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NOTES FROM

ACSM CERTIFIED PERSONAL TRAINER COMMITTEE

Tom Spring, M.S., ACSM CPT/HFS/CES, FAACVPB, ACSM CPT Committee Chair

As the fitness industry continues to evolve and develop into a prominent profession for both fitness enthusiasts and athletes, a new generation of personal trainers is emerging. Those who work with the general public, many of whom have some chronic health concerns, are being solicited for services to accompany and augment physician recommendations and advice related to health and physical activity. This evolution, although expected, requires some adjustments within the field from both a professional and an educational standpoint.

The committee responsible for overseeing ACSM’s Certified Personal Trainer® (ACSM CPT) certification has taken this to heart and recognizes the importance of preparing our trainers appropriately. Although there are numerous options for aspiring and qualified trainers, our mission is to provide a credential consistent with medical and public health guidelines whenever appropriate and to challenge candidates to be the best trainers possible to meet this increasing demand. Whether from a preventive or management standpoint, ACSM trainers are being asked to raise the bar and stand on the front lines of several public health concerns. Obesity management, chronic disease prevention through lifestyle and behavior change, and identifying and managing risk among those who are reaching ages where chronic disease is prevalent are key areas of focus for the ACSM CPTs. In response to this evolution, ACSM CPT study resources and guides are being updated with the most current information available and presented at a level consistent with our candidates. Look for updates in resources and materials published by ACSM.

In addition, focus on resistance training and the role that coaching and behavior change play in the personal trainer’s daily life have been discussed and examined. We feel some of the needs of trainers currently in practice are being reflected in the evolution of the ACSM CPT credential. Recently, ACSM CCRB committees underwent an exhaustive process of redefining what actually happens within several fields related to exercise science, including the personal trainer. This process, called a Job Task Analysis, led to an overhaul of the credentialing exam and ultimately the certification process as a whole. Working with our workshop and education providers, the CPT committee is committed to providing the best possible education for personal trainers and working with other ACSM credentials to ensure the highest level certification possible with the scope defined as a personal trainer. Based on this process and other discussions, ACSM is progressively increasing educational opportunities, certificate programs, and even certifications to help advance the professionals we serve.

I’m pleased to announce that the ACSM CPT has had its most successful year to date with more than 4,000 new ACSM CPTs—a great sign of industry growth and exposure for the College. In addition, the CPT committee has supported the evolution of a new professional designation: the Exercise is Medicine® credential, which will further acknowledge the ACSM CPT as a leader in an ever-changing and challenging market place. ACSM’s CPT committee members are proud to represent this exciting, rapidly growing and evolving field for ACSM and trust that our process and decisions will continue to both challenge and set the standard for the industry.
ONLINE TIPS AND TOOLS FOR EXERCISE PROFESSIONALS

By Peter Ronai, M.S., FACSM, RCEP, CES, PD, CSCS-D

Exercise practitioners interested in obtaining current health, medical, and science information have a number of reputable electronic resources and tools available to them. As in previous issues of ACSM’s Certified News, this Online Tips and Tools for Exercise Professionals article will discuss an electronic resource which exercise professionals can access for free and obtain immediate benefits from.

Exercise Prescription on the Net (www.exrx.net) is a free resource for the exercise practitioner, student, educator, or person preparing to take a health/fitness or clinical exercise industry certification and credentialing examination, like those developed and administered by ACSM.

Exercise Prescription on the Net features comprehensive exercise libraries (>1,300 exercises), fitness assessment calculators, reference articles, instructional video clips, and educational lectures and diagrams. On the left side of the homepage for the site, 17 interactive links are displayed. These links provide Exercise Prescription on the Net users with instant access to science-based and practical information, instructions, tutorials, and interactive tables, and tools:

- Beginner’s Page
- Exercise Instruction
- Weight Lifting
- Kinesiology
- Aerobic Conditioning
- Exercise Information
- Fitness Testing
- Weight Management
- Diet and Nutrition
- Psychology
- Anabolic Steroids
- Body Building
- Questions/Comments
- Fitness Calculators
- Audio Interviews
- Software Solutions
- ExRx.net Store

The applied anatomical muscle charts, mechanics, and clinical implications links included within the “Kinesiology” section provide excellent practical, didactic, and visual learning tools, as do all sections of this Web site. Viewers can play videos of exercises in slow motion or freeze the video clips while they are playing them. They also can access a series of stop-action photographs of exercises displayed on videos. This can enhance learning or teaching of complex skills like Olympic-style weightlifting and plyometrics.

The “Fitness Testing” section provides thorough descriptions, photographs, step-by-step illustrations, and scoring calculators and norm scoring tables for numerous medical and health-related tests, as well as clinical, functional, and performance-based assessments for persons of all ages.

In addition, section links within the “Weight Training” section regarding resistance exercise program development, periodization and corrective exercise interventions provide very accurate and useful tools, visual representations, and information regarding exercise program design and progression. Each of the section links on the homepage provides multiple links to similar resources.

Exercise Prescription on the Net is a National Strength and Conditioning Association (NSCA) authorized CEU provider. Exercise Prescription on the Net viewers can enhance their certification examination preparedness by using the link “Study Modules” from the homepage.

Exercise Prescription on the Net is an informative Web site that contains useful and practical materials and tools for educators, students, exercise professionals, and persons preparing to take professional exercise practitioner certification and credential examinations.

About the Author

Peter Ronai, M.S., FACSM, RCEP, CES, PD, CSCS-D, is a clinical assistant professor in the Exercise Science Department at Sacred Heart University in Fairfield, Connecticut. He is a clinical exercise physiologist and previously was manager of Community Health at the Ahlbin Rehabilitation Centers of Bridgeport Hospital in Connecticut and an adjunct professor in the Exercise Science Department at Southern Connecticut State University. He is a Fellow of the American College of Sports Medicine (ACSM). He is past-president of the New England Chapter of ACSM (NEACSM), past member of the ACSM Registered Clinical Exercise Physiologist (RCEP) Practice Board, Continuing Professional Education Committee, and current member of the ACSM Publications sub-committee. He is also the Special Populations column editor for the National Strength and Conditioning Association’s Strength and Conditioning Journal (SCJ) and a co-editor of ACSM’s Certified News.

