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Human Performance Lab Newsletter, 1996

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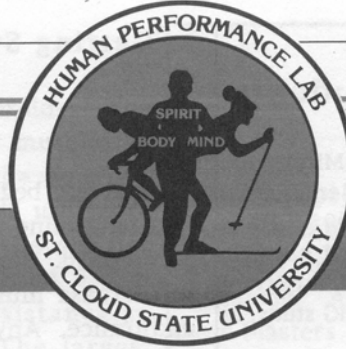
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NEWS

Department of Physical Education,
Recreation, and Sport Science



1996

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KELLY'S CORNER

by Dr. Jack Kelly

Why We Choose to be Physical

My first thought in selecting the topic for the newsletter was to discuss the reasons why nearly 70% of our adult population has chosen to lead sedentary life-styles. Although this is a major problem facing our society, I would rather dwell on a more positive theme. I have chosen to explore four of the most important reasons why a physically active life-style is so appealing to many. Perhaps a few of these ideas will be helpful to some readers who have been unable to incorporate at least 3 minutes of exercise into their daily living patterns.

Some of the most rational people among us are active because they have examined the facts and have determined that it makes good sense to be active as it helps them remain healthier. They understand that exercise provides protection from the disease and disabilities that are influenced by low levels of physical fitness.

Others participate in regular physical activity because it simply makes them feel better. These perceptions of well being include not only having stronger hearts, bones, muscles and joints, but also a more peaceful and relaxed attitude toward life in general. We have known for centuries that physical exertion is a natural tranquilizer. It's not surprising to learn of the recent research indicating that exercise can help to lower blood pressure.

A third reason why people choose active life-styles is because they like what it does for their appearance. It helps to keep their waist line trimmer and adds a bounce to their step. Have you noticed that active, fit people look younger than their years?

Finally, in my opinion, the most important reason why people choose to include regular physical activity within their life-style is because it is fun and enjoyable. The reason I believe this point is so important is because I have yet to meet a person who enjoys an activity who would be willing to give it up. The joy and enthusiasm a person derives from participating in an activity is by far the most important gift received. Not only is it a valuable gift in itself, but it provides the spark for keeping our flame burning bright for years to come.

The Human Performance Laboratory staff wishes you a happy and productive year and by all means take the time to find a way to add more joy to your lives.

Anti-What?

by Dean Stulz

Anti-oxidants are one of the most talked about and least understood topics in the health and fitness field. But what are they, where do they come from, and what do they do?

Anti-oxidants are molecules in the body that combine with unstable oxygen molecules known as "free radicals". The importance of anti-oxidants and the reason for their recent popularity is the effect they have on free radicals. Free radicals have been associated with the causes of diseases and conditions such as cancer, cataracts, stroke, asthma, peptic ulcers, congestive heart failure, high blood pressure, aging of skin tissues causing sagging and deterioration of bodily organs, and many other health harming conditions. However, free radicals also help fight inflammation, kill bacteria, and control smooth muscles of the blood vessels, which contribute to the control of blood flow.

As you can see, a balance of free radicals is optimal for maintaining a healthy body. This is where anti-oxidants enter the picture. Anti-oxidants help to balance the number of free radicals in the body. Anti-oxidants are formed in the body and are ingested in our diets. Vitamin C, vitamin E, and beta carotene are three good sources of anti-oxidants.

In the past few years, scientists have discovered that more free radicals are produced in people who participate in a regular, high intensity exercise program. Doctors were puzzled why some highly fit individuals were developing conditions and diseases associated with sedentary individuals. Part of the blame was placed on the high amounts of free radicals found in these individuals.

To ward off the harmful effects of free radicals some doctors recommend taking an anti-oxidant supplement (which can be found in any pharmacy department), a low fat, high fiber diet, fruits and vegetables, and of course, a low to moderate intensity aerobic exercise program. The debate continues as to whether or not anti-oxidant supplementation is necessary even if your exercise program consists of high intensity workouts. Dr. Kenneth Cooper's book, "The Antioxidant Revolution" is an excellent source for more information, or talk to your doctor.

Meet the New Graduate Students

Dean Stulz. Dean, from Dilworth, Minnesota, received his B.S. in fitness and sport science from Moorhead State University in February, 1995. He is interested in all sports, especially football and baseball. His hobbies include hunting, fishing, and a variety of sports. His master's thesis may involve an EMG study, as he is interested in muscle physiology.

