbs.) and RWG (p=.001, Δ =4.58 lbs.). Although not significant, knee flexion changed by 4 lbs. in RWG and 3.4 lbs. in RG. This slightly larger change in RWG may be attributed to the walking protocol. No changes were noted in the CG. However, over the three-year study the involvement of more subjects may lead to more significant results, which will allow for a future comparison of specific strength exercises with functional tests. In conclusion, strength can be increased in functionally limited individuals with resistance and combined resistance and aerobic training.

NIH #: R01 NR04929-01A1

FUNCTIONAL ABILITY IN THE ELDERLY AFTER A 16-WEEK EXERCISE PROGRAM: A PRELIMINARY STUDY

King, K.L., Morgan, A.L., McNevin, N., Fahlman, M.M., Boardley, D., Topp, R., and Doherty, K.D.
The University of Toledo, Toledo, OH

Maintaining functional ability plays a vital role in living a long and high quality life. Regular physical activity promotes the increase of strength and endurance in most populations. The purpose of this study was to determine if functional ability among functionally limited elderly individuals improved at the end of 8 and 16-weeks of an exercise program. Volunteer subjects, age 65 to 93 (n=48; males=13, females=35), were randomly assigned to one of four groups including a control (CT; n=9-10), resistance training (RG; n=10-15), aerobic training (AG; n=9-10), and a combined aerobic and resistance training group (ARG; n=11-12). All subjects were evaluated at baseline, 8-weeks and 16-weeks for their performance on five functional tasks, including a stair ascent/descent, arm curl test, chair stand test, and 6-minute walk test. In the stair ascent/descent the subjects were timed as they ascended and then descended 21 stairs. Subjects performed as many arm curls as possible in a 30 second period using hand held dumbbells (males=8lbs, females=5lbs). In the chair stand test the subjects were asked to sit in a normal straight backed chair and stand up as many times as possible in a thirty second period. The 6-minute walk test was used to measure ambulation distance for each subject. The data was analyzed using a repeated measures ANOVA. Although the exercise groups demonstrated increases ranging from 1-25%, statistically significant changes were not observed. The involvement of more subjects may lead to significant results at the conclusion of this three-year study. These results will assist in developing exercise programs for the functionally limited elderly.

NIH # R01 NR04929-10A1

THE RELATIONSHIP BETWEEN TESTS OF FUNCTIONAL ABILITY IN THE ELDERLY

Sobolewski, J.L., Morgan, A.L., Fahlman, M.M., McNevin, N., Boardley, D., Topp, R., The University of Toledo, Toledo, OH

Functional capacity in the elderly is related to quality of life. Therefore, the purpose of this study was to determine if an individual's performance on functional tasks is related to performance on other functional tasks. Forty-eight functionally limited volunteers (13M, 35F; 65-93 yr) were tested on a battery of functional and strength measures. Functional tasks carried out included time to ascend and descend 21 stairs, a six minute walk (total distance covered), a chair-stand in which the number of stands achieved in 30 seconds was recorded, and a test in which subjects were timed moving from a standing to supine position, and from supine to standing. Further, maximal knee flexion and extension were measured (KinCom 500H). Pearson Product moment correlations were calculated between all of the above mentioned variables. There was a strong relationship between the supine to standing and the ascending stair task ($r=.819, p<.01$) and between the supine to standing and the descending stair task ($r=.438, p<.01$), and supine to standing ($r=.332, p<.05$), indicating a relationship between quadriceps strength and functional ability. Knee flexion was related to knee extension ($r=.753, p<.01$) but not to any of the functional measures. Increasing quadriceps strength may ultimately maintain or enhance performance on functional tasks. In conclusion, quadriceps strength appears to be highly related to performance on functional tasks necessary for independent living.

NIH #: R01 NR04929-01A1

ORAL ABSTRACT PRESENTATIONS

9:00 - 11:00 am

9:00 - 9:15 am

EFFECTS OF DIFFERENT ACCESS TO PHYSICAL ACTIVITY OR EXERCISE ON GLUTATHIONE, OXIDIZED GLUTATHIONE, AND OXYGEN-RADICAL ABSORBANCE CAPACITY IN RATS

S. Nagy, R. Byrnes, B. Philip, H.M. Alessio, Ph.D., FACSM, A.E. Hagerman, Ph.D., and R.L. Wiley, Ph.D. Miami University, Oxford, OH

The purpose of this study was to determine if access to different frequency and intensity of physical activity and exercise affects select oxidative stress biomarkers. Male Sprague Dawley rats were separated into three groups (n=24): 1) having no access to physical activity outside of the cage, 2) having access to twice weekly physical activity in a large box, and 3) having regular voluntary access to a running wheel. At week 20 of the study, blood samples were collected from a total of thirty-six rats, 12 from each group. Glutathione (GSH), oxidized glutathione (GSSG) were measured in whole blood; oxygen radical absorbance capacity (ORAC) was measured in plasma samples:

	ORAC (Trolox units/ml)	GSH (µmolar)
No physical activity	1800±441	532±196
Physical activity	1849±262	802±175
Regular wheel exercise	1614±429	795±206

ORAC did not differ among the 3 groups. GSH was lower in the no-physical activity group ($p<0.05$) compared to the other groups. GSSG:GSH was similar in all groups. These results indicate that regular aerobic exercise or physical activity is associated with increased whole blood GSH, implying greater antioxidant protection. However, there is no alteration in antioxidant capacity in the plasma and no change in redox balance from physical activity or regular exercise.

9:15 - 9:30 am

EFFECTS OF DIFFERENT ACCESS TO PHYSICAL ACTIVITY OR EXERCISE ON BLOOD PRESSURE AND BODY WEIGHT IN A RAT MODEL

B. Philip, R.N. Byrnes, S. Nagy, K.H. Roeske, H.M. Alessio, FACSM, A.E. Hagerman, and R.L. Wiley. Miami University, Oxford, OH

The purpose of this study was to determine if access to different frequency and intensities of physical activity influences resting systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial pressure (MAP), heart rate (HR), and body weight (BW). Seventy-two male Sprague Dawley rats were separated into three groups (n=24) that were supposed to simulate a common human lifestyle: 1) The first group voluntarily exercised every other day on a running wheel, 2) the second group had access to twice-weekly physical activity in a large box, and 3) the third group gets no physical activity outside of their cage. The animals were monitored every week for blood pressure, heart rate, and body weights. Data from the first half (10th week) of the study shows that Group 1 had the lowest mean BW (399.8±7.9 g) followed by Group 3 (446.2±9.3 g) and Group 2 (464.9±6.5 g). Analysis of data for week 18 show that as before, Group 1 had the lowest mean BW (483±9 g), p<.05 followed by Group 3 (533.7±9.7 g) and Group 2 (549.5±7.2 g). Week 6 of the blood pressure data shows that Group 1 had the highest blood pressure (week 6 mean SBP=151.1 mmHg, MAP=102.1 mmHg, DBP=78.2 mmHg). However, over time, and with continued access to exercise on a running wheel, SBP declined and was lowest in Group 1 (week 13 SBP=129.1 mmHg, MAP=103.8 mmHg, DBP=90.4 mmHg) p<.05, followed by intermittent switching between the remaining groups, with average means >140 mmHg. This data shows that access to regular physical activity every other day reduces blood pressure and body weight-both of which are implicated in cardiovascular disease. Physical activity performed twice weekly does not provide a strong enough stimulus for blood pressure and body weights to be positively influenced.

9:30 - 9:45 am

EFFECTS OF DIFFERENT ACCESS TO PHYSICAL ACTIVITY OR EXERCISE ON SPATIAL MAZE PERFORMANCE IN RATS

K.H. Roeske, R.N. Byrnes, S. Nagy, H.M. Alessio, FACSM, A.E. Hagerman, and R.L. Wiley, Miami University, Oxford, OH

Evidence suggests a link between physical fitness and cognition (Chodzko-Zajko & Moore, 1994, Radak et al., 2001). The purpose of this study was to determine if access to different frequency and intensity of physical activity and exercise affects spatial maze performance, which is an indication of cognition and adaptation. Male Sprague Dawley rats were separated into three groups (n=24): 1) having no access to physical activity, 2) having access to twice-weekly physical activity in a large box, and 3) having regular access to a running wheel. At weeks 12 and 16, performance on a spatial maze was evaluated:

	Reference errors	Working errors	Correct responses
No physical activity	Mean ± sem 1.50±0.31 Total: 18	.92±0.29 11	2.89±0.43 16
Twice weekly physical activity	Mean ± sem 10.67±0.19 Total: 8	0.08±0.8 1	2.54±0.47 0
Regular voluntary wheel exercise	Mean ± sem 1.33±0.32 Total: 10	0.17±0.11 2	2.50±0.46 20

No difference in mean reference errors, and correct responses among the three groups was found. But, total errors per group was highest in the no physical-activity group (N=11) and lower in the regular exercise (N=2) and twice weekly physical activity group (N=1). Total correct responses were highest in the regular exercise group, followed by no physical activity and twice weekly physical activity groups. Therefore, we conclude that access to physical activity or exercise does not influence average spatial maze performance in young rats, but individual differences are apparent.

