ACSM Northwest
2011 Annual Conference
Full Program

The Future of Exercise Science:
Inspiring Health and Performance
April 8th–9th, 2011
Eugene, OR
Table of Contents

Conference sponsors 3
Pre-Conference Activities 4
Annual Meeting Schedule
  Friday, April 8th 5
  Saturday, April 9th 6
Student Oral Presentations Schedule 7
Saturday Intersession Activities 8
Conference Speaker Profiles 9-11
Abstracts 12-
  Student Oral Presentations 12-13
  Doctoral Student Posters 14
  Masters Student Posters 15-18
  Undergraduate Student Posters 19-25
  Professional Posters 26
Campus Maps & Parking Information 27-29

ACSM 2011 Annual Conference Committee Members
John Halliwill, University of Oregon (co-chair)
Aaron Harding, Oregon Heart and Vascular Institute (co-chair)
Marisa Hastie, Lane Community College (co-chair)
Janet Peterson, Linfield College
Steve Conant, Gonzaga University
Josh Atiyeh, Linfield College
Dan Heil, Montana State
Kerri Winters-Stone, Oregon State University
John Harshman, North Spokane YMCA
Steven Romero, University of Oregon

This program has been reviewed for the educational content and has been endorsed by the American College of Sports Medicine. This does not reflect endorsement of the sponsoring organizations, certifications or products.
Conference Sponsor

PHILIPS

ACSM NORTHWEST

GATORADE SPORTS SCIENCE INSTITUTE

slocum center for orthopedics & sports medicine

Commercial Fitness Equipment

LifeFitness what we live for

iworx

AMERICAN COLLEGE of SPORTS MEDICINE
www.acsm.org
Pre-Conference Activities

Friday, April 8th, 2011, multiple locations

9:00 – 11:00 am: Oregon Heart & Vascular Institute Open House

Come tour the Cardiac Wellness and Rehabilitation program at one of the busiest and most respected cardiac and vascular centers in the Northwest. See how ACSM Registered Clinical Exercise Physiologists and other professionals at Oregon Heart and Vascular Institute provide patients with services that range from prevention and diagnosis to treatment and rehabilitation.

Location: 3311 RiverBend Drive Springfield, OR 97477 - Look for the big clock tower at the entrance for Oregon Heart & Vascular Institute.

9:15 and 10:00 am: University of Oregon Casanova Center (Sports Medicine) Tour

Named after Oregon's longtime football coach and athletic director, the Casanova Center is the cornerstone of the football program’s outstanding facilities and includes a modern medical treatment area where sports medicine experts work with athletes in a “must see” high-tech environment.

Location: Tours groups will depart from the West entrance lobby of the Casanova Center at 9:15 and 10:00 (The star on the map denotes the West entrance to Casanova Center - look for the flagpoles). While free parking is available in front of the Casanova Center, it may be full due to spring practice. There is additional parking around Autzen Stadium.

9:00 – 11:00 am: Lane Community College Health and Wellness Center and Exercise Science Lab Open House

Built in 1993 the Fitness Education Center is an 8,000 square foot state-of-the-art fitness equipment laboratory and exercise facility. The Exercise Science Testing Lab is run by both students and instructors from the Exercise and Movement Science Program. The laboratory is equipped with state-of-the art testing equipment designed for general health and wellness assessments as well as specialized fitness testing for highly trained athletes. (see Lane Community College map, Building 30)

6:30 am – 5:00 pm: Lane Community College Fitness Center, Open Workout Times

Location: Lane Community College - Fitness Education Center (see Lane Community College map, Building 5)
Conference Schedule
Friday, April 8th, 2011, Lane Community College
Center for Meeting and Learning (Building 19)

11:00 am – 5:30 pm  Onsite Registration Open

12:00 pm – 1:00 pm  Student Session - College Quiz Bowl - Includes lunch for students

1:00 pm – 1:10 pm  Welcome and Opening Remarks
    Marisa Hastie, MS, Health & Physical Education, Lane Community College

1:10 pm - 2:00 pm  Opening Presentation
    SURVIVING STRONG: Scientific and serendipitous outcomes from strength training trials in cancer survivors
    Kerri Winters-Stone PhD, Oregon Health Sciences University
    Moderator: Marisa Hastie

2:10 pm – 3:00 pm  Concurrent Sessions

    Room 102  The Educator in Each of Us
    Sierra Dawson, PhD, ATC, Human Physiology, University of Oregon Faculty
    Moderator: John Halliwill

    Room 226  Accelerometer usage/application of data
    Dan Heil, PhD, Health & Human Performance, Montana State University
    Moderator: Steve Conant

3:10 pm – 4:00 pm  Concurrent Sessions

    Room 102  It doesn’t “gotta be the shoes”**: exercise physiology in the Nike Sport Research Laboratory
    Brad Wilkins, PhD, Senior Researcher – Physiology, Nike Sport Research Laboratory
    Moderator: Stas Stavrianeas

    Room 226  Sports Medicine: the foundation by which communities co-create their own health futures
    Brigitte Piniewski, MD, CMO Peace Health Laboratories
    Moderator: Aaron Harding

4:00 pm – 5:30 pm  Student Poster Session and Social with Appetizers and Bar sponsored by Philips Respironics

5:30 pm – 6:30 pm  Key Note Presentation

    The Limits to Human Endurance Performance
    Edward Coyle, PhD, Kinesiology and Health Education, The University of Texas at Austin
    Moderator: Steven Romero
Conference Schedule
Saturday, April 9th, 2011, University of Oregon
Erb Memorial Union (EMU) Ballroom

8:00 am – 2:00 pm  Onsite Registration Open
8:00 am – 8:50 am  Opening Presentation
  Training Athleticism: Strength, Power, and Tempo
  Jim Radcliffe, MS, University of Oregon Strength and Conditioning Coach
  Moderator: Stas Stavrianeas
9:00 am – 10:50 am  Student Oral Presentations - See page 7 for speakers
  Moderator: Gianni Madalozza
11:00 am – 11:50 am  Business Meeting - Lunch Provided
12:00 am – 3:00 pm  Intersession Activities - See page 8 for details on these events
  Attend the Pepsi Invitational Track Meet from 12-3 pm
  Tour the University of Oregon Human Physiology research labs from 2-3pm
  Use the University of Oregon Student Recreation Center from 12-3pm
  Visit the Jordan Schnitzer Museum of Art, University of Oregon
  Walk to Eugene’s famous Saturday Outdoor Market for shopping
3:10pm-4:00pm  Featured Clinical Presentation
  Jock Doc to Sports Medicine Specialty
  Stan James, MD, Orthopedic Surgeon - Slocum
  Moderator: Steven Romero
4:10 pm – 5:00 pm  Concurrent Sessions
  Integrating STOTT PILATES into Outpatient Physical Therapy
    Ballroom
    Julie Staub, PT, CSCS, Stott Pilates Instructor
    Moderator: Marisa Hastie
  To Siberia and Beyond: Studying Human Biology and Health at the Edge of the World
    Gumwood room
    Josh Snodgrass, PhD, Anthropology, University of Oregon
    Moderator: Janet Peterson
5:10 pm – 6:00 pm  Key Note Presentation
  Eugene ‘08: Pursuing the Unimaginable
  Vin Lananna, University of Oregon Associate Athletic Director and Director of Track and Field
  Moderator: John Halliwill
6:00 pm  Closing Remarks
  John Halliwill, PhD, Human Physiology, University of Oregon
Student Oral Presentations Schedule

9:00 am: Doctoral

VALIDATION OF THE U.S. SMOKEJUMPER PHYSICAL FITNESS TEST
Domitrovich, J.W.¹, K. Pattison¹, B. Ralston¹, S.G. Domitrovich¹, B.J. Sharkey, FACSM¹,², S.E. Gaskill, FACSM¹, and C.G. Palmer¹
¹The University of Montana, Missoula, MT, ²Missoula Technology and Development Center, Missoula, MT

9:15 am: Undergraduate

THE EFFECTS OF ALCOHOL CONSUMPTION ON MEASURES OF ANAEROBIC PERFORMANCE
University of Montana, HHP Dept. Missoula, MT

9:30 am: Masters

EFFECTS OF WHOLE-BODY VIBRATION TRAINING ON WALKING FUNCTION IN OLDER ADULTS
Ruben J. Guzman, B.S., Hyo Lee, M.S., Walker A. Maddalozzo, Bradley J. Cardinal, Ph.D., FACSM, and Gianni F. Maddalozzo, Ph.D., FACSM.
Department of Nutrition and Exercise Sciences, Oregon State University, Corvallis, OR

9:45 am: Undergraduate

NO EFFECT OF BLOCKING SUSTAINED POSTEXERCISE VASODILATION ON TISSUE OXYGEN INDEX
A.N. Lacewell, L.K. Hochhalter, S.A. Romero, J.R. Halliwill, FACSM
University of Oregon, Eugene, OR

10:00 am: Undergraduate

COMPARISON OF SUBJECTIVE MEASURES OF BODY COMFORT TO CORE TEMPERATURE DURING THREE HOURS OF WORK IN THE HEAT
Health and Human Performance, University of Montana, Missoula, MT

10:15 am: Masters

TEST-RETEST RELIABILITY OF HEMOGLOBIN AND HEMATOCRIT MEASUREMENTS USING A POINT-OF-CARE HEMOGLOBIN PHOTOMETER
B.C. Conder, K.J. Taylor, and D.P. Heil FACSM
Movement Science/ Human Performance Lab, Department of Health & Human Development, Montana State University, Bozeman, MT

10:30 am: Masters

THE EFFECT OF YOGA TRAINING ON FALL RISK FACTORS IN OLDER ADULTS
T. Lamb, C. Papadopoulos, T. Burnham, C. Sims
Central Washington University, Ellensburg, WA
Saturday Intersession Activities

Saturday, April 9th, 2011, multiple locations

Noon – 2:00 pm: Pepsi Invitational Track Meet

University of Oregon hosts this annual event which attracts top collegiate athletes from across the U.S. In addition to the University of Oregon, this year’s track meet includes top collegiate track programs from University of Nebraska, Stanford University, and University of Washington. Your ACSM Northwest conference badge will get you in free to this event. Location: Historic Hayward Field is considered the Carnegie Hall of Track and Field - See University of Oregon campus map.

2:00 – 3:00 pm: Human Physiology Research Lab Open House

The Department of Human Physiology at the University of Oregon has a number of outstanding laboratories that use physiological and engineering methods to evaluate the human condition under a broad spectrum of experimental conditions. Two of these labs will be open for visitors on Saturday.

Motion Analysis Laboratory (http://biomechanics.uoregon.edu/MAL) is located in the basement level of Gerlinger Annex (room B-52). (see University of Oregon Campus Map)

Evonuk Environmental Physiology Core (http://eeplabs.uoregon.edu) is located on the main floor of Esslinger Hall (room 156). (see University of Oregon Campus Map)

Noon – 3:00 pm: Work-out in the Student Recreation Center sponsored by Commercial Fitness Equipment

The Student Recreation Center boasts a variety of leisure and exercise activities including indoor rock climbing, indoor swimming pool, and a number of indoor and outdoor sport courts and fields. Location: Student Recreation Center (see University of Oregon Campus Map)

Activities – check in at front desk of Rec Center

Noon – 1:00 pm Core and Stretch Workout in room 41
Noon – 3:00 pm Open-gym
2:00 – 3:00 pm Open Rock Climbing

Noon – 3:00 pm: Jordan Schnitzer Museum of Art, University of Oregon

The University of Oregon’s Jordan Schnitzer Museum of Art (JSMA) is a premier Pacific Northwest visual arts center, features engaging exhibitions, significant collections of historic and contemporary art, and exciting educational programs that support the university’s academic mission and the diverse interests of its off-campus communities. Location: see University of Oregon Campus Map

10:00am – 5:00 pm: Eugene’s famous Saturday Outdoor Market

Since the early 70’s Eugene’s Famous Saturday Market has provided an outdoor shopping venue that continues as a staple of downtown between April and Thanksgiving. Local crafts, great food, live music, and a Farmers’ Market provide a wide variety of shopping opportunities that is sure to please. Location: Downtown Eugene – 8th and Oak; 20 minute walk from UO campus

Walking directions: 1) Head North on University St. toward E. 13th Ave; 2) Turn left at E 13th Ave – continue 0.6 miles; 3) Turn right at Oak St. – continue 0.4 miles to Saturday Market.
Speaker Profiles

Edward F. Coyle, Ph.D.
Dr. Coyle investigates the physiological factors that limit human exercise performance. Furthermore, he teaches scientists, exercise physiologists and athletic trainers how to best apply this knowledge to benefit sport and health. Optimal human performance requires that the systems of the body work synergistically. Thus, Dr. Coyle’s research covers a number of systems including substrate metabolism, cardiovascular function, thermoregulation and neuromuscular power. He has been at UT Austin for 28 years. In 2006, Dr. Coyle received the Citation Award from American College of Sports Medicine. On a personal note, Ed is an avid Track & Field fan, having competed as a middle distance runner in high school and college.

Sierra Dawson Ph.D., ATC
Dr. Dawson is an award winning educator who currently teaches large undergraduate Human Physiology I and II courses at the University of Oregon. In large classes, she creates an engaging and interactive classroom environment that values learning and relationships. Dr. Dawson also directs the National Athletic Trainers’ Association accredited Master’s program where graduate students are empowered to become leaders, and to combined scholarly and clinical experiences to become the best possible health care professional.

Dan Heil, PhD, FACSM
Dr. Dan Heil, an Exercise Physiology professor at Montana State University for the past 14 years, teaches both undergraduate and graduate Exercise Science courses and directs the Movement Science / Human Performance Lab. He received his B.S. (Biology) and M.S. (Exercise physiology; minor emphases in nutrition and statistics) degrees from Oregon State University and Ph.D. from the University of Massachusetts in Amherst (Exercise physiology; minor emphases in biomechanics and statistics). Dr. Heil’s research is primarily focused on understanding the determinants of Human energy expenditure through the development modeling algorithms, as well as understanding the physiological and biomechanical determinants of work performance. Dr. Heil’s drive to understand the Human body stems directly from his own interest in training for endurance ski racing in the winter (skate and classic) and triathlon racing in the summer.

Stan James, MD
Received a BS in physical education (1953) completed an orthopedic residency (1967) at the University of Iowa. Dr. James trained with Donald Slocum, one of the early grandfathers of Sports Medicine in the U.S. and a founding member of the American Orthopedic Society for Sports Medicine. Dr. James has been a member of ACSM for over years and is also affiliated with University of Oregon Athletic Department and the Department of Human Physiology. In 2006 Dr. James received the University of Iowa Carver College of Medicine award as Distinguished Alumnus for Achievement.
Vin Lananna

Vin Lananna’s accomplishments have established him as one of the premier leaders in track and field in the United States. Named Associate Athletic Director at the University of Oregon in July 2005, Lananna has been guiding a vision for the Oregon program and Historic Hayward Field as the center of track and field in the country. The unprecedented success of the 2008 U.S. Olympic Team Trials was a giant leap forward in Lananna’s grand plan for Track Town, USA, as a pair of UO student-athletes qualified for the 2008 Summer Olympics, Andrew Wheating in the men’s 800 meters and Galen Rupp in the 10,000 meters. That event served as a catalyst for the return of the nation’s most prestigious meets to Hayward Field, including the NCAA Championships in 2010, 2013 and 2014, the USA Championships in 2009 and 2011, and the U.S. Olympic Trials in 2012. The rise of the Duck track and field program to national prominence has coincided with Lananna’s tenure. In 2009 and 2010, the Men and Women of Oregon were both recognized as the NCAA national programs of the year.

