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Human Performance Lab Newsletter, March 2000

St. Cloud State University

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NEWS

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Department of Health, Physical Education, Recreation, and Sport Science
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March 2000

Inside this issue:

| | |
|----------------------|---|
| Jump Study | 2 |
| Assisting Amputees | 2 |
| Zone (cont.) | 3 |
| Blair (cont.) | 3 |
| EIA | 4 |
| Thesis Testing | 5 |
| Papers and Abstracts | 6 |

Coupon

Special Offer

50% Discount

Present this coupon at your next fitness evaluation and receive a 50% discount.

There's no such thing as excess eating, only inadequate activity.

-Dorothy Harris

Justification for eating as much as I want, and working myself to death...

Entering the Zone by Angela Frelich

Weight loss is a continuous battle for many people in our country. The desire to be thinner leaves us vulnerable to self-proclaimed health and fitness experts marketing their newest "revolutionary" diet! One of the latest diet trends comes from a book called "Enter the Zone," by Barry Sears. Statistics show that about 1/3 of the American population is overweight. Sears has claimed the increase in obesity is due to the low-fat, high carbohydrate diet recommended by most nutrition and fitness experts. However, diets high in complex carbohydrates and fiber have always had a strong, positive correlation to weight management and lower chronic disease risk. It is also important to note that such high carbohydrate, low-fat diets are based on complex carbohydrates, which are found in unrefined foods like whole grains, vegetables, and fruits. The high carbohydrate diets that Sears criticizes as responsible for weight gains are made up of simple and refined carbohydrates like sugar and refined flour. People that consume large quantities of foods like fat-free cookies, chips, frozen yogurt, and even bagels are basing their diets on high-sugar/refined flour foods. Therefore, they may see an increase in weight because they eat too many calories.

Another aspect of Sears' Zone diet is that high carbohydrate diets promote insulin resistance, which results in an excess of carbohydrates being stored as fat, instead of being used for energy. Insulin resistance, however, is seen most often in the overweight and sedentary population. If high carbohydrate diets were the cause of obesity, how

(Continued on page 3)

Dr. Blair Visits SCSU by Wayne Board

Steven Blair of the Cooper Aerobic Institute came to SCSU this past fall with a message, "The foremost practice that a person can do to prevent cardiovascular disease (CVD) and ensure good physical fitness and a long life is to engage in regular physical activity." Sure, we have all heard this before, and to varying degrees, we probably try to keep a regular routine of physical activity.

We may also measure our fitness level by different standards and grade our success or failures upon those standards. Most people use weight control (i.e. body fat and/or body weight) as the main criterion. After all, determining one's weight is the cheapest, most convenient assessment, and it does not require any fancy equipment or trained personnel: all we need to do is look in the mirror or stand on a scale.

The down side of this method is most are influenced to some degree by the media as to our desirable weight (usually some macho man or an emaciated model). For the average person this goal is not obtainable. Does this mean people cannot receive any benefit from their exercise program? Of course not, improvements are made in nearly every system of the body in response to exercise; however, some people are simply predisposed to carrying more weight than others. These people often abandon their exercise programs because they do not see visual signs of improvement.

Although body weight is a factor in determining fitness level, it is not nearly as important as one's level of physical activity. Blair, et al, found that "low levels of physical fitness are associated with an increased risk of all cause and CVD mortality." In fact, Blair's research showed

(Continued on page 3)

Measuring Vertical Jump Height by Mike Rasmussen

This fall, the HPL has increased its interest in vertical jump performance. A project that investigates the methods used to measure jump height has been the focus of Dr. Street and the Biomechanics students. Currently, there are three very common methods used to determine vertical jump height: flight time, impulse, and film analysis method. The flight time method calculates vertical jump height from the time spent in the air. The impulse method uses a force platform to measure forces at the feet to determine the height of a jump. The film analysis method determines jump height by measuring the displacement of the jumper from takeoff to peak height.

Each of these three methods have errors involved with them. The goal of this project was to reduce these errors as much as possible first, and then determine which method is best. Errors associated with the flight time, namely different body positions at takeoff and landing, cannot be minimized, reducing its desirability. Errors associated with the impulse and film analysis methods can be minimized, making these two methods preferable. Although the impulse and filming methods are comparable in accuracy, in future studies the Lab will likely rely on the impulse method because of its simplicity.

