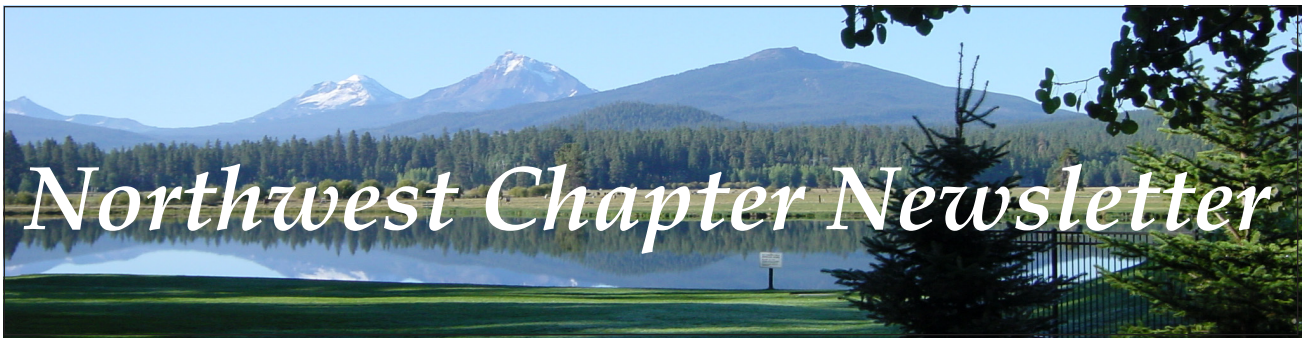

Northwest Chapter Newsletter

Spring 2005 *American College of Sports Medicine*

NWACSM President's Message

Involvement in NWACSM—A Call to Arms!

It is truly an exciting time for the Northwest Chapter of ACSM and you have a great opportunity to become part of the upcoming development. In my inaugural letter, I would like to encourage all members to get more involved in shaping the future of the chapter. With improved financial stability and a string of successful annual meetings, we are at a crossroads of sorts, and it is the ideal moment to help set the course for our future. In order to best represent the varied interests of NWACSM's members we need to hear from as many individuals as there are interests. Remember, typically those who are the most involved will be best served!

One of the major changes that have occurred over the last year within the chapter is our renewed focus on students within our region. Many opportunities currently available to students will be expanded, and a number of new opportunities are being created. Our hope is that student involvement in the chapter will continue to grow. Students, this is a chance for you to benefit from NWACSM. But we need to hear from you! Share your ideas with the Regional and National Student Representatives.

The challenge created by this shift in direction towards student service is that some groups may feel left out of the scope of NWACSM. A large part of this decision by the chapter board is based on the observation that the majority of people involved in NWACSM are from universities, serving graduate and undergraduate education. If you believe your needs and interest are not being met, we need to hear from you! Contact the Member at Large for your area and help get your peers motivated! We don't want anyone to be left out, but the board needs to know where your interests lie.

If you missed the annual meeting in Moscow, you really deprived yourself of a great meeting! The presentations were excellent and we had over 200 attendees, making it an all-around successful meeting. We congratulate Dennis Dolney and the other members of the organizing committee for arranging a meeting that transcended the various disciplines within ACSM, as there truly was something for everyone! The meeting incorporated topics ranging from basic science to performance-based physiology, with clinically-relevant topics interspersed throughout. The program spanned exercise physiology, motor control, biomechanics, sports psychology, fitness, and health. One of the most unique presentations was by Tom Jager, a five-time Olympic gold medalist swimmer who gave his "athletes perspective" on exercise science and training. Many of his comments may be controversial and in contrast to what we learn and teach in exercise science, but it was an extremely engaging and fun talk!

It was announced at the meeting that Sensor Medics is providing a donation to both National ACSM and NWACSM! This is a unique opportunity for us, and puts us in the enviable position of having discussions on how to best put this money to use. Some general ideas might be to grow current programs (such as expanding the number of research grants awarded), implement one or two programs that can be self-sustaining, or use the money for capacity building so that NWACSM is set for future growth. If you have ideas, we would love to hear them so that we can begin discussions on how best to take advantage of this wonderful opportunity!

Continued on page 2

Northwest Region Newsletter

Spring 2005

NWACSM Mission Statement:

It is the mission of the Northwest Chapter of the American College of Sports Medicine to provide educational opportunities for professional development in exercise science and sports medicine and to be a resource for the general public regarding sports medicine and health and fitness issues.

Contents

Newsletter Submission Deadlines

Issue	Deadline
Summer	July 15, 2005
Winter	Nov. 21, 2005
Spring	March 13, 2006

The ACSM Northwest Region Newsletter is produced by Henriette Heiny, Ph.D., FACSM, Director of the International Institute for Sport and Human Performance, University of Oregon. Members of the ACSM Northwest Region are invited to submit contributions to the newsletter.

NWACSM information can also be seen on the Internet, URL: <http://northonline.northseattle.edu/nwacsm/>

President's Message cont.

Christopher Minson, Ph.D., NWACSM President

Lastly, I would like to thank the chapter's immediate Past-President, Dan Heil, and former Past-President, Peter Harmer, for their diligent work. The current success of the chapter is due in part to their excellent leadership. Clearly, I have big shoes to fill!

I would also like to congratulate all new members to the Executive Board of NWACSM. As this is a volunteer organization, these individuals are donating their time and effort to help keep our chapter running and to bring fresh insights and direction to the chapter. That being said, these individuals have committed to working on your behalf, so I strongly encourage everyone to contact them with questions, concerns, and ideas.

As is probably obvious at this point, the goal of my letter is get as many people involved in NWACSM as possible. I strongly encourage all of you to join us in Corvallis in 2006 for another outstanding meeting. Now is the time to send your comments and suggestions to the planning committee to ensure that the program represents your interests. Contact information can be found on the inside back page of each newsletter and on NWACSM's webpage at <http://northonline.northseattle.edu/nwacsm/> .

—Christopher Minson, Ph.D., NWACSM President

Upcoming Events

ACSM 52nd Annual Meeting

Gaylord Opryland Resort in Nashville, Tennessee
June 1-5, 2005

On Line Registration: *https://www.acsm.org/meetings/forms/52nd_annual_meeting_reg_form.asp*

Joseph B. Wolffe Memorial Lecture

Pieces of the Same Human Puzzle: Evolution, Physical Activity, Chronic Disease, Public Health and Policy—Frank W. Booth, FACSM

D.B. Dill Historical Lecture

The Disabled Athlete: From Paralysis to Paralympics—Maria T.E. Hopman, FACSM

President's Lectures

Exercise-Induced Hyponatremia—Joseph G. Verbalis

Physical Activity and Aging: The Role of Self-Regulatory Processes—Edward McAuley

Preventing Injuries in Sports—A Scientific Approach—Roald Bahr, FACSM

Skeletal Muscle Hypertrophy: Exercise, Growth Factors and Supplements—Karyn A. Esser, FACSM

Gisolfi Tutorial Lecture

The Science of Sports Drinks—Robert Murray, FACSM

Gollnick Tutorial Lecture

The Physiology of Lactate Metabolism: Then and Now—George Brooks, FACSM

Pollock Tutorial Lecture

Exercise Physiology: Essential for Desired Procedural Outcomes After Heart Transplantation—Randy W. Braith, FACSM

Fitness Assessment and Training

Highlighted Symposium | *Pacing Strategy: The Unexplored Territory in Sports Performance*—Carl Foster, FACSM, Jos de Koning, Alan St Clair Gibson, David T. Martin, Alejandro Lucia

Cardiovascular, Renal and Respiratory Physiology

Featured Science Session | *Oxygen Sensing and its' Role in the Cardiorespiratory Response to Exercise*—Benjamin Levine, FACSM, Russell Richardson,

Skeletal Muscle, Bone, and Connective Tissue

Featured Science Session | *Physiological Versus Pathological Hypertrophy in the Heart*—Gary Diffee, Leslie Leinwand

Neutral Control and Biomechanics of Movement

Featured Science Session | *Using MRI in Biomechanics Research*—Joseph Hamill, FACSM, Jane Kent-Braun, FACSM, Bruce Damon

Metabolism and Nutrition

Featured Science Session | *Exercise Training Effects on Insulin Resistance and Type 2 Diabetes*—Janet Walberg Rankin, FACSM, John Ivy, FACSM, Juleen Zierath

Psychology, Behavior, and Neurobiology

Highlighted Symposium | *Exercise, Sport Performance, and the Human Brain - Overview of Assessment Techniques with Selected Applications*—Romain Meeusen, FACSM, Carl Cotman, Sean Deeny, Arthur Kramer, Charles Hillman, Jon Williamson, FACSM

Environmental and occupational Physiology

Featured Science Session | *Musculoskeletal Challenges to Long-Duration Spaceflight: To Infinity and Beyond?* James Pawelczyk, FACSM, Kenneth Baldwin, FACSM

Athlete Care and Clinical Medicine

Highlighted Symposium | *Evidence on Clearance for Sport: When is it Safe?* Thomas Best, FACSM Roald Bahr, FACSM, William W. Dexter, FACSM, W. Ben Kibler, FACSM, Gordon O. Matheson, FACSM, Ian Shrier, FACSM, Andrew L. Pipe, FACSM, Stanley A. Herring, FACSM

Immunology/Genetics/Endocrinology

Featured Science Session | *The Psychoneuroimmunology of Exercise* J. Mark Davis, FACSM, Keith Kelley, Monika Fleshner

Clinical Exercise Physiology

Highlighted Symposium | Perspectives on Cardiovascular Risk During Exercise: Clinical, Legal and Practical Considerations Kyle McInnis, FACSM, Paul Thompson, FACSM, Barry Franklin, FACSM. Neil Gordon, FACSM, William Herbert, FACSM, Barry Maron

ACSM Annual Meeting Calendar-at-a-Glance

Tuesday, May 31

Noon-8:00 PM	Registration
12:30 PM-9:30 PM	Committee Meetings

Wednesday, June 1

6:00 AM-7:45 AM	Committee Meetings
7:00 AM-6:00 PM	Registration open
8:00 AM-9:15 AM	Joseph B. Wolffe Memorial Lecture
9:30 AM-5:15 PM	Scientific and Clinical Sessions
1:00 PM-1:45 PM	Meet the Expert Session
5:30 PM-7:00 PM	Student Colloquium
5:45 PM-7:15 PM	Interest Group Meetings
6:30 PM-8:30 PM	Opening Reception in Exhibit Hall
9:00 PM-12 AM	Welcome Party featuring First Time, International, and Student Attendees

Thursday, June 2

6:00 AM-7:45 AM	Committee Meetings
6:30 AM-7:45 AM	Josephine L. Rathbone Memorial Breakfast
7:30 AM-5:00 PM	Registration open
8:00 AM-8:50 AM	President's Lectures
9:00 AM-5:15 PM	Scientific and Clinical Sessions
9:30 AM-5:00 PM	Exhibit Hall open
12:30 PM-1:30 PM	ACSM Annual Business Meeting
5:45 PM-7:00 PM	Clinician's Reception
5:45 PM-7:15 PM	Interest Group Meetings
8:00 PM-9:30 PM	Individual Regional Chapter Meetings

Friday, June 3

6:00 AM-7:45 AM	Committee Meetings
6:30 AM	2005 Gisolfi Fun Run (Supported by Gatorade)
7:30 AM-4:00 PM	Registration open
8:00 AM-9:15 AM	D.B. Dill Historical Lecture
9:30 AM-5:00 PM	Scientific and Clinical Sessions
9:30 AM-4:00 PM	Exhibit Hall Open
5:45 PM	New Fellow Reception (invitation only)
7:00 PM-8:00 PM	Awards Banquet Pre-function
8:00 PM-10:00 PM	Awards Banquet

Saturday, June 4

6:00 AM-7:45 AM	Committee Meetings
8:00 AM-8:50 AM	President's Lectures
8:00 AM-11:30 AM	Registration open
9:00 AM-4:00 PM	Youth Physical Activity Summit
9:00 AM-4:15 PM	Scientific and Clinical Session

Walking for Health: Measurement and Research Issues and Challenges

ACSM with the University of Illinois will present this focused conference, October 13-15, 2005, on the University of Illinois, Urbana-Champaign campus. The two and one half day program includes presentations given by a world-class faculty, poster sessions, exhibit hall, hands-on sessions (walking programs), and networking opportunities, all focused around the benefits, issues, and challenges of walking. To review and download the PDF version of the program in progress: <http://www.acsm.org/meetings/pdf/Walking%20Conf%20adv%20prg.pdf>

Attendees may submit abstracts for consideration through peer review and presentation. Additional details regarding the process will be available on the ACSM web site, <http://www.acsm.org/meetings/walkingconference2005.htm> after March 21, 2005.

For additional details regarding registration, hotel accommodations, travel and general information, please visit: <http://www.acsm.org/meetings/walkingconference2005.htm>.

ACSM Certifications

ACSM Certification is available to any professional within the preventive and rehabilitative exercise field who meets the established prerequisites.