9:45 - 10:00 am

EFFECTS OF DIFFERENT ACCESS TO PHYSICAL ACTIVITY OR EXERCISE ON BLOOD LIPID PROFILE IN RATS

R.N. Byrnes, S. Nagy, B. Philip, H.M. Alessio, Ph.D., FACSM, A.E. Hagerman, Ph.D., and R.L. Wiley, Ph.D. Miami University, Oxford, OH 45056

Regular exercise improves blood lipid profiles (Gesquire et. al., 1998), and prevents cardiovascular disease while a lack of physical activity may contribute to sedentary lifestyle-related health risks including hyperlipidemia and arterogenesis. The purpose of this study was to determine if access to different frequency and intensity of physical activity and exercise affects blood lipid profile. Male Sprague Dawley rats were separated into three groups (n=24): 1) having no access to physical activity, 2) having access to twice-weekly physical activity in a large box, and 3) having regular access to a running wheel. At week 20, blood samples were collected from 12 from each group. Triglyceride (TG), high-density lipoprotein (HDL), very low-density lipoprotein (VLDL), and glucose data are shown:

	Triglycerides (mg/dl)	HDL (mg/dl)	VLDL (mg/dl)	Glucose (mg/dl)
No physical activity	139.0 ± 12.4	18.7 ± 1.7	27.8 ± 2.5	164.3 ± 8.0
Twice weekly physical activity	151.3 ± 9.2	22.2 ± 2.0	30.3 ± 1.8	168.0 ± 6.0
Regular voluntary wheel exercise	98.4 ± 10.8	14.1 ± 1.6	19.5 ± 2.1	159.1 ± 2.7

At age 20 weeks, there was a significant difference between Group 3 and both the twice weekly and no physical activity groups in TG, HDLs, and VLDLs (p<.05). Access to regular wheel running exercise was associated with healthier levels of blood lipids in comparison to either animals with access twice-weekly physical activity or no regular physical activity

10:00 - 10:15 am

JOINT CRYOTHERAPY MODULATES THE SOLEUS HOFFMANN REFLEX AND MUSCLE RESPONSE

B.A. Krause, C.D. Ingersoll, FACSM, J.E. Edwards, M.L. Cordova, FACSM, R.M. Palmieri, M.B. Stone. Indiana State University, Terre Haute, IN

Cryotherapy is widely used as a rehabilitative modality in the sports medicine community. Mechanisms driving motoneuron recruitment during and following cryotherapy are both local and central in nature. Joint cooling facilitates motoneuron pool recruitment and changes the M-response. The purpose of this study was to compare changes in the Hoffmann reflex (H-reflex) and the muscle response (M-response) before, during and after ankle ice application. Maximum soleus H-reflex and M-response measures were collected from each volunteer prior and following to ankle ice bag application. The stimulus sufficient to evoke 10% of each subjects maximum M-response was recorded. This stimulus intensity was used to evoke reflex discharges in the tibial nerve through the entirety of testing. H-reflex and M-response peak-to-peak amplitudes were recorded at 10min, 20min, 30min and 40min. An ice bag (1000g) of ice in a 1L plastic bag) was placed on the dorsum of the ankle for the first 20min of testing. Upon removal of the ice bag at 20min, the extremity was rewarmed passively. Nine healthy, physically active students (age=23.1±2.2yr; ht=169±10.1cm; mass=70.1±7.2kg) volunteered for this study. The soleus H-reflex and M-response demonstrated facilitation (F_{4,32}=20.15, P<0.000). Joint cooling increases the m response suggesting a centrally mediated state change in the motoneuron pool of the soleus. This state change may effectively lower the threshold for alpha motoneuron firing. The observed decrease in the H-reflex is likely a result of an antidromic effect caused by the increasing M-response.

10:15 - 10:30 am**ARTIFICIAL KNEE JOINT EFFUSION IMPROVES POSTURAL STEADINESS**

RP Palmieri, CD Ingersoll, ML Cordova, SJ Kinzey, MB Stone, BA Krause. Sports Injury Research Laboratory, Indiana State University, Terre Haute, Indiana.

Applied Biomechanics Laboratory, California State University, San Bernardino, California.

Knee joint effusion is a common occurrence following knee injuries and surgeries. Relatively small effusions cause a reflex inhibition of the quadriceps musculature, which leads to muscular atrophy and quadriceps weakness. Increased neural drive to the soleus occurs following an artificial knee joint effusion. Due to the importance of the soleus in maintaining postural control, the facilitation seen in this muscle with knee joint effusion may affect one's ability to stand upright. Therefore, the purpose of this investigation was to determine the effects of an artificial knee joint effusion on sway path, sway velocity, mean power frequency, and selected spectral qualities of A/P and M/L center of pressure. Ten healthy volunteers

(20.1 ± 2.4 yrs, 168.0 ± 8.1 cm, 70.4 ± 13.3 kg) participated in this study. Baseline values (5, 10 second trials) were collected as subjects maintained a single-legged stance while wearing darkened goggles to minimize visual input. Following the initial trials, 60 cc of sterile saline were injected into the superolateral knee joint capsule. Following the knee joint effusion, data were again collected employing the same procedures used to gather the baseline data. Sway path decreased following knee joint effusion (pre-effusion mean = 92.3 ± 21.3 cm; post-effusion mean = 77.9 ± 24.7 cm). Sway velocity was also reduced following the effusion (pre-effusion mean = 9.2 ± 2.2 ; post-effusion mean = 7.7 ± 2.2 cm/sec). No differences were found pre to post effusion when examining the frequency characteristics of the center of pressure ($P > 0.05$). The results suggest following artificial knee joint effusion there is an increased ability to maintain an upright stance. The artificial knee joint effusion provided an additional sensory input thereby improving postural steadiness.

10:30 - 10:45 am**STATE OF ANXIETY AND HOFFMANN-REFLEX RESPONSES TO ACUTE BICYCLE ERGOMETRY AND RESISTANCE TRAINING**

C.L. Fink, J.S. Raglin, FACSM. Indiana University-Bloomington, Bloomington, IN

The purpose of the study was to identify whether soleus Hoffmann reflex (H-reflex) changes were associated with state anxiety changes following acute bouts of aerobic or resistance exercise. Twenty-six physically active participants (13 M, 13 F; age 22 ± 3 yrs) completed baseline soleus H-reflex recruitment curve and state anxiety (STAI-Y1) measures prior to 30-min of either resistance training or cycle ergometry at a self selected intensity. The soleus Hmax/Mmax ratio was used as a measure of motoneuron excitability. Post-exercise assessments of H-reflex and state anxiety were taken at 0-min, 45-min and 90-min. Repeated measures ANOVA revealed a significant ($P < 0.05$) trials effect for state anxiety and H-reflex. Post-hoc analysis indicated that state anxiety was reduced ($P < 0.05$) from baseline at 90-min post-exercise. H-reflex was reduced ($p < 0.05$) at 0-min post-exercise for the bicycle ergometry condition but subsequent assessments did not differ from baseline. No changes in H-reflex were observed following resistance training. Correlational analysis revealed that state anxiety values were not associated ($r = .04$, $p > 0.05$) with H-reflex measures. The independence of the H-reflex and state anxiety reduction following exercise were unrelated to H-reflex responses does support the tranquilizer effect explanation of exercise induced mood change.

10:45 - 11:00 am

THE MECHANICAL CHARACTERISTICS OF THE OVER HAND FLOATER SERVE IN VOLLEY-BALL

Moustafa B. Moustafa, Ahmed Kasra, Talha Houssen, Faculty of Physical Education, Helwan University, Cairo, Egypt.