Northland ACSM Spring Tutorial Meeting

The focus for this year's spring tutorial is on the applied science research in sport as it pertains to participation in both physical activity and sports. Experts in the area of sport physiology, physical performance, and body composition will share information on the effects of physical activity and sports on children. The format for the meeting is to have a couple of large lectures, then break off into small group tutorials for morning and afternoon sessions. Keynote speakers will be Dr. Oded Bar-Or, M.D., Professor of Pediatrics, McMaster University, and Dr. Russell Pate, Ph.D., Chair of the Department of Exercise Science, University of South Carolina, and Dr. George Blitz, M.D., Minneapolis. These three have authored over 100 peer-reviewed scientific papers focusing on exercise and children. They will provide us an integrated view of the role of physical activity in the health of children as well as the consequences of activity and training on children. The spring tutorial meeting will be held March 31st in Atwood Center.

Assisting Amputees by Tracy Beil

Amputees often develop pressure sores on their residual limbs. These sores are produced by excess movement that results from limb volume loss throughout the course of a day. Changes in limb volume were documented last year in work that was done with TEC Interface Systems, a local prosthetics manufacturer. The owner, Carl Caspers, believed that holding the prosthetic limb tightly to the residual limb with a vacuum would prevent this loss in volume. Last year's research team showed this to be true. The development of a vacuum pump, and why it works, are the main objectives of this year's work. Dr. Steven Covey and Josh Muonio from the Manufacturing Engineering Department are working on the design of this vacuum pump. The HPL is looking at why the limb does not lose volume while using this system. Dr. Glenn Street and Tracy Beil are measuring the difference in pressures applied to the limb when the vacuum system is used. A third team consisting of Scott Ficek, Dr. David Bacharach, Wayne Board, and Dr. Dele Gazal (Biology) are looking at limb physiology to determine the mechanism of the volume loss.

WHO'S NEW IN THE LAB THIS YEAR

Jeremy Frost

Jeremy is a first year student in exercise physiology. He is from Blaine, MN. Jeremy did his undergraduate studies at the University of Minnesota-Duluth. He received a B.A.A. in exercise science. Jeremy is working with the Nordic Ski team at SCSU.

Tracy Beil

Tracy is originally from Hermantown, MN. She graduated from Concordia College-Moorhead, MN with a B.A. in mathematics and secondary education. After teaching mathematics for a couple of years, she decided to pursue a master's degree in biomechanics. Tracy has always been very involved with track and field and loves to travel.

Angela Frelich

Angela was born in Fargo, ND, and was raised in Apache Junction, AZ. She graduated from Arizona State University in 1996 with B.S. in exercise science. Over the last few years, she has worked as a physical therapy technician. She enjoys water-skiing, playing volleyball and softball and spending time with her family and friends.

Scott Ficek

Scott is from Dickinson, ND. Scott has received two undergraduate degrees from Moorhead State University-MN, a B.A. in biology, and a B.S. in fitness and sports science. Scott is pursuing his graduate degree in exercise physiology. Scott loves being active and spending time with his friends.

(Zone continued from page 1)

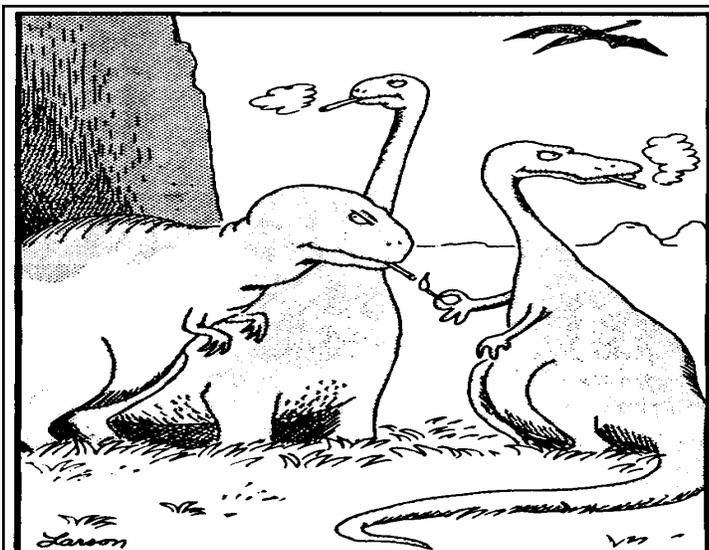
could one explain what has become known as the “Pima plague” in Arizona. The Pima Indians of Arizona eat a diet high in fat and protein and consequently, more than half of the Pimas develop non-insulin dependent diabetes mellitus (NIDDM) by the age of 50. Their cousins, the Pima Indians of Mexico, follow a diet centered more on complex carbohydrates, are quite active and weigh significantly less. The tribe has seen no trace of an NIDDM epidemic. Because of their same genetics, there are no other reasons for these two groups to be so drastically different other than their diets and activity levels.

