ACSM'S CERTIFIED NEWS

AMERICAN COLLEGE of SPORTS MEDICINE
LEADING THE WAY

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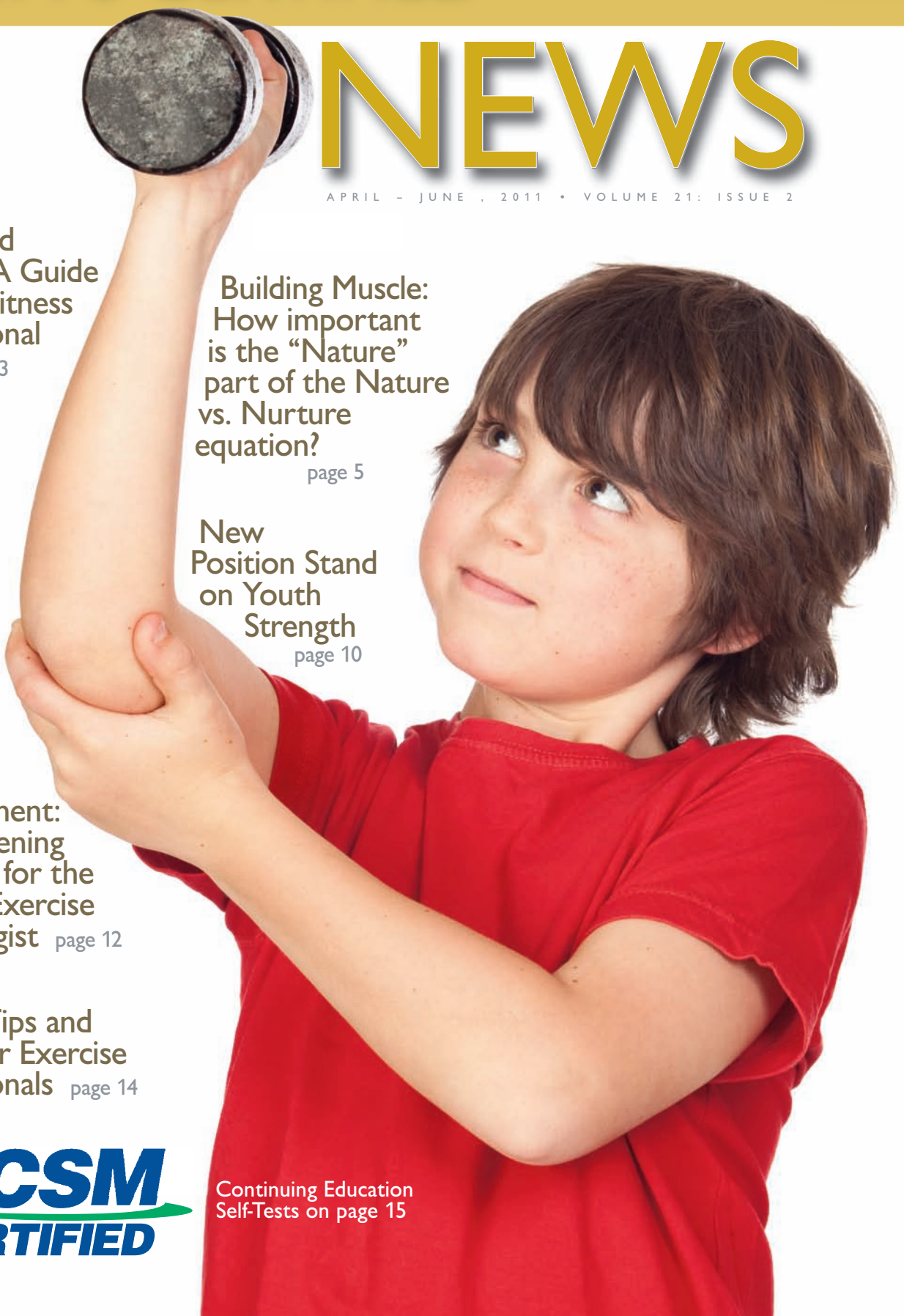

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THE CHANGING OF THE GUARD... AGAIN

Paul Sorace, M.S., RCEP
Chair, Publications Subcommittee

Just a few issues ago, my former co-editor James Churilla (we know him at ACSM as JC) wrote this column, announcing my stepping down as co-editor and Peter Ronai stepping up to replace me. Now I have the pleasure of returning the favor to JC. JC and I have known each other for over 10 years and during that time, aside from becoming friends, he has earned my admiration. I wanted JC to join me in editing Certified News three years ago because I knew without question he would be the one to help me take Certified News to the next level.

Over these past three years, Certified News has gradually grown with more high-quality articles and more balanced issues, with something for all ACSM certified professionals. While I would like to accept a small part of the credit for this, JC in many ways spearheaded these positive changes. He helped make me a better editor and so I want to take this opportunity to thank JC for his important contributions to Certified News, ACSM and the exercise science profession.

Finding the right replacement for JC would be very important and we are pleased to announce that veteran CCRB member Peter Magyari is the right replacement. Knowing Peter for a number of years which includes serving on the Exam Development Team (EDT) together, I can tell you first hand that Peter is meticulous about his work in the profession. That is what has made him such an asset for the EDT and there is no doubt this is what will make him an excellent co-editor, teaming with Peter Ronai, to help Certified News continue to be the quality publication that it has become. Best of luck to Peter and Peter!

Finally, I want to take this opportunity to invite you to consider submitting an article to Certified News. You can write a health & fitness feature, clinical feature or wellness article. This is a great opportunity to contribute your knowledge to your fellow professionals, obtain very good exposure for yourself and earn 10 CECs for ACSM certification renewal. Author guidelines can be obtained by contacting Traci Rush at: TRush@acsm.org

LIPIDS AND HEALTH; A GUIDE FOR THE FITNESS PROFESSIONAL

WILLIAM SNYDER; CHANG CHAU; AND SARAH MAKOSH; AND JAMES R. CHURILLA, PH.D., MPH, M.S., RCEP, CSCS

High blood cholesterol is a known cardiovascular risk factor that affects millions of people worldwide.