The ACSM Exercise Specialist®

is a healthcare professional certified by ACSM to deliver a variety of exercise assessment, training, rehabilitation, risk factor identification and lifestyle management services to individuals with or at risk for cardiovascular, pulmonary, and metabolic disease(s). These services are typically delivered in cardiovascular/ pulmonary rehabilitation programs, physicians' offices or medical fitness centers. The ACSM Exercise Specialist® is also competent to provide exercise-related consulting for research, public health, and other clinical and nonclinical services and programs.

Minimum Requirements

- A bachelor's degree in an allied health field* from a regionally accredited college or university (one is eligible to sit for the exam if the candidate is in the last term of their degree program); AND
- Minimum of 600 hours of practical experience in a clinical exercise program (e.g., cardiac/pulmonary) including exercise testing; AND
- Current certification in Basic Life Support (BLS)

** Examples: Nursing, Occupational Therapy, Physical Therapy, Physician Assistant, Physical Education, Exercise Science, Kinesiology, Kinesiotherapy, Physiology, Biology, Exercise Physiology and Human Performance.*

The Health/Fitness Instructor certification

provides professionals with recognition of their practical experience and demonstrated competence as a leader of health and fitness programs in the university, corporate, commercial or community settings in which their clients participate in health promotion and fitness-related activities.

Minimum Requirements

- An associate's degree or a bachelor's degree in a health-related field* from a regionally accredited college or university (one is eligible to sit for the exam if the candidate is in the last term or semester of their degree program), AND
- Possess current adult CPR certification

** Examples: Nursing, Occupational Therapy, Physical Therapy, Physician Assistant, Health Care Administration, Physical Education, Exercise Science, Kinesiology, Kinesiotherapy, Athletic Training, Physiology, Sports Management, Biology, Exercise Physiology, Human Performance, Health Science, Recreation Management/Science, and Nutrition.*

ACSM certified Personal Trainer™

(visit* www.pearsonvue.com/acsm *to register)

Minimum Requirements

- *A high school diploma or equivalent AND*
- *Possess current Adult CPR certification that has a practical skills examination component (such as the American Heart Association or the American Red Cross)*

2005 ACSM Northwest Region's Certification Schedule

	Wrkshp Dates	*Certification*	*Early Bird Deadlines*	*Deadline*
ACSM Certified Personal Trainer				
Ashmead College, Seattle, WA	April 29	May 1		April 22, 2005
ACSM Health/Fitness Instructor$_{SM}$				
Montana Tech, Butte, MT	May 18-19	Mary 20	March 15, 2005	April 1, 2005
International Institute for Sport and Human Performance, University of Oregon, Eugene, OR	None	Jun 24-25	April 15, 2005	May 01, 2005
PRO Sport Club, Bellevue, WA	Jun 23-24	Jun 25	April 15, 2005	May 01, 2005
Seattle Athletic Club, Seattle, WA	Aug 17-`8	Aug 19-20	June 15, 2005	July 01, 2005
PRO Sport Club, Bellevue, WA	Nov 17-18	Nov. 18-19	Sept 15, 2005	Oct 1, 2005
ACSM Exercise Specialist®				
International Institute for Sport and Human Performance, University of Oregon, Eugene, OR	Aug 25-26	Aug 26-27	June 15, 2005	July 01, 2005

—Apply ONLINE for fast and efficient service: <http://www.acsm.org/certification/certification_applications.htm>.

NW Chapter Business and Activities

A note from the Treasurer

Dear fellow members,

Before I provide you with the latest update on the financial health of our organization I would like to thanks Dr. Dennis Dolny (University of Idaho) and his Co-Chair, Dr. Kathy Browder (University of Idaho), for organizing a very successful Annual Meeting. In addition to outstanding presentations from leading researchers and exceptional students, this was a great opportunity to interact with friends and colleagues. From the information available so far, the conference was also a financial success, which means the chapter is closer to achieving the financial freedom to pursue additional objectives and initiatives.

Unfortunately, the financial details of the conference have not all been received yet, so I cannot give you the exact figures. We are still waiting for the invoices from university printing and catering.

For the remainder of the year, we are expecting two major expenses: the Fall Meeting of the Executive Board, which will take place in Corvallis, OR, and the seed money for the 2006 Annual Meeting. As for income, National ACSM is expected to forward the dues payments made to ACSM and to renew their administrative support. Additional details will be included in the summer newsletter.

The table below lists the chapter's financial assets at the end of June 2004 (approximate values).

Description	Amount
Balance for FY 2004	2920
Balance on 12/31/2004	10400
Home Office Balance	1800
Bank Deposit (CD)	11200
TOTAL ASSETS END 2004	26320

As I predicted in the previous spring newsletter, we ended the year with a positive balance. This is definitely a step in the right direction, as we plan multiple activities to serve our chapter members. As you may know, lack of financial stability has limited our efforts in the past. Our spending practices have always been conservative and our proposed move to a central location for the Annual Meeting is a most promising avenue for stabilizing the chapter budget.

As always, I encourage you to ask questions about this financial report as well as any other aspect of the Executive Board. Thank you for your continued support of our NWACSM Chapter.

Stasinos Stavrianeas, Ph.D.
NWACSM Treasurer
stas@willamette.edu
(503) 370-6392

This table is an outline of the present NWACSM balance sheet, as of the end of FY 2004.

Income	Amount	Expenses	Amount
Membership Dues	8895	Home Office & salaries	7100
ACSM administrative support	3250	Board Meetings	2170
Gatorade and student grants	1500	Student Grants & student trips	870
2004 Annual Meeting balance	2660	Social during National ACSM	0
		2005 Annual Meeting money	4000
		Miscellaneous	250
TOTAL	16305		14390
Most figures have been rounded to increments of $10.00.			

Results of the student poster competition

The two best undergraduate oral presentations were by Michelle Hadley and Tara McAllister, both from the University of Idaho. Each received $75.00.

The three best master's oral presentations were by Alin Moss (Montana State University), Tommy Manning (Montana State University), and Julie Ham (University of Montana). Each received $100.00.

The three best doctorate oral presentations were by Jenni Lockwood, Tomas Pellinger, and Brett Wong, all three from the University of Oregon. Each received a $100.00 award.

The best poster awards went to Carolyn Cox (University of Montana) in the doctorate category, Maggie Cooper (University of Oregon) in the master's category, and to S. Adamek (Linfield College) in the undergraduate category. Each were awared $50.

Abstracts submitted for student awards

Undergraduate

The effects of different warm-up strategies in Olympic weightlifting

J. Redden, K. Kipp, C. Harris & M. Conroy

Boise State University, Boise, ID USA

PURPOSE: During the Clean and Jerk portion of an Olympic weightlifting competition, athletes keep warmed up and prepare themselves for their next lifting attempt by performing clean pulls. The purpose of this study was to investigate the effectiveness of two types of clean pull routines, of different work volume, commonly used during competition.

METHODS: Five male and female national caliber weightlifters were pooled for this study. After a standardized warm-up consisting of 2-3 repetitions at 30, 50, 65, and 75% of 1-RM of full clean, subjects randomly completed a control condition (C; two sets of one repetition at 85% of 1-RM of full clean) or one of two different treatment conditions (T1, T2) in a crossover design.

T1: one clean pull of 100% of the full clean 1-RM 4 minutes prior to an 85% full clean

T2: three clean pulls at 85% of the full clean 1-RM 4 minutes prior to 85% full clean

(Each pull was separated by a 20 second rest period)

The control condition served to establish baseline data (average of 85% clean) against which the kinematic and kinetic parameters of the two treatment conditions were compared in order to establish their effectiveness. Kinematic data for the barbell velocity was sampled at 250 Hz using a six-camera infrared motion capture system. Kinetic data for ground reaction forces (GRF) was collected at 1250 Hz using Kistler force plates. A repeated measures ANOVA was used to compare means between conditions.

RESULTS: The total load lifted (volume) in T2 was 2.54 times as high as in T1 (**p = .0001). There were no significant differences between kinematic and kinetic parameters across any of the conditions.

	Maximum Bar Velocity			(m/s)Maximum GRF (N)		
Condition Mean±SD	C 1.78±.14	T1 1.80±.12	T2 1.78±.13	C 2965±426	T1 3039±459	T2 3019±445

Volume (kg)		
Condition Mean±SD	T1 91.3±22.2	T2 232.7±56.7**

CONCLUSION: The lack of statistical differences between the two treatment conditions indicates that both are sufficient to keep athletes warmed up and prepared for their next lifting attempts. However, due to the reduced volume of T2, the athlete has a better chance of avoiding cumulative fatigue during the course of the competition and could theoretically perform better toward the end of the competition.

Effects of carbohydrate feeding on sIgA in females during 10 hours of endurance exercise

A.M. Spiroski, A.E. McClaughry, S.G. Harger, S.E. Gaskill, FACSM & B.C. Ruby, FACSM

The University of Montana, Missoula, MT 59812. E-mail: anamishel@hotmail.com

Current research suggests a relationship between carbohydrate supplementation during moderate length endurance exercise and maintenance of normal sIgA levels. However, there is limited research investigating the effect of extended duration endurance exercise on salivary parameters. Purpose: The purpose of this study was to investigate the effect of supplemental carbohydrate feedings on salivary parameters in females during a 10 hour bout of extended endurance exercise. Methods: Recreationally active female subjects (n=6) completed two ten-hour exercise bouts consisting of upper body ergometer (double poling), cycling (70% VT, 46±6% VO_{2peak}), and treadmill walking (70%VT, 45±7% VO_{2peak}). In a double blind, random crossover design, subjects received either a CHO [20% maltodextrin (0.6g/kg FFM/hr)] or placebo (PLA) drink each hour. Unstimulated saliva samples were collected over a 4-minute period pre-exercise (PRE), prior to a standardized lunch (PRL), post-exercise (POST) and the next morning (AM) for each trial. Salivary parameters were assessed using an ELISA method. Samples were also analyzed for total protein content and osmolality. Data were analyzed using repeated measures ANOVA and apriori planned comparisons. Results: There was no significant difference in total fluid consumed (2.7±1.2 and 2.5±1.0 for the CHO and PLA trials, respectively). No significant differences were noted in sIgA concentration (mg/L), secretion rate (μg/min) or flow rate (mL/min) between the trials. In contrast, the sIgA:osmol ratio was significantly lower PRL for both groups but returned to PRE values POST during the CHO trial (7.74±2.7, 5.73±2.34, 7.32±2.99, 7.48±1.53 for the PRE, PRL, POST and AM, respectively). In contrast, values remained suppressed until the following AM for the PLA trial (7.29±2.30, 6.03±2.37, 5.76±2.18, 7.03±1.96 for the PRE, PRL, POST and AM, respectively). Conclusion: These data indicate that regular CHO supplementation during extended endurance activity better maintains the concentration of sIgA during a 10-hour period of extended work.

Supported by The Gatorade Sport Science Institute and The McNair Scholars Program.

Accuracy of consumer grade bioelectrical impedance analysis devices

S. Adamek, D. Parks, E. Hefferon, J. Penry, J. Swenberger & J. Peterson

Department of Health, Human Performance and Athletics, Linfield College, McMinnville, OR.

When it comes to tracking health and fitness, most rely on the scale to monitor weight. However, this is not the best way to keep track of one's health. Bioelectrical impedance analysis (BIA) devices used to measure body composition are becoming a popular consumer method of assessing one's body fat, a better predictor of health. Most current research compares laboratory grade BIA models to validated criterion methods, such as hydrostatic weighing. Purpose: The aim of this study was to compare body composition results from various consumer grade BIA devices to hydrostatic weighing. In addition, BIA results were compared to skin fold measures to investigate the relationship between BIA and body fat distribution patterns. Methods: Fifty-one volunteers ranging from 18-27 years (20.24 ± 0.22) enrolled in this study. Anthropometric measures included height, weight, skin-folds [9 sites both left and right side] and percentage body fat, assessed by consumer grade BIA devices; hand to hand (HH), Leg to Leg (LL), fingers to fingers (FF), and hydrostatic weighing (HW). All participants were required to adhere to standard BIA and hydrostatic guidelines prior to testing. This study was approved by the Institutional Review Board at Linfield College. Results: All three BIA devices moderately correlated (r ranged from 0.51 to 0.57, $p<0.01$) with hydrostatic body composition results, with LL having the highest correlation. However, when evaluated based on gender none of the BIA devices correlated significantly with hydrostatic weighing. In addition, LL had a stronger correlation to both upper and lower body skin fold measures ($r= 0.694, 0.756$, respectively, $p<0.01$). Conclusion: We conclude that the LL is the most accurate of the consumer BIA models studied. The consumer devices provide a quick estimate of body fat, however, due to variability, the consumer should be aware that they may not always be receiving

the most accurate assessment of their overall body composition.

Masters

Leg power responses of female collegiate volleyball players to three conditioning progams

P. Matern, V. Nethery, T. Iwamoto & J. Ruud

Exercise Science Laboratory, Central Washington University, Ellensburg, WA.