The purpose of this study was to examine the mechanical characteristics of the overhand floater serve in volleyball. Specifically the objectives were to describe the mechanical characteristics of the ball's trajectory, to describe the characteristics of the player's performance, and establish principles to improve the performance level of the overhand floater serve. The researcher used the descriptive method based on the kinematographic analysis. The research sample included 18 trials of the overhand floater serve performed by the best four players in the Egyptian National Tournament (1994). The research results indicated that the total time to perform the overhand floater serve ranged from 0.54 sec to 0.72 second. The shorter the time the more effective the serve. The general trend of the arm angular velocity is characterized by a tendency to increase at the beginning of the course then decrease significantly when hitting the ball. The angular velocity of the player's hand during hitting the ball varied between 9.4 deg/sec and 17.2 deg/sec. The further the distance from the net, the higher the velocity of projection ($r=.83, p<0.001$). The velocity of projection should be greater than the critical speed to insure a more effective serve. The wrist, elbow, and shoulder joint angles should be as close as possible to 180° during hitting the ball to achieve the highest possible height of projection. This study also suggests a theoretical model for the overhand floaters serve with a jump.

11:00 - 11:15 am

BODY MASS INDEX, NOT SEDENTARY BEHAVIOR, INFLUENCES MILE RUN TIME

M.S. Kerner, A.B. Kurrant, Long Island University, Brooklyn, NY

Obesity among children and adolescents has increased in the past 20 years, with rates ranging between 6 and 33%. Physical inactivity contributes to weight gain and relative risk for coronary heart disease. How these variables may interact to modify cardiorespiratory fitness is unclear. We sought to observe the strength of the relationships between body mass index (BMI), weekly leisure-time sedentary behavior (television watching + internet use) (ST), and cardiorespiratory fitness, measured by one-mile run time (MR), in 129 high school girls (age 14.8±1.1 yr). MR correlated moderately with BMI ($r=.38, p<.001$), but not with ST ($r=.01$). Using Body Mass Index Standards we divided BMI into three groups: Underweight/Normal (<25.0 kg m⁻²), Overweight (25.9-29.99 kg m⁻²), and Obese/Extremely Obese (≥30.0 kg m⁻²). ST was also divided into three groups: ≤ 2 hr day⁻¹ (Group 1), 2.01-4.0 hr day⁻¹ (Group 2), and ≥ 4.01 hr day⁻¹ (Group 3). Univariate ANOVA procedures indicated significant main effects for BMI but not for ST. No significant interaction effect was found. *Post hoc* tests with Bonferoni correction revealed that the Obese/Extremely Obese group was significantly different from the Underweight/Normal ($p>.001$) and Overweight ($p=.011$) groups, but the Underweight/Normal and Overweight groups were not significantly different from each other. We conclude that BMI, not leisure-time seden-

One-Mile Run Time (min) by Leisure-Time Sedentary Time and Body Mass Index			
	ST Group 1	ST Group 2	ST Group 3
Underweight/Normal	10.01	10.41	10.12
Overweight	10.68	10.44	11.07
Obese/Extremely Obese	12.61	10.73	12.74

tary behavior, influences cardiorespiratory fitness in this group of high school girls.

SYMPOSIUM

9:30 10:30 am

ASSOCIATION OF MENSTRUAL CYCLE AND FEMALE ATHLETES AGE 14-18: POSSIBLE RESEARCH PROPOSALS

Sara Terrell, Graduate Student, Eastern Michigan University

The purpose of this tutorial is to examine current theories explaining the increasing number of Anterior Cruciate Ligament injuries in female athletes when compared to their male counterparts. Particular focus will be on the theory of the association of the menstrual cycle and ACL injury in young women. As a student or professional working as an Exercise Physiologist, Athletic Trainer, or Personal Trainer, you may come across a client need sport specific training. It is essential to understand the needs of female athletes when designing and implementing training and/or rehabilitation programs.

Upon completion of this presentation the attendee will:

1. Discover the current research material on the topic of ACL injuries in female athletes.
2. Discover directions for future research proposals, including possible methodologies for research.
3. Learn essential exercise prescription techniques for female athletes

SYMPOSIUM

10:30 - 12:00 pm

TREATING CHRONIC DISEASES WITH EXERCISE: A LOOK AT EVIDENCE-BASED CLINICAL OUTCOMES.

Jonathan K. Ehrman, PhD, FACSM, Henry Ford Heart and Vascular Institute; Steven J. Keteyian, PhD, FACSM, Henry Ford Heart and Vascular Institute

Purpose: Provide a concise, evidence-based overview of the effects of regular exercise in the treatment of chronic diseases. This will be accomplished by reviewing recent meta-analysis or landmark clinical trials.

Objectives:

1. Provide the attendee with an understanding of exercise and evidence-based medicine, the strength of randomized clinical trials, and the Cochrane Library database.
2. Using no more than 6 slides for each disorder, define the scope of the disease, patho physiology of the disease, unique methods associated with randomized clinical trials for the disorder, the results of randomized clinical trials, and potential mechanisms by which exercise contributes to disease treatment.

Rationale: Over the past 15 years the number of randomized clinical trials testing the safety and effectiveness of exercise in the treatment of variety of disorders has increased. It is known that exercise improves both intermediate as well as clinical outcomes (morbidity, mortality) for many diseases. It is important that professionals trained in exercise and exercise physiology be familiar with the current research findings related to exercise and disease treatment. Such information applies to not only those students who will work with patients but also those responsible to instruct students at the graduate and under-graduate level. This symposium will provide a concise yet up to date review of the recent research of findings that address exercise in the treatment of a variety of chronic diseases.

POSTERS

1:00 - 4:30 pm

Kramp, et al.	Oakland University	(P-1)
Madej, et al.	Oakland University	(P-2)
Cohen, et al.	Indiana State University	(P-3)
Babington, et al.	Indiana State University	(P-4)
Fincher, et al.	Ashland University	(P-5)
Hipp, et al.	Ball State University	(P-6)
Darby, et al.	Bowling Green State University	(P-7)

VOLATILE ORGANIC COMPOUNDS MEASURED IN EXHALED BREATH DURING EXERCISE

F. Kramp, G. Notarnicola, J.V. Seeley, C.R.C. Marks. Oakland University, Rochester, MI

The analysis of volatile organic compounds (VOCs) in breath may be associated with several physiological, psychological, and pathological conditions. A recently developed method for measuring VOCs has not been applied to breath collected during exercise. The purpose of this study was to apply dual secondary column comprehensive two-dimensional gas chromatography in identifying co eluting peaks of isoprene and pentane in exhaled air during rest and exercise. Exhaled breath (about 1.5l) was collected into a Teflon bag for each of 14 active subjects at rest and then at 35 minutes into stationary cycling at 85% of age predicted maximum heart rate. Two chromatographic readings from each sample were taken. This method was able to separate isoprene and pentane in all subjects and conditions. In addition, this method demonstrated a decreased peak height and total peak area of isoprene in every subject with exercise. Finally, pentane remained stable with exercise in all subjects. It is concluded that isoprene and pentane can be separated and quantified in exhaled breath during exercise with this method.

BODY MASS AND EXERCISE HEART RATE RESPONSE NOT AFFECT BY WELLNESS/ PREVENTION EDUCATION IN FIRST YEAR MEDICAL STUDENTS

D. Madej, C.R.C. Marks, F. Stransky, B. Goslin, R. Jarski, S. Gorbis, Z. Comeaux. Oakland University, Rochester MI, Michigan State University, Lansing, MI, Ohio University, Athens, OH.

This study tested the hypothesis that wellness/prevention education during the first year of medical education will prevent reduced aerobic fitness and increased body mass/fatness in first year medical students. Two Osteopathic medical schools were identified in the Midwest for study. One school (G1) had lectures and demonstrations on the role of exercise, nutrition, and stress management for the prevention of lifestyle related diseases incorporated into first year courses. The other did not (G2). During the week before classes started (T1) and then nine months later (T2), volunteers (G1 n=52, G2 n=22) underwent a six minute submaximum bicycle ergometer test (power output of first test repeated for second test, heart rate monitored by a Polar) and had body mass, triceps skinfold (TSF) and exercise blood pressure measured. ANOVA, post hoc using dependent and independent t-tests, and $p < .05$ were used for statistical tests on SPSS. Results are reported below as mean (SD):

	HR(b/min)		SBP(mmHg)		DBP(mmHg)		BM(kg)		TSF(mm)	
	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2
G1	147 (7.9)	145 (13.4)	148 (17.1)	141 (22.6)	75 (9.0)	76 (11.1)	70.1 (13.6)	70.3 (12.7)	16.4 (7.3)	16.0 (6.8)
G2	150 (14.8)	151 (16.7)	165 (23.7)	160 (23.8)	72 (12.4)	70 (8.8)	71.8 (16.0)	73.4 (16.4)	17.2 (7.7)	15.9 (6.7)

Analysis revealed no significant differences for heart rate and triceps skinfold. In addition, both groups were significantly different for SBP and both significantly different for DBP only at T2. It is concluded that the education had no effect during the first year for these variables.

