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ACSM’S COMMITTEE ON CERTIFICATION AND REGISTRY BOARDS (CCRB) AND YOU

In every issue we run a short piece on one of the current events occurring with ACSM’s Committee on Certification and Registry Boards (CCRB) and it occurred to the editors of ACSM’s Certified News that many ACSM certified professionals may be unaware of what the CCRB is, its mission and objectives, which committees fall within the CCRB, and who you should contact with questions or concerns about relevant issues pertinent to the CCRB. This article will help inform ACSM Certified Professionals with the mission, committees, personnel, and objectives of the CCRB.

• **CCRB Mission Statement**: The CCRB will develop, provide, and market high quality, accessible, affordable credentials for health and exercise professionals who are responsible for preventive and rehabilitative programs that influence the health and well-being of all individuals.

• **Quality Assurance and Consistency**: The CCRB will continually upgrade the quality and consistency of all certification and registry programs as they relate to workshops, educational materials, exam format and content, management plans, materials to the candidate, and internal and external review of the workshops and/or examination sites.

• **Career Relevancy and Advocacy**: The CCRB will maintain a leadership position in the profession and marketplace by promoting superior standards and communicating information concerning the unique attributes of ACSM credentialed professionals in the public sector (e.g., students, educational institutions, practitioners, employers, peer professional organizations, governmental agencies, and others).

• **Service**: The CCRB will create and maintain an International network of ACSM credentialed professionals and encourage continuing education opportunities for these professionals.

• **Expansion/Growth**: The CCRB will expand examination opportunities, thus increasing the number of credentialed individuals, facilities, and educational institutions which adhere to the ACSM certification and registry guidelines.

• **Educational Outreach**: The CCRB will be responsive to other groups and organizations who express interest in our credentials and programs or the development of group specific continuing education programs.

**CCRB Standing Committees and Current Chair 2013-2014:**

- Certified Clinical Exercise Specialist Subcommittee (David L. Seiguer, M.S.)
- Certified Health Fitness Specialist Subcommittee (Benjamin C. Thompson, Ph.D.)
- Certified Personal Trainer Subcommittee (Thomas J. Spring, M.S.)
- Continuing Professional Education Subcommittee (Amy Jo Sutterleuty, Ph.D., FACSM)
- Ethics Subcommittee (Dino G. Costanzo, M.A., FACSM)
- Exam Development Team (Jeffrey T. Soukup, Ph.D.)
- Executive Council (Deborah A. Riebe, Ph.D., FACSM)
- Group Exercise Instructor Subcommittee (Grace T. DeSimone)
- International Subcommittee (Meir Magal, Ph.D., FACSM)
- Publications Subcommittee (Gregory B. Dywer, Ph.D., FACSM)
- RCEP Practice Board (Mark A. Patterson, M.Ed.)

The CCRB is currently working on an initiative to “Move the Profession Forward.” A talk describing the components of this initiative will be presented at ACSM’s Annual Meeting in Orlando, Florida. Please try to attend and help the CCRB “Move the Profession Forward”!
Evidence-based medicine (EBM) is all the rage these days and essential to the continued progress of health and medicine. Continuing research into many aspects of health and medicine help drive forward EBM. However, the amount of research can be dizzying. For example, it is estimated there are now more than 25,000 journals in science, technology, and medicine, and that number is increasing by 3.5% a year. The database PubMed now cites more than 23 million papers published. With all this research, we should expect some problems. However, there are some very important reasons why much of the research findings we are subjected to may not be accurate.

John P.A. Ioannidis, M.D., currently of Stanford University, is a prominent voice in the research is wrong movement. His recent articles in the PLOS Medicine journal as well as in the popular The Atlantic periodical address this issue. Dr. Ioannidis suggested that 10% of a selected group of "platinum-standard large randomized trials" are wrong compared with up to 80% of non-randomized studies. Let me summarize the six corollaries that Dr. Ioannidis has postulated as to why research studies may be wrong:

- Smaller size and number of studies conducted in a field.
- Smaller the effect (or treatment) sizes in a field.
- Greater the number and the lesser the selection of tested relationships in a field.
- Greater the flexibility in research designs, definitions, outcomes, and analytical methods in a field.
- Greater the financial and other interests and prejudices in a field, and
- The hotter the field (with more research teams involved).