Leg power in volleyball is often assessed using the vertical jump performance measure because it accurately reflects the power component of spiking and blocking skills. Specific physical conditioning techniques such as weight lifting and plyometric exercises are directed to enhancing this skill component. However, the responses upon initial exposure to such conditioning programs may not be immediately positive and the time frame associated with performance enhancing adaptations is not clearly understood. PURPOSE: The purpose of this study was to examine the rate of change in leg power of collegiate female volleyball players to one of three conditioning programs: weight training (WT), plyometrics (P), and a combination (WTP). METHODS: Twenty collegiate volleyball players (mean age 19.2yrs) were assigned to one of the aforementioned training programs using a balanced design according to rank order of initial assessments (WT n=7; P n=7; WTP n=6). Subjects trained 35 (±5) minutes two times per week during their off-season and did not partake in any other structured conditioning program. Block jump and spike approach jump heights were measured at two-week intervals over the 8 weeks of training and adjustments were made in the training intensity following the week four assessment. RESULTS: Block jump and spike approach jump heights increased over the eight week period for all three conditioning programs ($p = 0.0001$). However, interaction existed between the type of conditioning program and program duration for both block ($p = 0.05$) and spike approach ($p = 0.007$) assessments. Jump heights remained unchanged for WT and P at 2-weeks while WTP decreased below baseline for both block (-0.92in) and spike approach (-1.5in) jumps ($p<0.05$). Generally, WT resulted in the most consistent jump responses over the four measurements while the P and WTP programs generated substantially more variability among the measurement periods. CONCLUSION: In general, WT and WTP resulted in the greatest increases in vertical jump performance (10±1%) compared to P (8±1%). The decreases observed in jump performance (primarily in P and WPT conditions) at both the two and six-week measures (intensity adjustment at four-weeks) suggests a level of skeletal muscle distress requiring more than two weeks to adapt back to pre-stress levels. An understanding of the dynamics of skeletal muscle adaptations to physical stress is important for appropriately adjusting conditioning program components.

Skin blood flow responses to handgrip exercise are not altered by L-NAME

G.R. McCord & C.T. Minson, FACSM

Department of Human Physiology, University of Oregon, Eugene, OR

Cutaneous vascular conductance (CVC) has been shown to decrease during pronounced whole body heating in response to an increase in arterial pressure during isometric handgrip exercise. As nitric oxide (NO) is known to contribute to cutaneous active vasodilation (AVD), we tested the hypothesis that NO-synthase inhibition would unmask a greater reduction in CVC during combined heat stress and isometric exercise. Two skin sites on the ventral surface of the forearm of three subjects were equipped with intradermal microdialysis probes for delivery of Ringer's solution (control site) and L-NAME to inhibit NO-synthase. Skin blood flow was monitored by laser Doppler flowmetry (LDF) at the microdialysis sites during passive heating with a water-perfused suit. An index of core temperature (T_c) was measured by sublingual thermister. Mean arterial pressure (MAP) was measured (Portapres) and CVC was calculated as LDF/MAP and expressed as a % of CVCmax. The first isometric handgrip (30% max for 3-min) was performed when LDF had doubled from baseline at the control site. CVC was unchanged at both sites. The second handgrip was performed when T_c was ≥ 1°C above baseline. CVC decreased at the control-site (-9.9 ± 1.8%CVCmax; $P<0.05$) while a decrease in CVC in L-NAME sites appeared to be dependent on the level of CVC prior to handgrip. These data suggest NO-synthase

inhibition does not unmask a greater decrease in CVC during isometric handgrip exercise.

Sponsored by NHLBI 70928

Effects of carbohydrate feeding on muscle glycogen and substrate oxidation during extended exercise in females

A.E. McClaughry, S.G. Harger, S.E. Gaskill, FACSM & B.C. Ruby, FACSM

University of Montana, Missoula, MT 59812. E-mail: AnneM704@hotmail.com

There has been limited research on carbohydrate (CHO) feeding during long duration exercise in females. Although previous research has reported rates of muscle glycogen use and fuel selection in females during exercise up to 2 hours in length, we are unaware of any data for exercise durations exceeding 2 hours. PURPOSE: To determine the effects of CHO feeding during 10-hours of moderate exercise on muscle glycogen and substrate utilization in females. METHODS: Six moderately trained females (age 23±3 yr, eumenorrheic and not taking oral contraceptives) served as subjects. Subjects performed a GXT on a treadmill (TM) and on an electronically braked cycle ergometer (C) to determine ventilatory threshold (VT) and VO_{2peak}. In a double blind, random crossover design, subjects ingested either a CHO (0.6g CHO/kg fat free mass (FFM) of a 20% maltodextrin solution) or placebo (PLA) drink each hour. Subjects completed ten, 60 minute bouts of exercise at 70% VT (46±6 and 45±7% VO_{2peak} for the C and TM, respectively). Each 60 minute bout consisted of 9 minutes of a self-selected intensity on the arm ergometer (double poling), 19 minutes on the C, 20 minutes on the TM, followed by a 10-minute rest and feeding period. A standardized lunch was provided (5.46 g/kg FFM CHO, and 1.31 g/kg FFM protein) during both trials after the fifth hour. Muscle biopsies were taken pre- and post-exercise on the vastus lateralis, and metabolic gases were collected every other hour on the TM. Blood glucose was continuously measured throughout the day with an indwelling glucose sensor, and total urine void was collected. RESULTS: Whole body CHO oxidation on the TM was significantly higher during the CHO trial (269.1±64.1g) compared to PLA (209.6±45.8g, p=0.0012). Rates of muscle glycogenolysis were also significantly lower during the CHO trial (2.5±1.8 and 5.4±2.2 g/kg wet wt./hr, for CHO and PLA respectively, p=0.048). Blood glucose and RPE were similar for both trials. Total urinary nitrogen was also similar for both trials (525.2±455.3 and 617.7±508.2 mg/dl, for CHO and PLA respectively, p=0.1417). CONCLUSION: These data indicate regular CHO feedings during long duration exercise increase overall CHO oxidation while lowering rates of muscle glycogenolysis during 10 hours of moderate intensity intermittent exercise in females.

Supported by Gatorade Sport Science Institute

The acute effects of high intensity dynamic resistance exercise on sprint performance

R. Thomas, C. Harris, R. Pfeiffer & J. Moore

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PURPOSE: High intensity warm-up (HIW) has been shown to enhance short-term power (e.g. vertical jump performance). However, the potentiating effect of a HIW on a 40-yard (36.6 meter) sprint, a widely recognized power performance assessment, has not been studied. The purpose of this study was to assess the effects of a HIW involving a 3-RM back squat on 36.6-meter sprint time and split times for 9.1 and 18.3 meters.

METHODS: Ten men and three women (recreational athletes) (Age: 21.5±3.9 yrs, Ht: 175±5.3 cm, Wt: 82.0±16.6, 3RM Squat: 124.1 ± 30.2 kg) volunteered for the study. Each subject participated in both control (C) and treatment sessions in a randomized cross over design. In the C session, subjects performed a 5-minute light aerobic warm-up followed by static stretching 4.5 minutes before completing two 36.6-meter sprints. The treatment session was a HIW consisting of 4 sets of 3 repetitions of back squats at sub-maximal percentages, followed by 1 set of 3 repetitions at a 3RM weight. Two 36.6-meter sprints were run 4.5 minutes after the HIW. Fastest sprint times of the two trials were compared between C and HIW using a repeated-measures ANOVA.

RESULTS: No significant differences were found in 36.6-meter mean times as well as 9.1 and 18.3 meter split times following the treatment protocol (p>0.80).

Condition	36.6 meter	18.3 meter	9.1 meter
Control (C) mean±sd	5.16±0.44	2.82±0.23	1.57±0.14
Treatment (HIW) mean±sd	5.14±0.42	2.79±0.18	1.57±0.14

CONCLUSION:

The author concludes that the postactivation potentiation protocol used in this study was not a viable means of acutely enhancing explosive strength performance in recreationally trained individuals.

EECP effects on peripheral circulation

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Enhanced external counterpulsation (EECP) is a noninvasive treatment for patients with coronary artery disease (CAD). EECP has been shown to improve coronary perfusion. However, it is unclear if EECP can improve cutaneous vascular function. PURPOSE: We tested the hypothesis that EECP would increase the cutaneous vascular conductance (CVC) responses to various stimuli in the forearm. METHODS: In 6 subjects with CAD, we assessed CVC responses to local heating, reactive hyperemia, and iontophoresis of 2% acetylcholine (ACh) and 2% sodium nitroprusside (SNP) solutions. All subjects were tested pre and post EECP. Red blood cell flux was measured using laser-Doppler flowmetry (LDF) and CVC (LDF/mean arterial pressure) was normalized to maximal vasodilation via local heating to 43.5°C. For local heating skin temperature was increased at two sites from a baseline temperature of 33°C to 42ºC at a rate of 0.5°C every 5 seconds. RESULTS: Baseline, initial peak, nadir, and secondary plateau CVC responses to local heating showed no significant differences from pre and post EECP treatment. For reactive hyperemia, baseline, peak, and area under the curve showed no significant differences from pre and post-EECP treatment. Similarly, there were no significant differences in the CVC response to ACh or SNP iontophoresis from pre to post treatment. CONCLUSION: These data suggest EECP treatment does not improve measures of cutaneous vascular function.

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Effects of carbohydrate supplementation on substrate utilization, during ten hours of exercise

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The majority of previous research has shown that carbohydrate (CHO) supplementation during continuous exercise does not spare muscle glycogen. However, much of this research has been performed over short periods of time (<3 hours) at moderate to high intensities. PURPOSE: This study evaluated the effects of CHO supplementation on whole body and muscle substrate utilization during prolonged, discontinuous exercise. METHODOLOGY: Seven recreationally trained males performed a GXT on a treadmill (TM) and electronically braked cycle ergometer to determine ventilatory threshold (VT) and VO_{2peak}. In a double blind, random crossover design, subjects received either a CHO [20% maltodextrin (0.6g/kg FFM/hr)] or placebo (PLA) drink each hour. TM exercise was performed at 41±2% VO_{2peak}, and 69±2% VT. Cycle ergometer exercise was performed at 42±1% VO_{2peak}, and 72±4% VT. Hourly exercise included 9 minutes on an upper body ergometer, 19 minutes on the cycle ergometer, and 20 minutes on the treadmill, followed by a 10-minute rest and feeding period. A standardized lunch (5 g/kg BW CHO, and 1.2 g/kg BW PRO) was provided after hour five for both trials. Muscle biopsies of the vastus lateralis were performed pre- and post-exercise, and expired gases were collected every other hour during the TM segment. Blood glucose (BG) was measured continuously using an indwelling glucose sensor, and total urine void was collected. RESULTS: The rates of total CHO oxidation on the TM were significantly higher during the CHO trial (331.0±24.7, and 221.4±37.9g, for CHO and PLA, respectively, p=0.0001). There were no significant differences in pre-exercise glycogen between the trials (174.94±43.05, and 172.4±53.3 g/kg wet weight, for CHO and PLA respectively, p=0.7829). However, post-exercise glycogen concentration was significantly lower following the PLA (135.2±42.0, 109.35±32.2 g/kg wet weight, for CHO and PLA respectively, p=0.0274). No differences in BG or RPE

between trials were observed. Total urinary nitrogen output was also similar for both trials (483.0±429.4 and 609.7±461.2 mg/dl, for CHO and PLA respectively, p=0.1696). CONCLUSION: These data suggest that regular CHO feedings during extended exercise increases whole body CHO oxidation and has a small glycogen sparing effect over 10 hours of exercise. This may partially explain the ability to maintain exercise intensity or self-selected work rates over long periods of activity.

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Energetic responses to freestyle swimming in younger and older trained male swimmers: a preliminary analysis

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As one ages, there are changes in functional capacity which lead to athletic performance decrements. In swimming, declines in performance become exponential at approximately 40 years of age (Donato et al. JAP, 2003). Surprisingly, little work has been conducted in examining those physiological changes that lead to performance decrements in an older swim trained population. PURPOSE: The purpose of this study was to compare the energetic response to freestyle swimming between younger and older trained male swimmers. METHODS: Seven trained collegiate (age, 20±1.9 yrs, 18-24) and six trained older (age, 48±8.7 yrs, 40-64) male swimmers participated in this investigation. Expired air was collected via a snorkel apparatus (indirect calorimetry) during a series of submax (steady velocity) and one max swim. Each of the swims was 274.3 m (300yds) with expiratory air collected over the final 45.7-68.5 m (50-75 yds). Blood lactate (Bla; YSI Analyzer) for each exercise effort was also determined. RESULTS: The younger swimmers were lighter (77.9±10.3 vs 83.7±12.4 kg, p=0.39), had a lower % adipose tissue (13.9±3.6 vs 22.9±6.3, p=0.008), and were equal in height (1.8 m) compared to the older swimmers. VO_2 peak ($l \cdot min^{-1}$) tended to be greater for the younger (4.24±0.51, 3.33-4.84) versus the older swimmers (3.65±0.65, 3.05-4.67) (p=0.09). On average, the younger swimmers had a greater HR max (180±6 bpm, 171-187) compared to the older group (171±16 bpm, 153-195) (p=0.19). No difference in peak lactate was found between the younger (9.38±1.75 mM, 7.57-11.97) and older (9.99±2.96 mM, 6.73-13.77) swimmers. Swimming velocity at a given metabolic power value of 800 Watts was similar between the younger and older swimmers, 0.94±0.09 $m \cdot s^{-1}$ and 0.93±0.10 $m \cdot s^{-1}$. CONCLUSIONS: Nearly identical velocities at a metabolic power output of 800 Watts suggests that both the younger and older swimmers were able to apply the same amount of mechanical power into overcoming drag (useful swimming power). This finding suggests that younger and older trained swimmers have a similar propelling efficiency during submaximal freestyle swimming. The lower peak aerobic power in the older group with no apparent differences in submaximal propelling efficiency implies that at a given swimming velocity, the older group would work at a greater relative physiological load. This may compromise performance in a swimming event which requires a great rate of aerobic energy contribution. A limitation of this study is the low participant numbers. Irregardless, this investigation does provide some initial insight into the energetics of freestyle swimming between younger and older trained swimmers.