Reference

PART 2: RESISTANCE TRAINING DURING PREGNANCY

By Linda May, Ph.D.

Resistance training is known to improve muscular strength, is associated with improvements in activities of daily living, preventing disease, and is recommended by public health organizations. Many trainers do not know if resistance training is safe during pregnancy. This is due, in part, to the fact that most women who participate in resistance training while pregnant also are doing aerobic exercise. Resistance training is defined as a specialized method of conditioning that involves the progressive use of a wide range of resistive loads, including body mass, and a variety of training modalities designed to enhance health, fitness, and sports performance. During pregnancy, the main goals of resistance training should focus on making muscles stronger, preventing aches and pains common to pregnancy, and preparing for labor and delivery.

Prior to an appointment, trainers should review absolute and relative contraindications to exercise during pregnancy, as well as when to stop an exercise session (1). At the beginning of the appointment, a pregnant client should complete the PARmed-X, a free questionnaire (found at www.csep.ca/forms.asp or in ACSM’s Guidelines for Exercise Testing and Prescription, eighth edition) to determine a woman’s health status. You also should identify your pregnant client’s goals for exercising. Always maintain the physician’s release for exercise with the client’s file. Once you have established your client’s fitness level and goals, you can develop an appropriate program.

MAX ISSUES WITH RESISTANCE TRAINING WHILE PREGNANT

There are four main reasons that the use of weights during pregnancy can be risky. First and foremost is the potential for abdominal trauma from the barbells and dumbbells. For this reason, a woman who is pregnant typically should not exercise with free weights, particularly if she does not have previous experience using them appropriately and safely. Moreover, a woman who has experience using free weights should do so with extreme caution, to make sure there is absolutely no chance for a weight to hit or fall on her abdomen. A second issue is breathing while lifting heavy weights. The Valsalva Maneuver is caused by bearing down while holding your breath. Since it is not known if this maneuver causes increased cardiovascular stress to the mother and potential harm on the baby, women must not do this when they are lifting weights. Thirdly, pregnant women should avoid lifting heavy resistance or performing ballistic movements. Since pregnancy is associated with joint laxity, it is imperative to use safe amounts of weight, and controlled movements to eliminate the potential for harm. Lastly, the supine position should be avoided past the 13th gestational week. In order to maintain appropriate venous return to the heart, pregnant women should either lie on an incline, or on their left side. Exercises that traditionally are done lying down can be modified and performed on an incline, side, or seated position. For instance, a leg curl can be performed in a seated or standing position. They also can be performed with the head above the feet, as in performing an upright crunch. In addition, sit-ups and crunches can be done on an incline, the side, or even seated. Resistance exercises can be performed safely during pregnancy, but always make sure your client has physician approval.

CURRENT STRENGTH TRAINING RECOMMENDATIONS

Although the American Congress of Obstetrics and Gynecology (ACOG) states that participation in a range of recreational activities is safe for pregnant women, ACOG and the American College of Sports Medicine (ACSM) guidelines specifically addressing resistance training are lacking. The joint Society of Obstetricians and Gynecologists of Canada (SOGC) and the Canadian Society for Exercise Physiology (CSEP) recommend women in uncomplicated pregnancies participate in aerobic and strength-conditioning exercises. The current guideline in intermittent activity (strength training, yoga) is associated with improved fetal cardiac autonomic control (May LE, Suminski RS, Gustafson KM, unpublished data, 2012). This finding is similar to the exercise training response seen in an adult study utilizing light prenatal resistance training failed to detect difference in birth weight or length between babies born to mothers who practiced maternal strength training and those who did not, respectively. However, there was a dose response trend toward improved Apgar scores in babies whose mothers participated in greater amounts of strength training, coupled with aerobic exercise. Preliminary findings indicate that maternal participation in intermittent activity (strength training, yoga) is associated with aerobic activity during pregnancy decreased cesarean sections required during delivery. Additionally, maternal strength training either caused no adverse effects or in some cases contributed to better overall maternal health. Research has shown that oxygen availability is preserved during maternal weight lifting. Studies have indicated that there are no differences in birth measures (e.g., birth weight, length, Apgar scores) between babies born to mothers who practiced maternal strength training and those who did not, respectively. However, there was a dose response trend toward improved Apgar scores in babies whose mothers participated in greater amounts of strength training, coupled with aerobic exercise. Preliminary findings indicate that maternal participation in intermittent activity (strength training, yoga) is associated with improved fetal cardiac autonomic control (May LE, Suminski RS, Gustafson KM, unpublished data, 2012). This finding is similar to the exercise training response seen in an adult study utilizing light prenatal resistance training failed to detect difference in birth weight or length between babies born to mothers who performed strength training and those born to mothers in the control group. The caveat of these research findings is that exercise intensity, time, frequency, and type each will affect the magnitude of outcomes experienced during a training program.

BENEFITS OF REGULAR STRENGTH TRAINING WHILE PREGNANT

Recent research indicates that participating in resistance training during pregnancy can be beneficial for mother and baby. With a proper diet, resistance training throughout gestation can lead to decreased maternal weight gain, improved strength and flexibility, improved self-image, and decreased symptoms of pregnancy. In three recent studies, participation in light resistance and toning exercise had no effect on type of labor and delivery, but participation in strength training with aerobic activity during pregnancy decreased cesarean sections required during delivery.