These six corollaries all can contribute to why a research finding may be wrong and are largely dependent upon the methodology employed in the study. The corollaries can be quite technical and hard to evaluate for the non-researchers out there.

However, Dr. Ioannidis did not postulate a disturbing corollary regarding the falsifying of the research result data. There are too many examples of scientific misconduct with regards to research reports. In 2013, at least two major heart studies were uncovered to have less than forthright reporting of the results.

There was found to be altered data reporting and conclusions drawn from the Valsartan or Jikei Heart Study (Valsartan, or diovan, is an Angiotensin Receptor Blocker used to treat hypertension and heart failure). The Valsartan study is also referred to as the Jikei Heart Study and is based in Japan. This study was originally published in The Lancet in 2007. One major problem was that the reported blood pressures in the study were not accurate and may have influenced the statistical outcome.

Another example of research malfeasance was recently reported from the Kyoto Heart Study also based in Japan. The Kyoto Heart Study was published in the European Heart Journal in 2009. The European Heart Journal went on to discourage citations of the study again because there were inconstancies in the blood pressures reported.

A Web site devoted to all the many retractions of research findings across all types of studies is Retraction Watch (retractionwatch.com). Unfortunately, this Web site has a large database of published findings from studies found to be lacking in scientific rigor. Sometimes research findings are wrong due to methodological concerns and sometimes they are wrong due to malfeasance. I guess, we as consumers of medical and health information, must beware.

**About the Author**

Gregory B. Dwyer, Ph.D., FACSM, is a clinical exercise physiologist and professor in the Department of Exercise Science at East Stroudsburg University of Pennsylvania (ESU). He is certified as an ACSM Exercise Test Technologist, ACSM Exercise Specialist®, ACSM Program Director®, and ACSM Registered Clinical Exercise Physiologist. Dr. Dwyer has written two main textbooks (ACSM’s Health-Related Physical Fitness Assessment Manual and ACSM’s Metabolic Calculations Handbook) as well as numerous chapters for textbooks and a learning CD-ROM. Dr. Dwyer is the senior editor for ACSM’s Certification Review Manual.

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MASSAGE THERAPY AS A TREATMENT FOR DELAYED ONSET MUSCLE SORENESS

By Nicole Nelson MS, LMT

As an exercise professional, you most likely have had direct or indirect experience with delayed onset muscle soreness (DOMS). As such, it is important to understand the mechanisms and training implications of DOMS and be aware of the most effective treatment strategies to combat this sinister phenomenon.

DOMS is often associated with movements involving eccentric contractions; however, any unaccustomed activity has the potential to induce DOMS. DOMS generally appears 12 to 24 hours after exercise, peaks within 48 hrs, with resolution of signs and symptoms seen between 5 and 7 days. Indices of DOMS include tenderness upon palpation, swelling of the exercised limb, reduced range of motion, movement related discomfort, and increased levels of creatine kinase (CK). The perception of pain, often considered a form of allodynia, depends on the intensity and volume of training, physical condition of the individual and the relative novelty of the DOMS-inducing event.

Mechanisms

Eccentric contractions are believed to induce microscopic tears which initiate an inflammatory response. Factors such as the type and intensity of the activity, the novelty of the exercise, as well as age and gender have been shown to account for variance in the amount of inflammation experienced. Specifically, the inflammatory response includes the influx of Ca2+, neutrophils, cytokines, and macrophages. The movement of these products stimulates type III and IV nerve afferents that directly cause the sensation of pain and potentially impair neural drive of the muscles. Additionally, neutrophils generate free radicals, which are thought to further damage cell membranes, which cause the continued attraction of neutrophils and cytokines. Edema results from the continued movement of these cells, and the resultant accumulation of fluid contributes to the pain.

It is important to note that although both DOMS and changes in indices of muscle damage are induced by eccentric contractions, the respective association is still unclear. In other words, researchers have questioned how well muscle soreness correlates with muscle damage, demonstrating different findings such as lack of inflammatory cell infiltrate and/or fiber necrosis.