A lab-based test to evaluate pedometer longevity

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Purpose: Numerous studies have evaluated the step counting accuracy of commercially available pedometers. The longevity of pedometers (maintenance of step counting accuracy with repeated use), however, has yet to be determined or reported in the literature. The purpose of the present study was to test the efficacy of a lab-based protocol for measuring pedometer longevity using three commercial pedometer brands. Methods: 3 brands of new, commercially available pedometers (n = 10 each) were tested (hereafter identified as DW701, SL345, and MCST). To simulate habitual use of the pedometers during walking activities, each brand of pedometer was mounted to a modified bench

orbital shaker. The shaker was mounted to a table and turned 90˚ so that the oscillations of the shaker table simulated movement of the pedometers when worn at the waist. The shaker oscillated at 2.5 Hz which corresponded to one step accumulation on a pedometer per cycle and approximated a 80.4 m/s (3.0 MPH) walking speed when compared to the output from an activity monitor. Prior to testing on the shaker, the accuracy of each pedometer was verified using a treadmill walking test. Pedometers were worn (one at a time) by a lab technician while walking on a treadmill at 80.4 m/s for exactly 50 steps on 3 successive trials. Actual step count for each trial (50 steps) was verified using a hand tally while the pedometer step count was recorded and set to zero between trials. A pedometer was considered to have "failed" the treadmill test if the average pedometer step count (over the 3 trials) differed from the actual step count by ±5 steps. Non-failed pedometers were then mounted to the shaker and set (using an automated timer) to accumulate approximately 100,000 steps before retesting on the treadmill for step counting accuracy. The average number of steps accumulated prior to failing the treadmill test was recorded for each pedometer. Each pedometer was tested until failure or until a high accumulation of steps without failure (ie. 2-2.5 million). Differences between the 3 brands were evaluated using a 1-factor ANOVA at the 0.05 alpha level. Results: The DW701 accumulated significantly more steps (Mean±SE: 2.38±0.03 million steps) than either the SL345 (0.71±0.06 million steps) or the MCST (0.25±0.03 million steps). All of the SL345 and MCST pedometers were tested until failure while testing the DW701 pedometers were stopped due to high step counts without failure. Conclusions: The lab-test of pedometer longevity provided a clear stratification between the three pedometer brands tested. This type of test may be useful to perform prior to using any pedometer brand for large-scale physical activity tracking or intervention studies.

Effects of a dynamic resistive exercise warm-up on subsequent shot put performance

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PURPOSE: Research has shown that contractile force can be increased when it follows a potentiating activity incorporating brief maximum voluntary contractions. The purpose of this study was to investigate the extent to which a strength training exercise can be used as a method of acutely enhancing the performance of a standing shot put throw.

METHODS: Nine male and female collegiate shot-putters and multi-event athletes were pooled for this study (age: 20.1±1.5 years, height: 1.85±0.1 m, mass: 99.2±22.4 kg). Subjects threw the shot put following two randomly assigned warm-up conditions. A control warm-up (C) incorporated static and dynamic stretching. The treatment warm-up (T) consisted of a power jerk workout of three sets of two repetitions performed at 85% of 1-RM. Starting 5 min after T and C, subjects threw 3 series of 2 throws with 3 min rest intervals. Kinematic data for the release velocity of the shot put was collected at 250 Hz using a six-camera infrared motion capture system. A repeated measures ANOVA was used to compare the average calculated distance of each throw across conditions.

RESULTS: There were no significant differences in calculated throwing distances between treatment and control conditions. The average distances (Mean±SD) were 8.69+2.19 m (C) and 8.83+1.22 m (T) for the first series, 9.57±1.88 m (C) and 10.29±1.23 m (T) for the second series, and 9.37±1.88 m (C) and 9.74±0.79 m (T) for the third series.

CONCLUSION: Although results were not significantly different at a statistical level the results do indicate a practical application. The difference between the treatment and control group in the second series measures 0.72 meters. In a competitive situation this difference, although not statistically significant, can have tremendous implications in terms of rankings and medal placing.

Reliability for two measures of upper body power output in cross country skiers

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Measures of upper body power (UBP) in cross country skiers have been shown to correlate highly with skiing performance in youth and adults. A

new UBP ergometer was recently constructed for the purpose of designing and testing new UBP test protocols. PURPOSE: This study was designed to evaluate the test-retest reliability of two new UBP protocols in trained skiers across two separate days using the new UBP ergometer. METHODS: Six men (Mean±SD: 31±7 yrs, 37.8±6.6 yrs, 176.7±6 cm body height, 72.5±4 kg body mass) and two women (31±7 yrs, 158±0.2 cm, 55.9±8.9 kg), all with extensive ski racing experience, participated in two identical lab visits within 24 hrs to two weeks of each other. The new UBP ergometer required the subject to stand on a raised platform and simulate a double-poling motion by pushing on two ski poles attached to a resistance-loaded trolly. For a given flywheel resistance, power output could be increased by the subject by either pushing on the ski poles harder, increased poling frequency, or both. After a 5-8 min warm-up on the UBP ergometer, two 10 sec UBP tests were performed which required subjects to perform a 20 sec ramp-up of power output and then maintain the highest average power output possible over the last 10 sec (UBP10, W). The highest UBP10 value over two successful trials was recorded for subsequent reliability calculations. The second test required subjects to maintain the highest average power output over a 60 sec period (UBP60, W) without a ramp-up phase. All tests were separated by three mins of complete rest and the UBP60 test always followed the UBP10 tests. Subjects who had never performed UBP tests prior to this study returned for a third visit (first visit data not used for data analysis). Intraclass correlations (RXX, reliability for stability) were computed across two days of measurement for UBP10 and UBP60 and determined using a 1-factor RM ANOVA and the standard error of measurement (SEM). RESULTS: Mean values for UBP10 and UBP60 across the first (Mean±SE: 208.1±21.0 W and 210.4±21.6 W, respectively) and second days of testing (164.4±15.5 W and 161.8±15.5 W, respectively) did not differ significantly (P = 0.55 and 0.39, respectively). Intraclass correlations were high for both UBP10 and UBP60 whether computed across two days of measurement (R_{XX}>0.99) or extrapolated for a single measurement (R_{XX}>0.98). SEM was ±2.7 W (95% CI: ±5.4 W) for UBP10 and ±2.0 W (95% CI: ±3.9 W) for UBP60. CONCLUSION: These data indicate that both the UBP10 and UBP60 tests were highly repeatable across two days of measurement in trained cross country skiers.

Hypercapnia and cutaneous vascular tome

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Little is known about the cutaneous sympathetic or vascular response to hypercapnia. This study investigated the effect of acute hypercapnia on cutaneous vascular regulation. Twelve healthy subjects were instrumented with two microdialysis fibers in the ventral forearm. Each site was continuously infused with Ringer's (control) or bretylium tosylate (10mM) to prevent sympathetically mediated vasoconstriction. Skin blood flow was assessed at each site (laser-Doppler flowmetry) and cutaneous vascular conductance (CVC) was calculated (red blood cell flux/mean arterial pressure) and scaled as % maximal CVC (local heating to 43ºC). Adequacy of bretylium administration was verified via whole body cold stress. Subjects were exposed to normoxic hypercapnia, raising end-tidal P_{CO2} (infrared capnography) 5 torr above that of eucapnia (38±2torr), and normoxic isocapnic hyperpnea, matching hypercapnic tidal volume and breathing frequency. During hypercapnia, CVC in the control site increased from 8.5±1.5 to 9.4±1.6%CVC_{max} (Δ11.7% from baseline, P<0.05) and CVC in the bretylium site did not change (8.0±1.2 to 8.3±1.4%CVCmax; P=0.32). During hyperpnea, neither site showed a change in CVC. Thus, acute hypercapnia causes an increase in CVC that appears to be mediated by a decrease in sympathetic vasoconstrictor tone. In addition, this increase in CVC appears to be independent of changes in ventilation.

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The effects of a prophylactic ankle/foot support on motor performance

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Acute sprains of the ankle area are common in individuals who participate in athletic activities. Efforts have been made to prevent sprains during training and competition by employing various

ankle support techniques (i.e., taping, bracing). A common concern is that supporting the ankle may limit athletic performance, and consequently, may discourage athletes from using prophylactic ankle support devices. PURPOSE: To assess the effects of a prophylactic ankle brace (semi-rigid, softshell, McDavid brace) on jumping and sprinting ability, explosive power, and agility. In addition, this study evaluated the support effectiveness of the McDavid brace before and after exercise. METHODS: In a randomized, counterbalanced design, thirteen healthy collegiate males performed a series of motor tasks with ankles unsupported (no brace) or supported (McDavid brace). Motor tasks included vertical and horizontal jumps, stair run test for assessment of power, and agility (sprinting and changing directions around a designated course). In addition, participants performed a five minute exercise bout in which ankle/foot range of motion (goniometer) was assessed before and after exercise. RESULTS: The McDavid brace was found to decrease left and right ankle/foot plantar flexion, dorsiflexion, inversion and eversion motions ($p<0.05$). Vertical jump (57.1±2.1 vs. 55.6±1.7 cm), and standing broad jump (232.6±6.6 vs 226.4±6.8 cm) performances declined when the ankles were supported ($p<0.05$). Time required to run the agility course was not statistically different between the unsupported (17.04±0.33 s) and supported (17.21±0.36 s) trials ($p=0.16$). In general, there was no change in ankle/foot range of motion during the supported trial as a result of performing five minutes of continuous exercise involving jumping, running and side to side movement tasks. Based on questionnaire responses, the subjective support and comfort offered by the brace was rated toward excellent. CONCLUSIONS: The McDavid brace restricted ankle/foot range of motion and was effective in maintaining it's support effectiveness during an acute exercise bout involving jumping, running and quick side to side movements. The brace did not impact agility or explosive power as measured by a stair run test. Although vertical and standing broad jump ability were compromised, the practical implications and consequences on the athletic field of such modest decrements remains unknown.

Low-moderate intensity aerobic exercise improves quality of life indices and emotional distress in cancer survivors

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Cancer diagnosis and treatment is often accompanied by serious physiological and psychological side effects including: decreased aerobic capacity, muscular atrophy, body composition changes, fatigue and depression. These side effects can greatly reduce the quality of life (QOL) and increase emotional distress in cancer survivors. QOL can be defined as overall wellbeing and satisfaction with life, and encompasses the physical, psychological, social, emotional, and spiritual aspects of wellbeing. Exercise has been shown to be a useful tool in improving QOL in those rehabilitating from cancer treatment. However, the extent to which specific indices of QOL and measures of emotional distress are affected by exercise participation in cancer patients is unclear. PURPOSE: The purpose of this study was to examine which aspects of QOL and measures of emotional distress change as a result of aerobic exercise. METHODS: Twenty-nine survivors of cancer (26 Female and 3 male, 40-79 years of age) served as subjects. The subjects performed low to moderate (30-60% heart rate reserve) intensity aerobic exercise, three times a week for ten weeks. The Quality of Life Index for Patients with Cancer was administered to subjects prior to the onset and at the conclusion of the ten weeks of exercise. This scale is composed of 14 items evaluating physical condition, normal activities, and personal attitudes on general quality of life. Additionally, the Linear Analogue Self-Assessment (LASA) Scale was administered to subjects prior to the onset and at the conclusion of the ten weeks of exercise. LASA scale is composed of 6 items measuring fatigue, anxiety, confusion, depression, energy, and anger. RESULTS: Overall QOL improved significantly over the 10 week period ($p<.001$). Improvements in the indices of QOL included: significant improvements in sleep ($p<.02$), strength ($p<.0006$), ability to work ($p<.007$), and worry about cost of medical care ($p<.005$). The LASA scale showed significant decreases in fatigue ($p<.036$) and anxiety ($p<.004$), and an increase in

energy (p<.0002). CONCLUSION: These results indicate that low to moderate intensity aerobic exercise positively effects overall QOL, indices of QOL and measures of emotional distress in post-treatment cancer survivors. Programs such as these may be an important tool in the rehabilitation of cancer survivors.