Lloyd Hilgart, Jr. Lloyd received his bachelor's degree in physical education from SCSU in the spring of 1995. When he isn't in the lab, he enjoys fishing and listening to Rev 105. He grew up and graduated from high school in Elk River. "My career interests and thesis topics are still up in the air, which is typical of an unmarried guy."

Tyler Gibson. Tyler is originally from Portland, Oregon. He received two bachelor degrees from Oregon State University, one in pre-physical therapy and one in psychology. He was married in July of 1995. He and his wife Korlyn are expecting their first child sometime in September, 1996. Tyler's interests include basketball, baseball, and motorcycle racing.

Sean Goldsworthy. A 1990 graduate from Minnetonka High School, Sean earned his B.A. in sports science/sports medicine from St. Olaf in 1994. He served as a student trainer as well as played baseball and hockey for four years. His interests include sports, specifically coaching. He's currently the assistant coach for the St. Cloud Tech Tigers hockey team. Sean hopes some day to teach and coach college hockey.

Getting Started in Resistance Training

by
Jamie Jerdee

When you begin planning a resistance program you must first determine what your goals are and what you hope to accomplish. Resistance training programs can be designed to increase muscle strength, muscle size and/or muscle endurance. Any resistance training program will, at least initially, result in increases in all three components. Beginners with little or no experience in weight training will make remarkable gains as long as the program allows for gradual, consistent increases in the workload.

The overload principle is the basis of all training programs. This means the muscle to be developed must be overloaded, or forced to work harder than it is accustomed to. Once your muscles adjust to a workload, it is no longer an overload. The workload must be increased as the muscle adapts.

A repetition is defined as the number of times a certain exercise is performed uninterrupted. The number of repetitions that should be performed is dependent on what aspect of muscular fitness you want to develop. The range of repetitions is 1-5, 6-12, and 20-50 for muscular strength, muscular size, and muscular endurance, respectively.

A set is the number of times the specified number of repetitions is completed for a single exercise. For strength development the optimum number of sets is 4-8; to develop muscular size, 3-6 sets; and for muscular endurance, 2-4 sets. The amount of rest between sets also varies with the goal of your program. Rest periods for strength building programs should be from 2-4 minutes, 1-2 minutes to build muscle size, and 30-90 seconds to enhance muscle endurance.

The amount of resistance to use is also dependent on what aspect of muscular fitness you want to develop, as well as the number of repetitions and sets performed. If strength is the focus, then high resistance (85-100% of your maximal resistance for one repetition, or 1 RM) is the most effective. Muscular endurance is created by using lighter weights (50-70% of 1 RM). If your focus is to develop muscle size, another variable to consider is the number of exercises performed. Many beginners make the mistake of doing too many exercises too soon.

For beginners, one exercise per major muscle group is sufficient. More than this can lead to overtraining and cause a slowing or cessation of progress. Following this rule of thumb will result in 8-12 basic exercises per training session.

(Continued on the next page)

OUR GRATITUDE

The staff and students at the HPL would like to thank the following people for their contributions to the Adult Fitness Program in 1995:

Allan and Mary Andreotti
David and Nancy Bacharach
Carol Brink
Ray and Phyllis Collins
Michael and Kathy Drahuschak
Dennis and Anne Fields
James and Marcella Gammell
Curtis and Betty Ghylin
John Grogan
Abdalla and Earleen Hanafy

Jeffrey and Kim Holmberg
Randall L. Jensen
Rick and Carol Jones
Lee and Marlene Kasper
John M. and Doris Kelly
Ken and Sally Kelsey
Louis Krippner
David and Barbara Kunze
Tom and Mille Lembeck
Roger and Rosie Moran
Ruth Nearing
Harry Olson, Jr.
Frank and Jean Osendorf
John and Carole Pike
Judith M. Seitz
Les and Eva Sova
Glenn and Nancy Street

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The order of exercise is important to consider. The general rule is to start with the largest muscles or muscle groups first and progress to the smallest muscles last. The largest muscle groups use more energy and require the assistance of the smaller muscles. If the smaller muscles are fatigued first it will be difficult to use sufficient resistance to properly stress the larger muscles. The largest muscles and muscle groups are generally found on the torso and the smaller muscles are found in the limbs.

Remember to allow the muscles you train to recover for at least 48-72 hours before exercising them again. Some more advanced weight trainers perform different exercises on different days so they are able to resistance train five or six times per week; they don't exercise the same body parts each day.