Augmentation of DOMS: Central Sensitization and Psychosocial Factors

The variability of pain among those exposed to similar DOMS inducing events has evoked some interesting new theories regarding pain and DOMS. Although most researchers acknowledge the involvement of EIMD, it is becoming increasingly apparent that physiologic harm does not always equate with pain intensity. Ayles et al. induced DOMS in the tibialis anterior muscles of study participants. Pressure pain thresholds (PPTs) were...
measured 24 to 48 hrs post exercise in the exercised muscles as well as the unexercised muscles, but of same spinal cord segment. The researchers found that vibrating the painful muscles caused soreness in the surrounding, uninvolved muscles. Ayles postulated that DOMS spread to other muscle groups via the central nervous system (CNS), which suggests some degree of central sensitization. Others claim this pain spreading effect is merely the result of secondary hypoxic injury.

Gatchel and others demonstrated the role cognitions have on symptoms related to DOMS. Subjects were asked to complete surveys which measured their fear of pain. The volunteers underwent shoulder external rotation exercises to induce DOMS and were evaluated 24 hours after exercise. Those that demonstrated the highest fear of pain levels had more pronounced DOMS symptoms. This study was supported in 2008, as researchers investigated the role of fear and a specific gene associated with chronic pain. Subjects completed self-report pain questionnaires and were screened for having the COMT genotype (an enzyme linked to pain modulation). DOMS was induced by having participants perform shoulder exercises and were assessed 24, 48, and 72 hours post exercise. Those demonstrating high pain catastrophizing (a tendency to magnify or exaggerate the threat value or seriousness of pain sensations) beliefs and having the gene associated with low COMT enzyme activity (higher pain sensitivity), were more likely to have elevated pain intensity.

Trost et al. demonstrated a connection between fear-avoidance beliefs and DOMS symptoms by inducing DOMS to the trunk extensors of 30 subjects. The researchers found that fearful participants had lower strength production and were hyper-vigilant to pain sensations.

Mechanisms of massage

As the precise mechanisms behind DOMS remain unclear, it is difficult to distinguish why massage might improve DOMS. The most well established benefits of massage are those of a psychological nature, in which case, massage provides an opportunity for pain sufferers to relax which eases muscular tension and reduces pain. It has been theorized that massage may assist in decreasing cytokine levels, which in turn, can mitigate the inflammatory response that is expected from unaccustomed exercise.

An increase in local circulation is another reported benefit of massage. This increase in circulation presumably assists in evacuating pain augmenting factors and increases the delivery of nutrients that enhances recovery. Others have shown little or no increase in muscular blood flow. Hinds et al. suggested that massage actually draws blood flow to the skin, diverting circulation from skeletal muscle.

Finally, the mechanical pressure imposed by massage strokes is thought to alter neural excitability; these neural changes are believed to affect the potential for spasms and pain. Sefton et al. discovered a reduction in the Hoffman or H-reflex, which is used to measure the excitability of the motor neuron pool, among study participants receiving a one hour full-body massage. Behm et al. found that massage decreased spinal reflex excitability, with significant reductions seen in subjects receiving 30 seconds of tapotement (a percussive massage stroke).

Key findings: Massage and DOMS

Despite evidence of small improvements on DOMS symptoms (muscle soreness and reductions in strength), a recent meta-analysis reported the mean effect of massage too small to be of clinical relevance. In contrast, many studies have demonstrated significant reductions in tenderness and soreness associated with DOMS. With respect to strength and performance outcomes, the effectiveness of massage is less clear. Multiple studies have failed to show statistically significant improvement in performance outcomes.

To date, a clear dose-response remains elusive, however, a number of studies suggest that massage sessions of at least 10 minutes and received between 2 and 3 hours after exercise provides a significant reduction in tenderness and soreness. A few studies have examined the effect of multiple sessions performed at varying periods after exercise. A study by Hart et al. demonstrated no statistically significant reductions in soreness or girth size among limbs when performing massage at 24, 48, and 72 hours after exercise. This, however, may have been a function of shorter (5 minute) treatment time. Tiidus and Shoemaker performed multiple massage treatments of 10 minutes at 1, 24, and 72 hours after exercise, with reductions in soreness seen 48 hours after exercise. The opportunities for future research include further investigation into which depths of pressure and massage strokes are most effective, as well as whether the systematic benefits of full body massage may be more effective than simple treatment of the affected area.