There are four main components to a strength training program during pregnancy. The first component consists of the warm-up session. The warm-up session can last from 5 to 10 minutes and consist of slow walking or cycling. The second component is the strength and toning session. The resistance session can last between 20 and 45 minutes depending on the number of exercises chosen and can vary from 4 to 6 sets.
12. Exercise intensity should be monitored throughout the session, using the ratings of perceived exertion scale (RPE). On the 6 to 20 RPE scale, pregnant women should aim for 13 (somewhat hard) since this represents a moderate intensity level. Exercise resistance frequency should be 2 to 3 times per week. In recent studies, resistance exercise sessions have been done with light barbells, weight machines, and resistance bands (e.g., elastic bands, TheraBand). In some instances, heavier weights and resistance may be well tolerated in both athletic women and those who have been exercising with heavy weights prior to and throughout their pregnancies. 

Some studies included a third component of core training with the resistance training. The core is important in maintaining a pregnant woman’s posture due to her center of gravity changing. The core also is important in regard to the labor and delivery process. The core is an essential area, but it is often overlooked during training. Abdominal exercises can be done at an angle, on the side, seated, or standing. The studies that included core training specifically used 8 to 12 repetitions, with 1 to 2 sets, slow and controlled movements, and ensured proper exercise breathing techniques. This portion can last up to 20 minutes. 

The final component of the resistance training routine is the cool down and stretching period. Either slow walking or slow, steady stretching of major muscle groups can be done. This session should last about 5 to 10 minutes and allow time for maternal heart rate to return to pre-exercise levels. 

As always, a pregnant woman should feel relatively comfortable in her workout environment. She should exercise in a comfortable temperature. Prior to, during, and after her workout she must stay hydrated, along with consuming a well-balanced diet. During exercise, it is important to wear clothing that will allow unrestricted movements, and also provide support for her abdomen and breast tissue. It also is safest to have someone else present to supervise or assist during workout activities. Following these points will help ensure a safe and healthy pregnancy.

Summary

Resistance training is an important part of an exercise routine, even during pregnancy. You and your client must determine their current fitness level, establish appropriate goals, document health care provider permission, and maintain progress notes throughout the pregnancy. Ensure client safety by: enforcing proper breathing and exercise techniques, implementing appropriate exercise modifications, and monitoring exercise responses for signs and symptoms of exercise intolerance. Resistance training alone, or in combination with aerobic exercise, is safe and even beneficial for mother and baby. An appropriate routine for pregnancy consists of four components: warm-up, strength/toning, core training, and a cool down. Make sure to choose a frequency (2 to 3 times per week), intensity (RPE scale 13 or less), time (30 to 60 minutes per session), and type of exercise and equipment appropriate for your pregnant client’s fitness level, and goals. Ensure that your client is hydrated, comfortable, and safe during all exercises. Most importantly, participating in a regular exercise program, which includes aerobic and anaerobic exercises, will maximize the benefits during pregnancy, labor and delivery, and possibly afterwards.

References


About the Author

LINDA MAY, Ph.D., an assistant professor at Kansas City University of Medicine and Biosciences, teaches histology, gross anatomy, and physiology to graduate and medical students. Her research looks at effects of exercise during pregnancy on fetal/neonatal heart and autonomic nervous system development. Away from work, she enjoys time with her family, exercising, gardening, cooking, and baseball.
Lifestyle factors significantly impact athletic performance, and one of the principal behavioral factors is an athlete’s diet. Proper food choices often can mean the difference between winning and losing. Because of the influential role diet plays in an athlete’s performance, knowing what foods can positively affect performance and why is essential. Recent scientific information has defined that some specific plant-derived food provides more sports performance benefits than other food.

**What are Phytochemicals?**

Phytochemicals are a group of chemical compounds produced naturally by plants. As secondary metabolites, these substances function as the plant’s natural defense against disease and infection. “Phytochemical” actually is a general term describing a non-nutrient that offers no energy-based value in human diets. The potential benefit for consumption lies in their ability to modulate cellular activity. Unlike vitamins and minerals, there is no regulated recommended daily amount established for phytochemicals.

Among the various phytochemicals, the most important differentiating factor facing consumers is the effects these compounds elicit within the body. As previously stated, the effects are generated chiefly through the phytochemical’s ability to modulate cellular activity. Originally, phytochemicals were sought after by athletes because of their antioxidant characteristics. Free radicals produced during exercise can contribute to muscle fatigue. The free radicals and associated fatigue were thought to be reduced by antioxidants.

**Curcumin**

Curcumin (diferuloylmethane) is a component of the herb Curcuma longa (Tumeric) and has gained fame in the realm of enhancing sports performance because of its anti-inflammatory properties. Curcumin’s anti-inflammatory characteristics have been extorted medically in Asia for centuries. With respect to exercise, anti-inflammatory supplements are thought to provide important benefits, especially for older athletes. These individuals tend to have greater amounts of joint inflammation and are known to take multiple supplements to alleviate the pain and to avoid prescription medications. Funk et al., using an arthritis rat model, found that curcumin prevented joint inflammation and improved locomotion capability. In 2007, Davis et al. examined the effects of curcumin during recovery following a downhill running protocol in mice. They reported that curcumin significantly improved performance recovery, while decreasing muscle damage induced by inflammation.

**Quercetin**

Quercetin is a flavonoid (subclass of phytochemical), found in a variety of fruits and vegetables and is most concentrated in apples, onions, and berries. Quercetin has been the focus of more sports performance research than any other phytochemical. With increased popularity, quercetin has exploded as a marquee ingredient in ergogenic aids. The most significant proposed effects of quercetin are its ability to increase mitochondria number and improve mitochondrial function resulting in improved endurance performance. The evidence that supports this claim results from a handful of sources. Davis et al. found that supplementing quercetin for two weeks improved both VO2max, and time to fatigue on a bicycle ergometer test performed by healthy untrained men and women. Concordantly, MacRae et al. reported that a commercial beverage, which contained quercetin, improved bike time trial performance in highly trained cyclists. Conversely, studies do exist that report no performance improvement with quercetin use. For example, Quindry et al. reported quercetin supplementation had no effects upon performance time at the Western States 100-mile road race.