Brigitte Piniewski, MD

Brigitte Piniewski, MD is currently the Chief Medical Officer at PeaceHealth Laboratories, Springfield, Oregon. Her main focus is on exploring the clinical utility of laboratory science within crowd sourced approaches to pro-active preventative health strategies. At the Continua Health Alliance, Dr Piniewski acts as Vice Chair for the Wellness Solutions Working Group. She earned her medical degree from the University of British Columbia, Vancouver, B.C. and completed her internship at McGill University, Montreal, Quebec, Canada. Dr. Piniewski is a primary care specialist who has practiced for several years in both the US and Canada. Dr Piniewski is skilled in connecting expert insights and organizing useful parallels from the fields of clinical medicine, scientific research, corporate wellness, and high-tech innovation. By linking maximum clinically relevancy or high yield health contributors to scalable technology solutions, crowds will be able to pro-actively co-design optimal and sustainable health futures. Dr Piniewski is the principle author of “Connected Personal Health 2015” a future vision paper that charges technology to go beyond providing best care to providing best health. She also co-authored “Empowering Healthcare Patients with Smart Technology” IEEE Computer Society July 2010.

Jim Radcliffe, MS

Coach Radcliffe became an assistant strength and conditioning coach at the University of Oregon in 1985, a position that he held for 2 years before assuming the duties as Oregon's head strength and conditioning coach. Coach Radcliffe directs the year-round participation and preparation of Oregon’s football, baseball, and men’s and women’s track & field teams. During his tenure at Oregon, the longest of any current Pac-10 strength & conditioning coach, Coach Radcliffe has established himself as a highly respected teacher, coach and author. An active clinician throughout the United States, he is widely recognized as one of the leading authorities regarding exercise for the development of strength, speed and agility.

J. Josh Snodgrass, Ph.D.

Dr. Snodgrass received a Ph.D. in Anthropology from Northwestern University and subsequently completed a National Institute on Aging postdoctoral fellowship in Cognitive and Social Neuroscience at the University of Chicago. His research on human biology and health sits at the intersection of human physiology, evolutionary biology, epidemiology, and cultural anthropology. Dr. Snodgrass has active field projects in northeastern Siberia, the Amazon region of Ecuador, and several locations within the United States. Since 2005, he has also been involved with the World Health Organization's multi-country Study on Global Ageing and Adult Health (SAGE), a longitudinal study of health and well-being in older adults in six countries (China, Ghana, India, Mexico, Russia, and South Africa). Dr. Snodgrass also directs a research laboratory that focuses on the development and application of minimally invasive techniques (e.g., dried blood spots and saliva) for assessing health and physiology in population-based research.
Julie Staub P.T., CSCS, MS, Certified STOTT PILATES Rehab Instructor Trainer

Julie Staub has been practicing physical therapy for seventeen years. Coming from an athletic background, Julie has learned first-hand how injury can affect one’s quality of life as well as guide your path in life. Julie has worked as a physical therapist, athletic trainer, and Pilates instructor for the past several years. She has combined these diverse fields into a unique way of re-educating the neuromuscular system of the body as a whole. Julie has a love of horses. Within the last three years Julie has looked at how the human can influence horse movement and conformation and how horses can influence human posture. She is currently in process of developing a new lecture / lab series. Julie has been practicing outpatient orthopedics for the past seventeen years. She has worked in a variety of settings including Division I College athletics, High School athletics, hospital acute care, skilled nursing facility, and primarily outpatient orthopedics. This wide range of experience allows her to draw from a variety of experiences and help patients on many levels.

Kerri Winters-Stone, PhD, FACSM

Kerri Winters-Stone, is an exercise scientist and Associate Professor in the School of Nursing and Knight Cancer Institute at Oregon Health and Science University. Her current research focuses on the effects of cancer treatment on fracture and frailty risk and the ability of exercise to improve health in cancer survivors. Her research has received funding from NIH, the Lance Armstrong Foundation, American Cancer Society, and Susan G. Komen for the Cure Foundation. She has recently completed several randomized controlled exercise trials aimed to optimize body composition and physical function in breast and prostate cancer survivors and has begun a new exercise trial to evaluate the benefits of partnered strength training on physical functioning and relationship quality in prostate cancer survivors and spouses. Dr. Winters-Stone is also the author of the book “Action Plan for Osteoporosis” which is part of the ACSM’s Action Plan series of evidence-based exercise guides for health.

Brad W. Wilkins, Ph.D.

Brad has always been curious about the impact of the environment on human performance; asking questions related to thermoregulatory control of skin blood flow, the consequences of hypoxic exercise on vascular control in muscle, and the efficacy of heat dissipation mechanisms during exercise. Currently, a primary goal of his research is to discover innovative strategies and solutions that may reduce environmental impact and improve athletic performance. Dr. Wilkins received a Bachelors degree from Oregon State University, a Master’s degree from Northern Michigan University, and his Doctoral degree from the University of Oregon. He then trained as a postdoctoral fellow at the Mayo Clinic, in the Integrative Physiology Laboratory. In 2008, Dr. Wilkins joined the Nike Sport Research Laboratory and is currently the senior scientist directing the physiology research program for Nike. His research has received awards from the American Physiological Society and the American College of Sports Medicine.
Student Oral Presentations

VALIDATION OF THE U.S. SMOKEJUMPER PHYSICAL FITNESS TEST

Domitrovich, J.W.¹, K. Patterson¹, B.Ralston¹, S.G. Domitrovich¹, B.J. Sharkey, FACSM¹,², S.E. Gaskill, FACSM¹, and C.G. Palmer³

¹The University of Montana, Missoula, MT, ²Missoula Technology and Development Center, Missoula, MT

PURPOSE: To determine the ability of the current smokejumper physical fitness tests to predict performance on smokejumper job specific tasks. METHODS: A total of 57 wildland firefighters (38 smokejumpers, 19 non-smokejumper wildland firefighters) completed testing. Laboratory measures included body composition, and VO₂peak. The physical training (PT) tests were maximum continuous repetitions for sit-ups, push-ups, pull-ups, and time for a 1.5 mile run. Job specific field tasks were line digging (12 inch wide line to mineral soil with a Pulaski tool), pack carry (3 miles on mountainous terrain with 85 lbs), and lifting/carrying (movement of as many 45 lbs water containers for 10 meters in 5 min). Multiple regression analysis was used to correlate the PT test to job specific tasks. Data is reported as mean ± SD. Significance was set at α = 0.05. RESULTS: Subject descriptive data: age (29.67 ± 7.32 yrs), height (178.9 ± 8.16 cm), weight (77.26 ± 11.24 kg), VO₂ peak (55.54 ± 6.47 ml·kg·min). PT test results: sit-ups (119 ± 45), push-ups (53 ± 22), pull-ups (13 ± 7) and the 1.5 mile run (7.78 ± 0.74 min). The current PT test had significant multiple correlations with line digging (r = 0.634, adj r² = 0.341; p < 0.05), pack outs (r = 0.648, adj r² = 0.357; p < 0.05) and lifting/carrying (r = 0.638, adj r² = 0.644; p < 0.05). There were no differences between the heaviest and lightest individuals on PT test scores. CONCLUSIONS: The U.S. smokejumper PT test is a valid testing procedure based on The Uniform Guidelines on Employee Selection.

Supported by the U.S. Forest Service and Bureau of Land Management

THE EFFECT OF YOGA TRAINING ON FALL RISK FACTORS IN OLDER ADULTS

T. Lamb, C. Papadopoulos, T. Burnham, C. Sims

Central Washington University, Ellensburg, WA

Falls are one of the most serious problems for the elderly. For individuals over the age of sixty-five, falls can cause immediate injury and long-term disabilities. In the United States, falls are the leading cause of injury-related death among this population. Yoga has been found to improve balance and flexibility, and reduce depression and anxiety in younger adults. PURPOSE: To determine the impact of yoga on concern for falling and on the following risk factors associated with falling: balance, gait, and muscular endurance. METHODS: Nine older adults (age: 73.4 ± 8.5 years, height: 1.60 ± 0.03 meters, weight: 63.2 ± 8.7 kg) were randomly assigned to either a yoga (YOGA) or a control (CONT) group. The YOGA group (N = 5) participated in a ten-week, senior-specific Hatha yoga training program. Participants attended two training sessions per week for sixty minutes each session. The CONT group (N = 4) did not participate in any yoga training but remained active. Before and after the ten-week period, all participants completed a thirty-second bicep curl test, a thirty-second chair stand-sit test, and the Tinetti balance and gait assessments. Participants also completed a concern for falling questionnaire. A two-way repeated measures ANOVA with one within (pre-post) and one between (YOGA versus CONT) factors was used to determine differences between groups over time. Statistical significance was set at P < 0.05. RESULTS: There was a significant (P < 0.05) group by time interaction for both right and left arm muscular endurance and follow up analysis showed the YOGA group had significantly (P < 0.05) increased upper body muscular strength post-training compared to the CONT group. In addition, there was a significant (P = 0.03) group by time interaction for the chair stand-sit test and post hoc analysis revealed a significant (P = 0.03) increase in lower body muscular endurance post-training for the YOGA group. There was no significant (P > 0.05) difference between groups for balance and gait. Finally, there was a significant (P = 0.03) group by time interaction for concern for falling. Post hoc analysis showed that the YOGA group was significantly (P < 0.01) less concerned for falling after ten weeks of yoga. CONCLUSION: This study suggests that a 10-week yoga class improves upper and lower body muscular endurance in a group of older adults. In addition, yoga training reduces fear of falling within the next year in elderly.

EFFECTS OF WHOLE-BODY VIBRATION TRAINING ON WALKING FUNCTION IN OLDER ADULTS

Ruben J. Guzman, B.S., Hyo Lee, M.S., Walker A. Maddalozzo, Bradley J. Cardinal, Ph.D., FACSM, and Gianni F. Maddalozzo, Ph.D., FACSM.

Department of Nutrition and Exercise Sciences, Oregon State University, Corvallis, OR

Detrimental changes in walking function are a common consequence of senescence. These changes often precipitate falls, reduce daily physical activity and result in a decline in quality of life. Research suggests that whole-body vibration (WBV) training may improve walking function in older adults (65-90 years of age). PURPOSE: To determine if WBV training combined with lower extremity exercises is as effective as a group exercise class at improving walking function in older adults. METHODS: Thirty-one community-dwelling older adults were recruited from the Wilsonville, Oregon area for a 6-month intervention. Participants were randomized into a WBV group (n=15, age=76.13±8.7) and a group exercise class (n=16, age=74.53±8.3). The WBV group performed dynamic lower extremity exercises for 15 minutes, 5 d/wk while standing on a WBV platform (25-30 Hz, 0.3g). Participants in the group exercise class met twice weekly and exercised for 60 minutes per session. Walking speed, cadence, step length, step time, swing time (i.e., time the foot is in the air), and stance time (i.e., time the foot is in contact with the ground) were measured with an electronic walkway system. Gait variability, defined as the within-subject standard deviation of all walking function variables, was also assessed. Paired t-tests were used separately for each group to evaluate changes before and after the intervention. Independent t-tests were also used to determine between-group differences in change. RESULTS: For the WBV group, swing time decreased (p<0.01) while step length variability increased (p<0.01). Reductions in walking speed (p<0.05) and swing time (p<0.001) and an increase in stance time (p<0.001) were observed for the exercise group. The only significant between-group difference was step length variability. CONCLUSION: WBV training appears to have a partially beneficial effect on walking function in older adults. Walking speed, a key indicator of health and strong predictor of longevity, was preserved for the WBV group, but decreased in the exercise group. Caution should be taken when interpreting these findings. The small sample limits the generalizability of the results. Nonetheless, these preliminary findings suggest that WBV training may preserve walking speed in older adults.

Supported by a grant from the John C. Erkkila, M.D. Endowment For Health and Human Performance

COMPARISON OF SUBJECTIVE MEASURES OF BODY COMFORT TO CORE TEMPERATURE DURING THREE HOURS OF WORK IN THE HEAT

M. Martin, K. Patterson, J. Connors, K. Mikkelsen, M. Bartlett, K. Whalen, C. Thompson, M. Oshima, S.E. Gaskill, FACSM and J.W. Domitrovich

Health and Human Performance, University of Montana, Missoula, MT

Wildland Firefighters (WLFF) often endure arduous work conditions in high heat. Safety documents recommend using subjective feelings of body temperature for identification of heat related issues. PURPOSE: To evaluate the relationship between core temperature and subjective measures of RPE, and Thermal Comfort. METHODS: Nine male volunteers (age 24.56 ± 4.07 years, height 189.97 ± 17.06 cm and weight 80.99 ± 7.94 kg) completed three hour trials in a heat chamber (37.0 ± 0.5°C, 30.0 ± 7.6% rh), once a week for three weeks. Subjects wore a WLEF uniform, 20 kg pack, hard hat, and gloves while walking at 3 mph, 4% grade for 30 minute, with a 10 minute break. Core temperature was measured continuously from an ingestible sensor during the trial, Thermal Comfort and RPE were recorded at the start,
midpoint and end of each hour. Data was analyzed using Pearson Product correlation, significance was set at 0.05. RESULTS: The correlation between core temperature and RPE was (r = 0.8906, p < 0.001) and core temperature and Thermal Comfort (r = 0.9116, p < 0.001). CONCLUSIONS: Subjective ratings of RPE and Thermal Comfort are strongly correlated with actual body temperature making them valuable tools for WLFF working in hot environments.

TEST-RETEST RELIABILITY OF HEMOGLOBIN AND HEMATOCRIT MEASUREMENTS USING A POINT-OF-CARE HEMOGLOBIN PHOTOMETER

B.C. Conder, K.J. Taylor, and D.P. Heil FACSM

Movement Science/ Human Performance Lab, Department of Health & Human Development, Montana State University, Bozeman, MT

Percent change in plasma volume (%ΔPV) is a computational method for indirectly assessing changes in exercise induced hydration status, a measure that is calculated using pre and post hemoglobin (Hb, g/dL) and hematocrit (Hct, %) levels. However, the accuracy of the Hb and Hct measurements is dependent upon the validity and reliability of the equipment used. PURPOSE: To determine the test-retest reliability of Hb and Hct measurement using a point-of-care hemoglobin photometer.