According to the American Heart Association[2] an estimated 102 million adults in the United States have a total cholesterol (TC) level of greater than 200 mg/dL. An estimated 35.7 million have a TC of > 240 mg/dL, which places these individuals at high risk for adverse events such as myocardial infarction and stroke.[2] Total cholesterol is chiefly composed of high-density lipoproteins (HDL-C), also known as "good cholesterol," low-density lipoproteins (LDL-C), known as "bad cholesterol," and other lipid components such as very-low-density lipoproteins (VLDL).[7] When it comes to evaluating a person's cholesterol profile for cardiovascular risk, attention is typically focused on blood levels of HDL-C and LDL-C; however, recent research now also focuses on the role of other smaller lipoprotein molecules and their relationship with cardiovascular disease. Calculating what is designated as non-HDL cholesterol also has become an important and perhaps more effective tool for predicting cardiovascular risk.[8] In addition to evaluating blood cholesterol, the amount of triglycerides (TG), a type of fat found in the blood, are also measured; high levels of TG also have been linked to cardiovascular disease.

Fitness professionals working with individuals who are at increased risk of heart disease should be aware of the ways in which exercise is able to modify and improve the blood lipid profile. Research has shown that alterations in cardiovascular risk factors can be obtained by engaging in consistent and planned physical activity and exercise programs. Increased benefit may be realized when weight control and dietary measures are added to physical activity, collectively making up what are termed "Therapeutic Lifestyle Changes" (TLC).[11] The purpose of this article is to discuss how TLC can improve the blood lipid profile with a specific emphasis on exercise.

Exercise and Lipids

While research has shown that exercise is beneficial for those with atherogenic lipid profiles the fitness professional should be aware of how the FITT (frequency, intensity, type, time) framework should be implemented to bring about favorable results for their clients. Studies have indicated that total volume of exercise and physical activity may be the most important factor for obtaining improvements and that weight loss, when appropriate, can maximize results.[9, 15] The American College of Sports Medicine (ACSM) has provided guidelines for those with dyslipidemia and states that exercise prescriptions for individuals with lipid abnormalities are comparable to prescriptions for persons who are overweight or obese.[1]

When considering which type of exercise to employ, exercise professionals should keep in mind that research suggests that aerobic exercise should be the focus of a program that aims to improve blood lipid levels. The primary reason is because aerobic exercise appears to be a more effective mode for obtaining the levels of caloric expenditure that are suggested for those desiring to favorably impact their lipid profile. The component most often significantly affected by aerobic exercise is HDL-C. This lipoprotein plays an important role in removing free cholesterol from the blood stream thereby helping to reduce the risk of cardiac events, a process known as "reverse cholesterol transport." Aerobic exercise also has been shown to elicit significant decreases in TC and TG. This change typically occurs as a result of the weight lost with aerobic exercise. This is not to say that resistance exercise should not be integrated into a training program. Although the evidence is limited, resistance type activities have been shown in some studies to significantly decrease levels of LDL-C, which is typically the component targeted by the medical community with drug therapy to reduce cardiovascular risk.[14]

As mentioned earlier, the total volume of exercise is likely the most important factor for improving the blood lipid profile. Therefore, when

Table.

TC (mg/dL)	HDL-C (mg/dL)	LDL-C (mg/dL)	TG (mg/dL)	Non-HDL (mg/dL)
Desirable < 200	Low < 40	Optimal < 100 Near Optimal 100-129	Normal < 150	No CHD or <2 RF <190
Borderline High 200-239	High ≥ 60	Borderline High 130-159 High 160-189	Borderline High 150-199 High 200 - 499	No CHD or 2+ RF <160
High ≥ 240	—	Very High ≥ 190	Very High ≥ 500	CHD or CHD risk equivalent ** <130

Adapted from National Cholesterol Education Program Adult Treatment Panel III Classification (TC= Total cholesterol, HDL-C= High density lipoproteins, LDL-C= Low density lipoproteins, TG= Triglycerides) ** Option for high-risk patient: LDL-C < 70mg/dL RF= Risk Factors

considering how to manipulate the remaining variables in the FITT framework the certified professional should alter the program for client benefit and aim for the guideline set forth by ACSM to obtain an energy expenditure of at least ≥ 2,000 kilocalories (kcal)/week in 200 to 300 minutes/week.[1] Moderate intensity aerobic activity, usually conducted at 50% to 60% of maximum heart rate, has been shown to improve the cholesterol profile in previously sedentary subjects.[5] However, once an individual begins to increase their fitness level, training intensity should be adjusted to reflect improvements in physical conditioning. Recommendations for resistance training include completing two to four sets per body part for 8 to 12 repetitions. Individuals should gradually be performing 8 to 10 exercises that stress the major muscle groups two to three days per week.[1]

Fitness and Lipids

A moderate to high level of physical fitness has been shown to postpone all-cause mortality and cardiovascular disease (CVD) in both men and women.[3] High levels of blood cholesterol and TG are contributing risk factors for CVD. Achieving a high level of physical fitness can play a key role in improving the lipid profile and decreasing the risk of disease. Elevated HDL-C levels play a significant role in reducing this risk due to its role in recycling and excreting excess cholesterol. There is evidence that highly physically fit people have higher concentrations of HDL-C due to increased production of HDL compared to less fit people.[12] Having a HDL-C level of 60 mg/dL or higher is considered a negative risk factor (reduces risk) and allows the removal of one other risk factor that may be present.[1] The Table illustrates the fundamental components of the lipid panel. Metabolic risk factors are becoming more prevalent, particularly in college-aged students where there is little physical activity and gradual increases in body fat percentage. This combination increases metabolic risk; however, high levels of physical fitness and a healthy body composition have been shown to be associated with favorable blood lipid levels.[13] Engaging in exercise and physical activity during childhood and adolescence increases one's chances of maintaining a healthier lifestyle as they age. With increased age, the lipid profile often becomes unfavorably altered and the risk of cardiovascular disease increases. These negative changes can be modified with cardiovascular and strength-based fitness programs, which have been found to significantly improve body weight, waist circumference, body mass index, diastolic blood pressure, triglycerides, HDL-C, LDL-C, and TC in older sedentary men and women.[10] The evidence is clear that physical fitness is a significant factor in managing blood lipid levels and reducing the risk of CVD and other related diseases.