**Resveratrol**

Resveratrol is a stilbene (another subclass of phytochemical) and has many less edible food sources than the other phytochemicals. The primary source of resveratrol is from the skins of grapes. As a result, the
primary resveratrol food source for humans is wine. This is the main reason this rare phytochemical has been studied so zealously. Resveratrol was once thought of as the missing link in the “French paradox”: an observation that people from France consume more saturated fats than Americans, yet they have a lower incidence of heart disease. French wine consumption is hypothesized as a factor for their lower heart disease rates. Regardless of the validity of resveratrol causing the paradox, resveratrol has shown promise for improving endurance performance much in the same manner as quercetin. Lagouge et al. found that resveratrol improved markers of aerobic capacity and time to fatigue in mice. They also found that resveratrol reduced the negative effects of a high fat diet. Sun et al. replicated the findings for improved endurance performance induced by resveratrol supplementation.

**Summary**

Curcumin, quercetin, and resveratrol all show promising results for positively affecting athletic performance. However, much evidence is needed before considering phytochemicals as a beneficial human ergogenic aid. Most research is in preliminary stage development and lacks proper clinical translation. Truly establishing the long-term effects of any supplement for human consumption is a long and daunting task. Before phytochemicals are considered as standards in human supplementation, further research of these products in placebo-controlled, randomized controlled clinical trials is needed to ensure safety and to maximize potential benefits.

**About the Author**

Benjamin T. Gordon, M.S., CES, CSCS, is currently pursuing a Ph.D. in applied physiology from the University of South Carolina. He is also an investigator in the Psychoneuroimmunology and Nutrition Lab directed by J. Mark Davis, Ph.D., at the University of South Carolina.

**References**

Cardiovascular disease, which includes coronary heart disease (CHD), heart failure, cerebrovascular disease, and peripheral vascular disease, is the leading cause of death among both men and women in the United States with an overall death rate in 2007 of 251 per 100,000 deaths. This represents approximately 1 out of every 3 deaths in the United States. CHD alone accounts for approximately 1 out of every 6 deaths in the United States. While mortality and morbidity due to CHD have declined over the past 50 years, the degree of improvement has not been observed equally in all subgroups. This paper will briefly review social disparities in the epidemiology of CHD and the utilization of cardiac rehabilitation.

**Epidemiology of Coronary Heart Disease**

Based on data from the 2005 to 2006 and 2007 to 2008 National Health and Nutrition Examination Surveys (NHANES), the prevalence of CHD is 7.0% among adults (≥20 years) in the United States; 8.3% among men and 6.1% among women. The prevalence of CHD tends to be higher among non-Hispanic whites and the greatest discrepancy between genders is observed in this group. The lowest prevalence is among American Indians/Alaska Natives. The smallest discrepancy between genders is among non-Hispanic blacks. Within the United States, the highest prevalence of CHD is in Virginia (6.5%) and the lowest is in the District of Columbia (1.9%).

The annual death rate due to CHD in the United States is 191 per 100,000 deaths. Death rates due to CHD are highest in men and non-Hispanic blacks. Mortality due to CHD decreased 59% between 1950 and 1999 and decreased 26% between 1997 and 2007. Although the overall mortality and morbidity due to CHD continues to decline, disparities in both of these measures persist. Between 1985 and 1999, the largest reductions in CHD mortality were observed in white men, with smaller reductions observed in women and other race and ethnic groups. It is estimated that 47% of the reduction in CHD deaths is due to improved treatment strategies for acute events, heart failure, and secondary prevention; and another 44% is due to improved risk factors.

Disparities in the incidence and mortality of CHD exist by various social and economic factors, such as gender, race, ethnicity, education level, income, and residential location. Groups most affected by these disparities include non-Hispanic blacks, Hispanics, persons with low socioeconomic status, persons with less than an high school education, and residents of the southeastern United States and Appalachia. Death rates for CHD by gender and select race/ethnic groups in the United States between 1980 and 2007 are shown in the Figure.
were more evenly distributed across tertiles of neighborhood income. This is concerning as it suggests a greater burden of morbidity among people who are black living in disadvantaged neighborhoods, potentially increasing their risk of future mortality.11

In a separate analysis of the ARIC surveillance data, Ding et al.12 studied factors that may contribute to disparities in mortality rates from 29 days to 3 years after a myocardial infarction. Although the severity of myocardial infarction and time between symptom onset and arrival at the hospital were not different between black and white subjects, there were fewer cardiac interventions among the black subjects. No disparity in mortality was seen by race after adjustment for body mass index, smoking status, alcohol consumption, lipid profile, hypertension, diabetes, level of sports-related activity, education level, household income, severity of myocardial infarction, and treatment/intervention. A prior analysis of the ARIC dataset similarly did not show a disparity by race for mortality within the first 28 days after a myocardial infarction; however, in that analysis the rate of mortality before reaching the hospital was higher among black subjects.13

In a study of residents in a neighborhood at the lower end of the socioeconomic scale, but in a country (Scotland) with universal health care coverage, a gradient still was evident with the most disadvantaged individuals experiencing the highest rate of myocardial infarction.14 In addition, at the time of their myocardial infarction, the most disadvantaged individuals were more likely to die before reaching the hospital and during the event. The authors concluded that these disparities in health outcomes by levels of socioeconomic status may be due partly to a lack of awareness of the symptoms related to a myocardial infarction, which may delay getting medical care. In addition, the increased mortality rate may be due to factors that contribute to disease severity, such as the prevalence of cigarette smoking, access to care, and treatment decisions.