METHODS: Five males and seven females donated fingertip blood samples during a single laboratory visit for this study. Hb and Hct levels were measured in quadruplet from one to two fingertip blood samples. Reliability for the Hb and Hct measurements were assessed using 2-Factor repeated measures ANOVA, the intraclass correlation coefficient (RXX; stability reliability), and the standard error of measurement (SEM). Values for RXX and SEM were computed for all four samples (k=4), as well as extrapolated values for three, two, and one sample (k=3, 2, and 1, respectively). For the purpose of this study, a RXX value greater than 0.80 was considered to be an acceptable level of reliability. RESULTS: Mean values for Hb and Hct across the four measurements were statistically similar (P>0.79 for Hb and Hct). RXX (k=4) across all four measures of Hb was high (0.96) with a relatively low SEM value (±0.30 g/dL). When extrapolated to a single measure (k=1), RXX was also high for Hb (0.87) with a relatively low SEM (±0.60 g/dL). RXX (k=4) across all four measures of Hct was high (0.90) with a relatively low SEM value (±1.0 %). When extrapolated to a single measure (k=1), RXX was moderate for Hct (0.69) with a relatively high SEM (±1.7%). However, when extrapolated for two measurements (k=2), RXX was high for Hct (0.82) with lower SEM values (±1.0 %). CONCLUSIONS: A point-of-care hemoglobin photometer is a reliable instrument when using a single finger prick blood sample for measuring Hb but not for Hct. In order to accurately calculate %ΔPV, it is recommended that the average of at least two subsequent measures of Hb and Hct be taken

THE EFFECTS OF ALCOHOL CONSUMPTION ON MEASURES OF ANAEROBIC PERFORMANCE

H. L. Palakovitch, A.M. Harney, B.C. Ruby FACSM, and J.S. Cuddy

University of Montana, HHP Dept. Missoula, MT

Alcohol is a topic of research for its psychological and physiological effects on performance, but past research has focused on aerobic modes. Purpose: To determine the effect of acute alcohol ingestion on tests of anaerobic performance. Methods: Twenty five subjects (13 female, 12 male, 22 ± 3 yrs, 173 ± 12 cm, 70 ± 17 kg, Vo2max 45 ± 8 ml/kg/min) were tested in a randomized crossover design, once consuming a placebo (6.4 ml/kg orange juice for females and 7.9 ml/kg for males) and once consuming 80 proof (40%) alcohol (2.6 ml/kg alcohol + 5.3 ml/kg orange juice for males and 2.1 ml/kg alcohol + 4.3 ml/kg juice for females) to achieve a 0.06% blood alcohol content as measured with a breathalyzer. Drinks were administered at 0, 15, and 30 minutes. Tests included a 1 repetition maximum (RM) bench press, vertical jump, 2 minute crunches, and 30 second Wingate. Results: A significant decrease was observed with alcohol consumption vs. placebo in average mean power (539 ± 168 vs. 556 ± 179 watts, alcohol and placebo, respectively, p<0.01) as well as average minimum power (384 ± 129 and 405 ± 131 watts, alcohol and placebo, respectively, p<0.01) during the Wingate. There was no difference between trials in the 1 RM bench press, vertical jump, crunches, or Wingate peak power. Conclusion: These data suggest short duration (<15 seconds) or low intensity (i.e. crunches) activities are less influenced by alcohol than sustained high intensity activities. Further research is needed to target the effect of alcohol on sustained anaerobic power.

NO EFFECT OF BLOCKING SUSTAINED POSTEXERCISE VASODILATION ON TISSUE OXYGEN INDEX

A.N. Lacewell, L.K. Hochhalter, S.A. Romero, J.R. Halliwill, FACSM

University of Oregon, Eugene, OR

Skeletal muscle blood flow remains elevated after exercise and this sustained postexercise vasodilation is mediated by histamine H1- and H2-receptor activation. Previous research has suggested this elevation in blood flow is in excess of local O2 demand; however, the effect of blood flow on tissue oxygenation in the previously active muscle has not been examined. PURPOSE: To determine the effect of reducing blood flow via histamine-receptor blockade on tissue oxygenation following exercise. METHODS: Thirteen healthy recreationally active subjects (5 females, 8 males, ages 18-25) performed 60 min of whole body aerobic exercise on a cycle ergometer on two separate days. On one day, subjects were given 540 mg fexofenadine and 300 mg ranitidine at 1 hr preexercise to block H1 and H2 receptors (blockade day). On the other day, subjects did not receive any drug (control day). Order of days was randomized. Measurements of leg blood flow (Doppler ultrasound of the femoral artery), whole body VO2 (dilution hood), and tissue oxygen index (near-infrared spectroscopy of the vastus lateralis muscle) were taken for 20 min preexercise and 60 min postexercise on both days. Femoral vascular conductance was calculated using femoral artery blood flow and mean arterial pressure. RESULTS: Femoral vascular conductance increased 50.1±9.0% from preexercise to postexercise on the control day, but only 27.5±8.2% on the blockade day (both p<0.05 vs. pre, p=0.08 across days). Tissue oxygen index was similar preexercise and postexercise on both the control and blockade days (+1.5±0.8 vs. +1.3±1.0%, p=0.3 vs. pre, p=0.9 across days). VO2 was also unchanged postexercise (p=0.9 vs. pre). CONCLUSION: Consistent with our prior studies, much of the sustained postexercise vasodilation is dependent on activation of H1- and H2-receptors. However, in contrast to our expectation, the observation of unchanged postexercise tissue oxygen index values suggests that local perfusion may not exceed local O2 demand. Interestingly, manipulation of blood flow by histamine blockade had no clear impact on tissue oxygen index, suggestive of an independence of O2 delivery within skeletal muscle tissue from femoral artery blood flow.
1. COMPARISON OF CARDIOVAGAL BAROREFLEX SENSITIVITY ANALYSIS IN YOUNG HEALTHY WOMEN

J.A. Miner¹, V.E. Brunt¹, J.C. Miner¹, L.K. Hochhalter¹, P.F. Kaplan¹, W.H. Cooke², C.T. Minson³, FACSM
¹ University of Oregon, Eugene, Oregon, ² University of Texas San Antonio, San Antonio, Texas

PURPOSE: To compare common analysis techniques for cardiovagal baroreflex sensitivity. METHODS: Cardiovagal baroreflex sensitivity (CVBR) was assessed in 5 young women via intravenous administration of sodium nitroprusside (SNP) and phenylephrine (PHE) using the Modified Oxford technique, and was analyzed relating R-R interval and systolic blood pressure. For analysis, we first used the common binning method (values for R-R intervals pooled over 2 mmHg pressure increments) throughout the full 3-minute protocol. We then used both the sequence method and a piecewise linear regression to determine separate falling (during SNP), and rising (during PHE) pressure slopes for each subject. RESULTS: The binning method yielded an average slope of 23.55 ± 4.78. During SNP administration, the sequence method slope was larger (18.96 ± 5.85) than the piecewise linear regression slope (12.55 ± 8.05). However, during PHE administration the sequence method slope was larger (14.48 ± 2.47) than the piecewise linear regression slope (23.38 ± 6.22). CONCLUSION: These data demonstrate that there is large variability amongst these three CVBR analysis techniques. We believe this comparison warrants further analysis using additional subjects and a comparison of the sensitivity of each technique to detect differences between experimental conditions.

Supported by NIH Grant HL081671.

2. IS OXYGEN CONSUMPTION-HEART RATE RELATIONSHIP AFFECTED BY WALKING AT VARIOUS WATER DEPTHS VERSUS LAND?

W, Alkurdi¹, D. R. Paul¹, D.G. Dolny². ¹University of Idaho, Moscow, ID. ²Utah State University, Logan, UT.

PURPOSE: Compare the Oxygen Consumption (VO₂), Heart Rate (HR) relationship and predict VO₂ during walking on land vs walking in water at selected water depths in female subjects. METHODS: Eighteen subjects aged 45±13 yrs, body mass of 80±18 kg and body mass index (BMI) of 29.06±2 kg/m² walked on a land treadmill (land) in 24°C air and on three separate days in a water treadmill (ATM, Hydroworxtm) at 30°C. Sessions consisted of six 5-min walking bouts of 2.41, 3.22, 4.02, 4.83, 5.63 and 6.44 Km per hour. Water depth was at the xiphoid (xip), 10 cm below (-10 cm), and 10 cm above xip (+10 cm). HR and VO₂ were recorded during the final three min and averaged. The VO₂-HR slope and intercept were calculated for each condition and compared with repeated measures ANOVA. Stepwise linear regression was used to predict VO₂ (l/min) from walking speed, body mass or BMI, HR, and water depth (for water trials). RESULTS: The VO₂-HR relationship slopes (range = 0.0199 to 0.0214) and intercepts (range = -1.241 to -1.405) were similar (p<0.05) among land and water conditions. On land, VO₂ was predicted from walking speed, HR and BMI (r² = 0.83, SEE = 0.15 l/min) or body mass (r² = 0.87, SEE = 0.13 l/min). In water, VO₂ was predicted from walking speed, HR, water depth and body mass (r² = 0.87, SEE = 0.15 l/min) or BMI (r² = 0.82, SEE = 0.16 l/min). CONCLUSION: We are the first to demonstrate that VO₂ can be predicted to a similar extent during walking in shallow water as on land. However, water depth contributed to VO₂ prediction suggesting energy expenditure is influenced by water depth (~ at xiphoid depth). This may account for the discrepancy in prior research that identified walking in shallow water requiring either greater or less energy expenditure than walking on land.

Supported by National Swimming Pool Foundation (NSPF).

3. THE STRONGWOMEN™ PROGRAM: A SEVEN-WEEK STRENGTH TRAINING PILOT STUDY FOR ADULT WOMEN


The University of Montana Western, Dillon, MT.

Strength-training interventions with a focus on positive physical and psychosocial health outcomes as part of lifespan development throughout adulthood has increasingly become the focus of health professionals. However, intervention programs that focus on positive outcomes for adult women living in rural areas may be missing from the literature. PURPOSE: The purpose of this exploratory project was to introduce the StrongWomen™ program to adult women living in a rural Montana community. The StrongWomen™ program is a research-based strength-training intervention developed at the Tufts University John Hancock Center for Physical Activity and Nutrition Science and Policy designed to improve strength, physical activity frequency, and other important health outcomes for women. METHODS: Twelve women who were recruited by word of mouth from the campus and local community volunteered for the 7-week pilot study program that included twice weekly 75-minute sessions. Pre- and post-program standardized adult functional fitness tests were also administered. Seven women ranging in age from 39-63 years (Mean = 53.57) completed the all parts of the program. Three of the six pre- and post-program functional fitness assessments of interest to this study included (1) a 30-second chair stand test, (2) a 30-second arm curl test, and (3) a 2-minute stepping test. Paired t-tests were used to compare before and after fitness assessments. A retrospective program evaluation using a 4-point Likert scale was also used to assess psychosocial outcomes. RESULTS: Significant pre- and post-test improvements were found for three functional fitness tests: Paired t-test for the 30-second chair stand improved from pre-test (M = 18.00, SD = 2.67) to post-test (M = 22.00, SD = 2.53, p < 0.01). Scores for the arm curl pre-test (M = 24.86, SD = 3.48) to post-test improved significantly (M = 27.86, SD = 3.625, p < 0.01) as did the 2-min step test pre- (M = 114.83, SD = 9.60) to post-program scores (M = 131.83, SD = 9.63, p < 0.01). CONCLUSIONS: Based upon the positive health and fitness outcomes obtained during this exploratory study future expansion of this program to more broadly include the local rural community is recommended.

Supported by National Swimming Pool Foundation (NSPF).
with the advancement of technology, the feasibility of using portable wrist-worn accelerometer-based activity monitors (AMs) to measure free-living physical activity (PA) has become exceedingly popular. Whereas the impact of wrist-worn AM placement has been investigated in adults, no research has evaluated the influence of wrist AM location (left versus right wrist) on measurements of free-living PA in adolescents. Purpose: The purpose of the current study was to evaluate the influence of wrist-worn AM wearing location (left versus right wrist) and AM processing algorithm (single versus double regression, or 1R and 2R) on measures of free living physical activity in adolescents ages 12-17 years old. Methods: Five boys (Mean±SD: 16±1.2 yrs, range: 14-17, 171.2±8.7 cm, and 65.7±4.3 kg), and 7 girls (14.1±1.8 yrs, range: 12-17, 162.4±7.8 cm, and 58.4±8.2 kg) wore two AMs for 7 consecutive days, 24 hours a day, with one AM on the dorsal side of each wrist using locking plastic wrist bands. Subjects were instructed to engage in their usual daily activities. After downloading the raw AM data to computer, previously validated algorithms (1R and 2R) were used to transform and summarize the data into duration of time spent within moderate (MTime, mins/week), vigorous (VTime, mins/week), and moderate-to-vigorous (MVTime, mins/week) activity intensities for both monitors. Dependent variables (MTime, VTime, MVTime) were then evaluated using multivariate two-factor repeated measures ANOVA (α=0.05) with planned contrasts (α=0.01). Results: There was strong evidence to suggest that all PA outcome variables were different between 1R and 2R algorithms (F<.001). There were significant differences between mean values by wrist wearing location for MTime (P=0.03) and MVTime (P=0.03) using the 2R AM algorithm (MeansSE: MTime: 74.5±10.17 vs. 87.9±10.1; MVTime: 74.9±10.1 vs. 88.1±10.2 mins/week) but not for VTime (VTime: 0.44±0.29 vs 0.23±0.13 mins/week). In contrast, there were no differences by wearing location for any variable using the 1R algorithm (MeansSE: MTime: 43.3±6.8 vs. 50.0±6.9; VTime: 5.4±1.2 vs. 5.7±1.1; MVTime: 48.7±7.5 vs. 55.8±7.8 mins/week). Conclusion: These data indicate that AM wrist wearing location (left vs right wrist) can influence PA outcome variables in adolescents. Future research should consider standardizing wrist-worn AM location prior to measuring free-living PA in adolescents.

5. THE EFFECTS OF ORTHOTICS ON COMFORT AND PERFORMANCE AMONG MALE COLLEGIATE RUGBY PLAYERS
Central Washington University, Ellensburg, WA
Commercially available orthotics (CO) have been used among cleated athletes to combat hard field conditions and stud pressure for many years, however research in the area is sparse. The purpose of this study was to examine the effects of a CO on performance and comfort ratings among male collegiate rugby players. Purpose: Twenty five healthy male collegiate rugby athletes (20.8 ± 1.0 years) who were free of lower limb injury or physician prescribed orthotic completed this single-blind study. Participants were randomly divided into two groups: stud pressure (SP) (n=13) or no stud pressure (NSP) (n=12) based on an overall comfort scores. Subjective comfort was measured after training sessions for four weeks, and before and after a 500 meter hard surface run (HRR). Objective data was measured during one laboratory and two field tests: single leg drop balance assessment (SLD), three-cone shuttle (TCS) and broad jump (BJ). Participants were blinded to either the intervention, CO or placebo orthotic (PO). Comfort was measured using a survey utilizing a Visual Analog Scale. Performance was measured for TCS (seconds), BJ (meters), and muscle activity (volts) during SLD. Results: Significant improvement in forefoot comfort over the season was observed with CO (p=0.02), post HSR (p=0.04), and BJ (p=0.03). Furthermore, the orthotic significantly decreased peak muscle activity in the tibialis anterior (p=0.02) and gastrocnemius medialis (p=0.04) during the SLD. Conclusion: The use of the CO orthotic had a positive effect on improving comfort ratings and performance measures. It is plausible that this is an effective treatment for alleviating stud pressure.