Non-HDL Cholesterol

According to the American Heart Association,[2] non-HDL cholesterol levels should be evaluated when LDL-C levels are within the goal range but triglyceride levels are between 200 to 499 mg/dL. There is evidence that suggests that high total blood cholesterol and triglycerides results in a higher risk of CHD than elevated LDL-C levels alone. Low-density lipoprotein levels have long been established as a major risk factor for heart disease; however, we must take into account that LDL-C values are derived from a calculation and some over/underestimation may be present. In order for the Friedwald equation to accurately calculate LDL-C values, fasting TGs must be < 400 mg/dL. However, in the case of individuals with diabetes mellitus, who commonly experience hypertriglyceridemia, this indirect measurement of LDL may no longer be a valid tool for indicating lipid-related risk of CHD. The Third Adult Treatment Panel (ATP III) of the National Cholesterol Education Program (NCEP) has recommended the use of non–HDL-C as a secondary target of lipid lowering, after achieving adequate control of LDL-C and if TGs are elevated (≥ 200 mg/dL).[8]

Non-HDL represents the total content of cholesterol that may be atherogenic and thus may be a better predictor of CHD than LDL-C alone. For individuals with diabetes mellitus and hypertriglyceridemia, non-HDL-C seems to be gaining more clinical utility in accurately assessing lipid profiles. However, for non-HDL-C to be the main lipid target for the general population, further evidence is needed to illustrate its efficacy over LDL-C cholesterol.

Lipids and Diet

Diet plays a major role in establishing lipid levels. High LDL-C, VLDL cholesterol, TGs, and TC have been shown to be favorably altered when following various diets. Both a low-carbohydrate diet and a low-fat diet have been shown to be effective although they each impact lipid profiles differently. Low-carbohydrate diets have been shown to be the better diet to significantly increase HDL-C levels and lower VLDL cholesterol levels for up to 12 months.[4,6] While a low-fat diet is capable of the same effects, it has been shown to be the better choice for lowering LDL-C levels and TGs over longer time periods.[4] Both approaches may be useful for significantly decreasing the ratio of TC to HDL-C levels.[4] The American Heart Association recommends adopting an overall healthy eating pattern to reduce the risk of dyslipidemia. This pattern includes matching energy intake with energy needs and eating a variety of fruits, vegetables, grains, legumes, lean meats, fish, poultry, and fat-free or low-fat dairy products.[4]

CONCLUSION

Exercise, fitness, and diet all play important roles in managing the lipid profile. Research has suggested the importance of various exercise training, a well balanced diet, and the use of ACSM exercise guidelines; these three controllable variables have been used to favorably impact

Lipids and Health *(continued on page 8)*

BUILDING MUSCLE: HOW IMPORTANT IS THE "NATURE" PART OF THE NATURE VS. NURTURE EQUATION?

By Maria L. Urso, Ph.D.

In the last issue of *ACSM's Certified News, Volume 21:Issue 1,* we explored the basics of gene expression and protein synthesis as a foundation for skeletal muscle hypertrophy. The purpose of the next two articles in this series is to understand the regulatory events mediating the specific adaptation to various forms of exercise. Factors affecting adaptation to exercise are classified at two distinct levels: those which are genetically predetermined by an individual's genetic make-up and those which can be manipulated through alterations in gene expression resulting from exercise-induced stimuli. In other words, variations in the deoxyribonucleic acid (DNA) sequences of humans can affect how humans respond to exercise, but humans are born with these variations and there is no way to change them. For the purpose of this article, we will refer to DNA sequences as *hardware* to emphasize their fundamental role in dictating phenotypical (or physical) properties. The second level, in which one can manipulate the activity of genes that increase protein synthesis and muscle growth, is through training-induced stimuli that alter the rate and magnitude of DNA transcription to Messenger RNA (mRNA). For reference, we will refer to these factors as *software* since they can be changed with proper stimuli. While this article in the series will focus largely on components of genetic variation that result from hardware-specific mechanisms, the third article in the series will focus entirely on ways to manipulate *software* (gene expression) through exercise, nutrition, and supplements.

In the first article of this series, we reviewed the concept of the genetic code. Specifically, each nuclei contains combinations of four bases (adenine (A), guanine (G), cytosine (C), and thymine (T), which comprise DNA. It is the unique combinations of these nucleotides that provide the genetic information necessary to make all structural and functional proteins of the muscle fiber. The relationship between the nucleotide sequence of each gene and the amino acid sequence encoding its respective protein product is known as the genetic code. The genetic code consists of sequences called codons, which are formed from a sequence of three nucleotides, with each codon representing a specific amino acid. Since the genetic code is the recipe for amino acids and proteins, it is important that it is copied from cell to cell so that each cell in a specific tissue possesses the same properties. However, sometimes cells make "mistakes" in copying genetic information, typically resulting in variations in one or more nucleotides in a DNA sequence. The consequence is a variation in the DNA sequence, otherwise known as a single nucleotide polymorphism, or SNP (pronounced "snip"). Our cells typically

Table. Selected genes that may contain SNPs that influence phenotype and performance

Gene	Protein	Function	SNP Location	Outcome	Reference
ACTN3	Alpha-actinin-3	Structural Integrity: Anchors actin to Z-line in muscle	R577X	No functional ACTN3 protein made; lower strength and explosive power.	8, 14
IGFI	Insulin-like growth factor	Skeletal muscle growth factor	CA allele	Greater dynamic strength gains, increased muscle quality with aging.	1, 6
MSTN	Myostatin	Negative regulator of skeletal muscle growth	2379G allele	Greater increase (68%) in muscle size with strength training.	3
FST	Follistatin	Inhibits Myostatin	FST-5003A>T	Greater baseline strength and muscle cross sectional area.	5
TNFA	Tumor necrosis factor-alpha	Promotes skeletal muscle proteolysis	rs1799964 & rs1800630	Lower muscle mass in the leg, trunk, and arms.	7
IL6	Interleukin-6	Inflammatory and proteolytic mediator	rs1800795	Lower muscle mass in men only (CC genotype); higher frequency of the GG genotype in elite athletes.	10, 11
ACE	Angiotensin Converting Enzyme	Affects blood flow and blood pressure, resulting in effects on endurance traits	II variant DD variant	II variant: Improves endurance performance DD variant: Improves sprint performance.	4
PPAR-delta	Peroxisome proliferator-activated receptor	Regulator of fatty acid oxidation/glucose metabolism	rs2267668 A/A-Gly/Gly Allele	Improves endurance performance.	12

correct these mistakes, but, occasionally, these mistakes will get passed on. Since three nucleotides are intended to code for a specific amino acid (*i.e.,* GCC→ Alanine), the reader can appreciate that when this code is changed due to a substitution of a different nucleotide (*i.e.,* CCC), the end amino acid is different than that originally intended (*i.e.,* CCC→ Proline).