When one looks closely at the Zone diet based on a 40/30/30 ratio, meaning 40% of calories from carbohydrates, 30% from protein, and 30% from fat, one can see it is really a low calorie diet. Sears’ intricate calculations to figure an individual’s daily caloric intake are based first upon protein needs. Fat and carbohydrate calories are then calculated. This formula often leads to initial weight loss due to the drop in calories, not because of the 40/30/30 ratio. Experts state these high protein/high fat diet plans are too restrictive in calories to provide the energy needed by most active people. And, if a 40/30/30 ratio were followed in order to meet energy needs, an excessive amount of protein and fat is consumed, which could easily lead to weight gain.

In conclusion, people looking for an easy way to lose weight are very susceptible to the unproven, potentially dangerous claims of marketing. The real time-tested facts are well established. A healthy diet based on 55-65% caloric intake from carbohydrates, 12-15% protein, and 15-25% fat, along with being physically active, will help an individual to reduce and/or maintain a healthy weight level.

(Blair continued from page 1)

the worst correlation between body weight and fitness levels and the strongest correlation between fitness and reduced mortality. Steven Blair, an avid runner for many years, is a perfect illustration of these relationships: he has a low risk of chronic disease because of his good level of fitness, even though he is above his recommended body weight. There are plenty of people like Dr. Blair. If you are one of them, stop looking at the scale and start focusing on time spent exercising. Chances are good that you will live longer and happier if you do.



The real reason dinosaurs became extinct

FACT: Most smokers would die of lung cancer; but, heart disease kills them first!

Kelly’s Corner by Dr. Bacharach

We’re into the electronic millennium and there is not a doubt in my mind that it is here to stay. The question remaining is how far will it go? I have learned many things from e-mails and the World Wide Web. Things like polar bears are left handed (pawed?), butterflies taste with their feet, elephants are the only animals that can’t jump, an ant can lift 50 times its own weight and on average people fear spiders more than they do death. Add these new forms of media and there is so much information available to us that it’s hard to figure out what is worthwhile and what is not.

We had the good fortune of interacting with Dr. Steven Blair, an exercise epidemiologist from the renowned Aerobics Research Institute in Dallas, TX, for a day here in St. Cloud. And just recently, St. Cloud’s Heart Center entertained Dr. Ken Cooper, the father of “Aerobics” for an evening lecture. They both presented data that suggests being physically active is the greatest single factor in maintaining one’s longevity. Dr. Blair presented evidence showing a physically active, overweight person has only 20% of the risk of premature death compared to a sedentary, thin person. In fact, being active increased life expectancy by 8+ years! Dr. Cooper also spoke of the quality of life that is maintained just by staying active. What does it mean to be active? For all of us, it means getting up and out for a least 30 minutes each day. Walking, cycling, swimming, etc... anything aerobic in nature is a great choice. Don’t discount daily chores or hobbies such as cleaning, gardening, golf, or walking the dog. This is an old message; however, we need to express it with greater zeal. As Dr. Blair suggested, we exercise professionals need to bang the gong as loud as we can. But to do this we need your help. Please tell everyone you know about the wonders of activity. Do with new resolve and passion, for it appears no one in this millennium or the next will be able to discredit activity as the most important component for a healthier life.

Exercise Induced Asthma by Jeremy Frost

Many people suffer from asthma. Many of this group, as well as a small number of the non-allergic population also suffer from exercise-induced asthma (EIA). This type of asthmatic attack can occur 5-15 minutes or 4-6 hours after exercise, named the Early Phase and Late Phase, respectively. The likelihood of EIA is related to duration of activity, medication, and/or environmental conditions. The chances of developing EIA are increased with longer, more intensive activity. The type of activity can also have an effect on the severity of attack, with running causing the most asthmogenic responses. Exercise in cold environments, where warming of the respiratory tract is not possible, also precipitates EIA. There are many ways to control the response to EIA. Medication is a very popular means of control. However, it is advantageous to find a solution that does not require the use of medication. The focus of research now addresses cooling and drying of the respiratory tract. Preventing the respiratory tract from cooling too much appears to be important to prevent EIA.