6. THE ACUTE EFFECT OF CAFFEINE CONSUMPTION ON RESTING METABOLIC RATE
Z. Liu, C. Papadopoulos, K. Pritchett, and R. Pritchett
Central Washington University, Ellensburg, WA
The majority of the research has suggested that caffeine increases resting energy expenditure 4 to 24 hours after ingestion. However, the acute effects of a weight dependent dosage of caffeine on resting metabolic rate have not been well documented. Purpose: To examine the acute (< 60 minutes) thermogenic effect of caffeine on resting metabolic rate employing a randomized, double-blind, and cross-over study. Methods: Fifteen recreationally active individuals were recruited. Participants completed two resting metabolic rate measurements, one with placebo (PLB) and the other with caffeine (CAFF) each separated by one week. Participants arrived at the laboratory after an overnight fast. Each participant completed a 30-minute resting metabolic rate measurement prior to supplementation. After the 30-minute period participants consumed either CAFF or the PLB (5 mg/kg of body weight) and resting metabolic measurements resumed for another 60 minutes. Energy expenditure (kcal/min) was calculated using the Weir equation and averaged every 10 minutes. A two-way repeated measures ANOVA was used to evaluate differences between treatments over time for energy expenditure and respiratory exchange ratio (RER). Results: Energy expenditure and RER prior to supplementation were not significantly (p = 0.50) different between CAFF and PLB. There was a significant (p = 0.02) treatment by time interaction and post hoc analysis further revealed that energy expenditure was significantly (p < 0.01) higher for CAFF compared to the PLB between 20 to 60 minutes. There was also a significant (p < 0.01) treatment by time interaction and post hoc analysis showed that the respiratory exchange ratio was significantly (p < 0.05) higher for CAFF compared to the PLB between 20 to 40 minutes. Conclusion: The results of this study suggest that caffeine increases energy expenditure 20 minutes after consumption. Caffeine also increased RER 20 minutes after consumption alluding to increased carbohydrate utilization between 20 and 40 minute post-caffeine consumption.

7. MECHANISMS OF ISCHEMIC-PRECONDITIONING IN HUMAN SKELETAL MUSCLE
A.N. Bailey, S.M. Ratchford, H.A. Senesac, and H.C. Dreyer
University of Oregon, Eugene, OR
Ischemic-preconditioning (IPC) has been shown to stimulate endogenous production of antioxidant enzymes and signaling pathways in cardiac and skeletal muscle in animal models that confer protection against subsequent ischemic injury. IPC stimulates early-acting (2 hours) and late-acting (~24 to 96 hours) protective windows that may be used to mitigate tourniquet-induced ischemic injury. Additionally, IPC activates early-acting (2 hours) and late-acting (~24 to 96 hours) protective windows that may be used to mitigate tourniquet-induced ischemic injury. Furthermore, IPC activates early-acting (2 hours) and late-acting (~24 to 96 hours) protective windows that may be used to mitigate tourniquet-induced ischemic injury.
8. A FOUR-WEEK CIRCUIT WEIGHT TRAINING PROGRAM TO IMPROVE ANAEROBIC WORK CAPACITY

J. A. Ulbright, W. M. Silvers, J. Kawaguchi

Eastern Washington University, Cheney, WA, USA

Anaerobic work capacity (AWC) is the total amount of mechanical work, in Watts (W), performed using strictly an anaerobic ATP yield from both the immediate and the glycolytic energy systems. Improvements in AWC can increase the capacity to do high intensity exercise for short durations. Training methods, such as sprint and resistance training, have been reported to improve AWC. Another method, circuit weight training (CWT), may also improve AWC. PURPOSE: The purpose of this study was to examine the effects of a four-week CWT program on AWC. METHODS: Twenty (14 males, 6 females) healthy, recreationally active, college-age (22.4 ± 2.7 years) participants were randomly assigned to two groups. The experimental group (n = 10; 7 males, 3 females) completed four weeks (three days per week) of CWT. The control group (n = 10; 7 males, 3 females) maintained their current physical activity level for the duration of the study. Anaerobic work capacity was quantified via relative mean power output (MP) measured pre- and post-training with a 30-second Wingate Anaerobic Test. A repeated measures two-way analysis of variance with matched pairs was utilized to examine differences in AWC within-groups and between-groups. RESULTS: Pre- to post-training, the control group decreased relative MP 2.45% (6.79 ± 0.8 W/kg versus 6.63 ± 0.71 W/kg; p > 0.05) while the experimental group increased relative MP 2.0% (6.65 ± 0.48 W/kg versus 6.78 ± 0.72 W/kg; p < 0.05). CONCLUSION: There were no significant differences in AWC within or between groups from pre- to post-training. However, there was a trend for improved AWC in the experimental group (indicated by an increase in relative MP), which suggests that CWT has the potential to improve AWC. Non-significant results may be due to low sprint exercise intensity, low resistance exercise volume, short program duration, and/or an insensitivity of the measurement technique.

9. RESULT OF BACKPACK LOAD POSITIONING ON KINEMATICS AND ECONOMY OF TREADMILL WALKING

J.E. Hollins, K.J. Taylor, and D.P. Heil, FACSM

Movement Science/Human Performance Lab, Department of Health and Human Development, Montana State University, Bozeman – USA

Research has established that treadmill walking economy is influenced by stride rate, surface incline, as well as backpack load positioning. PURPOSE: In the interest of evaluating future backpack design characteristics, this study investigated the influence of vertical positioning of a fixed backpack load on treadmill walking economy and kinematics. METHODS: Five graduate exercise physiology class volunteers (1 male, 4 females; Mean ± SD: 23.8±1.6 yrs age, 77.6 ±14.3 kg body mass, 26.5±1.9 kg/m² BMI) self-selected treadmill walking speeds for each of 3 treadmill grades (0%, 15%, 30%) while wearing an adjustable backpack frame (5.11 kg) and an 18.75 kg pack load (23.86 kg total). Subjects completed three successive 5-min stages for each of 3 pack load positions (low, medium, and high) at each combination of speed and grade combination. Order of load position testing was counterbalanced while dependent measures of interest included steady state heart rate (HR, bpm), relative oxygen consumption (RVO₂, ml/kg/min), energy expenditure unit cost (EE, kcal/kg/m), and stride rate (SR, strides/min) from the last 3 minutes of each 5-min stage. Data were evaluated using multivariate repeated measures ANOVA and planned contrasts for post-hoc analysis at the 0.05 alpha level. RESULTS: Walking speeds averaged (Mean ± SE) 73.1±6.9, 52.4±11.2, 23.7±5.0 m/min for the 0, 15, and 30 % treadmill grades, respectively. Significant main effect differences were found across all grades for all variables (P<0.05). However, no significant main effects were found for pack position for any variable with only SR approaching significance (P=0.07). Although not significant, mean values for HR, RVO₂, and EE tended to be lower at the middle pack position at the 0% grade. At the 15% and 30% grades, similar trends were not observed. However, mean SR was always highest at the middle pack position for every grade. CONCLUSIONS: Significant trends were observed between grades but not between load positions. This indicates that the vertical position of load on a backpack frame, as tested in the current study, does not have a significant effect on the economy of walking. However, the observed non-significant trends for economy variables and SR between pack positions at the 0% grade could indicate a slight optimization at the middle pack position. Thus, future backpack designs should consider that load positioning only effects economy at the 0% grade, while walking kinematics were influenced at all grades.

10. THE EFFECTS OF A SIX-WEEK SNORKEL TRAINING PROGRAM ON 5-KM TIME-TRIAL PERFORMANCE

M.J. Johnston, W.M. Silvers, and G. Babcock

Eastern Washington University, Cheney, WA

Several training methods have been used to elicit physiological adaptations that benefit athletic performance. Respiratory muscle training (RMT) is one method that has been purported to improve endurance performance. PURPOSE: To examine the effects of a six-week snorkel training program on 5-km running time-trial (TT) performance. METHODS: Twelve (6 males, 6 females) healthy, college-age (18-30 years) recreational runners were assigned to two groups. The snorkel (SNK) group (n = 6; 3 males, 3 females) and the training (TRN) group (n = 6; 3 males, 3 females) completed six weeks of treadmill running at a speed that initially corresponded with 65% of their VO₂max. The SNK group completed the treadmill run training while wearing a snorkel with a restricted airway. The TRN group completed all training without a snorkel. Training was completed three days a week for 20 minutes. For every third session throughout the training period, treadmill speeds were increased incrementally 0.2-mph (0.16-km/h) for all participants. Five-km TT performance was measured pre- and post-training on an indoor 200-m track. A two-way repeated measures ANOVA with matched pairs was used to analyze the TT data. RESULTS: The SNK group 5-km times improved from 1469±155-sec to 1433±166-sec. The TRN group 5-km times improved from 1455±141-sec to 1444±136-sec. Despite the apparent improvements, there were no statistically significant differences in 5-km TT performance within (p = 0.20) or between (p = 0.98) groups from pre- to post-training. CONCLUSIONS: Despite the lack of statistical significance, the SNK group improved 5-km performance by 36-sec, which may be practically significant for coaches. Compared to relevant RMT literature the present study had a potentially lower RMT volume and undefined RMT intensity, which might explain the lack of significant findings. Also, the a priori power analysis called for 32 participants, but only 12 were able to participate. Consequently, even if statistical significance had been reached, the statistical power would have been too low for the results to be meaningful. Nevertheless, this study employed a form of RMT currently used by some athletes, despite a lack of empirical evidence, and as such necessitates further investigation.

11. VELOCITY AT VO₂MAX AS A CORRELATE OF COMPETITIVE COLLEGIATE CROSS-COUNTRY SKI PERFORMANCE

K.J. Taylor, J.E. Hollins, and D.P. Heil FACSM

Movement Science/ Human Performance Lab, Department of Health & Human Development, Montana State University, Bozeman, MT, USA
Velocity at VO2max (vVO2max) has been established as a useful laboratory parameter in the prediction of distance running performance, often correlating higher to performance than standard testing measures. Within cross-country skiing, laboratory-based measures are commonly used to track training status and predict performance. Thus, this population may benefit from the addition of vVO2max as a testing variable. PURPOSE: This study explored the use of vVO2max relative to common laboratory performance measures as correlates of skate and classic cross-country ski performance in competitive collegiate skiers. METHODS: Ten collegiate skiers, six women (Mean ± SD: 21 ± 2 yrs, 53.4 ± 3.7 ml/kg/min vVO2max) and four men (20 ± 1 yrs, 68.3 ± 3.4 ml/kg/min vVO2max), all of whom were training to compete in the upcoming season, volunteered for laboratory testing. All athletes completed an incremental roller ski VO2max test and two tests of upper body power (UPB) on successive days. The variables of interest from the VO2max Test included: VO2max (ml/kg/min), vVO2max (KPH), VO2 at lactate threshold (VLT; ml/kg/min), lactate threshold as a percent of VO2max (%LT), and roller ski economy (EC; ml/kg/m) at four common submaximal stages (ECs). Dependent variables from UPB tests included measures of absolute and relative power output for 10-second (W10, W and W/kg) and 60-second (W60, W and W/kg) tests, respectively. All laboratory variables were compared with actual ski performance (average speed, KPH) for both classic (CL; 5 km women, 10 km men; n=8) and skate ski races (SK; 10 km women, 15 km men; n=7). Simple linear regression was used to assess correlations and the standard error of estimate (SEE) of each laboratory variable to both CL and SK speed (α = 0.05). RESULTS: Measurements of ECs, and %LT had low to moderate correlations and relatively high SEE values when regressed with both CL and SK speed (0.49 – 0.77). CONCLUSIONS: When considering vVO2max as a correlate of ski performance among several common laboratory measures, it had both a strong correlation and low SEE values. Due to the small heterogeneous sample, however, further investigation is recommended to determine the efficacy of using this variable in conjunction with common laboratory correlates of performance for collegiate cross-country skiers.

12. RESULT OF BACKPACK LOAD POSITIONING ON KINEMATICS AND ECONOMY OF TREADMILL WALKING

J.E. Hollins, K.J. Taylor, and D.P. Heil, FACSM

Movement Science/Human Performance Lab, Department of Health and Human Development, Montana State University, Bozeman – USA

Research has established that treadmill walking economy is influenced by stride rate, surface incline, as well as backpack load positioning. PURPOSE: In the interest of evaluating future backpack design characteristics, this study investigated the influence of vertical positioning of a fixed backpack load on treadmill walking economy and kinematics. METHODS: Five graduate exercise physiology class volunteers (1 male, 4 females; Mean ± SD: 23.8±1.6 yrs age, 77.6±14.3 kg body mass, 26.5±1.9 kg/m² BMI) self-selected treadmill walking speeds for each of 3 treadmill grades (0%, 15%, 30%), while wearing an adjustable backpack frame (5.11 kg) and an 18.75 kg pack load (23.86 kg total). Subjects completed three successive 5-min stages for each of 3 pack load positions (low, medium, and high) at each combination of speed and grade (15% and 30%). Order of load positioning was randomized, and subjects wore the same frame, as tested in the current study, does not have a significant effect on treadmill walking economy. However, the observed non-significant trends for economy variables and SR between pack positions at the 0% grade could indicate a slight optimization at the middle pack position. Thus, future backpack designs should consider that load positioning only effects economy at the 0% grade, while walking kinematics were influenced at all grades.