Cardiac Rehabilitation

Cardiac rehabilitation is considered standard of care for the secondary prevention of CHD.15 It is estimated to reduce the incidence of secondary events by 20% to 30%.1 It also reduces all-cause mortality, improves functional capacity, quality of life, and some comorbidities, and facilitates return to work.1 Participation in cardiac rehabilitation has been estimated to be as low as 10% to 20%.1 due to physician referral rates, patient motivation, insurance coverage, and program access.1

In a retrospective study of patients with CHD who were discharged from a hospital in Scotland, researchers evaluated whether socioeconomic status affected participation in cardiac rehabilitation.1 Among patients who were eligible and referred to cardiac rehabilitation, 59% started and 58% of these patients completed the program. Significant predictors to being referred included the hospital to which they were admitted, age, gender, and referring physician (primary care vs. cardiologist). Socioeconomic status was not related to program referral, but it was related to starting the program, along with index hospital and referring physician. Finally, the only significant determinate of program completion was socioeconomic status. Further research is needed to understand those factors that limit persons of low socioeconomic status from starting and completing cardiac rehabilitation.

Suaya et al.15 conducted a study to assess the effects of cardiac rehabilitation on survival in older patients with CHD. This was a retrospective observational analysis of Medicare beneficiaries 65 years and older who were hospitalized for CHD in 1997 in non-federal acute care hospitals in the United States. Among 70,000 individuals, the utilization of cardiac rehabilitation was 12%. Cardiac rehabilitation participants were more likely to be male, white, younger, not receiving Medicaid, admitted for a myocardial infarction or a coronary revascularization procedure, and had fewer comorbid conditions. Individuals who participated in cardiac rehabilitation had lower mortality rates after 1 year (58% lower) and 5 years (34% lower) compared to those who did not participate. This benefit was seen within all subgroups based on gender, age, and race. The reduction in mortality rates due to cardiac rehabilitation increased with age and was greater among women in each age group. Based on the multivariable analysis, the mortality benefit of cardiac rehabilitation was greatest among those 75 years and older and women, but was not significantly different by race.11

Conclusion

Although improvements have been made in the incidence, survival, and medical management of CHD, social disparities persist. Several determinates have been revealed, but solutions are likely complex. Health care providers, policy makers, and the public need to be aware of these disparities and the underlying determinates so that community-based solutions and public policies can be developed. It is important to continue to monitor social disparities and CHD outcomes so that interventions can be assessed and new avenues for intervention can be identified.

About the Author

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References


Disparities (continued on page 13)
COACHING NEWS:

CLIENT SCENARIO
— HALFHEARTED ENGAGEMENT

By Margaret Moore (Coach Meg), M.B.A.

This column marks the start of a new format for our Coaching News column. We will explore a variety of client scenarios, one scenario for each column. I will describe a few tips from my science-based coaching toolbox to help you help your clients engage fully in a fit lifestyle that allows them to thrive, whatever thriving means in their lives.

In this column, we explore how to coach a client, Alice, who is working out but not sticking to the workout program that you gave her. She is rushing through her gym program and seems to be neglecting all the things she does not like. Those things happened to be the most important parts of her program!

Let’s consider what is driving Alice.

SELF-MOTIVATION — ALICE’S POWER SOURCE

Our first and primal drive as human beings is autonomy. We want to march to our own drummers, to be “the boss of me.” This drive is so strong that it triggers a deeply wired and spontaneous aversion to being told what to do—resist or rebel—without a whole lot of analysis. Our knee-jerk rebellion is so powerful that it can lead us to do things that are not in our best interest.

If you have teenage kids, you can appreciate how telling kids what to do for 13 years turns them into rebellious teenagers who are sick and tired of living a life with too little autonomy at home and school. We never lose our natural and spontaneous aversion to being told what to do, especially in response to a “know-it-all” expert who doesn’t fully empathize and appreciate what it’s like to walk in our shoes and what is important to us. Sometimes we are compliant with what an expert asks us to do in order to please the expert, avoid conflict, and stay out of trouble. But sometimes we are defiant; we quietly or loudly resist the authoritative expert and their control over our destiny.

Alice likely doesn’t agree with you on what’s important in her workout and may not yet be interested or curious enough to deepen her understanding of how different exercises impact her physical strength and fitness. She simply may be rebelling against your insistence on what she should do and expressing her need for autonomy by doing what she wants to do.

A coaching inquiry might include asking Alice open-ended questions, with a smile and not even a smidgeon of impatience, such as:

1. What do you hope will be the benefit of physical strength and vitality for you?
2. How will engaging in your workout make your life better?
3. Would you like to brainstorm with me on how the various exercises in your workout will contribute to the benefit of exercise in making your life better?
4. What is working for you with the current workout and what is not?
5. How can I better support you to realize the benefit of physical fitness?

Your goal is to help Alice dig out and fire up her self-motivation, the kind that is future-oriented—why the exercises really matter to her and how they will make her life better today, tomorrow, and in the future. You will help Alice discover and tap into her own future-oriented power source or drive to engage in the exercises she doesn’t like or seem to want to do.

We inadvertently create resistance to our advice when we convey a know-it-all attitude through what we say, how we say it, our body language, and unsaid words. This can send a message which seems judgmental and autonomy-depleting to Alice, causing her to pull away and not open up with you. Really start to listen intently to Alice without thinking about what you are going to say next, or any other distraction. This will help Alice get the message that you really care about what it’s like to walk in her shoes, what matters to her most, and that you’re completely focused on her wellbeing, not on her compliance to your prescribed workout.

The more genuine interest you show about what makes Alice’s life worth living and lights up her eyes, the more she will tell you about what matters most to her. Then a collaborative conversation on how her workout can make it possible for Alice to have a better life and will lead to a new workout design that Alice helped create, leading to her full engagement in a workout that she owns. Now she can march through her workout to her own drummer; a drummer that wants a bigger life, one made possible by a body which is fit, strong, and brimming with energy.