RELIABILITY AND VALIDITY OF THE BOSCO MECHANICAL POWER JUMP TEST

M. Cohen, P. Babington, J. Skaggs, J. Ozmun, J.E. Edwards. Indiana State University, Terre Haute, IN

The Bosco Mechanical Power Jump Test (BT) is a measure of the mechanical power production of the legs during 15 to 60 seconds of maximal vertical jumping. The reliability and validity of the test have been questioned. Therefore, the purpose of the study was to determine the reliability and validity of the 60 s BT. Twenty-nine college age subjects (18 M/11 F) completed a timed 40 m sprint, 30 second Wingate Anaerobic Test (WAT), and two trials of the 60 s BT on different days. Testing order was randomized to eliminate any effects of testing order. Forty-meter sprint time was measured to the nearest 0.001 seconds using photoelectric cells. WAT was measured on a pan loaded Monarch cycle ergometer with the workload set at 7.5% of body weight. BT was performed on a switch mat interfaced with a PC that recorded the number of jumps, flight time and time in contact with the mat. Subjects performed as many maximal jumps as possible in 60 s while keeping their hands on their hips and bending their knees to approximately 90 degrees when in contact with the mat. Power was calculated from the total number of jumps in 60 s, flight time and time in contact with the mat. Intersession reliability was estimated for the BT using a one-way random effects intraclass correlation (ICC). Concurrent validity was estimated using the 40 m sprint and the WAT as criterion scores. Mean values for the two trials of the BT were 12.64 ± 3.08 and 12.56 ± 3.55 W/kg respectively. ICC estimate for the 60 s BT between sessions was 0.93. Mean values for the 40 m sprint and WAT were 8.941 ± 1.055 s and 7.66 ± 1.13 W/kg respectively. Correlation coefficients between the BT and 40 m sprint and WAT were -0.814 and 0.827 respectively (significant $p \geq 0.0001$). These data suggest that the BT is a reliable measure of mechanical power production of the legs. Furthermore, validity estimates of BT suggest it is similar to other measures of mechanical power reported in the literature.

MEAN ANAEROBIC POWER AND THE ABILITY TO DEMONSTRATE A PLATEAU IN OXYGEN CONSUMPTION

P. Babington, M. Silva, J.E. Edwards, and J. Ozmun. Indiana State University, Terre Haute, IN

Maximal oxygen consumption (VO_{2max}) has traditionally been used as a measure of cardiovascular fitness. The main criterion for determination of VO_{2max} is no further increase in oxygen consumption with an increase in work rate. Not all individuals are able to demonstrate a plateau during a continuous graded exercise test. Perhaps their inability to achieve this plateau is due to insufficient anaerobic capability. Therefore, the purpose of the present study was to investigate whether mean anaerobic power differed between individuals who reach a plateau and those that do not reach a plateau in maximal oxygen consumption during a continuous treadmill graded exercise test. Mean anaerobic power (Bosco Test) and either peak or maximal oxygen consumption were measured in 21 subjects (14 males, 7 females, 22.5 ± 2.7 yrs). Group membership (PLATEAU vs. PEAK) was determined based on the subject's ability to attain a plateau in oxygen consumption (< 2.1 ml $kg^{-1} min^{-1}$ change in VO_2 with a change in workload). Independent t-tests were used to detect differences between groups. Eleven subjects (5 males, 6 females) met the criteria for membership in PLATEAU. The remaining 10 subjects (9 males, 1 female) comprised PEAK. VO_{2max} did not differ between groups (PLATEAU, 46.16 ± 9.83 vs. PEAK, 53.09 ± 3.98). No differences existed between groups in mean anaerobic power (PLATEAU, 16.22 ± 2.48 W kg^{-1} vs. PEAK, 17.02 ± 2.92 W kg^{-1}). The present study suggests there is no difference in mean anaerobic power between individuals who reach a plateau and those that do not reach a plateau in maximal oxygen consumption during a continuous treadmill graded exercise test.

THE EFFECT OF HIGH INTENSITY RESISTANCE TRAINING ON ISOTONIC STRENGTH AMONG COLLEGIATE FOOTBALL PLAYERS

G.D. Fincher II. Ashland University, Ashland, OH

Purpose: The purpose of this study was to examine the effects of a single-set, high intensity resistance training program on isotonic strength among collegiate football players. Methods: Forty healthy, highly resistance trained collegiate football players were randomly assigned to either a single-set, exhaustive high intensity (N=20) or multiple-set (N=20) group. Both groups performed heavy resistance exercise for 10 weeks. The high intensity group performed one set of 6-10 RM to volitional muscular fatigue for each exercise. The subjects were then urged to try additional repetitions until they were unsuccessful in completing a repetition. After this brief isometric contraction the set was terminated. The multiple-set group performed three sets of each exercise at 6-10 RM, but the subjects were not urged to try additional repetitions after volitional muscular fatigue. Isotonic strength data were collected at baseline and at 10 weeks by determining each subject's 1 RM and 10 RM squat and bench press strength. The change in isotonic strength was compared within and between groups. Results: (reported by mean change \pm SD): The change in 1 RM squat and bench press strength (42.3 ± 30.1 lbs. and 20.8 ± 12.3 lbs., respectively) in the high intensity group was significant ($p < 0.01$). The change in 1 RM squat and bench press strength (3.5 ± 7.3 lbs. and 3.3 ± 5.2 lbs., respectively) in the multiple-set group was also significant ($P < 0.05$). The change in 10 RM squat and bench press strength (25.0 ± 13.6 and 19.8 ± 14.6 lbs., respectively) in the high intensity group was significant ($p < 0.01$). The change in 10 RM squat and bench press strength (2.5 ± 5.0 and 9.0 ± 22.2 lbs, respectively) in the multiple-set group was also significant ($P < 0.05$). The isotonic strength gains were significantly greater in the high intensity group than in the multiple-set group ($p < 0.001$). Conclusion: The data from this study indicate that a single-set, exhaustive high intensity resistance training program elicits superior changes in isotonic strength than a multiple-set program among collegiate football players.

THE EFFECT OF ACUTE, HIGH-IMPACT EXERCISE ON BLOOD MARKERS OF BONE METABOLISM IN PRE-PUBERTAL CHILDREN

M.J. Hipp, A.D. Mahon, W.J. Kraemer, J.S. Volek and C.S. Anderson, Human Performance Laboratory, Ball State University, Muncie, IN

The mechanism underlying the exercise training-induced increase in bone density in children is unknown. Therefore, the purpose of this study was to examine the effect of acute, high-impact exercise on blood markers of bone formation (osteocalcin) and bone resorption (linear carboxyterminal telopeptides of type I collagen [Ctx] in pre-pubertal boys (n=4) and girls (n=4) with a mean age of 9.8 ± 0.1 yrs. Physical activity and calcium intake were assessed using questionnaires, and body composition was measured using DEXA. Exercise consisted of five sets of 10 vertical jumps with a 2 minute rest between sets. Blood samples were obtained before and after exercise (24 and 72 hours). Pre- and 24- and 72-hour post-exercise osteocalcin and CTx levels at any time point, however, physical activity tended to correlate with total BMD ($r = 0.67$, $P = 0.07$). These results suggest that an acute bout of high-impact exercise may not be a sufficient stimulus to augment bone development in pre-pubertal children. Determining the influence of intensity, duration, and mode of exercise on bone development in children warrants further study.