13. ACCELEROMETER DERIVED ACTIVITY COUNTS AND OXYGEN CONSUMPTION BETWEEN YOUNG AND ELDERLY INDIVIDUALS

L. Whitcher, C. Papadopoulos, V. M. Nethery, L. J. D'Acquisto

Central Washington University, Ellensburg, WA

Accelerometers offer detailed minute-by-minute information over extended periods pertaining to physical activity behavior. This information can be used to provide estimates of time spent in different levels of physical activity intensities and overall patterns of physical activity. Unfortunately, few applications to the elderly population have been made. PURPOSE: The purpose of this investigation was to compare accelerometer activity counts, vVO2MAX activity counts and oxygen consumption between young and elderly participants. METHODS: Sixteen young (age 21.3 ± 2.5) and sixteen elderly (age 66.6 ± 9.2) participants completed the investigation. All participants attended a familiarization session prior to testing. Resting metabolic rates were measured for each participant. Participants remained awake in a seated position for 30 min while expired gases were collected. The treadmill exercise included four 6-min walking intensities ranging from 27–94 m·min⁻¹. Participants were fitted with two accelerometers positioned on the anterior-axillary line of the right hip. Two-tailed independent t-tests were used to determine differences in heart rate and oxygen consumption between groups at rest. A two-way repeated measures analysis of variance with one within factor (exercise intensity) and one between factor (elderly vs. younger) was used to evaluate differences between groups in averaged activity counts, oxygen consumption, and MET values for each of the intensities. A regression analysis was used to determine the relationship between METs and activity counts. RESULTS: Resting oxygen uptake was significantly lower among the elderly group. There were no significant differences in activity counts (counts·min⁻¹) between groups at any of the treadmill intensities. Oxygen consumption (mL0₂·kg⁻¹·min⁻¹) was significantly greater among the elderly group at each of the treadmill intensities. Accelerometer activity counts of 1428 and 2258 counts·min⁻¹ were associated with moderate physical activity intensity for the elderly and young participants, respectively. CONCLUSION: These findings indicate that activity counts are similar across age groups at the selected intensities even though the relative intensity of exercise is greater among elderly individuals.

Supported by CWU Thesis Grant

14. UPPER EXTREMITY OVERUSE AND SWING-TORQUE BACK INJURIES DOMINATE THE INJURY PROFILE OF COLLEGIATE GOLFERS

A. Harveson, R. Pritchett, T. Burnham, and V. Nethery.

Central Washington University, Ellensburg, WA

PURPOSE: This study assessed the relationships between injury prevalence and a variety of elements related to competitive golf at the collegiate level. METHODS: Data on a range of golf specific including experience, handicap, method of club transport, conditioning elements, skill practices, along with type, location, and severity of injuries were collected via a confidential on-line survey of competitors at NCAA Divisions I and III levels. Injury was defined as any condition sustained during the playing/practicing of or conditioning for golf that stopped play or practice, that impeded normal performance, or that required medical treatment including over-the-counter medication such as analgesics and non-steroidal anti-inflammatory drugs. Injuries were categorized by type (e.g. overuse, accident) and were further identified by anatomical location (head/neck, shoulder, elbow, hand/wrist, back, hip, knee, and ankle/foot). Data were analyzed using Microsoft Excel
(2007) and SPSS (ver. 16.0), statistical significance was set at $P<0.05$, and mean values are provided. RESULTS: Respondents (n=130) included both male (n=73) and female (n=57) golfers from Division I (n=94) and Division III (n=36) levels. Males spent 23% more time on the course each week than females (12.3h vs. 10h; $p<0.05$) with no differences in any other golf related variable. Compared to Division III, Division I competitors had lower handicaps (2.2 vs. 6.6), more years experience (11.8y vs. 10.3y), and spent more hours each week on chipping/putting (6.7h vs. 4.1h), full-swing (5.9h vs. 4.3h), strength training (4.6h vs. 1.6h), and total conditioning (9.2h vs. 3.7h) (all $P<0.05$). They also had almost double the number of injuries per player (0.97 vs. 0.53). Overuse was the cause of most injuries (56%), with the hand/wrist (~28%) followed by shoulder (~22%) regions dominating. Swing torque accounted for ~20% of injuries with 56% of these to the back. A loss of competition time through injury occurred in 44 players with 65% of these out for a month or less while 27% were out for at least two months. The only variable that specifically correlated with injury prevalence, albeit weakly, was total years of golf experience ($r=0.2$; $P<0.05$) CONCLUSIONS: These data suggest that upper extremity components and the back are especially prone to injuries that result from overuse and swing torque. Surprisingly, injury prevalence was not related to time spent on conditioning practices.

15. EFFECT OF TOTAL KNEE REPLACEMENT SURGERY ON SKELETAL MUSCLE CELL SIGNALING AND GENE EXPRESSION

S.M. Ratchford1, H.A. Senesac1, B.A. Lantz2, B.A. Jewett1, and H.C. Dreyer1.

1University of Oregon, Eugene, OR. 2Slocum Center for Orthopedics and Sports Medicine, Eugene, OR.

Americans over the age of 65 represent the fastest growing segment of the U.S. population, thus it is not surprising to learn that the number of total knee arthroplasty (TKA) surgeries is predicted to increase as much as 673% by 2030, to 3.48 million procedures per year. By far the most significant clinical barrier following TKA surgery is persistent muscle atrophy and weakness. During TKA a tourniquet is used to reduce blood loss and maintain a clear surgical field. The tourniquet-induced ischemia-reperfusion (I/R) injury that results may contribute to the extensive muscle atrophy observed following this surgery. Additional research is necessary in order to better understand the effects of ischemia-reperfusion (I/R) on human skeletal muscle. PURPOSE: To determine the effects of I/R occurring in skeletal muscle during TKA. METHODS: Muscle biopsies were collected from older subjects (69±4.66 years) in the operating room following induction of anesthesia at baseline, during maximal ischemia (just prior to tourniquet release), and during reperfusion (following restoration of blood flow) during primary TKA. RESULTS: Phosphorylation status of Akt (Ser473), and 4E-BP1 (Thr37/46), were depressed during ischemia and reperfusion relative to baseline ($p<0.05$) and FoxO3a (Ser253) was decreased during ischemia ($p<0.05$). Total protein for HIF1α, REDD1, JNK, ATF4, and GADD34 were increased during ischemia ($p<0.05$). During reperfusion, HIF1α mRNA was elevated relative to baseline ($p<0.05$). During ischemia and reperfusion, REDD1, HSP 40, and MAFbx mRNA were elevated ($p<0.05$). CONCLUSIONS: Our data suggests that anabolic signaling is blunted and that proteins associated with stress pathways are being activated during TKA. Further, mRNA levels for several factors known to be involved in the stress activated signaling pathway are up-regulated during ischemia and reperfusion in muscles from older adults during TKA. These novel findings will help us to better understand the effects of I/R on muscle during TKA.

Supported by the Eunice Kennedy Shriver National Institute for Child Health and Human Development K01HD057332 (HCD)
Undergraduate Poster Presentations

16. QUANTIFICATION OF EXERCISE INDUCED INTRAPULMONARY SHUNT IN HEALTHY HUMANS USING SPECT-CT
H.C. Norris, S.S. Laurie, M.B. Fish, and A.T. Lovering
University of Oregon, Eugene, OR

Exercise-induced intrapulmonary arteriovenous (IPAV) shunting could play a significant role in determining pulmonary gas exchange efficiency, and therefore exercise performance. Although, exercise-induced IPAV shunting in healthy humans has been measured using semi-quantitative planar gamma camera imaging, true quantification of IPAV shunting in healthy humans using three dimensional imaging with attenuation and scatter correction has not been performed. PURPOSE: This study investigated the difference in quantification of IPAV shunting between SPECT imaging and SPECT-CT imaging for attenuation and scatter correction. We hypothesized that SPECT-CT imaging would quantify a greater shunt fraction than SPECT imaging alone. METHODS: A single subject (male age 40) was injected with Technetium-99m-labeled macroaggregated albumin (MAA) at rest and while exercising on a cycle ergometer on two separate days. CT imaging and SPECT scanning were performed within 3 minutes after MAA injection. A minimum emission threshold (B) was set at 5 counts to determine objective regions of interest for the lung, bladder, and whole body for both non-attenuation (NAC) and attenuation and scatter corrected (AC) SPECT data. RESULTS: We measured shunt fractions at rest of 15.34 and 5.80% for NAC and AC, respectively. During exercise we calculated shunt fraction of 17.33 and 7.41%, for NAC and AC, respectively. Calculated shunt fractions increased during exercise to 1.61 % of cardiac output. CONCLUSIONS: Failure to attenuate and scatter correct SPECT data may significantly overestimate absolute shunt fractions by 2.3 to 2.6 fold. CT attenuated and scatter corrected SPECT data showed an absolute shunt fraction of 5.8% at rest which is greater than expected; however the absolute change from rest to exercise resulted in an expected increase during exercise to ~2%. These data demonstrate that intrapulmonary arteriovenous shunt fraction increases during exercise which may explain the reduction in pulmonary gas exchange efficiency observed in healthy humans during exercise.

Supported by PeaceHealth TRAP and US Department of Defense

17. IMPACT OF PERINATAL OXYGEN THERAPY ON EXERCISE-INDUCED FLOW LIMITATION IN ADULTS BORN PREMATURELY
University of Oregon, Eugene, OR, USA.

Children born very prematurely (<32 weeks gestational age or weighing <1000g) typically have underdeveloped lungs and require supplemental oxygen during the perinatal stage. However, supplemental oxygen has been demonstrated to cause a chronic lung disease in humans referred to as Bronchopulmonary Dysplasia (BPD). PURPOSE: To investigate the relationship between duration of perinatal oxygen therapy and exercise-induced flow limitation (EIFL) in adults born very premature. We hypothesized that the duration of perinatal oxygen therapy received would positively correlate with the degree of EIFL in adults with BPD. METHODS: Fifteen healthy human subjects born full-term, 15 human subjects born preterm with BPD and 4 human subjects born preterm without BPD, performed exercise on a cycle ergometer breathing room air at 25%, 50%, 75% and 90% of their maximal oxygen consumption (VO2max). Flow limitation (% tidal volume) and rating of perceived exertion (RPE, modified Borg scale) for both lungs and legs were recorded. RESULTS: >50 days of perinatal oxygen therapy caused >250% flow limitation at 90% of VO2max. RPE was not significantly different between subjects with BPD compared to the healthy full-term subjects. CONCLUSIONS: The duration of oxygen therapy as a neonate during the first 50 days of life is predictive of EIFL in adults >20 years later. Oxygen therapy could potentially be more harmful if given for longer periods of time during the perinatal stage. Interestingly, the lack of difference in RPE scores during exercise between full-term controls and subjects with BPD suggests pulmonary and peripheral adaptations to EIFL not present in healthy humans born full-term. Supported by American Heart Association SDG 2280238

18. ACCEPTANCE AND USE OF EXERCISE INFORMATION BY FEMALE CANCER PATIENTS
J. Scott, B. Torgrimsson-Qerijo, R. Lopez, J. Dobek, K. M. Winters-Stone, FASCM
School of Nursing, Oregon Health & Science University, Portland, OR, USA

Exercise can help manage symptoms from cancer treatment, but motivating patients to become more active is challenging. Medical providers may be best suited to deliver exercise advice but patients may need more than a verbal recommendation to change their behavior. A simple, cancer-specific exercise video (DVD) provided along with an oncologist’s recommendation to exercise may enhance a patient’s ability to become active. PURPOSE: The goals of this project were two-fold: 1) to determine whether or not access to a home-exercise DVD resulted in greater increases in physical activity and quality of life and decreases in fatigue compared to standard written exercise information among women diagnosed with cancer who received an oncologist’s recommendation to exercise and 2) to evaluate the use and acceptability of an instructional exercise DVD for female cancer patients. Here we describe the study sample and report on the use and acceptance of the DVD. METHODS: We conducted an 8-week pilot study comparing female cancer patients randomized to one of two groups that, in addition to an oncologist’s exercise recommendation received either: 1) standard written education materials or 2) standard written education materials + DVD. Patient demographics and cancer history were determined at baseline using an interviewer administered questionnaire. Use and acceptability of exercise information were evaluated at 8 weeks later, also by interview. Equality of two groups at baseline was evaluated by independent t-tests or chi-square (α=0.05) and descriptive statistics characterized use and acceptance of information. RESULTS: Only age differed between groups, where the DVD group was significantly older (60 ± 11yrs) than the control group (54 ± 11 yrs). On average, participants were 3.3 ± 4.5 yrs past diagnosis (range 0-33), with early stage disease (85%) and mostly survivors of breast cancer (63%). Most women had chemotherapy (60%) and surgery (70%) with fewer having radiation treatment (42%). On a 1-5 Likert scale, the DVD group rated the usefulness of exercise information as slightly more useful (3.0 ± 1.5) than controls did (2.4 ± 1.4). Use of the DVD averaged twice per week, with 57% using the video at least once per week. The most common reason for not using the DVD was “too busy” (35%). CONCLUSIONS: The DVD was perceived as more helpful than written and verbal advice only and was used by the majority of participants who received it. Next steps are to determine the influence of this DVD beyond standard written information on patient outcomes in women with cancer.

Funded by the Oregon Health & Science University Knight Cancer Institute

19. COMPARISON OF THE ONSET OF BLOOD LACTATE ACCUMULATION TO CORE TEMPERATURE THRESHOLDS FOR EXERCISE
P.L.L. McDonald, J.G. Greiner, M.L. Walsh, and M.D. White
Simon Fraser University, Burnaby BC, Canada

At higher exercise intensities the increase in pulmonary ventilation (Vl) relative to metabolic need is argued to be a respiratory compensation for the concurrent lactic acidosis. Core temperature is also suggested to be a stimulus to Vl at exercise intensities greater than ~ 70% of maximal oxygen consumption. At these higher work intensities core temperature thresholds for Vl have also been identified, but it is unknown how these thresholds for Vl compare to the Onset of Blood Lactate Accumulation (OBLA). HYPOTHESIS: That the OBLA would be at a lower oxygen consumption (VO2) than core temperature thresholds for Vl during incremental exercise.
PURPOSE: To compare the level of VO2 at the core temperature threshold for VT to that at the OBLA during incremental exercise. METHODS: Seven fit male volunteers pedaled a cycle ergometer during incremental exercise tests (ramp: 20 W/2min) from rest until exhaustion. Each volunteer was instrumented for esophageal temperature (TES) and their expired gases were collected to assess VO2, carbon dioxide production (VCO2) and VT. At each workload, arterialized blood samples were taken from the fingertip and analyzed for blood lactate concentration. Ventilatory equivalents for oxygen consumption (VE/VO2) and carbon dioxide production (VE/VCO2) were plotted as a function of both TES and VO2. RESULTS: The VO2 of 1.6±0.17 L/min at the OBLA was significantly less than both the VO2 of 2.8±0.26 L/min (p<0.01) at the TES threshold for VT/VO2, and the VO2 of 2.5±0.23 L/min at the TES threshold for VT/VCO2 (p=0.04). In conclusion, the VO2 at the OBLA is significantly less than the VO2 observed at the TES threshold for VT during incremental exercise to maximal attainable work-rates. The results support the accumulation of blood lactate and the TES thresholds for VT are separate physiological events with different metabolic and/or neural origins.

Supported by Canadian Foundation for Innovation and Natural Sciences and Engineering Research Council of Canada.