Summary

DOMS is a combination of several factors including micro-trauma of muscle and connective tissue, which is accompanied by inflammation and edema and an infiltration of free radicals, and possibly further augmented by large diameter afferents. Gender, genetics, age, the repeated bout effect and psychosocial factors also have been shown to mediate the expression of DOMS. Massage shows potential for reducing soreness, yet is inconclusive with regard to improving strength and performance outcomes.

About the Author

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TAKE FIVE MINUTES OR LESS TO LEARN HOW TO PROTECT YOURSELF AND YOUR BUSINESS IN A LAWSUIT

By Ronda Jones

How much is five minutes worth? If five minutes of your time is worth learning how to protect yourself against a financially devastating lawsuit, please keep reading.

You realize already that when working with clients, you’re responsible for their safety. To put it another way, you have liability for their safety (“liability” being a legal term for “responsibility”).

Everyone makes mistakes, even with best practices in place, and the truth is people can be sued for just about anything. Even if you’re not at fault and the action against you is dismissed, an effective legal defense team is an expense few people can afford. Some professional (malpractice) liability cases close for lesser amounts of $3,000 to $10,000 in defense fees. But just as frequently, the defense costs run from $30,000 to $500,000. And settlement costs on top of legal fees usually range from $25,000 to $500,000, so it’s not unheard of to see a professional liability claim where the defense and settlement costs combined exceed $1 million.

The ACSM-endorsed professional and general liability insurance program is designed to protect personal trainers, health fitness specialists, nutrition consultants, exercise physiologists, lifestyle and wellness coaches, and other ACSM-certified professions in the event a client holds you responsible for perceived or actual mistakes in providing your services. Such claims can allege that you caused emotional distress, bodily injury, death, or property damage from providing a service, or that the service provided didn’t give the expected results.

The ACSM policy pays legal fees and damages up to $2,000,000 per claim/$4,000,000 annually, and provides other coverage benefits besides professional liability insurance, such as general liability and defense for sexual misconduct. And, the policy “goes with you,” not only covering you while working in a gym, but in your own home, clients’ homes or at other facilities. It also satisfies most requirements that facilities have for you to maintain “general liability” while on their premises (in case you’re responsible for damage to their equipment or injury to others).

Here are the types of claims that these professions incur:

• A suit was filed by a client against the personal trainer who provided him with a strength-training routine. The client accused the trainer of failing to assess his physical condition and abilities, and failure to design an appropriate conditioning program to fit his limitations. The client claimed the conditioning program the trainer designed led to injuries to his rotator cuff and bicep, requiring surgery. He is seeking damages for pain and suffering, medical costs, loss of enjoyment of life, and legal expenses.

• A recent suit against a personal trainer accused him of failure to properly oversee a client’s use of an exercise machine. She was dismounting from an assisted pull-up machine when the assisting portion was pulled back by the assisting weights and she was thrown several feet away, injuring her back, ribs, arm, and hand. She claims that if the trainer had been paying attention to how she was dismounting, he would have easily prevented her from falling. Damages for medical costs and pain and suffering are sought from the trainer.

• Certified professionals, such as exercise physiologists, are held to adhering to an established “standard of practice.” They can be held liable for failing to properly administer a treadmill test, improper monitoring during a test, or not obtaining informed consent from the client before proceeding with certain procedures.