John Seifert, Ph.D., recently headed research conducted in a cold chamber on campus and outside this winter. This study looked at the effects of a specialized facemask (Polar Wrap Inc) that warms the air prior to entering the throat and lungs. At a temperature of -10 degrees F, both normal and EIA subjects get an increase in blood pressure and a drop in resting heart rate. During mild exercise, pulmonary function is impaired for the first 30 min. Subjects with EIA sitting for 30 minutes in the cold experienced the largest increase in systolic blood pressure (20-60 mm Hg). For people with mild to moderate hypertension, just sitting in the cold puts them at higher risk of a cardiac event. With the mask however, blood pressure was maintained at a lower level, heart rate did not change, and peripheral circulation appeared to be maintained. These preliminary results suggest many people may benefit from a facemask such as the Polar Wrap when it gets cold outside.

Health Related Resources

Johns Hopkins Health Information
<http://www.intelihealth.com/IH/ihtIH>

Food Finder: Find the analysis of fast foods
<http://www.olen.com/food/>

Mayo Clinic Health Letter

Write to: Mayo Clinic Health Letter, Subscription Services,
PO Box 53889, Boulder, CO 80322-3889 or call (800)333-9037

Regaining the Power of Youth at Any Age
Kenneth H. Cooper (January 1999)

Practical Aerobic Conditioning

D. Ray Collins, P. Hodges, and John Kelly.
Tichenor Publishing

Our Gratitude

All of us at the HPL would like to thank the following people for contributions to the Adult Fitness Program in 1999.

David and Nancy Bacharach
Linda Bettison
Ron and Mary Beth Cochran
Ray and Phyllis Collins
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Rick Jones
Lee and Marlene Kasper
Louis Krippner
David and Barbara Kunze
Ruth Nearing
John and Carole Pike
Glenn and Nancy Street
Stephen and Elaine Thruene

Special Thank You!

A very special thank you goes to the St. Cloud Eagles Lodge who recently donated \$5,000 to the Human Performance Lab. This gift was matched by SCSU, enabling the HPL to purchase a new treadmill. We commend the Eagles for their continued support of health related issues.

We greatly appreciate the financial support so many of you have provided over the years. We are always so gratified to know that you believe in our work enough to personally invest in it. Should you be in a position to make a contribution to the HPL, please make checks payable to:

SCSU Foundation-Adult Fitness
St. Cloud State University
Alumni & Foundation Center
720 Fourth Ave. S.
St. Cloud, MN 56301-4498

Congratulations

The faculty and staff at the Human Performance Laboratory would like to acknowledge and congratulate the Exercise Science graduate students who completed their thesis work and earned a Master of Science degree in 1999:

Kurt Threinen
Jason Lahr



Thesis Testing

Lower Body Power And Cross-Country Skiing by Kristi Chupurdia

Cross-country ski race courses commonly contain flat, as well as hilly terrain. In fact, research has found that skiers spend more than 50% of race time on uphill sections and only 35% on flat terrain. Even with this knowledge, the vast majority of research has focused on the contribution of the upper-body, or combined upper and lower-body.

Studies have concluded that the lower-body is active in balance and stabilization, but may also contribute a lot to power output during uphill portions of the course. How much lower-body power output is needed for optimal performance has yet to be determined.

The interest of my thesis concentrates on short-term lower-body anaerobic power for uphill work in cross-country skiing. The purpose of my study is twofold. First, to determine if there is a relationship between short-term lower-body anaerobic power and success in cross-country skiing. And second, if a relationship exists, which of three noninvasive leg-power tests might best be used to assess power and possibly predict cross-country skiing performance. Eleven male and eight female developmental skiers in residence at the Olympic Training Center, Lake Placid, NY, participated in this study. The subjects completed four protocols. A running treadmill VO₂ max was used to determine aerobic capacity. A 30-s Wingate, a modified MART test, and a 50-m uphill sprint were used to determine lower-body anaerobic capacity. Time to complete a 5km uphill rollerski time trial was the performance measurement.

Preliminary results indicate that there is little correlation between short-term lower-body anaerobic power and a 5km uphill time trial. Therefore, predicting success in uphill 5km time trial cannot be based on short-term lower-body power

Internship Experience by Scott McMillan

From July to December this past year, I was fortunate to have the opportunity to work as a Biomechanics Research Intern at the United States Olympic Sports Complex in Colorado Springs, CO. The biomechanics group does research to answer specific questions athletes or coaches may have about their respective sport. The group is also heavily involved in the performance testing of the athletes. I was specifically there to do motion analysis of the start in speed skating. Aside from this work, I applied some vertical jump research we had done in St. Cloud to help redesign the protocols used to evaluate the performances of Ski Jumpers and Volleyball players. We were interested in the relationship between their jump height, speed to perform the jump, and how that would relate to their strength and conditioning. This was a great experience, and one I will never forget.