Whether your program is developed to build strength, endurance, or size, it is important to remember that any consistent resistance training program will result in changes in all three areas. The suggestions are made to optimize changes in the desired variable. The underlying principle in every training program is the consistent, slow progression of the workload. Adapted from: *Weight Training for Life* by James L. Hesson.

Run only if you must. If running is an imperative that comes from, inside you and not from your doctor. Otherwise heed the inner calling to your own Play. Listen if you can to the person you were and are and can be. Then do what you do best and feel best at. Something you would do for nothing. Something that gives you security and self-acceptance and a feeling of completion; even moments when you are fused with your universe and your Creator. When you find it, build your life around it.

-Dr. George Sheehan, in "Running and Being"

Congratulations

The faculty and staff at the Human Performance Laboratory would like to congratulate those who completed their thesis work and earned a Master of Science degree in 1995:

Scott Weber	Peggy Kratz
Kari Brown	Paul Guy
Maurice Steinley	Bill Priest
Webb Smith	

Internship at the U.S. Olympic Training Center

Internships provide students with experiences away from the lab and classroom and give them unique learning opportunities that will further their education. All graduate students who wish to earn their Masters Degree in exercise science are required to complete an internship. The site for this experience is up to the students, and they can choose any area that is of interest to them, as long as it relates to exercise science. Past interns have worked in cardiac rehab strength and conditioning, fitness training, and even golf research. All of these experiences provide the students with the practical application of the skills that they will need to survive in the 'real world'.

A unique opportunity, created by the United States Olympic Committee, allows students interested in a variety of areas to live at one of the Olympic Training Centers and work with the staff and athletes. Several SCSU graduate students in recent years have gone to either Lake Placid, New York or Colorado Springs, Colorado for their internships. Two current students, Mark Blegen and Paul Kammermeier, spent last summer in Lake Placid working with the athletes in a variety of capacities. Both second year students, Mark and Paul found their experiences valuable and fun.

Mark worked with athletes from many sports through the Sports Science Division, while Paul's work focused on the U.S. Brethren Team. Many teams travel through the Training Center, and the opportunity to work with different athletes of a variety of skill levels kept the two on their toes. "Our days were pretty much filled with the testing of athletes, doing V02 max tests, upper body power tests, and video analysis," says Mark. "Paul had the opportunity to get out in the field quite a bit, which I'm sure provided him with some valuable skills." The athletes that were tested were of all ages, from Developmental Teams being tested for the first time, to athletes that have been to three Olympics. This gave the two a look at working with all ages, and what to expect from each group of athletes. "We saw how the researchers and coaching staff draw heavily from both exercise physiology and biomechanics," Paul said. "Mark's experience gave him a lot of hands-on experience with biomechanics, especially digitizing, in addition to the physiological testing."

(Continued on the next page)

What's Going on in the HPL?

Recent Research

Breathe Right

The HPL has carried out two research studies on the effectiveness of the Breathe Right nasal strips in enhancing athletic performance. In one, twelve college athletes (track and field participants) were tested with the Maximal Anaerobic Running Power (MARP) protocol under three conditions: with a Breathe Right strip, with a placebo strip, and with nothing on their noses. The protocol involves 20s sprints followed by 100s recoveries at progressively faster treadmill rates. Four of the athletes were able to go an extra stage with the Breathe Right strip. For them, oxygen consumption was higher and lactate levels were lower.

In another test, twenty college football players ran a maximum of twenty 40 yard sprints, with and without Breathe Right strips. Mouth guards were in place during the sprint. After each sprint, sprint time and time needed to recover to a heart rate of 130 bpm were recorded. Minimal nasal cross sectional area was determined with acoustic rhinometry before and after applying the Breathe Right strip. The nasal cross sectional area increased by an average of 17% for this group. This increase correlated with faster recovery times while wearing the Breathe Right strip. The results will be presented in a symposium at the 1996 AAHPERD convention in Atlanta.

Nordic Track

A research study was performed to determine the mechanical work and metabolic demand of the Nordic Track 3DX Exercise Rider. 10 male and 10 female subjects completed multiple three minute stages in both the push and pull modes. From these data, a regression equation will be generated to predict the metabolic cost for each setting.