Effect of supplemental feeding on cognitive function in wildland firefighters during arduous fire suppression

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Our laboratory has previously revious field research with wild land firefighters has shown that ingesting supplemental liquid carbohydrate can maintain blood glucose levels and allow for increased total daily work and self selected exercise performance without affecting firefighter's perception of work intensity (RPE). PURPOSE: To examine the effect of supplemental carbohydrate feeding on reaction time, mathematical processing, sleepiness, blood glucose, physical activity, and rate of perceived exertion in wild land firefighters during 12-hour shifts of arduous fire suppression. METHODS: Subjects were members of three hot shot crews. Two trials were performed, one ingesting a carbohydrate solution and one ingesting a placebo solution. 200 ml were consumed every hour except for the first hour post breakfast and post lunch. Activity monitors were worn and RPE and job task were recorded. Subjects performed the cognitive tests, and recorded blood glucose before breakfast, right before starting their shift, and immediately post shift. RESULTS: When ingesting carbohydrate, subjects were able to maintain blood glucose and were more active. There were no significant differences in sleep score, RPE, and mathematical processing. Mean reaction on the four choice test decreased with carbohydrate, while the number of correct responses per minute of response time increased. CONCLUSION: Subjects were more alert at the end of the shift, giving some evidence that longer work shifts may be possible. Though there were some statistically significant findings in this study, these may not be practically significant. The cognitive tests used, though valid, may not be appropriate measures of decision making ability for wildland firefighters.

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Use of a wireless multi-channel physiological monitoring system during a half-Ironman Triathlon: a case study

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PURPOSE: The purpose of this study was to determine core, skin, and ambient temperature, drinking characteristics, power output, total energy expenditure (TEE), and supplemental carbohydrate intake during a half-ironman triathlon. METHODS: A recreationally competitive male triathlete served as the subject in this case study. A week prior to the event, VO_2 and VCO_2 were collected during three submaximal stages for each event (swim (S), bike (B), and run (R)) to establish regression equations. During the race, core, skin, and ambient temperature, heart rate (HR), power output, drinking characteristics, carbohydrate (CHO) intake, and event times were recorded. RESULTS: The average pace/intensity for each event was 0.98 m/sec (S), 31.02 km/hr and 257 watts (B), and 13.80 km/hr (R). Mean temperature values (˚C) for each segment of the race were as follows: core temperature (38.1, 38.6, 38.7), posterior neck (25.0, 24.6, 28.5), left chest (26.8, 18.9, 25.8), and ambient temperature (26.6, 16.7, 22.4) for the S, B, and R, respectively. The mean HR was 169 and 157 for the S and B, respectively. Estimated energy expenditure (EE) for each portion of the race was 2.6, 11.0, and 6.2 MJ for the S, B, R, respectively (total 19.8 MJ). The relative contribution from CHO represented 74% of TEE (14.7 MJ) with an exogenous intake of 6.3 MJ from liquid, gel and solid sources. During the B segment of the race, the total volume of fluid consumed was 1.16 L with a total of 44 drinks (26.36 ml/drink). The overall finish time was 5:01:43 (4th place overall), with split times of 32:48, 2:54:19, and 1:31:39 for the S, B, R, respectively. During the bike segment of the race, the correlation between power output and heart rate was 0.92, while the correlation between power output and core

temperature was 0.62. CONCLUSION: These data indicate the potential to track complex physiological data under competitive field conditions and demonstrates the versatility of a wireless digital activity monitor to collect data.

Automated external defibrillators in collegiate athletic training programs

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Automated External Defibrillators (AEDs) are a key component in the prevention of death from sudden cardiac arrest. The incorporation of AEDs into collegiate athletic training room cardiopulmonary emergency protocols is accompanied by controversy and affected by many variables.

PURPOSE: The purpose of this project was (a) to establish a descriptive picture of AED ownership and use, and (b) determine the predictability of ownership and use based upon variables identified from the data obtained in collegiate athletic training programs.

METHODS: Head certified athletic trainers (ATCs) at 325 National Collegiate Athletic Association (NCAA) Division I institutions were asked to complete an online survey: Automated External Defibrillators (AEDs) In Collegiate Athletic Training Programs to investigate the existence, use, and perceived need for AEDs within the athletic training room setting. The survey included the topics of the athletic training profession, emergency care by the athletic training staff, cardiovascular preparticipation screenings, and AED use and placement in athletic training rooms.

RESULTS: Consistent differences ($p \leq 0.05$) were found between the predictor variable AED ownership and relevant criterion variables: 1) Division membership, 2) preparticipation screening protocol, 3) who conducts the screenings, 4) cardiopulmonary emergencies, 5) emergency protocol, and 6) intent to purchase. Consistent differences were found between the predictor variable willingness to purchase and relevant criterion variables: 1) emergency protocol, 2) preparticipation screening protocol, 3) funding barrier, 4) who should purchase, and 5) AED ownership. When combined, the eight variables demonstrated an important level of predictability (71%).

CONCLUSION: This research provides a descriptive picture of the ownership and use of AEDs in Division I collegiate athletic training programs, but it also illustrates the underlying debate regarding AEDs. The variables that predict AED ownership are extremely broad and do not exist singularly. The NCAA and the National Athletic Trainer's Association (NATA) should use this research to educate ATCs and support future legislation for AEDs in collegiate athletic training programs.

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Energy expenditure and fuel use during running, cycling, and water exercise at a givem perceptual load

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Little research is available regarding energy expenditure and whole body fuel use during different modes of activity at a given perceptual load. PURPOSE: To examine energy expenditure and whole body carbohydrate (CHO) and fat oxidation during treadmill running (TR), cycling (CE) and shallow water exercise (SWE) at a given perceptual load. METHODS: Twelve healthy, recreationally active females (age, 18-32 yrs) performed a series of submax and one max effort for TR, CE and SWE. Open-circuit spirometry was employed to measure metabolic response for each exercise mode. Oxygen uptake (VO_2) and respiratory exchange ratio were utilized to determine energy expenditure (EE) and whole body CHO and fat oxidation. Blood lactate (Bla; YSI Analyzer) and RPE (Borg Scale, 6-20) for each exercise effort was also determined. RESULTS: Peak VO2 ($l \cdot min^{-1}$) for TR, CE and SWE was 2.81±0.09*, 2.67±0.10, and 2.53±0.11 (*$p<0.05$, TR vs SWE). Peak Bla for TR, CE and SWE was 7.9±0.6*, 11.5±0.6+ and 7.1±0.6 mM, respectively (*TR vs SWE, +CE vs TR & SWE, $p<0.05$). The relative physiological load (% VO_2 peak) during the submax efforts for TR ranged from ~ 45-85 (RPE, 8-16), while values ranged from ~ 20-80% for CE (RPE, 7- 17) and SWE (RPE, 7-16). On average, submaximal Bla was greater for CE (2.1±0.2 mM) compared to TR and SWE (1.6±0.1 mM) ($p<0.05$). Overall, RPE for TR, CE and SWE for the submax

efforts was similar, ~11-12. At a given perceptual load (RPE, 11-12), EE (kcal·min^{-1}) was greatest for TR (8.9±0.2) followed by SWE (6.7±0.3) and CE (6.2±0.3) ($p<0.05$). CHO oxidation (kcal·min^{-1}) for TR, CE and SWE was 5.9±0.3 (~66% of EE), 4.8±0.3 (~77% of EE) and 4.3±0.3 (~64% of EE) ($p<0.05$), whereas fat oxidation was 3.0±.2, 1.4+0.1, and 2.3±0.2 kcal·min^{-1}, respectively ($p<0.05$). % VO_2 peak for TR, CE and SWE was 64.1±1.4*, 45.8±2.2, and 51.1±2.5 (*$p<0.05$, TR vs CE & SWE). CONCLUSIONS: At a given perceptual load (RPE, ~11-12) an activity that incorporates both the upper and lower extremities and is weight bearing, such as running, elicits the greatest rate of energy expenditure compared to non-weight bearing modalities. Cycle ergometry, which presumably utilizes a smaller muscle mass at a given perceptual response, appears to rely more heavily on anaerobic metabolism (greater Bla and relative CHO oxidation) compared to locomotion using both upper and lower extremities (TR and SWE). Furthermore, a non-weight bearing activity performed in a water medium versus land (SWE vs. CE) results in a greater relative reliance on fat oxidation

Assessment of a portable metabolic measurement system during submaximal cycle treadmill exercise

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PURPOSE: The purpose of this study was to evaluate the validity and reliability of a portable light-weight metabolic analysis system during submaximal exercise intensities. METHODS: Thirteen apparently health subjects (age: 21.9 ± 0.4 yrs; height: 175.1 ± 2.6 cm; weight: 75.3 ± 4.3 kg; %BF: 15.0 ± 1.8) were recruited. Each subject exercised on a treadmill (rest, 2, 3, 4, 5, and 6 miles per hour (mph)) and a cycle ergometer (rest, 50, 75, 100, 125, 150, and 175 Watts). Each subject exercised for five minutes at each exercise intensity. Expired air was collected and simultaneously analyzed for oxygen consumption (VO_2), carbon dioxide production (VCO_2), minute ventilation (VE), fraction of expired oxygen (F_{EO2}) and fraction of expired carbon dioxide (F_{ECO2}) by two computerized metabolic instruments. Data collected over the last two minutes were averaged and compared. A two-way ANOVA with repeated measures (instrument X stage) was used to identify differences between the two metabolic systems during each stage of the submaximal exercise test. Pearson's correlation coefficient was used to identify relationships between the two instruments. RESULTS: Oxygen consumption, VCO_2, and VE increased significantly ($P< 0.05$) with increased exercise intensity. During the treadmill test, oxygen consumption and VE were significantly different between the two systems at rest. Carbon dioxide production measured by the portable system was significantly higher at rest, 2.0, and 4.0 mph. On the other hand, F_{EO2} and F_{ECO2} were not significantly different between instruments. During the cycle ergometer test, VO_2, and VE were not significantly different between instruments at 50, 75 and 100 Watts but the portable system was significantly higher at rest and significantly lower at 125, 150 and 175 Watts. Carbon dioxide production was significantly different at all exercise intensities between systems. F_{EO2} assessed by the portable system was significantly higher at 125, 150, and 175 Watts. On the other hand, F_{ECO2} was not significantly different between instruments. Finally, correlations for VO_2 values between the two systems were $r\geq0.85$. CONCLUSION: These results indicate that this particular portable light-weight metabolic analysis system can be used in the assessment of oxygen consumption, especially at low and moderate exercise intensities. However, at higher exercise intensities, especially if a cycle ergometer is used, the portable metabolic instrument does not present equally valid results.

Effects of carbohydrate feedings and prolonged exercise on cognitive functioning

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PURPOSE: The purpose of this study was to examine the effects of carbohydrate supplementation on performance of cognitive tasks measured regularly during a 10-hour extended exercise session. METHODS: Six female subjects participated in two prolonged exercise trials consisting of 9 minutes of a self-selected intensity on the arm ergometer (double poling), 19 minutes of cycling (46±6% VO2peak), 20 minutes of walking (45±7% VO2peak), followed

by a 10-minute rest and feeding period. Prior to the trials, to prevent learning effects from being reflected in the cognitive scores, subjects were trained to use the ARES cognitive functioning software, which evaluates memory, mathematical, and grammatical aptitude. During one trial subjects ingested a carbohydrate beverage (0.6g CHO/kg fat free mass (FFM) of a 20% maltodextrin solution); during the other trial, subjects ingested a placebo solution. Subjects completed the cognitive test at three different times during each trial: (1) prior to exercise and before eating breakfast (2) after hour five of exercise and prior to eating lunch and (3) between hours nine and ten of exercise. RESULTS: There was no significant difference between the two trials in response time, accuracy, or throughput in any of the cognitive-functioning tasks. Additionally, no significant difference was found in each of the three areas throughout each trial or across times during the two trials. During each trial, throughput of each task tended to increase throughout the day. Response time and accuracy measures of the three tasks did not demonstrate any trends between or within trials. CONCLUSIONS: The results from this study suggest that cognitive functioning is not influenced by carbohydrate supplementation during prolonged laboratory exercise.

Supported by Gatorade Sport Science Institute

Doctoral

Determination of total energy expenditure of dog sled drivers during the 1049-mile Iditarod Race

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The Iditarod dog sled race provides a unique opportunity to study the rate of human energy expenditure during extended exercise with the added challenges of sleep deprivation, extreme cold and the management of a large team of dogs. In addition, the distribution of macronutrients and the fitness of the driver are important in order to guide the team through steep and icy conditions during a multi-day race. PURPOSE: The purpose of this study was threefold: (a) to assess the total energy expenditure (TEE) of the musher, (b) to determine the distribution of macronutrients ingested during the race and (c) to estimate the fitness level of the dogsled driver (musher) prior to the race. METHODS: Five mushers from the Iditarod sled dog race were recruited as research subjects to receive doubly labeled water, with three agreeing to monitor food intake. Four out of the five subjects completed the entire race. Pre-race estimate of aerobic fitness (VO_{2peak}) using a multi-stage bench stepping protocol were also determined. RESULTS: Doubly labeled water data demonstrated an average TEE of 20.8 $MJ \cdot d^{-1}$ (4972 $kcal \cdot d^{-1}$) from Anchorage to Nome for our male subject, with an average of 11.8±1.7 $MJ \cdot d^{-1}$ (2808±397 $kcal \cdot d^{-1}$) for the female subjects during the race. Food records suggested an average distribution of macronutrients of 1.5±0.4, 3.9±0.4 and 1.7±0.9 $g \cdot kg^{-1}$ for protein, carbohydrates and fats, respectively. Estimated VO_{2peak} was 66.2 $ml \cdot kg^{-1} \cdot min^{-1}$ and 50.0±8.4 $ml \cdot kg^{-1} \cdot min^{-1}$ for the male (n=1) and female subjects (n=4), respectively. CONCLUSION: These data demonstrate that dogsled drivers, with an above average estimated VO_{2peak}, maintain consistent, high daily total energy expenditure (TEE) throughout all phases of the race.