Ribose: What can it do for you by Eric Fenstad

Claims of ribose as a beneficial supplement are mounting. Researchers believe this five-carbon sugar may aid in quickly replenishing our energy sources following high-intensity exercise. Our energy supply is composed of a compound called adenosine triphosphate (ATP). ATP is to the body, as gasoline is to a car. Without ATP, we are unable to perform. When we exercise, ATP is broken down into subcomponents. These subcomponents are often excreted through urinary or respiratory pathways. The body can rebuild ATP through various pathways, but these processes take a long time, especially if the subcomponents must be reproduced from scratch. The purpose of my thesis was to investigate the effect ribose has on various metabolic responses. Specifically, the study measured blood glucose, blood lactate, and the estimated rate of carbohydrate oxidation. Previous research has demonstrated a drop in blood glucose with ribose ingestion. Literature has not definitively explained why this happens. Thus, insulin, the hormone that escorts blood glucose into the cell, will also be determined.

Two different age groups were tested (20-30 year olds and 40-50 year olds). All subjects were fed 0, 2, 5, or 10 grams of ribose in 300 milliliters of water, following an overnight 12-hour fast. Data were then collected for a two-hour period. The 40-50 year old age group had a higher average blood glucose compared to the 20-30 year olds. Results indicate that doses of 5 grams or more led to a drop in blood glucose, while a dose of 2 grams was able to maintain blood glucose. If blood glucose decreases, where does it go?

Carbohydrate oxidation rates were estimated to determine if the drop in blood glucose could be accounted for by increased use as an energy source. No significant differences were found for any changes in carbohydrate oxidation rates. Thus, one can conclude that changes in carbohydrate oxidation cannot fully explain why blood glucose dropped. Blood lactate was also measured. As a whole, blood lactate decreased for the first 30 minutes, but then increased, peaking at 60 minutes. Statistical analysis has not yet been fully completed.

It appears that 2 grams is the optimal dose to administer without seeing a significant decline in blood glucose. Further studies are needed to determine whether ribose supplementation following high-intensity exercise will aid in replenishing our energy sources.

1999 Papers and Abstracts

Papers:

- Von Duvillard, S, Rundell, K, Bilodeau, B, & D Bacharach, (2000). Biomechanics of alpine and nordic skiing. *Exercise and Sport Science*, (Ed. Garrett, W.E. & Kirkendahl, D.T.), Lippencott, Williams & Wilkins, Philadelphia, PA., 617-638.
- Gaskill, S, Serfass, R, Bacharach, D, & J Kelly, (1999). Response to training in cross country skiers. *Medicine and Science in Sports and Exercise*, 31, 1211-1217.
- Bacharach, D. & W Roberts. Creatine: What do we really know about it? (1999). *MN State High School League Bulletin*, 68, Fall 18-23.

Presentations:

- Fernholz, KM, JG Seifert, DW Bacharach, & O Gazal. The effects of phosphatidyl serine on markers of muscular stress in endurance runners. *Med Sci Sports Exerc.* 32(5), 2000
- Fenstad, ER, JG Seifert, & DW Bacharach. Effects of ingested ribose on blood glucose, blood lactate and estimated rate of carbohydrate oxidation. *Med Sci Sports Exerc.* 32(5), 2000
- Nelson, AJ, JG Seifert, & DW Bacharach. The effect of a heat exchange mask on pulmonary and cardiovascular functions during cold exposure. *Med Sci Sports Exerc.* 32(5), 2000
- Seifert, JG, MJ Luetkemeier, AT White, LM Mino, & D Miller. Fluid balance during slalom training in elite collegiate alpine ski racers. *2nd International Congress on Skiing and Science.* St. Christoph, Austria, 2000
- Bacharach, D, J Seifert, K Dean, D Schultz, & L. Rice. Coaching cues via radio enhance practice performance of alpine skiers. *Presented at the 2nd International Congress on Skiing and Science, St. Christoph, Austria, January, 2000.*
- Camp, K, L Oetting, S Ready, D Paulson, M Walker, J Seifert and D Bacharach. Aerobic fitness and physiological reactivity to a mental stressor. *Presented at the National ACSM Meeting, June, 1999.*
- Noonan, B, J Seifert & D Bacharach. On and off ice anaerobic indices of division I ice hockey players. *Presented at the National ACSM Meeting, June, 1999.*
- Seifert, J, E Burke & D Bacharach. A comparison of the physiological responses of tandem and single bicycle riding. *Presented at the National ACSM Meeting, June, 1999.*