Rollerblade

Rollerblade has asked the biomechanists in the HPL to help them design a wrist guard. Rollerblade wants to make a new wrist guard which is strong enough to withstand the forces induced in falls, while protecting the wearer against injury. The HPL staff will have two undertakings: 1) design wrist bands that will measure the force incurred during falls; and 2) record the force data when people fall. The information will help Rollerblade design tests to make sure their wrist guards do not break during use.

Publications and Presentations

- Carbohydrate drinks and cycling performance. Bacharach, D. W., von Duvillard, S. P., Rundell, K. W., Meng, J., Cring, M., Szmedra, L. and J. Castle. *Journal of Sports Medicine and Physical Fitness* 34(2):161-168, 1994.
- Anaerobic power differences in fit women across age. Pankey, R. B., Bacharach, D. W. and R. A. Gaugler. *Journal of Strength and Conditioning Research* 10(1):62-64, 1996.
- Intermediate and long-term anaerobic performance of elite alpine skiers. Bacharach, D. W. and S. P. von Duvillard. *Medicine and Science in Sport and Exercise* 27(3):305-309, 1995.
- Physiological characteristics and performance of top U. S. Biathletes. Rundell, K. W. and D. W. Bacharach. *Medicine and Science in Sports and Exercise* 27(9):1302-1310, 1995.
- Relationship of blood urea nitrogen to training intensity of elite female biathlon skiers. Bacharach, D. W., Petit, M. and K. W. Rundell. *Journal of Strength and Conditioning Research* (In press).
- Development of a field test battery for U.S. Biathlon skiers. Bacharach, D., Gaskill, S., Rundell, K., Pichler, W. and A. Shalna. Presented at the 1st International Congress on Skiing and Science, St. Christoph, Austria, January, 1996.
- Implementation of a field test battery for biathlon skiers. Bacharach, D. Presented at the Berlin Free University Sports Symposium, January, 1996.
- Lactate accumulation during laboratory testing in elite alpine ski racers. Rice, D., von Duvillard, S., Bacharach, D. and S. Johnson. Presented at the National ACSM Meeting, June, 1995.
- Kinematics and ground reaction forces during takeoff of the long jump and triple jump. Weber, S., Bacharach, D. and G. Street. Presented at the National ACSM Meeting, June, 1995.
- Quadriceps muscle activation during forward and backward running. Steinley, M. and D. Bacharach. Presented at the National ACSM Meeting, June, 1995.
- Anaerobic power and performance of elite junior male alpine ski racers. Bacharach, D. and S. P. von Duvillard. Presented at the AAHPERD National Meeting, March, 1995.

(Continued from the previous page) Working in Lake Placid for the summer also provided the two with future opportunities. Paul just returned from a second trip to New York to help out with the National Biathlon Championships,

and Mark made a trip to Steamboat Springs, Colorado in early December to work with the U.S. Nordic Combined Ski Team at a World Cup event held there. Interning at the Olympic Training Centers is just one of many experiences

that are available to the graduate students. Whether the students choose to work with athletes, work in cardiac rehab, or take advantage of other opportunities, internships provide a fascinating way to learn.

What's Going on in the HPL?

Thesis Work in Progress

The Effect of Backrest Inclination on Sitting Head Posture. (Larry Wallner) Studies have demonstrated that sitting reclined decreases low back muscle activity and intra-discal pressures. This study will attempt to determine how this position influences neck position.

Prediction of On-ice Hockey Performance from Laboratory Tests. (Jamie Jerdee) With limited hours of ice time during off-season months it is important to be able to track training progress using other methods. This research seeks to determine whether any existing laboratory anaerobic tests can predict on-ice skating performance.

Comparison of Two Methods of Gas Exchange Analysis. (Janice Engebretson) The purpose of this study is to evaluate the laboratory's computerized, cardiopulmonary exercise test equipment for reliability and accuracy. The computerized equipment will be compared to a conventional method in determining oxygen consumption (V_{O2}), carbon dioxide production (V_{CO2}), minute ventilation (VE), and respiratory exchange ratio (RER).

Blood Urea Nitrogen and Overtraining. (Paul Kammermeier) Some coaches use Blood Urea Nitrogen (BUN) to monitor athletes' training status, and may alter the training if the BUN level is too high. This thesis will attempt to see if there is a correlation between the overtrained state and elevated BUN.

Relationship between Amount of Knee Flexion and Vertical jump Height. (Joe Vardas) This study seeks to discover if better jumpers use less knee flexion upon rebounding after dropping from various heights of boxes. Controversy exists as to whether large or small amplitudes of knee flexion are more beneficial.