• Numerous physical injuries occur from use of exercise equipment (particularly treadmills), and often the plaintiff (injured party) in a lawsuit prevails in accusations that the trainer didn’t
provide proper instruction, wasn't supervising the usage, or didn't properly maintain the equipment.
• Diet and wellness coaches are exposed to negligence claims from advising clients about dietary restrictions and usage of supplements. A client may have unknown or undisclosed medical conditions or medication conflicts, resulting in injury or death from taking your advice.
• False complaints of sexual misconduct also are very common against any professional who touches clients, regardless of intent. ACSM’s professional liability coverage also provides up to $25,000 for defense of civil sexual misconduct claims.
• Bodily injuries that result from accidents such as a client or guest falling on a wet floor, or you accidentally dropping heavy equipment on them. The general liability section of the ACSM policy responds to such claims, and it also covers you for damage you accidentally cause to others’ property (such as someone else’s equipment).

How do you decide if you need to buy your own professional liability insurance policy?
You definitely should have your own coverage if you aren’t performing as a W-2 employee and either (1) own a business serving clients directly, (2) are contracting for services directly with clients, or (3) are otherwise self-employed (perhaps using a facility where you or the facility schedule the clients you’ll be training). There is no employer or 3rd party to protect you from the costs of a claim in these circumstances.

If you are a W-2 employee when performing your services, don’t automatically assume your employer is prepared to defend you against a negligence claim. Here are several situations in which protection for you might not be available and you should maintain your own coverage as back-up protection/excess limits:
• The employer may have an insurance gap from inadequate, unpaid, lapsed, cancelled, or already-used-up coverage.
• You may not be covered under the employer’s policy for suits filed after your employment ends.
• If a suit is based in part on your failure to comply with the employer’s procedures, treatment method or facility policy, the employer’s defense team may try to deflect liability to you in order to protect the employer’s own interests.
• Although not a “negligence claim,” a client can file a complaint to the Certification Board or Regulatory Body that oversees your professional standards. As the allegation against your certification is not a “covered claim” under your employer’s policy, you will not be defended by the employer’s insurance policy. ACSM’s policy provides defense costs for license and disciplinary proceedings.
• Do you ever give advice to a neighbor or friend? Your employer’s policy will not provide coverage for any allegation made against you outside the duties of your job.

Applying for coverage is easy, and premiums are reasonable. ACSM recommends that you at least explore your options and contact Keri Thomas at 800-821-7303, x1514 about the ACSM-endorsed Professional Liability Insurance. Or visit: www.ffj.com/acsm for further information and an online application to obtain your “no obligation” quote for review.

About the Author
Ronda Jones is an insurance broker with Forrest T. Jones & Company, Inc.—ACSM’s Member Insurance Program administrator.

This article is for informational purposes only and is not meant to define, alter, limit, or expand any policy in any way.
COACHING NEWS

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

Build confidence
1. What strengths and talents do you have to help you get to your vision? Only one-third of adults can identify their strengths; most of us spend more time thinking about our weaknesses. There is often untapped potential in strengths that clients use skillfully in their professional and family lives. One assessment used by coaches, called Values in Action Character Strengths, identifies one’s top five “signature” strengths — check it out at www.viacharacter.org. Perhaps your client is good at planning and execution, or creative problem-solving, or learning. You can discuss new ways to put these strengths to good use to stay on track with a fit lifestyle.

2. What is one major challenge and three possible ways to overcome it? It’s important to help clients discover their capacity to be curious and creative in handling small and large obstacles that emerge to sabotage their good intentions to stay healthy. A brainstorming exercise, where you and your client come up with new ideas to navigate around a challenge, can help your client access his/her creativity to deal with the ups and downs that are unavoidable in busy lives.

3. What is your special formula for being resilient? Your client has most likely handled some setbacks while at work and home. Help him/her identify the strategies and resources he/she used that worked best to get back on track. Was it reaching out for the support and counsel of others? Or his/her ability to discover the silver lining or meaning of the setback? His/her confidence in their ability to bounce back? His/her curiosity about what the lesson to learn would be? His/her persistence to not give up? Once he/she has more clarity about what works, he/she can tap into his/her resilient formula when the need arises.

Now it’s time to use your creativity to come up with open questions to explore how your clients could tap into their heartfelt motivation and use that energy source to continually improve confidence to live the life they treasure. Even better, consider getting trained as a wellness coach so that you can continue your client relationship when she moves away.