ABOUT THE AUTHOR
Margaret Moore, coach Meg, MBA, is the founder and CEO of Wellcoaches Corporation, a strategic partner of the ACSM, widely recognized as setting a gold standard for professional coaches in health care and wellness. She is co-director of the Institute of Coaching, at McLean Hospital/Harvard Medical School and co-directs the annual Coaching in Leadership & Health care Conference offered by Harvard Medical School. She co-authored the ACSM-endorsed Coaching Psychology Manual, the first coaching textbook in health care.
RESEARCH ON ENHANCING MUSCLE/STRENGTH DEVELOPMENT THROUGH SUPPLEMENTAL PROTEIN/CARBOHYDRATE INGESTION

By Wayne L. Westcott, Ph.D.

Throughout my college training and the majority of my career in the fitness profession, I was taught that most Americans eat plenty of protein and that supplementation of this nutrient is neither necessary nor effective for enhanced muscle development. However, since 2000, several research studies have demonstrated that ingesting supplemental protein in close proximity to resistance training sessions can result in greater strength gains and muscle hypertrophy.

The common factor in these studies is the timing of the protein or protein/carbohydrate ingestion. Although eating extra-large servings of protein-rich foods at mealtimes may not be a productive strategy, it appears that post-exercise protein supplementation enhances protein synthesis and muscle hypertrophy.

An early study by Esmarck and associates compared the effects of a moderate amount of supplemental protein/carbohydrate (10 g protein, 7 g carbohydrate, 3 g fat) taken immediately or two hours after resistance training sessions. The 13 older exercise participants, mean age 74 years, trained 3 days each week for a period of 12 weeks. Magnetic resonance imaging (MRI) showed significant increases in muscle cross-sectional area (quadriceps) in the subjects who ingested the supplement immediately after their workout but not in those who took the supplement two hours after training.

A 2006 study examined the effects of milk ingestion on net muscle protein synthesis following resistance exercise. The 24 young men and women (mean age 26 years) drank either 237 g of fat-free milk, 237 g of whole milk, or 393 g of fat-free milk with the same caloric value as the whole milk, one hour after performing 10 sets of knee extension exercise (eight repetitions per set). The results revealed that post-exercise milk ingestion stimulated net muscle protein synthesis, with whole milk associated with greater uptake of available amino acids for muscle anabolic processes.

That same year an impressive study on supplement timing was conducted by Cribb and Hayess. Seventeen recreational male bodybuilders (mean age 23 years) completed a 10-week program of heavy resistance exercise. All of the study subjects ingested a protein/carbohydrate supplement twice each training day (four times per week). One group consumed the supplement just before and just after each workout, while the other group took the supplement in the morning and evening of the training days (at least five hours before and after the workout). Participants were prescribed 1 g of supplement per kilogram of bodyweight. The supplement dose for an 80 kg participant was 80 g, which included 32 g of protein, 34 g of carbohydrate, and 6 g of creatine monohydrate. Following the training period, the group that consumed the protein/carbohydrate supplement immediately before and after each workout attained significantly greater increases in lean mass (2.8 kg vs. 1.5 kg), one repetition maximum squat strength (20.4 kg vs. 16.1 kg), and one repetition maximum bench press strength (12.2 kg vs. 9.0 kg), as well as significantly greater increases in cross-sectional area of Type Ila and IIX muscle fibers. This group also experienced significantly greater increases in contractile protein content and muscle glycogen concentrations. These findings clearly support the efficacy of ingesting supplementary protein and carbohydrate in close time proximity to resistance training sessions.

In a 2007 article, Hoffman reported results of several studies that examined the effects of protein/carbohydrate supplementation on muscle/strength development. He summarized the research as follows:

“...evidence strongly indicates that the proper timing of protein ingestion provides a distinct advantage in stimulating muscle protein synthesis rates and subsequent muscle adaptations” (page 32).

A 2010 review article by Poole and colleagues addressed the role of post-exercise nutrient administration on muscle protein synthesis and glycogen synthesis. They concluded that “The supplementation of protein and/or amino acids following a resistance training bout results in a net positive protein balance that enables skeletal muscle hypertrophy to take place ... carbohydrates are vital to replenish glycogen stores diminished from prolonged or high intensity exercise” (page 360).

A 2011 study examined the effects of a combined strength and endurance exercise program with and without protein/carbohydrate supplementation on muscle mass and bone mineral density. Fifty-two participants (mean age 59 years) completed a nine-month research program in one of three study groups: (a) a control group that did not exercise or take nutritional supplements; (b) an exercise group that performed strength and endurance training, but did not take nutritional supplements; and (c) an exercise plus nutrition group that performed strength and endurance training, and also consumed nutritional supplements. The exercise program was performed 2 or 3 days/week (Tuesdays and Thursdays or Mondays, Wednesdays, and Fridays) and consisted of one set of 8 to 12 repetitions completed for each of the 12 resistance machines in the circuit and 25 minutes of recumbent cycling performed in an interval training format. Resistance exercise load was increased by approximately 5% when at least 12 repetitions were completed in proper form. Participants in the exercise and nutrition group drank a protein/carbohydrate shake (24 g protein fortified with free Heucine; 36 g carbohydrate) immediately after each training session, and also took a daily vitamin/mineral complex that contained 1,200 IU of vitamin D and 500 mg of calcium. Only the exercise and nutrition group attained a significant increase in lean weight (5.2 pounds) over the 36 week training period. Although not significant statistically, the control group experienced a 1.0% decrease in bone mineral density, the exercise group maintained their bone mineral density (no loss or gain), and the exercise plus nutrition group experienced a 1.0% increase in bone mineral density.