A Biomechanical Comparison of the Standing and Crouch Sprint Starts for Collegiate Women Track Sprinters. (Kurt Threinen) Although the crouch sprint start is the standard starting technique in track and field, the standing start has gained popularity with small college sprinters. This study aims to see if the standing start can be as effective for short sprint races as the crouch start for small-college varsity women.

A Biomechanical Analysis of the Longsnap in Football. (Mark Blegen) Special Teams play in football is a critical factor in the outcome of any game. A solid punting game can provide excellent field position for the entire half. The center is responsible for delivering the ball to the punter quickly and accurately. This thesis will look at the determining factors of both accuracy and velocity of the longsnap.

The Effect of Resistance Training on Balance In the Elderly. (Dani Baker) Falls in the elderly are a serious danger, and the number of reported falls keeps increasing with the number of elderly in society. Resistance training has been shown to improve strength in the elderly. This research will try to show that resistance training also increases balance.

A Comparison of Three Methods of Monitoring Aerobic Exercise Intensity. (Annie Howes) This study looks at the accuracy of maintaining target heart rate intensity (70-85% of max. heart rate) using either pulse measurement, rating of perceived exertion scale, or self-selected pace. Subjects will be asked to workout on a treadmill, stationary bike and walk/run on the indoor track. Heart rates will be recorded on a heart rate monitor and down-loaded onto a computer for analysis of percent of time within, above or below one's target heart rate range.

Metabolic changes following combination arm leg training. (Bryan Huft) This research will examine potential differences when combination training is added to running.

Running performance the morning after significant beer consumption. (Mike Reid) The use of alcohol among athletes reflects that of the general population-it's common. Some athletes have set personal records the morning after significant alcohol consumption. This study will attempt to find an explanation for this. Several variables, including oxygen consumption, blood glucose and lactic acid concentrations, heart rate, and rating of perceived exertion will be examined during treadmill running at race pace.

New Designation for Graduate Studies

The graduate program at the Human Performance Laboratory went through a comprehensive review in 1995 and was changed from its previous Special Studies designation to a Master of Science degree in exercise science.



Nutrition and Health Quiz

by Ann Hudspeth

- | | | | |
|---|--------|----------------------|----------|
| 1. A product that says "fat free" on the label has virtually no fat. | True | False | |
| 2. Margarine contains fewer calories and less fat than butter. | True | False | |
| 3. If you're on a diet, snacking is out of the question. | True | False | |
| 4. Jogging two miles burns more calories than walking two miles. | True | False | |
| 5. If you buy frozen or canned vegetables, you are robbing your family of precious vitamins and minerals. | True | False | |
| 6. The easiest way to cut down on salt is to throw out your salt shaker. | True | False | |
| 7. The word "lean" on a food label means the food is low in fat and calories. | True | False | |
| 8. How many lung cancer deaths have been caused annually by involuntary (secondhand) smoke? | a. 500 | b. 2,000
c. 4,000 | d. 6,000 |

(Answers are below.)

1. True. A "fat free" product must have less than one-half gram of fat per serving. (American Heart Association) 2. False. Regular margarine and butter both contain about the same amount of fat and calories per teaspoon. Butter has more saturated fat. (AHA) 3. False. Snacking may actually help you lose weight by curbing your appetite so you eat less at meals. Make sure to incorporate healthful snacks into your day. (American College Health Association) 4. False. About the same amount of calories is used in either activity. The difference is in the amount of time it takes to complete the two miles. (AHA) 5. False. You are actually better off nutritionally with a vegetable that has been frozen or canned immediately after harvest than a fresh vegetable that's been sitting around too long. (ARA) 6. False. Only 15 percent of the sodium the average American consumes comes from the shaker. Another ten percent occurs naturally in foods. By far the most comes from processed foods. Watch out for most brands of frozen dinners or pizzas, processed meat, canned meats, salad dressings and canned or dried soup. (Bonnie Liebman, Nutrition Action Healthletter, March 1994) 7. False. Any food can be called lean if it has no more than 10 a of fat, 4.5 g of saturated fat and 95 mg of cholesterol. "Lean" claims are useful only when they appear on fresh cuts of meat or poultry. (Nutrition Action Healthletter, April 1994) 8. C. The Environmental Protection Agency estimates that 4,000 lung cancer deaths annually have been caused by involuntary smoking. (American Cancer Society)