SPECIFICITY OF A MAXIMAL AEROBIC DANCE BENCH STEP PROTOCOL

J.L. Marsh, L.A. Darby, FACSM, P.A. Shewokis, Bowling Green State University, Bowling Green, OH, R.L. Pohlman, Wright State University, Dayton, OH

The concept of "exercise specificity" is based on premise that exercise testing and training should be completed using the same physical activity. Precise physiologic responses to exercise occur by the use of specific muscle groups, biochemical reactions, and neural pathways. Strømme et al. (1977) supported this specificity concept because rowers, cyclists, and skiers completing three different max VO_2 tests did "better" on the max VO_2 test performed while doing the physical activity for which they were trained (i.e., runners > running max (continued...))

VO₂; skiers > skiing max VO₂). Aerobic dance and step aerobic exercise combine exercises of both arms and legs. It has been estimated that 23 million and 10.8 million exercisers in the U.S. participate in these activities, respectively (SGMA, 1998). Previously, aerobic dance exercisers have completed maximal running tests to examine physiological responses (i.e., HR and VO₂) (Darby et al. 1995; Parker et al., 1989). It is hypothesized that step exercisers may have greater max VO₂ when tested using an activity specific, maximal aerobic dance bench step test (ADBST) (arms and legs) rather than a maximal running test (legs only). Female aerobic dance exercisers (N=18; 20.7±1.5 yrs) performed 3 maximal GXTs: 2 ADBST; 1 treadmill test (TMT). The ADBST consisted of 6, 3-min progressive stages of alternate lead, basic step, basic step with biceps curls, knee raise with pull-down, repeater knee with pull-down, lateral lunge with pull-down, and side squat with shoulder presses. Steps were performed at 32 steps×min⁻¹ on an 8" step for stages 1-3, and 10" step for stages 4-6. Peak and max VO₂ (ml×kg⁻¹×min⁻¹), HR (b×min⁻¹), % HR max, % VO₂ max, V_E (l×min⁻¹), V_E/VO₂, RER, total exercise time (TET), and RPEs were recorded at the end of each stage and at volitional exhaustion for each test. Test-retest reliability was examined using one-way ANOVA intraclass correlation coefficients. Reliability was high for each stage between ADBST1 and ADBST2 and for max responses (HR max: $\underline{R} = .92$; 95% CI = .80-.97; VO₂ max: $\underline{R} = .98$; 95% CI = .95-.99). To test the specificity of the ADBST to the TMT, paired t-tests were calculated for max HR and max VO₂. A significant difference was found for max HR [$t = -8.21$, $p = .0001$, $f = -1.90$, $1-b = .99$]. No significant difference was found for VO₂ max [$t = 1.54$, $p = .14$, $f = .36$, $1-b = .44$]. It was concluded that the ADBST was both a valid and reliable protocol for assessing cardiorespiratory responses in these aerobic dance step exercisers and that max HR obtained from the criterion TMT was lower than from the ADBST. When training HR is prescribed from TMT HR max, HR is underestimated by 5-7 b×min⁻¹ (i.e., ~2 ml×kg⁻¹min⁻¹) for aerobic dance bench step exercise. However, the necessity of using an "exercise specific" ADBST protocol for testing step exercisers warrants further study.

SYMPOSIUM

2:00 - 3:30 pm

RESISTANCE TRAINING FOR THE ELDERLY

Bruce W. Craig, David Wright, and Chris Fick, Human Performance Laboratory, Ball State University, Muncie, IN 47306

Rationale: There is general agreement in the literature that the decline in muscle strength the elderly experience is directly linked to a progressive loss in muscle mass. Resistance training has been shown to be an effective way to attenuate muscle loss, and is currently used in older populations to enhance muscle mass and strength. Although the ACSM position statement for Exercise and Physical Activity for Older Adults does include a section on strength training it does not contain specific guidelines. This has led to the development of exercise programs in which experience and a trial and error system has been used to establish workouts.

Purpose: Resistance training programs for the elderly are based on training techniques that have been established for young subjects. In most cases the techniques are modified to fit the older subject but have rarely been tested for effectiveness. Therefore, the purpose of this symposium will be to present the current information concerning aging and training techniques in an effort to develop some basic guidelines for the elderly.

Objective: The specific goal of this symposium will be to establish some basic guidelines for strength training in older adults. To accomplish this task the first two speakers will present a brief overview of the muscular changes that occur with age, and the current principles of strength training. The information they present will then be used in the third presentation to engage the audience in an exchange of ideas that will hopefully produce agreement on appropriate techniques for the elderly.

PHYSICIAN CASE PRESENTATIONS

2:00 - 3:00 pm

THIGH PAIN IN COLLEGE FEMALE SOCCER PLAYER

D. Mattern. The Ohio State University, Columbus, OH 43221

An 18-year-old college female soccer player presented to the training room with a complaint of left “quadriceps” pain. Initial onset was insidious, 3 weeks ago, after a training run in an area park. She had been working with the athletic training staff since that time with a presumed diagnosis of a muscle strain. The patient described the pain as deep and more like an ache. She also stated that “nothing seemed to stretch it.” She also admitted that her right leg was now starting to hurt and her performance was beginning to suffer as a result of her pain. There was only one game left in the season.

She denied any history of trauma and no previous injury to either leg. She denied any other aches or pains and was not rehabilitating any other injury. She had no medical problems and was not on any medications (OTC or prescription). Her menses occurred regularly every 30 days, she ate a normal diet, and there was no family history of osteoporosis. Her preseason workouts consisted of swimming, biking, and running on a daily basis. On physical exam, gait was normal, there was no deficit, swelling, tenderness with palpation or ecchymosis to the quadriceps muscles, and there was no asymmetry. Her strength was 5/5 and equal bilaterally. She did have vague pain in the left thigh with resisted hip flexion and adduction. Pubic symphysis was non-tender and she had a normal back exam.

Differential diagnoses included: muscle strain, stress reaction, stress fracture, referred hip pain, or referred pain from disc pathology.

Tests and Results: Because the athlete’s pain had been present for only three weeks, a three phase bone scan was obtained. There was increased uptake in the mid shaft of the left femur, medially, compatible with a stress fracture. There was also slightly increased uptake in the right femur at the junction of the proximal and mid thirds. This was felt to be compatible with an early stress fracture. Plain films were obtained for correlation.

The femurs were normal and no fractures or lytic lesions were identified. There was an ill-defined cloud-like calcification on the lateral aspect of the proximal femoral shaft of both femurs, measuring 10 cm on the left and 9cm on the right. The calcifications were felt to be consistent with the appearance of myositis ossificans post-traumatica.

The patient was given a diagnosis of bilateral femur stress fractures and her activities were immediately halted. She was given crutches for the initial 2 weeks and was recommended to limit her ambulation. She was provided a bone stimulator which was to be worn for 3 hours a day on each fracture site for a minimum of 2 months. At 1 month post-diagnosis, she was ambulating without crutches and without pain. At 2 months, she began a supervised exercise program as well as physical therapy. Her rehabilitation included aggressive stretching and strengthening of the lateral thigh structures. She gradually progressed into full activity and returned to competitive soccer in January.

MEDIAL FOOT PAIN IN A COLLEGIATE FOOTBALL PLAYER

D.L. Bright. The Ohio State University, Columbus, OH 43221

Purpose: The purpose of this presentation is to review an important cause of medial foot pain in a young athletic individual.

History: This case presents an 18-year-old male football player who had a three-day history of increasing medial foot pain. While he was participating in conditioning drills 3 days earlier, he gradually developed pain on the medial aspect of his right foot. He was unable to recall any acute injury but believes he may have everted the foot while running. The pain had progressively become more severe and he was unable to ambulate without discomfort. The pain was described as a dull ache, becoming sharp with weight bearing activities. He denied any history of prior ankle injury or similar discomfort in either foot.

(continued...)

Physical: Clinical examination of the bilateral lower extremity did not reveal any obvious deformity, swelling, or erythema. He had normal and symmetric active range of motion in both ankles. He reported some discomfort with resisted internal rotation, plantar flexion, and dorsiflexion. There was a bony prominence over the medial surface of the tarsal navicular. This palpable protuberance was very tender to palpation. Note was made of a similar prominence on the unaffected left foot which was not tender to palpation. There was no other bony tenderness. Compression of the forefoot did not cause any discomfort.