☆☆☆☆☆☆

Additional Abstracts —Not for student Competition—

Effects of an electronic peripheral cooling device on core temperature and performance in the heat

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Previous research conducted, using an electronic peripheral cooling device on the hand, has not shown significant effects on core body temperature. However, this research has been done at one set cooling temperature (22C). Purpose: The purpose of this study was to determine the effects of an electronic peripheral cooling device on core body

temperature and exercise performance in the heat when set at three predetermined cooling temperatures (22ºC, 19ºC, and 16ºC). Methodology: Six subjects participated in this study, three male and three female. Preliminary testing was done on each subject to determine cycle VO_{2peak} and ventilatory threshold (VT). Three trials were performed by each subject in random order using a peripheral cooling device worn on the left hand. Each trial was performed in a climate controlled heat chamber on an electronically braked cycle ergometer. The temperature of the heat chamber was set at 32.2ºC for every trial. Each trial consisted of 30 minutes of cycling at 75% of VT with a 5 minute seated rest followed by a 5 kilometer time trial on the cycle ergometer which was then followed by 15 minutes of seated rest/recovery. Subjects were treated with electronic peripheral cooling via a hand device during the 30 minutes of cycling at 75% of VT, the 5 minute rest period, and the 15 minute recovery period. No treatment was provided during the time trial. Core body temperature was measured rectally and heart rate was recorded every 5 minutes during each trial. Time trial performance was recorded as finish time and mean power output (watts). Results: The average time trial time was significantly lower during the 16ºC trial compared to the 22ºC trial (8.83±1.08 and 9.54±1.68). The power output during the 16ºC time trial was also significantly higher compared to the 22ºC time trial (247±61 and 217±78). No significant differences were found in heart rate response between trials. Core body temperature difference between trials was minimal. During the 19ºC trial core temperature was decreased during the first 5 minutes of the 15 minute recovery period compared to the other trials. Conclusion: These data suggest that cooling via the electrical peripheral cooling device will enhance exercise performance in the heat when provided at a plate temperature of 16ºC. However, peripheral cooling has a minimal effect on core body temperature and heart rate response.

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IL-6, CPR and CK response to a 32.2-kilometer trail race in experienced and novice runners

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In a preliminary study (n=8) we found that female runners with extensive mountain trail endurance racing experience had a more pronounced interleukin-6 (IL-6) response to a 32.2-killometer trail race with 631 meters of ascent and 883 meter of descent (Ed Anacker Bridger Ridge Run). We hypothesized that a protective effect related to the inflammatory response may occur with habituation to rigorous downhill running leading to a higher response of IL-6. The impact of this difference on C-reactive protein (CRP) and creatine kinase activity (CK) responses is unknown.

PURPOSE: To determine whether experienced runners differ in their IL-6, CRP, and CK responses following the Ed Anacker Bridger Ridge Run. METHODS: Twenty-seven endurance-trained runners (14 male, 13 female) registered for a 32.2-kilometer trail race were divided according to history of at least three previous Ridge Runs or at least two ridge runs and at least one ultra (>42.2 kilometers) endurance event (experienced) or less (novice). Eighteen novice runners (mean ± SD: Age 30.9y ± 7.4y, finish time 5.9h ± 1.2h) and 9 veteran runners (Age 43.4y ± 13.4y, finish time 6.2h ± 1.3h) Blood samples were collected on the afternoon before the run, and 0, 4, and 24 h post-race. Plasma and serum samples were analyzed for IL-6 (ELISA), CRP (EIA), and CK activity (enzymatic assay. Data were analyzed using a general linear model with group and time as main effects and race time and carbohydrate intake as covariates. RESULTS: IL-6 was increased pre- to 0-h post-race from 1.01 ± 0.55 pg/ml to 32.22±12.38 pg/ml for the veteran group and 0.93±1.05 pg/ml to 33.26±23.94 pg/ml for the novice group. No differences between groups were detected. A significant group by time interaction ($P<0.01$) for CRP was measured, which increased ($P<0.001$) 24 h post-race. The increase from pre-race to 24 h post-race was 2.15±1.95 $mg \cdot l^{-1}$ to 36.27±27.16 $mg \cdot l^{-1}$ for the experienced group and 0.69±0.73 pg/ml to 14.91±7.49 pg/ml for the novice group. Creatine kinase activity increased ($P<0.001$) at 0, 4, and 24 h post-race, peaking at 4 h post-race for the novice runners (1515±1094 $IU \cdot l^{-1}$) in the novice and at 24 h post-race for the experienced runners (1360±1106 $IU \cdot l^{-1}$). No differences in CK were detected between groups. CONCLUSION: Using race time and carbohydrate intake as covariates, no difference in IL-6 was measured between experienced and novice runners. However, the systemic acute phase (CRP) response was more pronounced in experienced runners and the later

peak in CK may be an indication that the kinetics of the inflammatory and muscle damage responses may differ between the groups.

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Asymmetry in joint kinetics during landing in preadolescent soccer players

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Purpose: Asymmetry during landing may lead to musculoskeletal load imbalances resulting in acute or chronic injury. The purpose of this study was to evaluate whether asymmetry exists in lower extremity joint kinetics during two-footed landings in preadolescent athletes.

Methods: Fourteen female youth soccer players (age: 9.8±0.7 years, height: 1.45±0.08 m, mass: 37±7 kg) performed two-footed landings from vertical jumps off a 30 cm box onto two force platforms. Sixteen retroreflective markers were placed on the pelvis and lower extremity to track lower extremity kinematics. Kinematic and kinetic data were sampled at 250 Hz using a six-camera infrared motion capture system. Resultant joint force and moment at the hip, knee, and ankle of each leg were calculated using inverse dynamics. Force data was normalized to body weight and moment data to body weight times height (%BW*Ht). Data from the right and left legs were compared using Student's t-tests with α=0.05.

Results: There were no significant differences between legs in any of the lower extremity joint angles at ground contact. Knee valgus/varus range of motion was significantly greater in the right knee than in the left (9.4±3° vs 7.4±2°, p=0.03). Peak lateral shear force at the ankle was greater in the right leg, as was peak hip abduction moment (Fig. 1), peak knee valgus moment, and peak ankle plantarflexion moment (p<0.05). Power absorbed at the hip also tended to be greater in the right leg (137±55 vs 97±35 W), but the difference was not statistically significant (p=0.06).

Conclusion: Significant asymmetry was noted in joint kinetics during landing in our young subject group. Intervention programs aimed at improving landing may need to begin in youth athletes.

Abstracts from Student Presenters

Doctoral

Does histamine$_2$-receptor mediated vasodilation contribute to postexercise hypotension?

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In normally active individuals, the early (~30 min) postexercise hypotension response after a single bout of aerobic exercise is due to an Histamine$_1$ (H_1)-receptor mediated vasodilation (The Physiologist 47:4, 276). When H_1-receptors are stimulated the vasodilation produced has a rapid onset and is short-lived; however, Histamine$_2$ (H_2)-receptors produce an extended period of vasodilation after a slow onset. PURPOSE: to determine the potential contribution of an H_2-receptor mediated vasodilation to postexercise hypotension. METHODS: We studied five healthy normotensive men (ages 24.0±3.6 yr) before and through 90 min after a 60 min bout of cycling at 60% VO_{2peak} on randomized control and H_2-receptor antagonist days (300 mg oral ranitidine hydrochloride). Arterial blood pressure (automated auscultation), cardiac output (acetylene-washin) and femoral blood flow (Doppler ultrasound) were measured. Systemic and femoral vascular conductance was calculated as flow/pressure. RESULTS: At 60 min postexercise on the control day, femoral (Δ 71.4 ± 28.6%; P = 0.02 vs. preexercise) and systemic (Δ 13.8 ± 4.6%; P = 0.04 vs. preexercise) vascular conductances were increased while mean arterial pressure was reduced (Δ -6.4 ± 1.5 mmHg; P = 0.01 vs. preexercise). In contrast, at 60 min postexercise on the ranitidine day, femoral (Δ 10.4 ± 16.6%; P = 0.60 vs. preexercise) and systemic (Δ 0.5 ± 6.5%; P = 0.80 vs. preexercise) vascular conductances were not elevated and mean arterial pressure was not reduced (Δ -0.9 ± 2.3 mmHg; P=0.60 vs. preexercise). Furthermore, postexercise femoral and systemic vascular conductance were lower (P<0.05) and mean arterial pressure was higher (P=0.004) on the ranitidine day compared to the control day. CONCLUSION: Ingestion of an H_2-receptor antagonist markedly reduces vasodilation after exercise and blunts postexercise hypotension. These data suggest H_2-receptor mediated vasodilation contributes to postexercise hypotension.

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H1 histamine receptors do not contribute to the skin blood flow response to local heating

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Local skin heating is characterized by an axon-reflex mediated initial peak and a secondary plateau primarily mediated by nitric oxide (NO). In human skin, H1 receptor antagonists have been shown to attenuate vasodilation to histamine and certain neuropeptides. PURPOSE: To investigate the role of H1 receptors and NO to local skin heating. We hypothesized the skin blood flow response to local heating would be attenuated in the presence of an H1 receptor antagonist. METHODS: Six subjects were instrumented with three microdialysis fibers. Sites were randomly assigned to receive 10mM of NO synthase inhibitor L-NAME, 500μM of H1 receptor antagonist pyrilamine, or 10mM L-NAME plus 500μM pyrilamine. A fourth site served as control. Local skin heaters were used to control skin temperature and laser-Doppler flowmetry (LDF) was used as an index of skin blood flow. Skin was heated from 33°C to 42°C at a rate of 0.5°C every 5 seconds. Cutaneous vascular conductance (CVC; LDF/mean arterial pressure) was normalized to maximal vasodilation via 28mM sodium nitroprusside infusion and local heating to 43°C. RESULTS: Initial peak and secondary plateau CVC in control sites was not different from pyrilamine sites, and L-NAME sites were not different from L-NAME plus pyrilamine sites. However, in L-NAME and combined L-NAME plus pyrilamine sites, initial peak and secondary plateau CVC were attenuated compared to control and pyrilamine sites ($P<0.01$ for all conditions). CONCLUSION: These data suggest H1 receptor activation does not contribute to the skin blood flow response to local heating and there does not appear to be an interaction between H1 receptors and NO during local skin heating.

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Assessing arterial barorflex-mediated vascular responses in humans

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Arterial baroreflexes play a key role in the regulation of blood pressure via effects on the heart and vasculature. Most methods to assess baroreflex function measure heart rate responses, but fail to measure the vascular response. PURPOSE: We tested the feasibility of two separate non-invasive techniques to assess arterial baroreflex-mediated vascular responses. METHODS: Eight healthy subjects (ages 22-28) underwent either a unilateral thigh cuff release (UTCR) or carotid neck pressure (NP) protocol designed to unload the arterial baroreceptors, thereby eliciting reduced femoral vascular conductance (FVC) via increased sympathetic outflow. During both protocols, beat-by-beat mean arterial blood pressure (MAP; finger photoplethysmography), femoral mean blood velocity (MBV; doppler ultrasound) and femoral artery diameter (edge-detection software) were measured. Femoral artery blood flow (FBF) was calculated as artery cross-sectional area * MBV and FVC was calculated as FBF/MAP. RESULTS: A 10.2±1.4 mmHg reduction in MAP was induced by the release of a unilateral thigh cuff after 10 minutes of resting leg ischemia (220 mmHg), evoking reductions from baseline in femoral blood flow (FBF; Δ 43.3±7.3%) and FVC (Δ 43.57±5.9 %). Five-second periods of NP (50mmHg) induced shorter-lived reductions in FBF (Δ 27.5±5.2 %) and FVC (Δ 26.2±4.6 %).

CONCLUSION: The smaller vasoconstrictor response with NP may be due to shorter, isolated unloading of the carotid baroreceptors with NP, compared to longer unloading of multiple arterial baroreceptors with UTCR. Both methods have potential for use in measuring baroreflex-mediated vascular responses.

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Masters

Predicting projected frontal area for cycling in women competing at the 2004 Hawaiian Ironman Triathlon

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PURPOSE: Previous studies have developed equations for predicting the projected frontal area (A_P,

m^2) of male cyclists (EJAP 85:358-366, 2001; EJAP 87:520-528, 2002), but similar analyses have never been performed for female cyclists. Such equations are needed for the creation of generalized models of cycling performance in women. Thus, the present study was designed to determine the best AP prediction equation in female triathletes from anthropometric, body position, and bicycle geometry variables.