20. EFFECTS OF NORMOXIC NITROUS OXIDE AND HYPERTHERMIA ON CARDIORESPIRATORY RESPONSES DURING LIGHT EXERCISE
S. Ghaffari, M.L. Walsh, M.E. Clegg and M.D. White
Simon Fraser University, Burnaby BC, Canada

Elevated pressures in undersea environments increase tissue nitrogen partial pressure inducing nitrogen narcosis and cognitive impairment. It is not clear how nitrogen narcosis influences cardiorespiratory responses during the light work performed by undersea divers. PURPOSE: Normoxic nitrous oxide and hyperthermia were examined for their effects on cardiorespiratory responses during light exercise in humans. HYPOTHESIS: It was hypothesized that there would be a positive interaction between elevated body temperature and normoxic nitrous oxide on these cardiorespiratory responses. METHODS: Four male and 1 female participants were tested at 1 Atmosphere Absolute (ATA) breathing air or a 30% normoxic nitrous oxide (balance nitrogen). Each volunteer exercised at 50 W on an electrically braked cycle ergometer in a climatic chamber at either 18°C or 35°C. Following a 15 min rest each volunteer exercised for 10 min breathing air, 10 min breathing 30% normoxic nitrous oxide and again breathing air for 10 min. RESULTS: Irrespective of Gas Type, an effect of ambient temperature was evident giving significant increases in esophageal temperature from ~36.8 to ~38.2°C (p<0.009), skin temperature from ~29.5 to ~37°C (p<0.001), pulmonary ventilation from ~26.4 to ~38.3 L/min (p<0.002). Concurrently, end-tidal carbon dioxide partial pressure decreased from 47.6 to 45.2 mm Hg (p<0.046) and end-tidal oxygen partial pressure increased from ~98.5 to ~103.8 mm Hg (p<0.02). With the exception of tidal volume, that showed a trend for a greater value during hyperthermia (p=0.08), there were no effects of Gas Type on the outcome variables. CONCLUSION: The results support hyperthermia stimulated exercise ventilation but there was no evidence of an interaction between normoxic nitrous oxide and hyperthermia on cardiorespiratory responses during light exercise in humans. Supported by Canadian Foundation for Innovation and Natural Sciences and Engineering Research Council of Canada.

21. MUSCLE REGROWTH DURING PHYSICAL REHABILITATION AND AMINO ACID SUPPLEMENTATION
University of Oregon, Eugene, OR

Americans over the age of 65 represent the fastest growing segment of the U.S., population, thus it is not surprising to learn that the number of total knee arthroplasty (TKA) surgeries is predicted to increase as much as 673% by 2030, to 3.48 million procedures per year. By far the most significant clinical barrier following TKA surgery is persistent muscle atrophy and weakness. Previous research has demonstrated that essential amino acid (EAA) ingestion is a potent means to stimulate muscle protein synthesis in older adults. PURPOSE: To determine the effects of twice-daily ingestion of 20 grams of EAA before and after TKA surgery on muscle mass, strength and physical function. METHODS: Magnetic resonance imaging (MRI), isometric quadriceps strength and functional measures (stair climb, timed-up-and-go (TUG) and six-minute walk) were obtained at baseline and at 2 and 6 weeks post-TKA from older adults supplemented with EAA or placebo. RESULTS: Preliminary results indicate that muscle volume is significantly decreased at 2 and 6 weeks post (p<0.05). Timed stair assent and descent, and the timed-up-and-go (TUG) were increased at 2 weeks post relative to baseline (p<0.05), and the distance walked in 6 minutes decreased at 2 weeks post. Isometric quadriceps strength was significantly decreased at 2 weeks post relative to baseline (p<0.05). CONCLUSIONS: Our preliminary data demonstrate that TKA surgery is associated with significant muscle atrophy, declines in muscle strength and physical performance. These preliminary findings will help us to better understand the potential for EAA supplementation to attenuate loss and boost recovery of muscle mass, strength and function following TKA in older adults.

This work was supported by the Eunice Kennedy Shriver National Institute for Child Health and Human Development KO1HD057332 (HCD)

22. IS ACTIVATION OF THE HPA AXIS DURING HIGH INTENSITY CYCLING MEDITATED BY INTERLEUKIN-6?
C.E. Corser-Jensen, J.R. Hagerup, C.C. Moore, G.E. McCall
University of Puget Sound, Tacoma, WA

Interleukin-6 (IL-6) is secreted by skeletal muscle(s) into the circulation during and after exercise and is thought to regulate availability and use of energy substrates in contracting muscles. This myokine may also activates the hypothalamic-pituitary-adrenal (HPA) axis to release ACTH and cortisol; however, the extent of the IL-6 response to high intensity exercise and the potential to activate the HPA axis is unclear. PURPOSE: To characterize IL-6 release and HPA axis activation in response to high intensity cycling. METHODS: Collegiate physically active subjects (n=9) performed two cycle ergometer tests of equal total duration and work. The 14 min high intensity test (HI) consisted of 4x30s Wingate tests separated by 4 min of recovery at 20 W. The total work performed during the HI test was equally distributed over a continuous 14 min low intensity test (LI) (~48 hr later). Blood was collected from an indwelling venous catheter pre-, during (1.5, 6, and 10.5 min), and postexercise (+1, +15, +30, +60 min; +48 hr). Resting and exercise hormone concentrations were evaluated using repeated measures ANOVA. RESULTS: Mean (SD) plasma IL-6 peaked postexercise in both protocols: ~60 min in HI (1.69(0.75) pg/ml) and +30 min in LI (1.26(0.96) pg/ml) and were similar to preexercise levels. Cortisol changes in response to exercise differed between protocols (main effect: p= 0.06; interaction: p= 0.04). In both protocols cortisol declined during exercise; however, an opposing response was apparent from 10.5 min to +1 min (p<0.01) with an increase in HI (21.7(6.9) to 22.6(5.9) ug/L) and decrease in LI (20.1(6.5) to 17.7(3.9) ug/L). After +1 min HI and LI cortisol declined to continue postexercise. HI+48 hr cortisol levels were lower at rest (HI pre= 24.5(4.8) ug/L; HI+48hr =21.6(5.6) ug/L; p=0.07) and during the subsequent LI protocol (p= 0.0001). CONCLUSION: Although high intensity exercise had a minimal effect on exercise-induced IL-6, cortisol responses suggest some degree of HPA axis activation. Ongoing ACTH analysis will help to further characterize the extent of this activation in response to high intensity cycling.

Supported by University of Puget Sound faculty and student research grants.

23. ANALYSIS OF MECHANOMYOGRAPHY AND ELECTROMYOGRAPHY DURING THE H-REFLEX USING A WAVELET-BASED INTENSITY ANALYSIS.
J.D. Welch, J.R. Jones, and W.J. Armstrong.
Western Oregon University, Monmouth, OR

PURPOSE: The relationship between mechanomyography (MMG) and electromyography (EMG) during electrically-evoked muscle contraction was examined using a Morlet version of the von Tscharny (MvT) “intensity analysis,” which describes the power of a non-stationary signal as a function of both frequency and time. Method: Data for 8 college-aged participants (3
24. THE EFFECT OF SHOD AND BAREFOOT CONDITIONS ON RUNNING ECONOMY IN TRAINED FEMALES

Gonzaga University, Spokane, WA

It is evident that running shoes are important in protecting the plantar surface of the foot, but they might also increase the cost of running. PURPOSE: The purpose of this study was to determine if running barefoot was more economical than running shoe in trained females and to determine if differences in economy occurred due to the mass of the shoes. METHODS: Ten trained female collegiate cross-country runners (age: 20.3 ± 1.3 yr; mass: 54.5 ± 6.4 kg; stature = 161.9 ± 4.1 cm) ran on a treadmill at 85% of their individualized 10 km race pace for 6 min in three conditions: shod, barefoot, and barefoot with mass attached to each foot equal to the mass of their running shoe size. A Sensorsmedics metabolic cart was used to collect 30 s averages of oxygen consumption and the respiratory exchange ratio (RER). A Polar heart rate monitor was used to measure heart rate (HR, min⁻¹) every 30 s. Only data from the last 2.5 min of each run were used in the analysis. A one-way repeated-measures ANOVA was used to determine if significant differences existed among the shod, barefoot, and mass conditions for the rate of oxygen consumption, RER, and HR. Where significant differences were found, a Bonferroni post-hoc test was run to determine which conditions were significantly different. RESULTS: The rate of oxygen consumption was significantly greater in the mass condition (33.54 ± 4.44 mL kg⁻¹min⁻¹) than either the barefoot (32.53 ± 4.44 mL kg⁻¹min⁻¹) or shod condition (32.51 ± 4.24 mL kg⁻¹min⁻¹) (F=5.33, P=0.04), which were not different from one another. Similarly, HR was significantly greater in the mass condition (165.7 ± 11.0 min⁻¹) than either the barefoot (156.6 ± 13.0 min⁻¹) or shod condition (156.6 ± 13.0 min⁻¹) (F=3.54, P=0.05), which were not different from one another. No significant differences existed for RER among the three conditions (mass = 0.92 ± 0.05; barefoot = 0.92 ± 0.04; shod = 0.92 ± 0.04; F=0.31, P=0.69). CONCLUSIONS: Running with mass attached to the foot increases running cost when compared to running barefoot but not compared to running with an equivalent shoe mass. This suggests that the structure of the shoe serves to eliminate any decrease in running economy caused by the shoe’s mass.

25. EXAMINING THE RELATIONSHIP OF LONG-TERM EXERCISE WITH DEPRESSION

J. Morgan, N. Hardy, A. Holweger, C. Kelley, J. Housman, L. Stanley, J. Vandette, S. Domitrovich
University of Montana, Human Performance Lab, Missoula MT

Depression is a widely prevalent disorder and there is a continual effort to find ways to improve treatments, such as, the recent studies conducted exploring exercise therapy. Purpose: The purpose of this study was to examine the relationship between physical fitness and depression in active and non-active subjects. Methods: 46 volunteers (n=46, mean age = 22.7±3.9 years) recruited from the University of Montana participated in the study. Subjects filled out 4 surveys (The RAND-36, CES-D, Trait Hope Scale, and a Lifestyle questionnaire), performed an underwater weighing test at residual volume to determine percent body fat (BF%), and a treadmill graded exercise test to determine VO2max. Data were analyzed using correlations between VO2max and percent body fat with scores from the survey data. T-tests were performed between chronic exercise and sedentary persons using the survey data. Results: There were few -statistical significances between the different surveys examining quality of life and the relationship with fitness. There was a significant correlation between BF% and general health (mean score of 19.57% BF ± 8.51, r=0.295). Another significant correlation was seen between chronic exercisers and sedentary individuals for scores of anger (6.84 months regular exercise ± 5.23, 1.24 days per week feeling anger ± 1.69, p<0.05). Similarly, there was significance found between chronic exercise and three health concepts from the RAND-36; physical functioning, role limitations due to emotional problems, energy/fatigue (p<0.05). Conclusion: This study showed few correlations, however, the results found suggest that there could still be a relationship between physical fitness and mood levels. Low BF% showed a strong correlation to a subject’s general health, while significance was found between those that chronically exercised and lower levels of anger, with a trend toward lower levels of stress.

26. CAFFEINE PATCH EFFECTS ON 1RM BENCH AND REPEATED 20M SPRINTS

E. A. Gonzalez
Eastern Washington University, Cheney, WA

PURPOSE: To examine the ergogenic effects of energy patches (EP) on 1RM bench press (1RM) and repeated 20m sprints (RS). It was hypothesized that a significant difference would be observed between caffeine patch (EP) and placebo (PLA) in increasing 1RM or improving first (FT), fastest (FTT) or mean RS times. METHODS: A convenience sample of 14 college students volunteered for this study (n=4, mean age = 22±5yrs). Participants were defined as healthy, moderately active and experienced lifters. 1RM was assessed using an olympic-bar and free weights. All sprints were performed on a 20m straight section marked off on an indoor track. A photo cell gate and digital was used to record sprint times. Two patches were applied to participants’ medial bicep containing either caffeine (74mg total) or nothing (PLA). 60min seated rest was given to ensure uptake of caffeine into the bloodstream. Participants performed 2 warm-up sets on the bench of 8-10 and 5-7 reps respectively at a self-selected weight. Up to 5 attempts for the 1RM were allowed at a self-selected weight, separated by 2-5min of rest between attempts. If any participant failed to lift the weight, the previous 1RM completed successfully was recorded. Following 1RM testing, participants performed a 5min self-paced warm-up that included at least 20 walking lunges, kneeling hip flexor stretch, lying hip flexor stretch, scorpions, and two warm up sprints at 70-80% of max effort. Participants then performed six, 20m sprints with 30s active rest in between. A paired t-test was used for each dependent variable to test for significant difference between EP and PLA with alpha set at p ≤ 0.05. RESULTS: No significant difference was found in 1RM between EP (85.05kg ± 38.90kg) and PLA (84.37kg ± 38.90kg) with. Statistics for sprint times were examined using three different methods: mean (3.74s ± 0.29s EP vs. 3.75s ± 0.29s PLA), FT (3.75s ± 0.28s EP vs. 3.76s ± 0.28s PLA), and FTT (3.65s ± 0.29s EP vs. 3.68s ± 0.29s PLA) times; none of which showed any significance. CONCLUSION: Two 37mg patches used in this study were not enough to see an ergogenic effect.

27. EFFECTS OF AN IONIC BRACELET ON PHYSICAL, COGNITIVE AND INTEGRATIVE TASKS

C. Kimura, E. Bringman, and P. Schot
Department of Exercise Science | Pacific University | Forest Grove, OR 97116

Use of alternative and complimentary therapies is increasing. One approach posits corrective manipulations of undocumented energy patterns in the body (biofields) via therapeutic touch or devices such as magnets, metals,
light and ionic materials can improve health and function. One aggressively marketed device is the ionic bracelet claiming immediate benefits in a wide variety of domains. PURPOSE: To determine acute effects of ionic bracelet use on physical, cognitive and integrative tasks. METHODS: 52 young healthy adults participated. None reported use of this device type. Each completed 2 series of 6 tasks, though data for 3 tasks were lost for 11 (denoted by * in Table 1). For a test series, either the ionic or the inert bracelet was worn (counter-balanced). Investigators applied bracelets behind a shield and covered by a sleeve in a single-blind design. Vertical jump take-off velocity (m/s) served to test power; maximum force (N) in an isometric dead-lift was used to test strength; time (s) to hold a weight (20% of body weight) at a clavicle level served to test endurance; center of pressure excursion (cm) in single leg stance on dynamic surface assessed posture control, absolute anticipation timing error (ms) represented perceptuomotor performance; and time (s) to complete a Stroop conflict variation tested concentration. Effects of test order and bracelet type were analyzed independently via paired t-tests. RESULTS: An order effect for strength was observed, most likely learning or an artifact of the number of t-tests applied; no other contrast revealed a significant difference (Table 1). CONCLUSIONS: This ionic bracelet demonstrated no immediate benefits.