SYMPOSIUM

3:30 - 5:00 pm

IMMUNITY CHALLENGE: DEMYSTIFYING EXERCISE IMMUNOLOGY

Michael G. Flynn, PhD, FACSM; Kyle Timmerman, BS; Liu Jing, BS; Laura K. Stewary, MS; Brian K. McFarlin, MS

Purpose – The purpose of this symposium/tutorial will be to summarize the recent research in exercise immunology. We will employ a “light-hearted” presentation style with the information geared to the student/professional with a rudimentary knowledge of immunology. We will use a “Survivor” theme and several catch phrases from the popular television broadcast to help us capture the imagination and enthusiasm of the audience and to help us to meet our goals – keep it fun, make it understandable and informative.

Objectives – Our primary objective will be to present information to the audience in a fun and familiar context, in the hope that it will make the material less intimidating and easier to understand. Each speaker will provide a concise summary and “take-home message” at the conclusion of their presentation and will endeavor to present material that is relevant to a general audience. Dr. Flynn will introduce the session, introduce each speaker and provide closing remarks. Each of the speakers, a Purdue graduate student, has been given an “immunity challenge” – make the material in their presentation understandable, interesting and applicable.

Rationale – Exercise Immunology is viewed by some as an unpleasant, difficult to understand area of study. The immune system is indeed redundant and complex and it is often difficult to untangle the sizable “web of research” that has been woven in less than two decades. Exercise immunology has grown substantially and researchers are beginning to provide information that has a broad appeal. Thus, we will endeavor to present information that shows both the practical applications of the research and the astounding potential for continued study and growth in the area.

KEYNOTE ADDRESS**5:00 - 6:00 pm****Revisiting the Significance of Oxidants and Antioxidants**

CHANDAN SEN, PH.D., FACSM
LABORATORY OF MOLECULAR MEDICINE
THE OHIO STATE UNIVERSITY MEDICAL CENTER

Director, Laboratory of Molecular Medicine, Heart & Lung Research Institute
 Asst. Prof. of Surgery and Molecular & Cellular Biochemistry
 Faculty, Molecular and Cell Developmental Biology
 Director, DNA Microarray and Genetics Facility, Heart and Lung Research Institute
 Chair, Committee of Graduate Studies, Department of Surgery
 Co-chair, Committee of Research, Department of Surgery
 Vice-Chairman of Research, Department of Surgery
 Director of Research, OSU Center for Minimally Invasive Surgery

Several studies have consistently shown that exhaustive exercise results in increased production of reactive oxygen species (ROS) and oxidative stress (1-7). ROS are implicated in the pathogenesis of a wide variety of human diseases. Recent evidence suggests that at moderately high concentrations ROS such as H₂O₂ may act as signal transduction messengers (7-14). To develop a better understanding of the exact mechanisms that underlie ROS dependent disorders in biological systems, recent studies have been directed to investigate the regulation of gene expression by oxidants, antioxidants and other determinants of the intracellular reduction-oxidation (redox) state. The efficacy of different antioxidants to favourably influence the redox sensitive molecular mechanisms that are implicated in human disease should be a critical determinant of their therapeutic importance.

1. **Sen, C. K.** Oxidants and antioxidants in exercise. *Journal of Applied Physiology*, 79: 675-686, 1995.
2. **Sen CK.** Antioxidants in exercise nutrition (Leading Article). *Sports Medicine*, in press, 2001
3. **Sen, C.K., L. Packer and O. Hänninen (Eds.).** HANDBOOK OF OXIDANTS & ANTIOXIDANTS IN EXERCISE. Elsevier Science Publishers, Amsterdam, ISBN 0-444-81765-4, pp 1207, 2000.
4. **Reznick, A., L. Packer, C.K. Sen, J. Holloszy, M. Jackson (Eds.).** OXIDATIVE STRESS IN SKELETAL MUSCLES. Birkhauser, Switzerland, pp 340, 1998.
5. **Sen, C.K., L. Packer and O. Hänninen (Eds.).** EXERCISE AND OXYGEN TOXICITY. Elsevier Science Publishers, Amsterdam, ISBN 0-444-81765-4, pp 536, 1994.
6. **Sen CK, Packer L.** Thiol homeostasis and supplements in physical exercise. *Am J Clin Nutr.* 2000 Aug;72(2 Suppl):653S-69S.
7. **Sen, C.K.** Glutathione homeostasis in response to exercise training and nutritional supplements. *Molecular and Cellular Biochemistry* 196: 31-42, 1999.
8. **Engelhardt, J.F., C. K. Sen and L. Oberley.** Redox-modulating gene therapies for human diseases (editorial). *Antioxid Redox Signal* 3: 341-346, 2001
9. **Sen CK.** Antioxidant and redox regulation of cellular signaling: introduction. *Med Sci Sports Exerc.* 2001 Mar;33(3):368-70.
10. **Sen, C.K.** Cellular thiols and redox regulated signal transduction. *Current Topics in Cell Regulation* 36: 1-30, 2000.
11. **Sen, C.K.** Redox signaling and the emerging therapeutic potential of thiol antioxidants. *Biochemical Pharmacology*, 55: 1747-1758, 1998
12. **Sen, C. K. and L. Packer.** Antioxidant and redox regulation of gene transcription. *FASEB Journal* 10: 709-720, 1996.
13. **Sen, C.K. and L. Packer (Eds.).** METHODS IN ENZYMOLOGY: Redox Cell Biology & Genetics. Parts A & B. Vols 352 & 353 Academic Press, in press, 2001
14. **Sen, C.K., H. Sies and P. Baeuerle (Eds.).** ANTIOXIDANT AND REDOX REGULATION OF GENES. Academic Press, pp 556, 2000.

SYMPOSIUM

9:00 - 10:30 am

ARTHROGENIC MUSCLE INHIBITION: IMPLICATIONS AND INTERVENTIONS IN JOINT INJURY

J. Ty Hopkins, PhD, ATC; Christopher Ingersoll, PhD, ATC, FACSM; B. Andrew Krause, MS, ATC; Riann Palmieri, MS, ATC

Arthrogenic muscle inhibition (AMI) is a presynaptic, ongoing reflex inhibition of joint musculature following distension or damage to the joint. Musculature surrounding the injured joint is inhibited, even though it is not damaged. This neuromuscular response results in deficits in strength, neuromuscular control, and a greater susceptibility to re-injury. AMI is a natural response designed to protect the joint from further damage. However, if the affected joint can be protected from further damage, active exercise can be employed to expedite the rehabilitation process. The purpose of this symposium is to discuss the implications of AMI specific to ankle and knee injury, interventions that may be used to reduce the negative effects of AMI, and future directions in AMI research. We will discuss an injury model that has been used to examine changes in the motoneuron pools of joint musculature, what changes those are, and what it means to the injured athlete. We will share data regarding the effects of a few interventions, including cryotherapy, on AMI. Finally, we will discuss some of the many questions that have been raised by these data, and what directions may be taken in the future.

SYMPOSIUM

9:00 - 10:30 am

EXERCISE BEHAVIOR CHANGE FROM THE INSIDE OUT

Jay Kimiecik, PhD, Miami University, Oxford, OH

This tutorial will introduce the idea that many mainstream approaches (Outside in) to motivating physically inactive people to exercise regularly do not match what is known about why and how people develop and maintain a physically active lifestyle (Inside out). Traditional Outside-In approaches will be critiqued and then three principles for effective behavior change programs will be presented: 1) Psychoemotional effect on change, 2) Intrinsic mindset shift for change, and 3) One to one to change. These three principles form the core of an Inside Out approach to exercise behavior change. Each principle will be presented and explained as well as how the inside out approach can – and has – been implemented as a YMCA of the USA exercise behavior change program. The tutorial will attempt to use humor whenever possible, includes video clips, and will contain audience interaction and discussion.

ORAL ABSTRACT PRESENTATIONS

9:00 - 10:30 am

9:00 - 9:15 am

A SINGLE DOSE OF *GINKGO BILOBA* DOES NOT AFFECT SOLEUS MOTONEURON POOL EXCITABILITY.