METHODS: 16 women (Mean±SD: 41.8±11.6 yrs, 59.7±4.4 kg body mass, 1.66±0.06 m body height) competing in the 2004 Hawaiian Ironman World Championship Triathlon volunteered to have projected frontal area determined from a single photograph. A digital photo was taken of the frontal plane of the cyclist (front view) while they sat on their bicycle mounted to a stationary trainer. The cyclists were instructed to place their feet parallel with the ground, use their aero handlebars while looking forward, and wear their typical race clothing and helmet for the digital photograph. Both total A_P (body of cyclist + bicycle; 0.437±0.041 m^2) and *body* A_P (cyclist only; 0.315±0.029 m^2) were predicted using body height (BH, m), body mass, shoulder width (0.37±0.02 m), trunk angle (TA, 19.5±4.2˚), and seat tube angle (STA, 75.6±1.8˚) as dependent variables. Both total and body A_P were separately determined as the average of two separate measurements of the same digital photograph using digital photo analysis software (ImageJ 1.28u). Computed areas within each photograph were calibrated against a calibration frame (0.578 m x 0.578 m, or 0.334 m^2) with known dimensions. The calibration frame was located in the field of view at the midline of the subject's torso. Standard step-forward multiple regression procedures were used to identify the single best prediction equation while a paired t-test was used to compare actual and predicted AP values (0.05 alpha level).

RESULTS: The final prediction equation was as follows (n = 32 images):
$A_P = 0.963 + 0.122xC - 0.0133xSTA - 0.00194xTA + 0.238xBH$
($R^2 = 0.926$, SEE = ±0.021 m^2, $P < 0.0001$)
Where C was binary coded '0' and '1' for predicting body and total A_P, respectively. Actual A_P (Mean±SE: 0.376±0.013 m^2) did not differ significantly (P = 0.687) from predicted A_P (0.378±0.012 m2).

CONCLUSIONS: The accuracy of the AP prediction equation is similar to that reported previously for male cyclists. This equation may be useful when integrated into mathematical models for predicting time-trial bicycling performances of women triathletes and cyclists.

Accuracy of WAAS-enabled GPS monitors to determine speed while walking and Running

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Studies have shown that differential global positioning satellite (dGPS) monitors are accurate enough for field-based human movement studies. While absolute positioning accuracy for dGPS monitors is ±3-5 m, newer WAAS (Wide Area Augmentation System) enabled GPS monitors are reportedly more accurate (±3 m) and much cheaper. Purpose: This study evaluated the accuracy of WAAS enabled GPS monitors to determine walking and running speeds for future field-based studies of energy expenditure. Methods: A single subject walked and ran around a level 400 m track at predetermined speeds ranging from 67 m/min (2.5 MPH) to 388.6 m/min (14.5 MPH) in 13.4 m/min increments for a total of six walking (67-134 m/min) and 14 running (147.4-388.6 m/min) target speeds. Actual travel speed was calculated as the time (to 0.1 sec) required for the subject to cover 200 m sections using a handheld stopwatch. During the track walking/running, the subject wore a light weight backpack to which several GPS monitors were attached. The GPS monitors included two wrist-worn and two waist-worn WAAS enabled models, as well as two each of the same model GPS monitors with the WAAS enabling turned off for a total of eight GPS monitors. All GPS monitors were programmed to record position data (latitude, longitude, altitude) every 15 secs. The raw GPS data was downloaded to a computer and processed using two parallel methods: 1) Raw data processed by web-based software using a proprietary algorithm to compute speed (SPD_E); 2) Raw data processed using a computational algorithm imbedded within a spreadsheet program to compute speed (SPD_C). Actual travel speed (SPD_A) was compared to predicted speeds (SPD_E and SPD_C) for each of the eight GPS monitors using a 1-factor ANOVA (0.05 alpha level), PPM correlations, as well as calculations of SEE and total error (TE = SEE + bias). Results: SPD_A across all trials (Mean±SE: 201.0±19.1 m/min) did not differ significantly (P>0.99) from mean SPD_E values (Range of mean values: 191.4 to 201.1 m/min) or SPD_C values (191.1 to 198.1 m/min) for all GPS monitors. Correlations of SPD_A with SPD_E and SPD_C were high (>0.98) for all monitors. SEE and TE

values ranged from ±5.5-11.0 m/min and ±8.4-16.4 m/min, respectively, for SPD_E and ±7.0-11.7 m/min and ±7.5-14.3 m/min, respectively, for SPD_C. TE tended to be higher than SEE due to a slight under prediction bias for both SPD_E and SPD_C for the fastest running speeds. There was no difference between normal and WAAS enabled monitors between wrist-worn and waist-worn GPS monitor models. Conclusions: Both normal and WAAS enabled GPS monitors predicted SPD_A accurately (both SPD_E and SPD_C) enough for field-based human movement studies.

Factors effecting core temperature and hydration during extended arduous work

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Wild land firefighters (WLFF) work long shifts in extreme environmental conditions. Temperature regulation and hydration status are important factors that effect WLFF 's cognitive and physical performance. PURPOSE: The purpose of this investigation was to determine the effects of wildfire suppression on temperature regulation and drinking behaviors during an arduous day on the fireline. METHODS: Subjects included male (n=16) and female (n=4) wildland firefighters from various Hot Shot and District crews. Core, skin and ambient temperature and self-selected work rate (via activity monitor) were measured using a wireless physiological monitoring system. Drinking characteristics were recorded with a previously validated digital flow meter (MSSE 33(5):S257, 2001), which allowed for the measures drink volume/rate (ml/hr), drink frequency (drinks/hour), and total volume (L/workshift). Urine specific gravity was measured at 2nd AM void, late AM, late afternoon, and post shift +1hr. Data were analyzed across the day by comparing average AM and PM workshift values with repeated measures ANOVA. RESULTS: Ambient temperature demonstrated a significant increase throughout the day (AM=24.8±2.2 and PM=34.0±3.4 °C, $p<0.05$). There was also a significant increase in core (AM=37.2±0.3, PM=37.8±0.02), $p<0.05$) and skin (AM=32.7±1.2, PM=34.67±1.3, $p<0.05$) temperatures throughout the day. Drinking volume (ml/hour) was significantly higher during hours 8-15 vs. hours 1-7 (AM=275±139, PM=583±259, $p<0.05$). However, drinking frequency (drinks/hour) was similar from hours 1-7 and 8-15 (AM=5.3±3.9, PM=7.4±3.3, $p>0.05$). There was a significant decrease in nude body weight pre to post-shift (AM=79.8±14.1, PM=79.1±14.2, $p < 0.05$). Similarly, urine specific gravity demonstrated a significant increase throughout the workshift (AM=1.019±0.006, PM=1.023±0.009, $p<0.05$). However, self-selected workrate (mean activity counts/hr) was not significantly different between the early and later segments of the workshift (AM=502±223, PM=450±146, $p>0.05$). CONCLUSION: These data demonstrate that extended arduous work in the heat is associated with a rise in ambient, core and skin temperature and self-selected drinking volume. The similarity in hourly activity counts during the early and later segments of the workshift suggests that drinking behavior may be more related to temperature changes than work rate. The reduction in BW and increase in urine SG suggests that although drinking volume increased throughout the day, it was not enough to maintain euhydration.

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Undergraduate

Muscle activation during elliptical trainer, treadmill, and recumbent bike exercise

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The dual action (legs and arms) elliptical trainer (ET) and the dual action recumbent bike (DB) have been marketed as more effective alternatives to the treadmill (TM) because they incorporate arm exercise into the workout, providing a more total body workout. To date, no research has compared these modes of exercise to examine these marketing claims. PURPOSE: To compare muscle activation across DB, ET, TM, and single-action (legs only) recumbent bike (SB). METHODS: Ten males and four females (Age: 21±2 yr; Height: 177.9±10.0 cm; Weight: 77.4±13.7 kg) volunteered as subjects. Each subject warmed up for 5 min, and then completed 6 minutes of exercise on each machine. The metabolic workload was standardized across machines at ~31.3 $ml.kg^{-1}.min^{-1}$.

EMG activity of the biceps brachii (BB), pectoralis major (PM), triceps brachii (TB), middle deltoid (MD), gastrocnemius (GA), gluteus maximus (GM), vastus lateralis (VL), and biceps femoris (BF) was sampled continuously at 1000 Hz for 6 consecutive strides at the end of each minute of exercise. A one-way repeated measures ANOVA was calculated to determine differences in average EMG activity across machines. RESULTS: No significant differences were found across machines for PM, VL, BF, or GM. GA activation was less in ET than in SB, DB, or TM (p<.001; GA_{ET}: 66+27 μV; GA_{DB}: 116+51 μV; GA_{SB}: 104+42 μV; GA_{TM}: 136+51 μV). BB activation was greater in DB and ET (p<.001; BB_{ET}: 96+93 μV; BB_{DB}: 95+68 μV; BB_{SB}: 19+10 μV; BB_{TM}: 26+18 μV). TB activation was greater in DB (p<.002; TB_{ET}: 55+36 μV; TB_{DB}: 97+79 μV; TB_{SB}: 39+25 μV; TB_{TM}: 45+44 μV). MD activation was greatest in DB and TM, and least in SB (p<.001; MD_{ET}: 39+23 μV; MD_{DB}: 69+40 μV; MD_{SB}: 24+15 μV; MD_{TM}: 59+33 μV). CONCLUSION: These results suggest that claims for a better overall body workout may be true for the dual action recumbent bike but not for the elliptical trainer.

Supported, in part, by SportsArt, Inc.

Ratings of perceived exertion (RPE) during elliptical trainer, treadmill, and recumbent bike exercise

T. McAllister, B. Cowin, M. Hadley, C. Jasper, C. Stewart, B. Terrell, D.G. Dolny & K.D. Browder.

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Previous research has reported that dual action (arms & legs) elliptical trainer (ET) exercise elicits a higher physiological response than is perceived by the individual (Batte et al., 2003), which may be an important factor in an individual's selection of exercise equipment. To date, research has not compared this response across different types of exercise machines. PURPOSE: To compare RPE, VO2 and HR across ET, a dual action (arms + legs) recumbent bike (DB), a treadmill (TM), and single-action (legs only) recumbent bike (SB). METHODS: Ten males and four females (Age: 21±2 yr; Height: 177.9±10.0 cm; Weight: 77.4±13.7 kg) volunteered as subjects. Each subject warmed up for 5 min on a stationary upright bike, and then completed 6 minutes of exercise on each machine in randomized order with 3 min rest period between bouts. The metabolic workload was standardized across machines at ~31.3 $ml \cdot kg^{-1} \cdot min^{-1}$. Heart rate (HR, bpm) and oxygen uptake (VO2, $ml \cdot kg^{-1} \cdot min^{-1}$) were sampled continuously during exercise, and overall RPE (O-RPE), central RPE (C-RPE), and peripheral RPE (P-RPE) were measured at the end of each exercise bout. A one-way repeated measures ANOVA was calculated to determine differences across machines. RESULTS: No significant differences were found in VO2 (p=0.690; $VO2_{ET}$: 31.1± 6.2; $VO2_{DB}$: 32.9±6.1; $VO2_{SB}$: 30.8 ±6.2; $VO2_{TM}$: 30.6±3.0), HR (p=0.620; HR_{ET}: 164± 17.0; HR_{DB}: 166 ±16.0; HR_{SB}: 167 ±15.0; HRTM: 159±16.0), or C-RPE (p=0.256; $C\text{-}RPE_{ET}$: 11± 2; $C\text{-}RPE_{DB}$: 12±2; $C\text{-}RPE_{SB}$: 12±3; $C\text{-}RPE_{TM}$: 11±3) across machines, confirming that subjects worked at equivalent metabolic workloads. P-RPE was significantly less (p<0.002) in ET (10±2) versus DB (12±2); SB: (13±3); and TM (11±3). O-RPE was significantly less (p<0.007) in ET (11±2) and TM (12±3) versus DB (13±2) and SB (13±3). CONCLUSION: These results indicate that P-RPE is less at similar metabolic workloads on the elliptical trainer than on single and dual action recumbent cycles and that O-RPE was reduced during ET and TM exercise when compared to SB and DB. These findings may have implications in selecting exercises that help promote exercise adherence.

Supported, in part, by SportsArt, Inc.

News and Views

NWACSM Website: a multi-purpose resource

The NWACSM website is a resource not only for meeting minutes and newsletters but also an electronic location to find information on employment opportunities and upcoming conferences and workshops. As of March 2005, some of the items on the NWACSM home page include:

- Conference on Sports Medicine for the Primary Care Provider
- Conference, "Rails to Trails"
- Internship announcement, Rockwood Clinic, Spokane, WA
- Employment opportunities: personal trainers, certified athletic trainer

If your organization is hosting a conference, directing a workshop, sponsoring internships or is offering employment opportunities fitting the interests of NWACSM members, please contact Trish Root at: troot@sccd.ctc.edu to have your organization's activities posted on the NWACSM website. Similarly, to help keep the website as up-to-date as possible, NWACSM asks all who submit information for web postings to include a date for removal of the information.

Thank you to everyone who has contributed to and visited the NWACSM website. The success of this resource has been possible maily through your support.