Based on the results of these studies and research reviews, it would appear that ingesting a protein/carbohydrate snack in close...
PART 1: HEART SOUNDS

By Paul Visich, Ph.D., MPH

The education and skills of Clinical Exercise Physiologist (CEP) graduates vary somewhat among programs, and CEP skill sets aren’t always well understood by other health care professionals. Improving the level of proficiency in the area of cardiovascular and pulmonary assessment reflects positively on the profession and demonstrates competency and credibility of CEPs especially in a field that is striving for licensure. Proficiency in the ability to recognize the more common heart sounds comes with practice and experience over time. The following information may help you become more proficient in listening and recognizing the more common heart sounds that a CEP may encounter in a cardiac rehabilitation program or when performing diagnostic exercise testing.

**Physiology**

Heart sounds are made primarily by closure of heart valves. In addition, whenever these valves leak and allow blood to flow backwards (regurgitation) additional sounds are heard that are referred to as murmurs. Under normal conditions, the two common heart sounds are “lub” and “dub” representing the closure of the atrioventricular valves followed by the semilunar valves respectively. These two sounds are categorized as S1 and S2. S1 reflects ventricular contraction (systole) and S2 reflects ventricular relaxation (diastole). Ventricular relaxation can be further broken down to two additional heart sounds: S3, when blood is passively flowing from the left atrium to the left ventricle, and S4, when blood is being pushed from the left atrium to the left ventricle when the atrium is contracting (atrial kick). S3 and S4 are sounds typically observed in older individuals with some form of cardiac pathology but also may occur in healthy individuals. Therefore, it is important to competently recognize the heart sounds and evaluate them in the context of an individual’s complete medical history to determine their significance and the need for further evaluation.¹

**Stethoscope**

It is important to have your own stethoscope that you can adjust for your ears and that feels comfortable. Better quality stethoscopes produce clearer sounds and are well worth the additional cost. A mid-range or better stethoscope with a diaphragm and bell is recommended. Those that may struggle to hear the sounds may consider a cardiology version. Newer stethoscopes allow you to switch from the diaphragm to bell by altering the pressure on the head of the stethoscope when placed on the chest, whereas the older units require you to twist the head when switching from the bell to diaphragm. The advantage of the newer head is that you don’t have to take the head of the stethoscope off the chest wall to switch from the bell to the diaphragm. The diaphragm is used for detecting high pitch sounds, S1, S2, and regurgitation of the mitral and aortic valve. The diaphragm should be pressed firmly to the skin surface. The bell is used primarily for low pitch sounds, S3, S4 and mitral stenosis and is placed lightly on the chest, but enough pressure to seal the rim to the skin surface. Readers interested in viewing narrated lessons on listening to heart sounds are directed to the University of Florida medical school “Online Physical Examination Assistant” (accessed at http://medinfo.ufl.edu/cardio/CV_main.html).

**Anatomical Sites to Assess Heart Sounds**

The examiner can start at the base or apex of the heart. To start at the base, the stethoscope should be placed over the second intercostal space at the right sternal border. This represents the aortic valve area. The stethoscope then is moved over to the left sternal border, second intercostal space, which would represent the pulmonary valve area. The stethoscope should be moved slowly down the left sternal border to the fifth intercostal space, then over to the apex that represents the tricuspid and mitral valve area, respectively. Defining S1 (systole) and S2 (diastole) can be challenging. To help distinguish these two sounds, you would expect S2 to be louder than S1 at the base, and at the apex, S1 should be louder than S2. Being able to distinguish between systole and diastole becomes of greater importance when you also are detecting S3, S4, and murmurs.²

**Helpful tips to assess heart sounds:**

1) Use a quiet room, if at all possible.
2) Find access to an examination table or bed.
3) The head of the stethoscope should be warmed prior to placing it on the skin surface.
4) Place the stethoscope head on the skin’s surface rather than over clothes.
5) The patient should be in a reclined supine position to assess heart sounds. For greater cardiac examination of the left lateral decubitus position, the patient should be asked to lean forward while seated, which can increase the examiner’s ability to recognize certain heart murmurs (mitral stenosis, aortic regurgitation).

Part 2 will cover the common abnormal heart sounds that you may encounter in a clinical setting, along with helpful hints to detect these sounds.

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About the Author
Paul Visich, Ph.D., MPH, is the current chair and professor of the Exercise and Sports Performance Department at the University of New England in Biddeford, Maine and was previously a professor of health promotion and rehabilitation at Central Michigan University. Paul brings more than 35 years of experience as a researcher, author, clinical exercise physiologist, and educator to his new appointment as ACSM’s Certified News clinical columnist. Along with Jon Ehrman, Steven Keteyian, and Paul Gordon, he served as a team editor of the textbook, Clinical Exercise Physiology, published by Human Kinetics. Paul served as a member of the Practice Board for ACSM’s Registered Clinical Exercise Physiologist (RCEP) credential, the chairperson of the ACSM Professional Education Committee, and a member of ACSM’s Committee on Certification and Registry Boards (CCRB). Paul has authored and co-authored numerous peer-reviewed and refereed articles and will be sharing his clinical knowledge and expertise with us and the readers of ACSM’s Certified News. We are thrilled to have him as our new clinical columnist.

References

Research (continued from page 11)
time proximity to resistance training workouts produces significantly greater increases in muscle mass and strength than taking no supple-
mentation or consuming supplemental protein/carbohydrate two or more hours removed from the exercise session. Although minimum levels have not been established a range of 8 to 40 g of protein and up to 40 g of carbohydrate have been prescribed in the studies pre-

tered. A general recommendation for post-exercise nutritional

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References

Disparities (continued from page 9)
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**SELF-TEST #1 (1 CEC):** The following questions are from “Online Tips and Tools for Exercise Professionals” published on page 3.