M.B. Stone, M.A. Vaughan, C.D. Ingersoll FACSM, J.E. Edwards, J.P. Babington, R.M. Palmieri, M.L. Cordova FACSM, B.A. Krause. Indiana State University, Terre Haute, IN

Ginkgo biloba (*Gb*) improves cognitive function in previously impaired subjects. If, as some suggest, choli-

nesterase inhibition is the mechanism by which cognitive function is improved we may also observe excitatory effects in the neuromuscular system. These effects would be manifested by changes in motoneuron pool excitability. The Hoffmann reflex (H-reflex) to Motor Response (M-response) ratio is an accepted method of measuring motoneuron pool excitability. Purpose: The purpose of this study was to determine if a single dose of *Gb* affects motoneuron pool excitability of the soleus muscle as measured by the H-reflex to M-response ratio (H:M). Methods: Initial soleus H:M were recorded from twenty healthy volunteers (6 male, 14 female; age: 22 ± 3 y; height: 168 ± 8 cm; mass: 65 ± 8 kg). Subjects were then randomly assigned to one of three groups: control, placebo, or *Gb*. Control received no treatment, placebo received 180 g cellulose, and *Gb* received 180 g *Gb*. Placebo and *Gb* were administered in a double-blind manner. Max H and max M were then recorded 1, 2, and 3 h post-treatment. A 3 X 4 repeated measures ANOVA was used to analyze differences in H:M. Results: No differences were observed between treatments ($F_{2, 19} = 0.29$; $p=0.75$) or over time ($F_{3, 19} = 1.69$, $p=0.17$). Nor was there a treatment by time interaction ($F_{6, 57} = 1.31$, $p=0.27$). Conclusions: A single dose of 180 g of *Gb* does not affect soleus motoneuron pool excitability. Perhaps, to observe *Gb*'s potential cholinesterase inhibitory effects in the neuromuscular system a longer, increased dosing schedule may be necessary.

9:15 - 9:30 am

POST EXERCISE METABOLIC RATE FOLLOWING DOWNHILL RUNNING

K.-S. Park, D.A. Sedlock, FACSM, J.W. Navalta, J. Andrews. Purdue University, West Lafayette, IN

A bout of eccentric exercise produces muscle damage and delayed onset muscle soreness (DOMS), the latter of which usually peaks approximately 24-48 h postexercise. It is also known that both muscle damage and DOMS are attenuated following a subsequent eccentric exercise bout. The purpose of this study was to investigate whether excess postexercise oxygen consumption (EPOC) measured for 1h and resting metabolic rate (RMR) measured up to 48h post-exercise would differ following level vs. downhill treadmill running. Seven untrained male volunteers (mean \pm SD: age (yr)= 25.6 ± 2.3 , ht (cm)= 167 ± 28 , wt (kg)= 75.8 ± 12.5) performed a VO_{2max} test and three 40 min submaximal exercise trials eliciting ~ 70 - $75\%VO_{2max}$: a level running trial and two downhill running trials (DH1 and DH2). All testing took place early in the morning following an overnight fast and no strenuous exercise during the previous 36 h. For each trial, VO_2 was measured for 30 min prior to exercise (baseline RMR-day 1), during the 40 min exercise, for 60 min immediately following exercise (EPOC), and for 30 min at 24h (RMR-day 2) and 48h (RMR-day3) post exercise. The level running trial was performed first, DH1 was performed one wk later, and DH2 occurred 2 wk following DH1. Two downhill running trials were performed to investigate whether muscle damage affected post exercise metabolic rate. DOMS was rated for five lower body sites (buttocks, front of thigh, back of thigh, shin, and calf) at 24 h and 48h post exercise using a scale ranging from 1 to 6 (Rodenburg et al., 1993). One-way and two-way repeated measures ANOVA and Tukey post hoc tests were used for data analysis. There was no significant difference in EPOC among the trials (level= 296 ± 33 , DH1= 301 ± 30 , and DH2= 292 ± 28 ml/kg/60 min). However, VO_2 averaged over the last three min of the 60 min EPOC period was significantly elevated above baseline for the DH1 (3.4 ± 4 vs. 4.4 ± 5 , $p < .0001$) and DH2 (3.3 ± 2 vs. 3.9 ± 3 , $p < .005$) trials, but not the level trial (3.5 ± 3 vs. 3.8 ± 4 ml/kg/min, $p > .05$). RMR did not significantly differ among days 1, 2, and 3 of each trial, nor among the three trials. Downhill running produced significantly greater DOMS than level running ($p < .01$). It can be concluded that 40 min of downhill running at a moderately high intensity, which produced a significant amount of DOMS (and likely muscle damage), resulted in a prolonged EPOC (>1 h). However, an elevated metabolic rate was not detected 24 or 48 h following exercise when DOMS was evident. In contrast, metabolic rate returned to the resting value within 1 h after running on a level grade. The physiological mechanisms involved in producing a prolonged elevation in metabolic rate following downhill running remain to be elucidated.

9:30 - 9:45 am

COMPARISON OF TWO METHODS FOR PREDICTING VO_{2max} IN ADOLESCENT BOYS WITH HIGH AND LOW LEVELS OF PHYSICAL ACTIVITY

J.W. Navalta, D.A. Sedlock, FACSM, C.M. Weaver, M. Kern, K.-S. Park, L.K. Stewart, K.L. Timmerman, J. Petite. Purdue University, West Lafayette, IN

This study compared two methods for predicting maximal oxygen uptake (VO_{2max}) in adolescent boys with different levels of physical activity (PA). The Godin Leisure-Time Exercise Questionnaire (Godin and Shephard, 1985) was administered to 41 boys who were part of a larger research project investigating calcium

retention. They were then categorized into quartiles based on their PA score. Those who scored in the upper ($X \pm SE$ score= 131.2 ± 8.2) quartile (UG; $n=10$, $ht=164 \pm 3$ cm, $wt=59 \pm 6$ kg, $age=13 \pm 0.3$) and lower (score= 46.6 ± 2.8) quartile (LQ; $n=10$, $ht=170 \pm 3$ cm, $wt=72 \pm 7$ kg, $age=13 \pm 0.2$) completed a PWC_{170} test using a mechanically-braked cycle ergometer. Initial work rate was 25W (50 rpm) with 25W with increases every 3 min. Heart rate (HR) was recorded at the end of each min and the test was terminated after completion of the work rate in which HR reached 170 b min^{-1} . The work rate then was used in the equation of Rowland et al. (1993) to estimate VO_{2max} . For the second method (MET), regression equations developed using HR and VO_2 values were used to predict VO_{2max} based on estimated HR_{max} (220-age). Data were analyzed using t-tests, a 2 (quartile) x 2 (method) mixed factorial ANOVA, and Pearson product-moment correlation coefficients ($\alpha=0.05$). Results show that LQ was significantly taller ($p=.05$) but not heavier than UQ. PWC_{170} was similar between UQ (102 ± 13 W) and LQ (104 ± 13 W). VO_{2max} was significantly higher ($p<.01$) when predicted from PWC than from MET for both UQ ($PWC=48 \pm 1$, $MET=42 \pm 2 \text{ ml kg}^{-1} \text{ min}^{-1}$) and LQ ($PWC=47 \pm 1$, $MET=36 \pm 2 \text{ ml kg}^{-1} \text{ min}^{-1}$). Estimated VO_{2max} values using the two different methods were not significantly correlated ($r=.40$, $p=.08$). Adolescent boys with a relatively low physical activity level had a physical work capacity at $HR=170 \text{ b min}^{-1}$ similar to those who were relatively active. This finding suggests that although classified as having a relatively low level of physical activity, these boys manifest certain submaximal physiological responses similar to those who are more highly active. The PWC and MET methods used in this study yielded VO_{2max} values that were neither statistically similar nor significantly correlated. Predicting VO_{2max} in adolescent males may be somewhat difficult perhaps due to differences in physical maturation level. Therefore, caution should be exercised when selecting an equation to predict VO_{2max} in this population. Much more research is needed regarding validation of equations used to predict VO_{2max} in adolescents.

9:45 - 10:00 am

TOTAL BODY VOLUME ASSESSMENT WITHOUT LUNG VOLUME CORRECTION FROM DUAL DIGITAL-0PHOTOGRAPH ANTHROPOMETRY

R.P. Mikat, University of Wisconsin-La Crosse, La Crosse, WI

Dual digital-photograph anthropometry (DDPA) is a new development of potential value in the assessment of human total body volume (TBV), body composition and circumference measurement. Initial research with this method used lung volume assessments [functional residual capacity (FRC)] when creating regression formulas for the prediction of TBV. The purpose of this investigation was to assess the need for inclusion of FRC measurements in TBV regression formulas. Healthy female adults ($n=18$) (age 22 to 51) were evaluated for TBV by DDPA and hydrodensitometry from a single tester. FRC was measured using an oxygen dilution method. Results of regression analyses both with and without FRC are presented in the table below.