—Trish Root, Secretary

Sponsorship from Viasys Healthcare creates opportunity at ACSM National and Regional Levels

ACSM National and Regional venues have, for many years, been fueled partially on much needed sponsorship from corporate partners, agencies and affiliated organizations. Sponsorships help reduce meeting costs for attendees, underwrite outside speakers, and often create lower-cost options for student participation. In a positive move that we hope becomes a trend, Viasys Healthcare suggested and committed to a sponsorship package including the ACSM Annual Meeting as well as general activity in the Northwest Regional Chapter. The Annual Meeting sponsorship falls into the more traditional category, with Viasys Healthcare underwriting the briefcase bag provided to all attendees. The Northwest Chapter will receive 40% of the total sponsorship package ($10,000). The size of the gift relative to the chapter's annual operating fund opens the door for some very interesting opportunities. The structure of this sponsorship is ideal for Viasys Healthcare, providing both national and grass roots connections with ACSM members. Amy Katzenberger, ACSM National Center, shares, "Our sincere thanks goes to Frank Stanek, Ph.D., Sales Consultant for Viasys, for helping to make this substantial gift a reality. We're hopeful that the relationship proves to be very beneficial for both Viasys Healthcare and ACSM and something we can continue into the future."

VIASYS™ HEALTHCARE
Excellence For Life

Kootenai Medical Center offers internship

Kootenai Medical Center in Coeur d'Alene (KMC), ID, is accepting applications for a summer intern position. The center provides inpatient and outpatient cardiac rehabilitation, as well as a maintenance program called Activity for Life. Other programs include the Mended Hearts support group and the Heart to Heart wellness screening program. KMC's North Idaho Heart Institute provides interventions such as CABG, PTCA/Stent, as well as other cardiovascular disease patient diagnosis strategies. KMC offers ample opportunity to work with a wide

Continued on page 28

Book Review

Inclusive Physical Activity: A Lifetime of Opportunities

Susan L. Kasser & Rebecca K. Lytle
Human Kinetics, 2005, 280 pages, $49.00

Public policy mandating the inclusion of people with disabilities in school and community recreation has challenged exercise science and health education professionals to develop additional skills. Although social attitudes are more supportive of inclusive activity, and adaptive equipment is more widely available than in the past, challenges to the implementation of inclusive physical activity programs remain. With *Inclusive Physical Activity: A Lifetime of Opportunities*, Kasser and Lytle take students through a step-by-step approach to building and growing educational programs for individuals and groups.

The authors lay the foundation for developing skills related to inclusive physical activity by examining disability and the philosophy of inclusion. They describe the evolution of participation in the public education system and the community by people with disabilities, identifying the various approaches taken since the move toward inclusion began in the 1950s. The growing emphasis on ability rather than disability and it's impact on physical education program structure are explained in some detail, setting the stage for later discussions of specific strategies and activities. This section also looks at common barriers to inclusive physical activity, such as attitudes, language, and inadequate activity selection.

Building on the philosophical foundation of inclusion, the text addresses physical activity program planning and implementation. The authors describe the team approach that is common to many inclusive activity programs, identifying roles, responsibilities, and strategies that lead to successful programming. This framework will be helpful for exercise science students whose programming experience is limited to group exercise classes and personal training.

The chapter on participant assessment, another key section, provides a thorough look at evaluating individuals along the full spectrum of ability and across the lifespan. The authors provide a detailed rationale for selecting assessment tools based on individuals' capabilities and physical activity goal(s). They also identify appropriate developmental skills for individuals of all ages and indicate desirable program focus for various age groups.

Many individuals with disabilities or functional limitations require individualized activity programs to maximize their opportunity for meaningful participation. The text includes examples of how instructors and program directors can use assessment results to create physical activity plans that are both inclusive and appropriate for individuals' capabilities and interests. The authors explain the functional approach for modifying movement experiences (FAMME) model, which provides a framework for modifying activities and evaluating the modifications. Individual chapters illustrate application of the FAMME model to movement skills; play, games, and sports; health-related fitness and conditioning; and adventure and outdoor programming.

Planning and implementing inclusive physical activity programs requires both knowledge of exercise science and the personal perspective that activity is important and possible for everyone. In addition to presenting the technical and professional skills necessary for quality programming, Kasser and Lytle amply impart the attitude needed to help participants reach their goals while enjoying activity. This text is an excellent reference for physical education instructors, personal trainers, and fitness professionals working in education and the community.

—Carolyn Petersen, M.S.
Web Editor, mayoclinic.org
Mayo Clinic, Rochester, MN

Continued from page 26, Kootenai

variety of patients and to observe patient procedures. Interested individuals must submit a resume including a list of pertinent completed classes to: Joyce Kratz Klatt at jklatt@kmcmail.kmc.org, or call 208-666-2897.

University of Oregon professor receives ACSM award

Christopher Minson, President of the NWACSM Chapter, and assistant professor in the Human Physiology Department at the University of Oregon just received word that he was awarded the Young Investigator Award from the Exercise and Environmental Physiology Section of the American College of Sports Medicine. He will receive the award at the Experimental Biology Meeting in San Diego in April of this year.

Boise State announces new publications

Dr. Werner Hoeger, Professor of Kinesiology at Boise State University, released the 8th edition of his textbook, *Principles and Labs for Fitness and Wellness*, and the 5th edition of *Principles and Labs for Physical Fitness*. His article "Preparing for Recreational Sports Participation," coauthored with Jim Moore, M.S., from the Idaho Sports Medicine Institute, will appear in the May/June issue of ACSM's *Health and Fitness Journal*.

Washington State University, Spokane announces

New publication: Tuttle KR, Johnson EC, Cooney SK, Anderberg RJ, Johnson EK, Clifton GD, Meek RL. Amino acids injure mesangial cells by advanced glycation end products, oxidative stress, and protein kinase C. Kidney Int 67:953-968, 2005.

Recently received grants:

1) The Diabetes Action Research and Education Foundation (DAREF), Emily Carolyn Johnson, PhD, Principal Investigator. Vascular endothelial growth factor and transforming growth factor interactions mediating injury responses of renal glomerular endothelial cells to high glucose and high amino acids. September 2004-August 2006.

2.) NIH, University of Washington's Center for Women's Health Research supported pilot project, 04-05. Iygengar Yoga as an Intervention to Enhance Immune Functioning, Psychosocial Functioning and Quality of Life in Women with Stable Stage II-IV Breast Cancer. Sally E. Blank, Co-investigator.

Student Page

Students provide opportunity to submit original work for publication

Procedures for Submission

A new column will be added to the Northwest American College of Sports Medicine (NWACSM) newsletter. The Graduate Student Corner will feature original articles submitted by graduate students. The following guidelines must be followed for successful submission.

Eligibility. Submission must come from a graduate or doctoral student currently enrolled in a university that is in the NWACSM region.

Suitable Content. Articles may include any recent research finding or be a "lay" summary of findings associated within an area of interest of NWACSM.

Target Audience. As NWACSM is committed to the students in the region, articles should be composed to draw interest from this group.

Deadline. You find the newsletter deadlines for each issue on the second page of each newsletter. The deadline for the article is one month before the issue in which you would like your article to appear. Any submissions after this deadline will not be considered for the intended newsletter.

Subsequent Submissions. The successful writer may not submit an article for immediately consecutive newsletters; however, future submissions are invited.

Review of Submission. The NWACSM regional and national student representatives will initially review the articles. Selected works will then be submitted for the optional review of the NWACSM board. At least one additional NWACSM board member must approve the submission.

Please send all submissions to steveconant@advsportconditioning.com and to jlockwoo@darkwing.uoregon.edu.

Student Page

Jenni Lockwood is the new National Student Representative

I want to introduce myself to you, the students of NWACSM, and thank you for giving me the opportunity to represent you and the Northwest Region. This is my third year as a human physiology graduate student at the University of Oregon. I have learned a lot as a graduate student and look forward to learning more from you in these next two years. For those of you who are in the process of completing graduate school application, I have included some "Dos and Don'ts of Applying to Graduate School," which I hope will be of some benefit. If you have any comments related to my suggestions or any questions in general about graduate school or ways in which you can help with the NWASCM, please do not hesitate to contact me: (541) 346-5527 or jlockwoo@darkwing.uoregon.edu (*note no "d" in lockwoo in the email).

Dos and Don'ts of Applying to Graduate School

DO – decide where your passions lie in this big field! DO volunteer at hospitals, physical therapy clinics, research labs, classrooms, etc.

DON'T – start preparing yourself too late. Look into what classes you want and need to take to get into your program of choice, putting in the time now will save you some stress in the end

DO – research on the programs you are interested in (websites!)

DON'T – contact the program or faculty member unless you have done the appropriate background research to see if you are interested in what they do

DO – look at program website for all application details and for bios on all faculty members

DON'T – contact every faculty member in the same department. Don't tailor what you're interested in to the faculty member that you are contacting (i.e., don't change your interest from biomechanics to physiology)

DO – ask your current advisor or faculty member(s) for advice

DON'T – be afraid to ask alumni from your school and/or current students of the program that you're interested in for help or guidance

DO – if interested in a research program, contact the faculty member that only matches your interest

DO – schedule a visit to the university. This is the best way to see if you and the program (i.e., curriculum, faculty, and other students) are a good fit

DON'T – be quiet on your visit. Ask plenty of questions to the potential advisor and current students

DON'T – apply to just one program/university, there is tough competition

DO – plan early! Most programs have early deadlines for applications and/or fellowships

DON'T – ask for recommendation letters too late, in order to give plenty of time to the writer and DON'T forget to say thank you!

DO – be prepared to spend some money in this process. There are fees to apply for schools, get transcripts, take the GRE (once or more!), and to visit the schools.

The 2005 3rd Annual Sports Medicine CONFERENCE

for the Primary Care Provider

Saint Martin's College • Worthington Center and Pavilion • Apr 29 – May 1, 2005 • Olympia, WA

South Sound Sports Medicine and Capital Medical Center are pleased to sponsor the 3rd Annual Sports Medicine for the Primary Care Provider. This conference is intended to increase your knowledge and provide a comprehensive review of the selected topics in Sports Medicine. The conference is designed for the Primary Care Provider and Allied Health Professional who care for the athlete at all levels of competition. Faculty members will discuss current clinical challenges via didactic presentations, roundtable discussions and workshops.

Target Audience

Family Physicians, General Internists, Physical Therapists, Athletic Trainers, Nurses, Nurse Practicioners, Physician Assistants, Coaches, and Residents should attend.

Accreditation

17.75 hours of CME/CEU has been approved by the AMA and NATA. Capital Medical Center in Olympia Washington will function as the accrediting organization.

Meals and beverages provided during breaks.

Further educational hours are being sought through the NATA, AAPA and AOA.

Receive Maximum 17.75 Accredited Hours

Please cut and return

REGISTRATION FORM (Check out online registration: www.southsoundsportsmed.com)

Personal Info

Name: _____ Clinic/Co: _____

Title/Degree: _____

Address: _____

City: _____ State: _____ Zip: _____

Home Phone: _____ Work Phone: _____

Fax: _____ Email: _____

Registration Fees

	Prior to April 18	After April 18
Physicians	$295.00	$345.00
Physician Assistants & Physical Therapists	$195.00	$245.00
Athletic Trainers & Nurses	$145.00	$195.00
Residents/Coaches	$95.00	$145.00

Payment Method

❑ Master Card ❑ Visa ❑ Check (payable to South Sound Sports Medicine)

Card#: _____ Exp#: _____

CV2: _____ Zip Code: _____

Signature: _____

Please return this completed registration form & applicable registration fee to:

SOUTH SOUND FAMILY & SPORTS MEDICINE

South Sound Sports Medicine
2960 Limited Lane NW
Suite A
Olympia, Wa. 98502

Additional Information

For any additional information, please contact Dr. Jon Peterson at 360.709.9500 or mail inquiries to South Sound Sports Medicine. If you have any special requests, please contact us prior to Apr 18, 2005. SSSM reserves the right to change the program at any time.

Website

For more information or to register online, go to: **SouthSoundSportsMed.com**

Accommodations

If you require any lodging accommodations during the conference please contact: the Ameritel Inn at 360.459.8866 or Donna Moreland at Destinations Unlimited at 360.943.4994.

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2005 Northwest American College of Sports Medicine Membership Form

Name: _____
First Middle Last

Date of Birth: _____

Mailing Address:

_____

_____

_____
City State Zip Code

Home Phone ( ) _____

Business Phone ( ) _____

Fax: ( ) _____

E-mail: _____

Occupation: _____

Highest Degree Earned: _____

Are you a member of the national ACSM? _____

Your ACSM member no. _____

If yes, check any that apply
- ☐ Professional
- ☐ Professional-in-Training
- ☐ Associate Member
- ☐ Undergraduate Student
- ☐ Graduate Student

Chapter membership category and yearly dues

- ☐ Professional ACSM member ($30)
- ☐ Professional ACSM nonmember ($45)
- ☐ Student ($15)
  - ☐ Undergraduate Student
  - ☐ Graduate Student

Mail this form and a check made out to NWACSM to:

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Eastern Washington University , PEHR Dept., PEB 200
Cheney, WA 99004
Ph. (509) 359-7960; Fax: (509) 359-4833
E-mail: wrepovich@ewu.edu

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American College of Sports Medicine

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200 Physical Education Building
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