### Table 1. Effects of test order and bracelet type on performance.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Test Order</th>
<th>Bracelet Type</th>
<th>Grand Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posture Control</td>
<td>0.795</td>
<td>0.637</td>
<td>284.3</td>
<td>127.8</td>
</tr>
<tr>
<td>Perceptuomotor</td>
<td>0.019</td>
<td>0.34</td>
<td>48.1</td>
<td>22.0</td>
</tr>
<tr>
<td>Concentration</td>
<td>1.346</td>
<td>0.647</td>
<td>4.1</td>
<td>7.4</td>
</tr>
<tr>
<td>Power</td>
<td>0.872</td>
<td>0.509</td>
<td>2.56</td>
<td>0.25</td>
</tr>
<tr>
<td>Strength</td>
<td>2.381</td>
<td>0.671</td>
<td>869</td>
<td>278</td>
</tr>
<tr>
<td>Endurance</td>
<td>1.623</td>
<td>0.619</td>
<td>43.3</td>
<td>15.7</td>
</tr>
</tbody>
</table>

28. HUMAN WALKING: RELIABILITY OF PREFERRED BEHAVIORS AND SELF-OPTIMIZATION

K. Anderson, R. Mijares, and P. Schot
Department of Exercise Science | Pacific University | Forest Grove, OR 97116

Walking behavior may manifest self-optimizing processes. If the leg is viewed as a pendulum, economy should be optimized if self-selected stride frequency naturally matches the resonant frequency of the leg-pendulum model. Several studies support this notion, but a potential methodological concern is apparent; testing nearly always uses a single session. This presumes self-selected behaviors are consistent traits. Such an essential consideration should not be left to assumption. PURPOSE: The purposes of this study were (a) to assess the reliability of self-selected walking behaviors across multiple sessions and (b) to examine economy when using self-selected stride frequencies and then imposing theoretically ideal stride frequencies based on the pendulum model. METHODS: 47 adults representing a broad range of leg lengths participated. Self-selected (SS) treadmill walking behaviors were determined at 3 testing sessions spaced at least 24 and no more than 96 hrs apart. Speed (WS), stride length (SL) and frequency (SF), heart rate (HR) and economy (WE, expressed as meters traveled per heart beat) were gathered under steady state conditions during each test. At a fourth session, we contrasted WE under varied conditions of paced SFs based on the pendulum model (PM) or SS. Specifically, C1 = SS-SF, SS-SL and SS-WS; C2 = PM-SF, but allowing for SS use of SL and WS; C3 =PM-SF, but maintaining the original SS-WS which obligated a specific SL that was not particularly natural. RESULTS: Repeated measures ANOVA and intra-class correlation revealed preferred walking behaviors were reliable; there were no significant session effects for any variable examined (average probability of >0.31 overall) and Cronbach’s alpha indicated high internal consistency for each variable (overall average of >0.82). There was a significant effect exerted by the SF/WS combinations; WE actually worsened by >6.5% using the two theoretically ideal pendulum-model based SFs compared to preferred (F2,90=10.84, p<0.001). CONCLUSIONS: Self-selected walking behaviors appear to be reliable; the justified use of a single testing session, historically and in future work, is of valuable practical significance. The unexpected decrement in WE with the pendulum-based SF was attributed to a methodological choice made for this study. Prior pendulum models introduced a biological correction factor. We modeled the leg as a truncated cone and did not apply this correction. The result was an unnaturally low SF that resulted in excessive SLs, which is known to hinder locomotor efficiency.

29. THE ENERGY COST OF BALLROOM DANCE

Brigham Young University Idaho, Rexburg, ID; *Montana State University, Bozeman, MT

In recent years ballroom dance has undergone a rebirth in popularity. However, with little data available, the energy requirements and therefore cardiovascular benefits of ballroom dance are relatively unknown. PURPOSE: To determine the energy cost of ballroom dance and compare these results with current guidelines for aerobic activity. METHODS: Participants consisted of 24 college-age individuals (12 male, 12 female). Oxygen uptake was recorded and used to determine energy expenditure during 30-minutes of ballroom dance (waltz, fox trot, swing, cha cha). Dances were performed in four-minute intervals with two-minute rest periods between each dance. The swing dance was performed twice in order to reach 30-minutes of total activity. RESULTS: Mean energy expended during the 30-minutes of total activity including rest was 5.88 ± 1.7 kcal/min. Energy expended during the waltz (6.01 ± 1.8 kcal/min), foxtrot (6.01 ± 1.9 kcal/min) and cha cha (6.41 ± 2.1 kcal/min) were considered moderate aerobic activity according to CDC and ACSM guidelines. The energy expenditure of both swing dances (8.14 ± 2.5 and 7.92 ± 2.5 kcal/min) were considered vigorous aerobic activity by the same guidelines. CONCLUSION: Ballroom dance is an acceptable form of aerobic exercise and can be used to reach recommended prescription guidelines for aerobic activity.

30. THE EFFECTS OF CAFFEINE ON PULMONARY FUNCTION AT REST

Pacific University Oregon, Forest Grove, OR.

Caffeine has been shown to stimulate respiration in apneic infants and asthmatic patients; however, little research has assessed resting respiration and caffeine consumption in healthy individuals. PURPOSE: To assess the effects of caffeine on pulmonary function, specifically maximum voluntary ventilation (MVV), forced vital capacity (FVC), and forced expiratory volume in one second (FEV1.0) during resting conditions. METHODS: Seventeen participants, 13 females (19-22 yr) and 4 males (20-26 yr) completed a double-blind, repeated measures study consisting of placebo and experimental (CAF ingestion, 6 mg·kg-1 body mass) conditions. The study examined MVV, FVC, and FEV1.0 using a metabolic cart. All participants were nonsmokers and free of pulmonary dysfunctions (e.g. asthma, illness). Testing schedule consisted of one familiarization session followed by two pulmonary function testing sessions. Participants were asked to abstain from caffeine for a minimum of 48 hours prior to testing. Testing sessions included baseline testing of MVV, FVC, and FEV1.0 followed by a randomized administration of treatment capsule. Post testing was performed 60 minutes after capsule administration. RESULTS: Repeated measures two-way ANOVA comparing pretest and posttest data for CONT and CAF conditions (α=0.05) found no pretest/posttest main effect, placebo/caffeine main effect or interaction for any of the pulmonary function variables - FVC, FEV1.0 and MVV. CONCLUSION: Caffeine had no effect on the resting pulmonary function of healthy individuals. Although some studies suggest caffeine has the action of bronchodilation, this effect may only be measureable and meaningful in pulmonary-compromised individuals such as asthmatics. This study does not address caffeine’s effect on pulmonary functioning during exercise conditions.
31. EXAMINATION OF FIREFIGHTER AEROBIC ACTIVITY LEVELS AS REPRESENTED BY HEART RATE TRAINING ZONE: ON-SHIFT VS. OFF-SHIFT

M.R. Mitchell and S.O. Henry
Pacific University, Forest Grove, OR.

To ensure safety and effectiveness, the profession of firefighting requires a reasonably high level of physical fitness, including aerobic fitness. To that end, the Fire Service Joint Labor Management Wellness Fitness Initiative (WFII) was created to promote the achievement and maintenance of adequate fitness and overall wellness. Although firefighters are encouraged to be physically active, and even provided physical training time in many departments, there is insufficient research on the actual aerobic exercise habits of professional firefighters. PURPOSE: Quantify and compare the on-shift and off-shift aerobic activity, as represented by “time in heart rate training zone,” of fulltime professional firefighters. METHODS: Thirty-two firefighters participated in this study, 31 males and 1 female (22-50 yr). All were career firefighters over the age of 18 and currently employed by a local fire department. Participants wore heart rate (HR) monitors, consisting of a chest-strap transmitter and wristwatch receiver, for 72 consecutive hours (24 hr on-shift and 48 hr off-shift). Heart rate was collected at 5 s sampling frequency and later downloaded and graphed via computer software. To assure identification of physical activity associated HR data, participants recorded all relevant daily activities (e.g., eating, sleeping, emergency call response, physical training) in a logbook. Individualized HR training zones were established to represent aerobic activity. RESULTS: Paired t-test comparing time in HR training zone on-shift (49.22 ± 37.07 min • day⁻¹) and off-shift (35.71 ± 41.91 min • day⁻¹) showed no difference. CONCLUSION: The firefighters participating in this study were equally engaged in aerobic physical activity during their on-shift and off-shift days. However, the daily activity level amongst firefighters was highly variable, with a range of 0 min • day⁻¹ to > 120 min • day⁻¹. Although the WFII does not specify amount of aerobic exercise per day recommended for firefighters, 37 % of firefighters in this study are meeting or exceeding a commonly-reported criterion of ≥ 30 min • day⁻¹. A limitation of this study is the reliance on only one full shift cycle of HR data for each participant. Further research examining multiple shift cycles would be beneficial. In addition, it is important for future research to expand the examination of physical activity to include all types (e.g. resistance training).

32. UNSTABLE TRAINING PROVIDES SUPERIOR VERTICAL JUMP IMPROVEMENT COMPARED WITH STABLE SURFACE TRAINING

Brigham Young University-Idaho, Rexburg, ID

Athletes and fitness enthusiasts often use various training methods to challenge their balance and in attempt to further improve performance. Recent attention has been drawn to performing traditional resistance training on unstable surfaces. However, little research is known on the effect that unstable surface training has on performance-related tests. PURPOSE: The purpose of this study was to compare improvements in agility, explosive power, and core strength between a group performing resistance training on unstable surfaces (UST) and a group that trained on stable surfaces (S). METHOD: Ten recreationally active students between the ages of 18-28 with little weight training background volunteered for this study. Two comparison groups performed resistance training twice per week for six weeks using squats and lunges as the core exercises for leg strength development. UST performed squats on a half-dome stability ball and lunges on balance disks.

Group S did the squats and lunges in a traditional manner on a stable surface. Both groups were tested for changes in one-repetition maximum back squat (1RM), agility (T-Test), core strength (Plank), and vertical jump height (VJ). Mean change between groups were analyzed using a two-tailed independent t-test. Significance was established as p<.05. RESULTS: There were no between-group differences in 1 RM squat (p=.36), T Test (agility) (p=.16), and plank test (p=.88). Mean improvements in vertical jump were significantly greater in UST compared to S (2.5” ± 1.35”, -20” ± 1.58”, p<.02).

CONCLUSION: Unstable training does not appear to hinder improvements in leg strength, agility, or core strength when compared to improvements made with stabilized resistance training. However, unstable training provides superior results for vertical jump improvement compared to traditional resistance training.

33. HIGH INTENSITY INTERVAL TRAINING: IMPACT ON FITNESS AND BODY COMPOSITION IN SEDENTARY, OVERWEIGHT, PREMENOPAUSAL WOMEN

Department of Nutrition and Exercise Sciences, Oregon State University, Corvallis, OR.

Current research shows positive fitness and health benefits from high intensity interval training (HIIT), including reduced body mass and waist circumference (WC), and increased VO2max. In general, HIIT refers to repeated sessions of brief intermittent vigorous (>6 METS) and low-moderate intensity exercise. However, most of the research examining the health benefits of HIIT has focused on changes in WC in overweight, sedentary men and women. Limited research has examined the effect of HIIT on the fitness and health benefits in sedentary, overweight, premenopausal women. PURPOSE: To investigate the impact of a HIIT program on fitness and body composition in sedentary, overweight, premenopausal women. METHODS: We recruited 34 sedentary, overweight (body mass index=25-32 kg/m²), premenopausal women (age=36±10y) with abdominal obesity (WC >80cm) to participate in a 16-wk energy-restricted diet and Zumba-based HIIT program. Participants were randomly assigned to a diet of either 15% of energy from protein (n=16) or 25% of energy from protein (n=18), which was also energy restricted by 300 kcal/d. All participated in Zumba 3d/wk (45min/d) and 2d/wk (45min/d) of self-selected moderate intensity aerobic exercise. At baseline and post-intervention, VO2max and body composition were measured using the modified Balke submaximal VO2 treadmill test and dual energy x-ray absorptiometry (DXA), respectively. Paired t-tests were used to compare difference over time; data are presented as mean ± SD. These data are from a larger study examining the impact of HIIT and diet on abdominal body fat. RESULTS: Groups did not differ on any fitness or health variables; thus, groups were combined for further analysis. VO2max increased by 20.0 ±10.5% (5.6 ± 2.7mL/kg/min) (p<.05). Significant decreases were seen in weight (5.1±3.2kg) (p<.05) and total body fat (3.3 ± 1.6%; 4.5±1.8kg) (p<.05), while lean body mass only decreased by 0.6 ± 1.5kg (p<.05). CONCLUSIONS: HIIT increased VO2max by 20% compared to increases of only 7-10% reported in the research literature using traditional training programs of similar duration. In addition, a Zumba based HIIT significantly decreased body fat while helping to preserve lean tissue; only 12% of weight loss was lean tissue. These data show that previously sedentary, overweight, premenopausal women can participate in and benefit from HIIT, without adverse effects. HIIT decreases the overall exercise time needed to see health benefits and may be easier to fit into the busy lifestyles of women.

Research supported by Standard Process, Inc., OSU College of Health and Human Sciences Undergraduate Research Awards, and USDA Training Grant

34. EQUATIONS CURRENTLY USED TO ESTIMATE RESIDUAL VOLUME ARE NO LONGER ACCURATE

University of Montana, Human Performance Lab, Missoula, MT.
The Quanjer equation to estimate residual lung volume was created in 1983 when the US population was leaner and more active. It is unknown if this common equation using age, height, and gender remains valid. PURPOSE: The purpose of this study was to determine the accuracy of the Quanjer equation to estimate residual volume. METHODS: Gender, height, measured using a stadiometer, and weight, measured on a calibrated digital scale, was used to estimate residual volume of 147 participants (n=76 females, n=71 males; age 24.8 ± 5.3) using the Quanjer equation. Actual residual volume was measured using the nitrogen washout method. Results were analyzed using a dependent T-test with alpha set at p<0.05. RESULTS: There was a statistically significant difference in RV between measured and estimated equations (1.54 ± 0.40 L and 1.74 ± 0.26 L, p<0.05, respectively).

CONCLUSIONS: These data show a significant difference between estimated and measured residual volume with the Quanjer equations significantly overestimating residual volume. Since the greatest overestimation was seen in sedentary and overweight/obese individuals we believe that this change in the American population since 1983 is the possible cause of the current inaccuracy using the commonly used Quanjer equation to estimate residual lung volume. A new equation to estimate RV can be created using these data.

35. THE EFFECTS OF THREE DIFFERENT WILDFIRE SUPPRESSION UNIFORMS ON PHYSIOLOGICAL HEAT STRESS


University of Montana, HHP Dept. Missoula, MT.

Wildland firefighters (WLFs) wear required, fire-resistant clothing while performing arduous labor in hot, dry environments. Efficient heat dissipation is important for WLF performance to avoid conditions such as hyperthermia and exhaustion. Different agencies require diverse clothing layering. PURPOSE: To compare the physiological effects of three different WLF uniforms during sustained submaximal exercise in the heat. METHODS: Nine apparently healthy, ± uniforms during sustained submaximal exercise in the heat. METHODS: Nine apparently healthy, ± uniforms during sustained submaximal exercise in the heat.