	R	R ²	SEE	TE
DDPA	0.00	0.98	1.57 Liters	1.66 Liters
DDPA and FRC	0.99	0.99	1.45 Liters	1.59 Liters

Results from stepwise linear regression analysis indicate that the inclusion of FRC calculations do not significantly improve predictions of TBV when using DDPA. Exclusion of lung volume assessments from the DDPA protocol will substantially reduce the cost and time of testing while making the evaluations more comfortable and convenient for subjects.

10:00 - 10:15 am

THE HORMONAL EFFECTS OF ACUTE ANDROSTENEDIONE SUPPLEMENTATION IN ELDERLY MEN.

B.W. Craig, D. Biggs, C. Fick, D. Wright, and K. Lim. The Human Performance Laboratory, Ball State University, Muncie, IN 47306

The purpose of this investigation was to determine if the acute androstenedione supplementation in elderly subjects could alter testosterone and estradiol responses. The subjects were elderly males who were separated into androstenedione (ANRO) and placebo (PLC) groups with a mean age \pm SE of 62.3 ± 2.6 and 60.2 ± 1.0 yrs respectively. The BMI of the two groups was 26.5 ± 1.4 and 25.0 ± 1.6 respectfully. The subjects were tested

after a 12 hr fast and a 21 Ga Teflon catheter was established in an antecubital vein prior to exercise. The subjects warmed-up and stretched for 10 minutes, and then were seated on a leg extension (Paramount) machine that was set at their pre-determined 10 RM. A 5 ml pre-exercise blood sample was taken and they performed 3 sets of 10 repetitions. They rested 1 minute between sets, and for 2 minutes following exercise and then moved to a leg curl machine (Paramount) and repeated the exercise routine. A 5 ml blood samples was taken before they moved and at 5, 15, 30, 45, and 60 minutes following the leg curl exercise. These tests were repeated after 7 days of ANDRO (300 mg/day) or PLC (cellulose) supplementation. From the 5th to the 7th day of supplementation the subject repeated a 2 day pre-supplement diet they recorded prior to testing. Androstenedione supplementation (300 mg/day) significantly elevated serum testosterone in the treated subjects, being 4.4 ± 0.6 pre- and 6.7 ± 0.6 post-supplement. The pre- to post supplement differences of the ANDRO group decreased slightly, going from a 44% to 29% difference from the 5 to 60-min. post-exercise measurements. The pre- to post-values for the PLC were the same. The ANDO treatment group also showed a sharp increase in estradiol levels after 7 days of treatment in some but not all of the subjects.

10:15 - 10:30 am

CHANGES IN GENE EXPRESSION FOLLOWING CONTRACTION-INDUCED INJURY IN MICE USING MICROARRAY ANALYSIS

S.J. McGregor, T.J. Koh, S.V. Brooks, F.X. Pizza, University of Toledo, Toledo, OH and The University of Michigan, Ann Arbor, MI

Purpose: To characterize changes in gene expression following contraction-induced injury using microarray analysis. *Methods:* Six C57B/6 mice (3-4 mo of age, 27.78 ± 3.31 g) performed 75 lengthening contractions of the extensor digitorum longus (EDL) while anesthetized. The EDL was excised from ambulatory controls (n=3) and experimental animals 6 (n=3) and 72 h (n=3) after the contraction protocol. Pooled samples of ³³P-dATP radiolabeled cDNA derived from the EDLs were hybridized to membrane arrays consisting of 1185 named genes from the mouse genome. Genes elevated, on average, more than 2 fold, or decreased 50%, on triplicate arrays were clustered using k-means analysis. *Results:* 127 genes were up-regulated 2 fold, and 7 genes were down-regulated 50% or more relative to control at 6 or 72 h. K-means analysis revealed, 4 up-regulated and 3 down-regulated clusters based on similarities in patterns of changes in gene expression. Cluster 1 and 2, elevated at 6 and 72 h, contained, contained primarily immediate early genes (IEG), heat shock proteins (HSP), and genes associated with inflammation. Interestingly, IEGs elevated at 6 h consisted of genes related to both growth (c-fos, jun, EGR-1) and differentiation (BTG-2, Tob) indicating these contrasting physiological processes are initiated early in recovery from muscle injury. Clusters 3 and 4 contained genes that were not elevated at 6 h, but expressed at least 2 fold at 72 h. These clusters included genes relating to growth (c-myc), differentiation (myogenin), inflammation (clusterin, osteopontin), DNA repair (RAD23) and structural components (vimentin, integrin α 7). Elevated expression of genes for DNA repair may be indicative of impairment of proliferating cells, such as activated muscle precursor cells, as the cell-cycle may not progress until DNA repair is complete. Genes down-regulated at 6 h, but returned to baseline at 72 h (cluster 76; yin yang 1, nuclear factor-1B) were indicative of elevated retinoblastoma product (pRb) activity associated with differentiation. Cluster 7 contained genes (SOX4, WSB-2) related to immune function that were reduced greater than 50% at 6 h, but were not decreased at 72 h. *Conclusion:* Microarray technology, in conjunction with cluster analysis, identifies seven patterns of gene expression that begin to elucidate complex molecular events following contraction-induced injury.

Supported by NIH grant AR47599-01

10:30 - 10:45 am

THE EFFECTS OF PHOSPHOLIPASE C INHIBITION ON INSULIN STIMULATED GLUCOSE UPTAKE IN FAST TWITCH SKELETAL MUSCLE.

D.C. Wright, B.W. Craig, B.R. Barnes, K.L. Lim. Human Performance Laboratory, Ball State University, Muncie, IN 47306.

The insulin-signaling pathway in skeletal muscle has not been fully elucidated. Previous research from our laboratory has demonstrated that phospholipase C (PLC) inhibition in slow twitch rat skeletal muscle leads to a

significant decrease (35%) in insulin stimulated glucose uptake suggesting that PLC may in part mediate insulin stimulated glucose uptake. The purpose of the current investigation was to determine if a similar relationship between PLC inhibition and glucose uptake is present in fast twitch skeletal muscle. Male Wistar rats (200-250 grams) were anesthetized and the extensor digitorum longus (EDL) muscle split *in situ* and clamped at their resting length. Muscles were removed and sealed in oxygenated vials containing Krebs-Henseleit buffer, BSA, 2mM pyruvate and 18 mM mannitol and incubated in a shaking water bath (37°C, 60 cycles/min). Muscles were then incubated in the presence of 4mM glucose and the absence or presence of 100 µU/ml insulin and/or the PLC inhibitor U73122 (50 µM). Following a 10 minute rinse the muscles were incubated in [³H]-3-O-methylglucose and [¹⁴C] mannitol (to correct for extracellular space) and the given experimental condition for 10 minutes. Following the final incubation muscles were quick frozen in liquid nitrogen (-70°C), digested in 1N NaOH and glucose uptake determined by liquid scintillation counting. Insulin (i) stimulation led to a 225% increase in glucose uptake compared to basal (b) (3.52 ± 0.64 i, 1.57 ± 0.097 b µmol/ml/hr). PLC inhibition did not impact basal glucose uptake. However, the addition of U73122 to the incubation medium caused a 21% attenuation of insulin stimulated glucose uptake (3.52 ± 0.64 vs. 2.78 ± 0.53 µmol/ml/hr). The results of the current investigation demonstrate that PLC in part mediates insulin stimulated glucose uptake in fast twitch skeletal muscle though to a lesser degree than in slow twitch muscle. Further research examining the molecular intermediates involved in PLC activation and insulin signaling is needed to further clarify this relationship.

TUTORIAL

9:30 - 10:30 am

MAGNETS AND MEDICINE: WHAT'S THE ATTRACTION?

Elaine Filusch Betts, PhD, PT, FACSM

Rationale: Magnets have been used in medicine for many years in Eastern Europe, but have only recently gained attention in the United States. Numerous companies now market devices containing static magnets for use in various medical conditions, but provide limited information regarding the scientific basis for appropriate use.

Purpose: This tutorial is designed to educate the audience on the science of magnet use and the evidence for clinical application. The attendee will hear a brief history of magnet use in medicine, an overview of scientific studies involving static magnet usage, and learn the implications for the clinical use of magnets.

After attending this tutorial, the listener will:

1. understand the basic science underlying magnetism,
2. be familiar with the various types of magnets currently used in medicine,
3. be familiar with basic studies evaluating the efficacy of static magnet use,
4. understand the rationale for the application of static magnets in clinical conditions.