It is this way, through causing differences in the recipes for amino acids and proteins, that SNPs can generate biological variation between people. While many times SNPs have no effect on phenotypes, resulting in no observable differences, research has shown that certain SNPs are responsible for differences in appearance, disease susceptibility, or, in some cases, the response to drugs. The effects of certain SNPs on one's response to drugs have been most apparent in treatments such as anti-platelet medications like clopidogrel (trade name, Plavix®). Although this is one of the leading selling drugs in the world, a SNP in the gene that codes for the cytochrome P450 isoenzyme (CYP2C19) can determine if a patient is going to respond to anti-platelet treatment or not.[2] To this end, the magnitude of influence of a SNP is quite profound.

Over the past decade, a fair amount of research has been conducted involving "gene hunting" in skeletal muscle. The rationale for this work was to identify if SNPs within skeletal muscle that determine phenotypical outcomes lead to athletic prowess or susceptibility to muscle loss with aging (sarcopenia). The result has been a substantial number of publications exploring the potential of SNPs to influence many aspects of performance from $\dot{V}O_2$ to muscle size, strength, and endurance. Although hundreds of genes involved in various aspects of athletic performance have been targeted for SNP analysis, currently there are only a handful of genes that have been shown to play a role in athletic ability or propensity to experience large gains in muscle size and or strength with resistance training (Table).

Indeed, the advent of this research and the proof of concept in genetic association studies have led to a substantial number of commercial enterprises that aim to provide individuals with specific information regarding their genetic make-up and how it may explain their ability to increase skeletal muscle strength and size, speed, endurance, or even whether they may be more susceptible to early losses in skeletal muscle mass with age. Additionally, there are a number of companies advertising their services in predicting whether one's child may be the next Olympic stand-out. To do this, a parent can simply supply a cheek-swab from the child for DNA sequence analysis. However, the problem with this approach is the lack of validated scientific evidence to support that results of SNP-association studies are ready for clinical and diagnostic application. Specifically, many genetic association studies have yielded inconclusive results or reported false positives and negatives due to inadequate sample size. This is not a consequence of "bad science" but rather a rate limiting factor associated with the number of individuals needed to provide valid proof of a SNP-association. Moreover, the understandable premature excitement over a field with great potential in regards to predicting athletic success has resulted in media involvement and hype that exaggerates scientific claims.

A perfect example of this is the ACTN3 gene, which codes for the alpha-actinin-3 protein in skeletal muscle. Alpha-actinin-3 provides skeletal muscle with structural integrity. A SNP has been discovered (Table) that affects whether an individual will make the alpha-actinin-3 protein. Approximately 18% of the population is homozygous (XX genotype) for a premature stop codon SNP in the ACTN3 gene, resulting in no functional alpha-actinin-3 protein being made.[14] While lack of alpha-actinin-3 protein is not harmful, research has revealed a strong association between R577X mutations and performance in various sports. This is likely due to the presence of alpha-actinin-3 (RR genotype) being beneficial in generating forceful contractions at a high velocity, subsequently improving sprint performance (an obvious evolutionary advantage). Most Olympic-level power athletes and sprinters that have been tested typically have the RR or RX mutation that ensures that they will make at least one copy of the ACTN3 gene and subsequently, the alpha-actinin-3 protein.[9] Despite this evidence, there are outliers, which include an Olympic long-jumper with the XX genotype, thus lacking the alpha-actinin-3 protein.[13] Although this is just one example, it is testament to the importance of the challenges in fully understanding the genetics of athletic performance.

To summarize, genetics-based research over the past decade has revealed that athletic performance is polygenic (resulting from the input of many genes) and results from a complex set of underlying genetic and environmental modifiers to include age, sex, and ethnicity. Better understanding of the genetics underlying athletic performance has several practical applications, including the advancement of personal genomics, which can be used to predict who will respond positively and negatively to different interventions like exercise and drug therapy. Furthermore, while the knowledge of genetic determinants of muscle traits may be useful for sports, such knowledge also could have significant benefits in developing personalized injury rehabilitation programs. However, until we fully understand the genetics of athletic performance, clinical use and recreational application of personal exercise genomics should be cautioned against.

About the Author

Maria L. Urso, Ph.D., is a principal investigator in the Military Performance Division at the United States Army Research Institute of Environmental Medicine (USARIEM) in Natick, MA. Dr. Urso also serves as an associate editor for the *NSCA's Journal of Strength and Conditioning Research.*

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Building Muscle *(continued on page 7)*

Exercise is Medicine® Month

Each year, May is recognized as Exercise is Medicine® Month; a time to celebrate the wonderful benefits of physical activity and start healthy habits that will keep you moving throughout the year. Everyone is encouraged to be active themselves and to share the message with their family, friends, patients, and colleagues.

Beginning in 2009, cities and states joined the movement as mayors and governors proclaimed May as Exercise is Medicine® Month in their city or state. Last year, more than 35 cities and states made proclamations, as well as several colleges and universities and one military base. For EIM Month 2011, many cities, states, and organizations joined the movement and proclaimed May 2011 as Exercise is Medicine Month. For a full listing, visit www. exerciseismedicine.org/makeithappen.htm.

Building Muscle *(continued from page 6)*

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World Congress on Exercise is Medicine®

The second World Congress on Exercise is Medicine was a great success! This year marked the 58th Annual Meeting and 2nd World Congress which were held in Denver, Colorado May 31st through June 4th. With a theme of the global expansion that has happened over the past year, this World Congress featured the six newly formed Exercise is Medicine Regional Centers. The Regional Centers include the African Regional Center, Australasian Regional Center, European Regional Center, Latin American Regional Center, North American Regional Center and Southeast Asian Regional Center. Each discussed the challenges and successes they have had in implementing Exercise is Medicine in their regions.

This year the Exercise is Medicine® Keynote Address at the World Congress was given by Karim Khan, M.D., Ph.D., FACSM, from the University of British Columbia. Dr. Khan's talk, *Supersize My Exercise! Learning from Mad Men, Marlboro Man, and Freakonomics to Promote Physical Activity* was well received.