1. Exercise Prescription on the Net provides viewers with _______ interactive links:
   - Four
   - Eight
   - Twelve
   - Seventeen

2. Descriptions of senior fitness testing would appear in the _______ section:
   - Resistance Training
   - Kinesiology
   - Fitness Testing
   - Nutrition

3. Exercise Prescription on the Net directs viewers to information regarding certification examination preparation for which organization:
   - American College of Sports Medicine (ACSM)
   - American Heart Association (AHA)
   - National Academy of Sports Medicine (NASM)
   - Centers for Disease Control and Prevention (CDC)

4. Information regarding exercise and behavior change would occur in the _______ section:
   - Exercise Instruction
   - Exercise Information
   - Psychology
   - Fitness Calculators

5. The services can be accessed by navigating through the following Web sites:
   - www.EvRx.net
   - www.acsm.org
   - www.AHA.org
   - www.nasnm.org

**SELF-TEST #2 (2 CECs):** The following questions are taken from “Part 2: Resistance Training During Pregnancy” published on page 4.

1. A pregnant mother, now 13 weeks along, would like to start a workout routine. She was to get toned and strong to prepare for labor and delivery. Although she has not worked out previously with weights, she tells you that Kettlebell workouts look interesting. What is the best advice you can give her?
   - a. She should avoid kettlebells, since it might affect her breathing (cause Valsalva maneuvers).
   - b. She should use small kettlebells to begin with.
   - c. She should not use kettlebells due to the potential for trauma.
   - d. She should not start a workout routine now.
   - e. She should do only aerobics and not strength training.

2. At 15 weeks gestation, your pregnant client is on her third week of an exercise routine, which includes resistance training. She is lifting the same weight as last week on all of the 8 machines, but doing 13-17 repetitions for each exercise, for all 2 sets. To determine if it really is okay to increase her weight, what is an appropriate intensity level while she is lifting weights?
   - a. When she can’t have a conversation
   - b. When her HR is less than 130 bpm.
   - c. RPE about 10.
   - d. RPE about 13.
   - e. It’s not safe to increase her weight, since she is doing 2 sets of 8 exercises.

3. One of your friends just found out she is pregnant. She has worked out for more than 10 years. Her workout routine has always included weights (free weights and machines), aerobic exercise, and abdominal training. Since she knows you are a trainer, she asks what type of exercise she can start now. What would be your best recommendation for her strength routine based on her previous exercise experience?
   - a. Free weights and core training.
   - b. Machines and core training.
   - c. Resistance bands and strips on the floor.
   - d. Only sit-ups.
   - e. She can continue everything now that she did previously.

4. You start a pregnant woman (14 weeks pregnant) on an exercise routine, which includes resistance training. She is reluctant because she heard that aerobic activity was okay, but that lifting heavy weights was not safe during pregnancy. What can you tell her to educate her about exercise during pregnancy?
   - a. Resistance training will increase her heart rate after she exercises, and baby’s too.
   - b. Resistance training will increase her weight gain, and baby’s weight.
   - c. Aerobic and resistance training might increase her labor and delivery time.
   - d. She right, only aerobic exercise is safe during pregnancy.
   - e. Exercise (aerobic and resistance training) is safe during pregnancy.

5. Since the maternal body undergoes many changes as the pregnancy progresses, what special modifications should you educate your client about concerning resistance exercises?
   - a. Keep movements steady and controlled.
   - b. Do not wear restrictive clothing.
   - c. Do not hold your breath (especially while pushing hard).
   - d. Do not lay flat on your back.
   - e. All of the above.

**SELF-TEST #3 (1 CEC):** The following questions are taken from “Can Phytochemicals Improve Athletic Performance?” published on page 6.

1. Phytochemicals are:
   - a. The chemicals that convert sunlight into energy in plants.
   - b. Secondary metabolites of plants.
   - c. Growth factors secreted from special glands in the plant.
   - d. None of the above
   - e. All of the above.

2. True or false: Quercetin has been shown to increase O2 max in human subjects?
   - a. True
   - b. False

3. For humans the daily recommended amount of phytochemicals is:
   - a. 200mg
   - b. 500mg
   - c. 1000mg
   - d. 1200mg
   - e. There is no daily recommended amount.

4. Both quercetin and resveratrol have shown promise in sports performance enhancement by:
   - b. Being CNS stimulants.
   - c. Increasing the number of mitochondria in muscle.
   - d. Survival benefits of cardiac rehabilitation were greater among subgroups by gender, age, and race.
   - e. Exercise (aerobic and resistance training) is safe during pregnancy.

5. True or False: Based off of the current body of research it is safe to assume that supplementing with phytochemicals will improve performance.
   - a. True
   - b. False

**SELF-TEST #4 (1 CEC):** The following questions are taken from “Social Disparities in Coronary Heart Disease?” published on page 8.

1. What is the leading cause of death among women in the United States?
   - a. Breast cancer
   - b. Cardiovascular disease
   - c. Heart failure
   - d. Stroke

2. According to data from the National Health and Nutrition Examination Surveys, which group has the highest rate of mortality due to coronary heart disease?
   - a. Hispanic men
   - b. Non-Hispanic black men
   - c. Non-Hispanic white men
   - d. None of the above

3. Which of the following is NOT a factor to disparities in the incidence and mortality of coronary heart disease?
   - a. Gender
   - b. Race
   - c. Education level
   - d. Residential location
   - e. All of the above factors

4. All studies have shown disparities between races for mortality due to myocardial infarction.
   - a. True
   - b. False

5. Which of the following outcomes was NOT observed in the study of Medicare beneficiaries by Susa et al. (13)?
   - a. Survival benefits of cardiac rehabilitation increased with increased age
   - b. Women who participated in cardiac rehabilitation showed lower mortality rates compared to men
   - c. Survival benefits of cardiac rehabilitation were greater among whites compared to blacks
   - d. Survival benefits of cardiac rehabilitation were seen in all subgroups by gender, age, and race.
   - e. There is no daily recommended amount.
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