The purpose of this study was to determine the accuracy of the Quanjer equation to estimate residual volume. METHODS: Gender, height, measured using a stadiometer, and weight, measured on a calibrated digital scale, was used to estimate residual volume of 147 participants (n=76 females, n=71 males; age 24.8 ± 5.3) using the Quanjer equation. Actual residual volume was measured using the nitrogen washout method. Results were analyzed using a dependent T-test with alpha set at p<0.05. RESULTS: There was a statistically significant difference in RV between measured and estimated equations (1.54 ± 0.40 L and 1.74 ± 0.26 L, p<0.05, respectively).

CONCLUSIONS: These data show a significant difference between estimated and measured residual volume with the Quanjer equations significantly overestimating residual volume. Since the greatest overestimation was seen in sedentary and overweight/obese individuals we believe that this change in the American population since 1983 is the possible cause of the current inaccuracy using the commonly used Quanjer equation to estimate residual lung volume. A new equation to estimate RV can be created using these data.

36. REPEATED BOUTS OF HIGH INTENSITY CYCLING EXERCISE DOES NOT INCREASE PLASMA INTERLEUKIN-6 IN COLLEGE STUDENTS


University of Puget Sound, Tacoma, WA

Increases in circulating Interleukin (IL)-6 after endurance exercise are well documented; however, the response to repeated bouts of high-intensity exercise has not been elucidated. Characterizing this response may foster a better understanding for the role of skeletal muscle IL-6 expression in response to the metabolic demands of high intensity exercise. PURPOSE: To determine the effects of repeated high-intensity cycling exercise on circulating IL-6 in college men and women. METHODS: Apparently healthy, physically active subjects (4 males; 5 females; mean (SD) age 21 (1) yrs; VO2 max ml/kg/min, 55.8 (3.2) males, and 40.2 (7.5) females) completed two protocols on a cycle ergometer. A 14 min high-intensity (HI) protocol consisted of four 30 sec Wingate tests at 7.5% of body mass load with a four min recovery at 20 W between each test. The low-intensity (LI) protocol evenly distributed the total work completed in the HI over the same test duration. Blood was collected before, 1.5, 6, and 10.5 min during, and 1, 15, 30, and 60 min postexercise. Plasma IL-6 was measured by a chemiluminescent immunoassay. Hematocrit and hemoglobin concentrations were determined to correct IL-6 concentrations for plasma volume shifts from preexercise. RESULTS: The mean (SD) total work completed during the four HI bouts was 69.8 (10.4) kJ. Total work decreased from 17.2 (0.6) to 15.0 (0.5) kJ from the first to the fourth Wingate test. Mean (SD) resting IL-6 values were 1.04 (0.63) and 1.12 (0.76) pg/ml for the HI and LI, respectively. The peak plasma IL-6 values occurred postexercise for HI [1.69 (0.75) pg/ml at 60 min], and LI [1.27 (0.96) pg/ml at 30 min] with no significant ANOVA main effects for exercise time (p=0.18) or between protocols (p=0.43). However, the pattern of response differed (ANOVA interaction, p=0.05), with HI increasing [1.14 (0.48) to 1.69 (0.75)] and LI decreasing [1.27 (0.96) to 0.98 (0.55)] from 30 to 60 min postexercise (p=0.002). CONCLUSION: Although repeated high intensity Wingate tests did not change circulating IL-6 levels during or postexercise, the response diverged from that of a lower intensity test of the equivalent total work and duration.

Supported by student and faculty research grants from the University of Puget Sound.

37. NUTRITIONAL STATUS AND LIPID PROFILES IN ACTIVE WOMEN WITH AND WITHOUT MENSTRUAL DYSFUNCTION.

RB Biegler, J Chang, DL Finders, EE Sperber, LC Kam, CP Guebels, MM Manore, FACSM.

Dept. of Nutrition and Exercise Sciences, Oregon State University, Corvallis, OR

Exercise-induced menstrual dysfunction (ExMD) is prevalent (6-79%) in active women and may result from low energy availability. Unfavorable lipid profiles have been reported in women with ExMD; low energy intake may also increase risk for poor nutritional status. PURPOSE: To compare nutritional status (diet, blood and lipid profiles in active women with ExMD 1) before and after a 6-mo intervention that provided a daily fortified CHO-PRO supplement (360 kcal/d, 300 mg/d calcium [Cal] and 2) to Eumenorrheic controls (EU). METHODS: Menstrual status was confirmed by measuring reproductive hormones. In the ExMD group (n=8; age=23±3y, VO2 max=49±6 ml/kg/min, body fat=22 ±5%) performed 3 trials of treadmill walking (3 mph, 4% grade) on separate days over 3 h in a hot, dry environment (37 ± 0.5°C, 30 ± 7.6% rh) with a 10 min rest period each hour. Volunteers wore leather gloves, hardhat, and field pack (20.4 kg) with Nomex shirt and pants unpregnated with Kevlar (trial FSI), US Forest Service standard issue Nomex pants and shirt (trial FSI), or Cal Fire standard issue Nomex shirt and brush pants over station pants (trial Cal Fire). Results were analyzed using a Repeated Measures ANOVA, significance was set at 0.05. RESULTS: No significant differences were found in heart rate, weight, or combined skin temperature (p > 0.05). For HI, FSI (3.86±0.54) was significantly lower than Cal Fire (6.06±0.81, p=0.038), while FSI (4.08±0.64) showed a trend to be lower (p=0.070). Core temp, however, revealed both FSI (37.66±0.09) and FSI (37.87±0.03) to be significantly lower than Cal Fire (38.28±0.09) (p=0.003, p=0.044 respectively). Cal Fire (0.01±0.001) also had a significantly higher heart rate of core temp rise (°C/min) FSI (0.003±0.001, p=0.001) and FSI (0.004±0.001, p=0.005). CONCLUSION: A greater number of layers result in increased physiological strain. Heat illness, a result of physiological strain in hot, dry environments, can greatly hinder job performance. Agencies that require double Nomex layers could benefit from a decrease in clothing strata.

Supported by Gatorade Sports Science Institute, OSU College of Health and Human Sciences, and USDA Training Grant.
Caffeine ingestion is a well-documented ergogenic aid that has been found to improve various types of athletic performance. PURPOSE: This study examined the ergogenic effects of a caffeine-containing Energy Patch (EP) on Wingate (WIN) performance with healthy adults. METHODS: A convenience sample of thirteen, moderately active college students (22 ± 3.4 yrs old; 89.5 ± 23.3 kg; 176.6 ± 6.34 cm) volunteered for participation. All participants were familiarized with the WIN test prior to testing and asked to refrain from caffeine consumption before each session. Using a randomized crossover design, participants received either two EP (74 mg caffeine) or two placebo patches (PLA; 0 mg caffeine) upon arrival for each session followed by 60-min of seated rest. Peak (PP) and mean power (MP) output and fatigue index (FI) were measured using a Monark 894e cycle ergometer. Paired t-tests were used to investigate significant differences between EP and PLA for each dependent variable (PP, MP, and FI). RESULTS: Table 1 summarizes the results for both conditions and each dependent variable. PP was significantly greater (p < 0.05) for PLA compared to EP. However, MP and FI were not significantly different between conditions (p > 0.05). CONCLUSION: The significant difference observed in PP is likely a Type II error due to a low observed statistical power (0.035) associated with a small sample size and small effect size (d = 0.09). Further research regarding the ergogenic effects of EP with higher dosages and in a variety of exercise, settings might provide coaches and athletes with additional insights and alternatives for athletic performance improvement.

<table>
<thead>
<tr>
<th>Variable</th>
<th>EP</th>
<th>PLA</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>PP (W)</td>
<td>748.9 ± 256.1</td>
<td>772.1 ± 252.1</td>
<td>0.04</td>
</tr>
<tr>
<td>MP (W)</td>
<td>572.8 ± 187.8</td>
<td>577.1 ± 180.1</td>
<td>0.4</td>
</tr>
<tr>
<td>FI (%)</td>
<td>40.4 ± 8.94</td>
<td>43.79 ± 4.24</td>
<td>0.1</td>
</tr>
</tbody>
</table>

Table 1. Descriptive statistics and t-test results for EP and PLA.
Professional Poster Presentations

39. FACTORS INFLUENCING THE INTENSITY OF EXERCISE ELICITING MAXIMAL FAT OXIDATION RATES IN COLLEGE AGED MALES

D.E. Lankford 1, J.D. George 2, P.R. Vehrs 2, G.W. Fellingham 2, L. Carluccio1

1Brigham Young University Idaho, Rexburg, ID; 2Brigham Young University, Provo, UT

The intensity of exercise at which maximal fat oxidation rates (IEMF) occur during exercise has been largely studied due to possible connections with obesity related diseases. However many variables likely to influence fat oxidation have been excluded from the research determining IEMF.

PURPOSE: The purpose of this study was to determine whether exercise training alters the intensity of exercise at which maximal fat oxidation rates (IEMF) occur during a submaximal graded exercise test (GXT) while controlling for diet and percent body fat (BF), and accounting for blood glucose and triglycerides. METHODS: Fifty-one untrained college-aged males participated in the study. Based on initial percent BF, participants were randomly assigned to a low fat training group (LFT, <13% BF, n=13) or a low fat control group (LFC, <13% BF, n=12); or to a high fat training group (HFT, >20% BF, n=14) or a high fat control group (HFC, >20% BF, n=12). During the submaximal GXT, ventilator threshold (VT) and lactate threshold (LT) were determined; subsequently all participants performed a maximal GXT to measure maximal oxygen uptake (VO2max). Participants in both training groups performed eight weeks of exercise training. RESULTS: VO2max increased significantly (p<0.01) in both LFT (pre 48.9 mL/kg/min, post 53.7 mL/kg/min) and HFT (pre 39.7 mL/kg/min, post 44.5 mL/kg/min) groups; while both control groups showed no significant change in VO2max. No change in IEMF was found in any group following eight weeks of training. A statistical model identified two significant covariates explaining IEMF: blood triglycerides, (p<0.01) and dietary fat intake, (p<0.01); and found that both percent BF (p=0.12) and eight weeks of training (p=0.49) did not exert a statistically significant influence on IEMF for any group. CONCLUSIONS: It is concluded that changes in the ability to uptake oxygen during exercise precede changes in the ability to utilize fats during exercise following eight weeks of training. Future studies should continue to explore the influence that exercise training, VO2max, and blood metabolites have on IEMF across a variety of samples.

40. ISCIENCE AND IHSI: A MODEL TO TRANSFORM EXERCISE SCIENCE EDUCATION

S. Stavrianeas, M. Stewart, and P. Harmer, FACSM

Willamette University, Salem, OR

Current science education guidelines require that educators should engage in a pedagogical paradigm shift towards student-centered curricula, investigative experiences for all students, increased numeracy, and truly interdisciplinary collaborations. This conversation about what this shift means for the field of exercise science has yet to take place on a national scale, with only sporadic reports on a regional level. Our goal is to engage students and professionals in our region in a discussion about our role as educators, clinicians, fitness specialists, and health experts. We will present 1) an account of our multi-year collaborative effort to establish a modern and vibrant exercise science curriculum, 2) measures of the effectiveness of our teaching philosophy, and 3) our vision for the future. The iScience pedagogical framework encompasses the best practices we have incorporated in our curriculum. We will present a set of activities and assessment outcomes that support our claims regarding the efficacy of our approach. The iHuman Sciences Initiative (iHSI) represents the collaborative and interdisciplinary research component of this effort. Together, the two programs serve as models of innovative thinking in science education and human health. In addition to providing sustainable opportunities for student-faculty research collaborations at the undergraduate level, these efforts have gained recognition through funding from the National Science Foundation and the W.M. Keck Foundation. However, despite the potential these efforts hold for transformation of the broad field of exercise science, ACSM has been less than willing to facilitate or encourage this conversation. It is our intent to create a forum for exchange of ideas and best practices within ACSMNW and spearhead the national conversation on exercise science education.

41. SERVICE LEARNING IN EXERCISE SCIENCE CURRICULUMS

W. Bjerke

Sacred Heart University, Fairfield, CT

Service Learning (SL) describes teaching methods that incorporate student service activities with specific learning objectives. SL has been applied to Public Health, Education, Nursing, Physical Therapy and Occupational Therapy higher education programs. Student outcomes include positive changes in health promotion and research skills, critical thinking, civic engagement, and facilitation of social change. PURPOSE: To examine student learning outcomes and SL intervention variables and determine the applicability of SL to Exercise Science courses. SL Data associated with an undergraduate course in Exercise Physiology serving a local fire department and afterschool childhood obesity program (Fit Kids) in Connecticut is examined. METHODS: Seventy 5-12 year old children were assessed via a health and fitness behavior/knowledge questionnaire at baseline and post a two month program that consisted of bi-weekly 60 minute nutrition education and supervised physical activities. Among 90 firefighters, resting heart rate, blood pressure, estimated relative VO2 max, body composition, lower extremity power, upper body strength, flexibility, and perceived stress was assessed pre and post a 12 month education and physical activity intervention consisting of exercise prescriptions, supervised exercise programming and education for 60 minutes 1-3 times per week. Learning outcomes for both programs were assessed via a validated questionnaire assessing higher education SL objectives. RESULTS: An increase in estimated VO2 max (+9%, p = .04), and upper body strength (+13%, p = .03) and a decrease in perceived stress (-34%, p = .00) were observed in the firefighters. No other significant changes were observed. Student SL data revealed 86% of 34 respondents "strongly agreed" or "agreed" that the activities were "relevant to the course", 78% found that the activities "enhanced communication skills", and 76% found that the activities "enhanced relationships with faculty". Fit Kids data revealed significant changes in health and fitness knowledge. Knowledge of general exercise guidelines increased by 5%, (p = .02) and the number of sports/exercise specific skills attained by the children increased from 1 to 5 (p = .01). Eighty nine percent of 23 student respondents "strongly agreed" or "agreed" that activities were "relevant to the course", 84% found that the activities "enhanced communication skills", and 78% found that "relationships with faculty were enhanced". CONCLUSIONS: Preliminary data collected argues for applications and associated benefits of SL in Exercise Science curriculums. Subsequent data collection shall include expansion of variables examined and use of comparison groups.
“Parking Lot D” is reserved for conference attendees

Lane Community College Main Campus

4000 East 30th Avenue • Eugene, Oregon 97405 • (541) 463-3000
Map revised 05/2010

KEY

B Bicycle Parking
E Elevator
Wheelchair Ramp
Covered Smoking Area
1 Electric Door—number designates floor
Parking with Handicapped Permit
Compact parking
Gravel Parking Areas
New motorcycle parking
There is no reserved parking for conference attendees. Faculty/staff/student parking is available on weekends – watch for posted signs. Vehicles parked in metered spots without payment or in unauthorized areas are subject to parking citations.
Please place on dash so permit is visible at all times

Good for Lot “D” only

PARKING PERMIT ONE DAY PASS
VALID ONLY FOR:

“ACSM Northwest Regional Conference”

April 8th, 2011
Lot D