Earlier in the week, an Exercise is Medicine Community Walk and opening ceremony included special addresses by Senator John Barrasso (R-Wy.), President's Council on Physical Fitness and Sports Executive Director, Shellie Pfohl, and seventh season finalist of The Biggest Loser Tara Costa. During the walk, Senator John Barrasso, Exercise is Medicine Chair, Dr. Bob Sallis, and Exercise is Medicine National Spokesperson, Pam Peeke wrote America their physical activity prescription.

Performances by the Art of Fitness, and Zumba, LLC were lively demonstrations that exercise is fun! To begin the week's events, Colorado Governor John Hickenlooper read the Colorado Exercise is Medicine Proclamation and was awarded special recognition for promoting physical fitness throughout Denver and the state of Colorado. Attendees enjoyed Exercise is Medicine programing and the opportunity to learn about and develop the necessary tools and partnerships to implement Exercise is Medicine in their community.

For information on the 2011 World Congress, please visit our Web site (http://www.exerciseismedicine.org/worldcongress.htm).

Lipids and Health *(continued from page 4)*

HDL-C, LDL-C, VLDL-C, TC, and TGs. Non-HDL serves as a secondary target of lipid lowering and can be a better predictor of CHD than traditional methods. Although utilized in the clinical setting, more evidence is needed to support the use of non-HDL-C in the general population. The fitness professional should understand how varying strategies (therapeutic lifestyle changes) may affect blood lipid levels and implement these strategies to produce favorable changes with their clients.

Glossary of Terms

- **High-density lipoprotein:** HDL is considered the "good" cholesterol and its function is to collect free cholesterol and transport it back to the liver where its either used for bile production or excreted.[2]
- **Low-density lipoprotein:** LDL is the primary transporter of cholesterol through the blood stream. High levels of LDL present in the blood will gradually build up in inside the arterial walls causing the arteries to narrow and harden.[2]
- **Very low-density lipoprotein:** VLDL not only carries cholesterol, but also contains a high amount of triglycerides, a type of fat produced by the liver. VLDL converts to LDL in the blood stream and in turn raises LDL levels.[2]
- **Triglycerides** are another type of lipid present in the blood. They are released in to the blood stream following the digestion of fats in the diet and also produced by the liver. Triglycerides are stored in fat cells and used by the body for fuel between meals.[2]
- **Total Cholesterol:** comprised of HDL, LDL, and VLDL (triglycerides/5). A total cholesterol level of less than 200 mg/dl is desirable to be at a decreased risk of coronary heart disease.
- Non-HDL cholesterol: difference between total and HDL cholesterol. The Third Adult Treatment Panel (ATP III) of the National Cholesterol Education Program (NCEP) has recommended the use of non–HDL cholesterol as a secondary target of lipid lowering, after achieving adequate control of LDL cholesterol and if triglycerides are elevated (> 200 mg/dl).[8]
- Dyslipidemia: genetic, environmental, and pathological factors that combine to abnormally alter blood lipid and lipoprotein concentrations.[5]
- Hypertriglyceridemia: elevated fasting triglyceride concentrations.[5]

About the Authors

William Snyder (right), Chang Chau (left), and Sarah Makosh (center) are senior Exercise Science majors in the Brooks College of Health at the University of North Florida in Jacksonville, Florida. Current and future goals include becoming Certified Health and Fitness Specialists and pursuing graduate degrees in Exercise Physiology, Physician's Assistant, and Physical Therapy, respectively.

James R. Churilla (right), Ph.D., M.P.H., M.S., RCEP, CSCS, is an assistant professor of clinical exercise physiology and physical activity epidemiology in the Department of Clinical and Applied Movement Sciences in the Brooks College of Health at the University of North Florida in Jacksonville, FL. His research focuses on physical activity and the metabolic syndrome and population health. He is ACSM Program Director Certified and a previous member of the ACSM Publications Subcommittee. James is a member of ACSM, the American Heart Associations Council on Nutrition, Physical Activity and Metabolism, the American Physiological Society, and the National Strength and Conditioning Association.

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COACHING NEWS:
BOUNCING BACK FROM CRISES

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

IN LATE 2009 THE TOPIC OF OUR COACHING NEWS COLUMN WAS "POSITIVITY: A KEY TO SUCCESSFUL LIFESTYLE CHANGE." IN THIS COLUMN I WANT TO EXPLORE THE VALUE OF POSITIVE EMOTIONS IN ENABLING RESILIENCE, WHICH IS AT THE TOP OF MY MIND AS I PREPARE A KEYNOTE TO DELIVER IN JAPAN IN LATE MAY, 2011, TWO MONTHS AFTER JAPAN WAS HIT WITH A CRIPPLING EARTHQUAKE, TSUNAMI, AND NUCLEAR DISASTER. IT IS HARD TO COMPREHEND HOW THOSE WHO LIVE IN JAPAN CAN COPE AND BOUNCE BACK FROM SUCH OVERWHELMING WAVES OF CRISIS AND NEGATIVITY.

Positivity Leads to Resilience

First let's revisit the connection between positivity and resilience. According to Barbara Fredrickson, Ph.D., the leading positive emotion researcher, positivity includes a wide range of positive emotions. The top ten in frequency are: **joy, gratitude, serenity, interest, hope, pride, amusement, inspiration, awe, and love.** Fredrickson and collaborators discovered the tipping point positivity ratio of 3:1, which is three positive emotions for one negative emotion.[2] Above the tipping point, people are resilient. They have the resources to change and grow, and bounce back from adversity. Below the tipping point, people languish and fall into a downward spiral.

Fredrickson's research has shown that *positivity is the main mechanism of action for resilience.*[1] Hence, a main determinant of resilience is the ability to foster positive emotions when we are swimming in a sea of negativity. So what forms of positivity might be in action for people and organizations in Japan?

Positivity and Resilience in Action

One of the most heartwarming aspects of the common reaction of people and communities to severe crises is the abundant outpouring of **love,** support, and connection. Crises often bring us to our knees and help us appreciate how our relationships with others are truly the backbone of our lives, to survive and beyond that to thrive. Taking time to help another, even ahead of one's own needs, is nourishing for the giver and receiver.

Another common response to crisis is a sense of deep **gratitude** and appreciation for one's life – that we and others are alive, having survived a serious crisis. The value of material possessions slips away as we come to appreciate the gift of waking up every morning to a new day, new possibilities, and new learning. We may even feel **awe** for the amazing talents of humans to adapt and respond beautifully to enormous loss and suffering. Some will feel awe for the power and force of Mother Nature – even when she unleashes massive destruction in natural disasters.

Faced with adversity, resilient people are **interested,** open, and curious, hunting for silver linings and ways to foster positive emotions as the fuel to put one foot in front of the other to rebuild lives and communities. Developing a sense of profound meaning and purpose is a rich vein of positivity – how can I make a difference, how can I use my strengths to help others recover and rebuild? How can I make lemonade out of lemons – to notice, amplify, and harvest the many lessons that emerge from a huge setback?

When we make a difference individually and collectively, slowly, arduously, and patiently, we find **pride** in our accomplishments, which propels us to keep going. When we observe the courageous efforts of others who are close or distant, we are **inspired** further to continue forward progress.

Hope for the Future Fuels Positivity and Resilience

My observation is that one's relationship to one's future is a particularly critical source of positivity for our well-being. **Hope** for a better future is an important contributor to our positivity and resilience. Hence, all of the positivity emerging from crisis already described – love, gratitude, awe, interest, pride, and inspiration – provides the positive energy that "hopefully" takes us to hope: a sense that better days are ahead and we have the resources to get there. And perhaps if we're lucky, we can find small moments of the last three of the ten most common positive emotions **– joy, serenity, and amusement –** to find things to smile and laugh about, to be at peace with one's self, and even feel a little joy from new beginnings.

About the Author

Margaret Moore/Coach Meg, M.B.A., is the founder and CEO of Wellcoaches Corporation, a strategic partner of ACSM, widely recognized as setting a gold standard for professional coaches in healthcare and wellness. She is co-director at the Institute of Coaching, at McLean Hospital/Harvard Medical School and co-directs the annual Harvard Medical School Coaching in Medicine & Leadership Conference. She co-authored the ACSM-endorsed Lippincott, Williams & Wilkins *Coaching Psychology Manual,* the first coaching textbook in healthcare.

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NEW POSITION STAND ON YOUTH STRENGTH

BY WAYNE L. WESTCOTT, Ph.D.

Recently, the Canadian Society for Exercise Physiology[1] published a very comprehensive position paper on resistance training in children and adolescents. The three Canadian authors were joined by one American researcher, Avery Faigenbaum, Ed.D., FACSM, who has conducted numerous research studies on the effects and factors related to youth resistance exercise. With more than 150 references, this position paper provides both qualitative and quantitative information that is relevant to fitness professionals, physical education teachers, youth sports coaches, and parents.

As with previously published position papers on this topic, the authors confirm that youth strength training significantly increases muscular strength and endurance in children and adolescents. They also note that youth may experience enhanced muscle development as a result of strength training. In addition, youth strength trainees may benefit from improved bone mineral density, body composition and blood lipid profiles, as well as joint flexibility, motor skills performance, coordination, and psychosocial characteristics.

According to the position stand, there is no evidence that properly performed and appropriately supervised youth strength training results in stunted growth, bone growth plate damage, musculoskeletal injury, or pain. The authors conclude that the keys to maximizing the strength training benefits and minimizing the injury risks are providing well-designed and well-supervised exercise programs. The 12 general recommendations presented in this paper for safe and effective youth strength training are summarized as follows:

- Instruction and supervision provided by qualified (certified) fitness professionals
- Program design based on each child's cognitive development, physical maturity, and training experience
- Exercise environment that is safe and free from hazards
- 5 to 10 minute dynamic warm-up period prior to strength exercise
- Strength training sessions scheduled two or three non-consecutive days a week
- Strength training programs that begin with 8 to 12 exercises to strengthen the upper body, lower body, and midsection muscles
- Strength training protocols that begin with one or two sets of 8 to 15 repetitions using a light to moderate load (about 60% of maximum resistance)
- Exercise sessions that emphasize correct exercise technique and safe training procedures instead of the amount of resistance used in training
- Inclusion of exercises that require balance and coordination
- Progression to more advanced exercises that enhance power production
- Cool-down period with less-intense activities and static stretching
- Periodized variations in the strength training program

Perhaps the most impactful statement in the new position paper is "Traditional fears associated with youth resistance training have been replaced with more recent findings that indicate that regular participation in weight-bearing physical activities is essential for normal bone growth and development."[1] The authors state that there is no minimum age requirement for youth to participate in properly designed and instructed programs of resistance exercise, but they suggest age seven or eight as a general guideline. Quite possibly, the physical activity that offers young people the highest potential for desirable musculoskeletal development as well as the lowest risk of injury is a sensible and supervised program of strength training.

YOUTH STRENGTH TRAINING GUIDELINES

With respect to specific guidelines for youth resistance exercise, research indicates that a training frequency of two nonconsecutive days a week is more effective than one weekly strength training session.[5] In a study of training frequency, 9 year old boys and girls who performed one resistance exercise session a week attained only 67% of the strength gains achieved by the their peers who performed two resistance training sessions a week.[5]

Although single-set training protocols have proven to be highly effective for strength development in preadolescents, the research on multiple-set training reveals different responses to two classic three-set exercise protocols. Boys and girls (mean age 10 years) who completed 8 weeks of resistance exercise using the DeLorme-Watkins protocol experienced average strength gains of 65%,[2] whereas children (mean age 10 years) who completed an identical 8-week training program using the Berger protocol experienced average strength gains of 47%.[3] The DeLorme-Watkins protocol requires a first set of 10 repetitions with 50% of the 10 repetition maximum (10RM) weight load, a second set of 10 repetitions with 75% of the 10RM weight load, and a third set of as many repetitions as possible with the 10RM weight load. Each training exercise is essentially performed with one low-effort set, one moderate-effort set, and one high-effort set. The Berger protocol requires three high-effort sets, each performed for as many repetitions as possible with the 6-repetition maximum (6RM) weight load. Based on these studies, it would seem that three-set training protocols employing a light, moderate, and heavy weight load may be preferable to three-set training protocols employing only heavy weight loads for preadolescent youth.

With respect to specific guidelines for resistance and repetitions, preadolescents appear to respond differently than adults. In one study, 8 year-old boys and girls who performed one set of 13 to 15 repetitions of each resistance exercise attained greater strength gains than their peers who performed one set of six to eight repetitions of each exercise.[4] However, in a follow-up study, 10-year old boys and girls who per-

formed one set of 6 to 10 repetitions achieved similar strength development as their peers who performed one set of 15 to 20 repetitions of each exercise.[6] In both cases training with higher repetitions and moderate resistance was at least as effective as training with lower repetitions and relatively heavy resistance. These results may be attributed to children having less-developed musculoskeletal systems that respond favorably to lighter weight loads or to motor learning factors associated with more repetitions of the exercise movements.

Preadolescent boys and girls should effectively enhance their musculoskeletal development by performing one to three sets of 8 to 12 exercises, using a resistance that permits 8 to 15 repetitions, two or three nonconsecutive days a week. It should be noted that this youth strength training protocol also is applicable to obese children. In 2007, the *President's Council on Physical fitness and Sports Research Digest*[7] published a position paper on resistance training for obese children that clearly documents the physiological and psychological advantages of strength training over traditional exercise activities for overweight youth. The authors state that "in addition to favorable changes in body composition, regular participation in strength-building activities gives obese youth a chance to experience success, feel good about their performance, and gain confidence in their abilities to be physically active."[7]

About the Author

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OBESITY MANAGEMENT:

A BROADENING HORIZON FOR THE CLINICAL EXERCISE PHYSIOLOGIST

BY JONATHAN K. EHRMAN, Ph.D., CES, FACSM

A recent study published in the *Archives of Internal Medicine*[6] assessed the effect of primary care practices' ability to deliver lifestyle counseling on long-term weight management in overweight and obese patients. Counseling was primarily delivered by phone, during visits by a nurse practitioner for the intervention group (goal setting, food diaries, pedometer use, barriers for change, etc.), and by general practitioners at routine medical visits for the usual care group. The primary findings were that neither group lost a significant amount of weight and weight maintenance, as compared to baseline, was similar. An accompanying editorial[1] expounded upon the fact that these results were consistent with previous data that the primary care setting likely is not the best for delivering weight management counseling and achieving significant results.

Table: Key Items that the CEP is trained to deliver in a clinical weight management program.

- Evaluation of patient for program entry with respect to referral, appropriateness for program, questionnaires
- Presentation of program "nuts and bolts" to prospective patients
- Evaluation of overall patient goals
- Evaluation of previous physical activity and exercise history
- Presentation of the necessity of exercise during and after a weight loss program
- Development and implementation of exercise training program
- Clinical assessment of weight loss program tolerance
- Providing on-going follow-up and support
- Leading a support group and/or monitoring an online patient forum
- General counseling with respect to behavior and lifestyle related topics
- Reinforcement of registered dietitian developed and implemented meal plan

In this same editorial,[1] they point out that the overwhelming evidence from large scale, multi-center, randomized clinical trials such as LOOK AHEAD[4] and the Diabetes Prevention Program[2] suggests that intensive lifestyle interventions provide the best initial weight loss results and long-term maintenance. These particular trials used counseling from a variety of allied health professionals, including exercise physiologists/specialists, along with meal replacements, frozen food entrees, and pharmacologic treatment that was delivered weekly for six months and then every other week for the next six months. The bottom line is that these types of programs are extremely difficult, but not impossible, to deliver in the primary care setting. They would require a redesign of the office setting in order to accommodate the regular face-to-face interactions that would take place. Recently, a large trial was reported[5] in which seven primary care offices in Louisiana were trained to delivery this type of intensive program to its patients. The results were positive for weight loss with a 10% reduction compared to initial weight 2 years prior

Based on these studies and other work the consensus among weight management professionals is that a multi-disciplinary approach is best. The National Heart, Lung and Blood Institute's guide on overweight and obesity treatment specifically states that the guide should be used by exercise physiologists *(i.e.,* clinical exercise physiologists (CEP)) in preparing to work with this patient population.[3] Thus the CEP, in this document, is looked upon as an important part of a clinical weight management program staff. But what specific role should a CEP play in this staffing?

Common staffing of a clinical weight management program consists of a physician leader, a registered dietitian, a behavioral medicine specialist (*e.g.,* psychologist), and a clinical exercise physiologist/specialist. Some programs also will have a registered nurse and/or a health educator on staff. Duties to be performed include providing information about the program, educating physicians about sending their patients to the program, intake assessments, education sessions regarding meal plans, exercise and behavior/lifestyle change, and medical follow-up. Depending upon the design and breadth of a given program, the CEP is the appropriate staffer to independently perform many of these responsibilities, in whole or in part. The CEP also may perform other duties under the direction of another allied health professional (*e.g.,* physician, registered dietitian). The Table lists responsibilities that the CEP can perform as part of a clinical weight management program team.

Finally, it is important to note that some states in the United States have enacted legislation requiring that "medical nutrition therapy" be delivered only by a state licensed professional. Although varying by state, this most often infers that the development and education of meal plans for weight loss are to be delivered only by a registered dietitian or possibly a state licensed nutritionist. In these cases, some states may allow the CEP to provide diet related education under the direction of a registered dietitian. In other cases, it may restrict any counseling on diet by the CEP. However, the CEP can assess diet compliance and re-enforce the treatment plan put forth by the registered dietitian.

SELF-TEST ANSWER KEY FOR PAGE 15

QUESTION	1	2	3	4	5
TEST 1:	C	D	B	C	A
TEST 2:	C	B	C	B	D
TEST 3:	D	C	A	B	D

About the Author

Jonathan K. Ehrman, Ph.D., CES, FACSM, is the associate program director of Preventive Cardiology at Henry Ford Hospital, Detroit MI. He also is the Director of the hospital's Clinical Weight Management Program. He served on ACSM's Committee of Certification and Registry Board (CCRB) from 2000 to 2010 and was chair of the Clinical Exercise Specialist Committee. He also is the senior editor of the sixth edition of *ACSM's Resource Manual for Guidelines for Exercise Testing and Prescription* and is the umbrella editor for the next editions (2013 release date) of the ACSM certification texts.

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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. The National Heart Lung and Blood Institute of the National Institutes of Health (NHLBI/NIH) Web site[3] is an excellent resource for health and fitness professionals. It contains interactive tools, health and disease information, and clinical practice guidelines for the prevention, detection, and management of a number of chronic health disorders. Two useful resources/links from within the Web site of the NHLBI/NIH include the "Cardiovascular Risk Reduction Guidelines in Adults"[1] and the "Health Information for Professionals"[2] pages. This article will briefly describe these two resources and explain how to access them from the NHLBI/NIH Web site (http://www.nhlbi.nih.gov/)[3].

The NHLBI develops clinical practice guidelines for the prevention, treatment, and care of a number of diseases and chronic health conditions. Readers of *ACSM's Certified News* can access the current clinical practice guidelines and learn about the changes being made on the Web page "Cardiovascular Risk Reduction Guidelines in Adults,"[1] which provides information on several reports. In 1976, NHLBI developed the first report of the "Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure" (JNC). This report has been followed up by a number of updates. The most recent update was released in 2003 (JNC 7). In 1988, the NHLBI released the first report from the "Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults" (Adult Treatment Panel (ATP)). The third update, ATP III, was released in 2004. Another report, "Clinical Guidelines on Identification, Evaluation, and Treatment of Overweight and Obesity in Adults" (Obesity) was released in 1998. These guidelines have helped practitioners increase awareness of and improve care for the cardiovascular risk factors of hypertension, high blood cholesterol, and obesity. Presently, The NHLBI is updating each of the three previously mentioned clinical guidelines, which are scheduled to be released for a public comment period in the fall of 2011. Practitioners will be able to read the new proposed clinical guidelines and share their observations and recommendations regarding content and the need for modifications. Final release of these guidelines is scheduled for the spring of 2012. In addition to the Cholesterol Guideline Update (ATP IV), Hypertension Guideline Update (JNC 8), and Obesity Guideline Update (Obesity 2)," a new guideline, "Integrated Cardiovascular Risk Reduction Guideline," is in the developmental stages. A release date is to be determined for this new guideline. To learn more, go to the NHLBI/NIH home page (http://www.nhlbi.nih.gov/), select the "Health Professionals" tab located at the top left hand side of the main screen, and then select the "Clinical Practice Guidelines" tab. The direct link to information on reports that make up the "Cardiovascular Risk Reduction Guidelines in Adults" is http://www.nhlbi.nih.gov/guidelines/cvd_adult/background.htm.[1]

The guidelines are part of a larger set of resources on the NHLBI/NIH site. *ACSM's Certified News* readers can access more resources by going to the NHLBI/NIH home page (http://www.nhlbi.nih.gov/),[3] and then to the "Health Professionals," tab, which directs them to the "Health Information for Professionals" Web page.[2] This Web page contains a series of links and online tools for practitioners. Some of the more popular links include, but are not limited to:

- Clinical Practice Guidelines, which cover a number of chronic health disorders
- NHLBI Health Publications, available with applications for Palm OS and Pocket PC, interactive health assessment tools, mortality maps, slides and more
- NHLBI National Education Programs and Initiatives, which include, among others, the National High Blood Pressure Education Program (NHBPEP), National Cholesterol Education Program (NCEP), and Obesity Education Initiative (OEI)
- Continuing Education Opportunities

Practitioners can learn more about specific diseases, detection, prevention, treatment, and management as well specific educational initiatives, health observances, and incentive programs they can use with their clients.

Exercise practitioners have access to free, online services that can provide them with valuable resources and a wealth of practical and valuable information.

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April – June 2011 Continuing Education Self-Tests

Credits provided by the American College of Sports Medicine • CEC Offering Expires June 30, 2012

SELF-TEST #1 (1 CEC): The following questions are from "Lipids and Health; A Guide for the Fitness Professional" published on page 3.

1. According to the article, which is a better predictor of cardiovascular risk?
   a. High LDL-C
   b. Low HDL-C
   c. Non-HDL-C
   d. Triglycerides

2. Which is not mentioned in this article as part of Therapeutic Lifestyle Changes (TLC)?
   a. Physical activity
   b. Diet modification
   c. Weight loss
   d. Meditation

3. Aerobic exercise is the only mode shown in research to affect blood lipid levels.
   a. True
   b. False

4. Which level of HDL-C is considered a negative risk factor?
   a. 40 mg/dL
   b. 50 mg/dL
   c. 60 mg/dL
   d. 70 mg/dL

5. Non-HDL should be evaluated when LDL-C levels are in goal range and triglyceride levels are elevated (≥ 200 mg/dL).
   a. True
   b. False

SELF-TEST #2 (2 CEC): The following questions are taken from "Building Muscle: How important is the "Nature" part of the Nature vs. Nurture equation?" published on page 5.

1. SNPs are:
   a. Single Nuclei Predictions
   b. Single Nucleotide Pedigrees
   c. Single Nucleotide Polymorphisms
   d. Skeletal Nuclear Pedigrees

2. All SNPs result in a change in protein function
   a. True
   b. False

3. A commercially advertised (and acceptable) way to test if an individual has a SNP is through:
   a. Blood transfusion
   b. MRI
   c. Cheek swab
   d. Muscle biopsy

4. Currently, there are at least eight known SNPs that have been proven, unequivocally, to affect athletic performance:
   a. True
   b. False

5. If an individual is homozygous (XX) for the ACTN3 gene, they:
   a. Are 50% more likely to be an Olympic-level athlete
   b. Will excel at endurance sports
   c. Have greater muscle strength and size than RR homozygotes
   d. Do not make the alpha-actinin-3 protein

SELF-TEST #3 (1 CEC): The following questions are taken from "Online Tips and Tools for Exercise Professionals" published on page 14.

1. The JNC 7 report addresses prevention, detection, and treatment of:
   a. asthma
   b. obesity
   c. high cholesterol
   d. hypertension

2. The ATP III report addresses the prevention, detection and treatment of:
   a. asthma
   b. obesity
   c. high cholesterol
   d. hypertension

3. Both the JNC 7 and ATP III reports ultimately come under the purview of the:
   a. National Heart Blood and Lung Institute
   b. American Heart Association
   c. U.S. Centers for Disease Control and Prevention
   d. American College of Sports Medicine

4. Which of the following below represents a new and upcoming component of the "Cardiovascular Risk Reduction Guidelines in Adults"?
   a. Cholesterol Guideline Update (ATP IV)
   b. Integrated Cardiovascular Risk Reduction Guideline
   c. Hypertension Guideline Update (JNC 8)
   d. Obesity Guideline Update (Obesity 2)

5. The reports and other online resources discussed in the article can be accessed by navigating through the following Web site:
   a. www.cdc.gov
   b. www.acsm.org
   c. www.AHA.org
   d. www.nhlbi.nih.gov

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