About the Author
Margaret Moore, MBA (Coach Meg), is the founder & CEO of Wellcoaches Corporation, a strategic partner of 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, an affiliate of Harvard Medical School and co-directs the annual Coaching in Leadership & Healthcare Conference offered by Harvard Medical School. She co-authored the ACSM-endorsed Lippincott, Williams & Wilkins Coaching Psychology Manual, the first coaching textbook in health care and the Harvard Health Book published byHarlequin: Organize Your Mind, Organize Your Life.

References

Tap into Motivation
1. How might your move be a catalyst for you to learn and grow? Humans are meaning-makers; we are always asking ourselves – why is this happening to me? What am I supposed to learn from this experience to make the disruption worthwhile? Help your client find ways to make her move meaningful, to tap into her wisdom about new possibilities. Perhaps it’s time to build his/her confidence in maintaining a fit lifestyle without you, or to experiment with new types of exercise. Or maybe this client will find a new trainer who brings a different and helpful perspective.

2. If you were to imagine your vision for your lifestyle in this next phase, what would that look like? Just like an architect draws a picture of a new house, the brain benefits from having a vision or picture of what an ideal future looks like. Harvard psychologist Shelley Carson describes envisioning, a brain activation pattern, where brain regions related to visual processing at the back of the brain are activated, as a critical early step in the creative process’. Help your client imagine a vision for his/her fitness or well-being, in writing or pictures. A good vision has magnetic force like that of deliciously warm sunshine, drawing us toward it.

3. How does your fitness and wellness help you live a life you treasure? Humans have a strong need for autonomy’, to march to our own drummers, using our unique life forces to learn, grow, and make the world a better place. Fitness and wellness is the fuel for one’s life force; it’s vital to be fit and healthy to live the life our hearts desire. Help your client discover and explore the connection between the life he/she wants to live and the physical and mental health and energy needed to support it.

Today’s article continues a popular format for our Coaching News column, exploring a variety of interesting and challenging client scenarios. I 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.

“My client is moving out of the area in two months and is afraid that she won’t be able to continue her program without me. How do I help her develop the resources to continue and to succeed?”

The ideal accomplishment of a personal training relationship is that clients become self-sufficient; they learn to coach themselves to stay on track with a fit lifestyle. Of course that doesn’t mean that they won’t want to continue personal training sessions. A great relationship with one’s trainer has a special place in a client’s life. Mine included — I love my trainer!

I often say that there are twin engines that need to be fueled and fired up to start and sustain changes in mindset and behaviors: self-motivation and self-confidence. A client’s relationship with a trainer can keep both engines on full throttle by revisiting the gains and benefits of a fit lifestyle, to recharge motivation, and to co-create ways to navigate around barriers and challenges, to recharge confidence. Here’s a short list of open-ended coaching questions that could help lead a client to improve his/her motivation, confidence, and performance, in your absence.

1. What one thing do you do that helps you stay on track with a fit lifestyle?
2. What is one major challenge and three possible ways to overcome it?
3. What is your special formula for being resilient?
4. How might your move be a catalyst for you to learn and grow?
5. How does your fitness and wellness help you live a life you treasure?
6. If you were to imagine your vision for your lifestyle in this next phase, what would that look like?

Humans are meaning-makers; we are always asking ourselves — why is this happening to me? What am I supposed to learn from this experience to make the disruption worthwhile? Help your client find ways to make her move meaningful, to tap into her wisdom about new possibilities. Perhaps it’s time to build his/her confidence in maintaining a fit lifestyle without you, or to experiment with new types of exercise. Or maybe this client will find a new trainer who brings a different and helpful perspective.

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How does your fitness and wellness help you live a life you treasure? Humans have a strong need for autonomy’, to march to our own drummers, using our unique life forces to learn, grow, and make the world a better place. Fitness and wellness is the fuel for one’s life force; it’s vital to be fit and healthy to live the life our hearts desire. Help your client discover and explore the connection between the life he/she wants to live and the physical and mental health and energy needed to support it.

References
WEIGHT TRAINING AND WEIGHT LOSS

By Wayne L. Westcott, Ph.D.

In 2009, the American College of Sports Medicine (ACSM), released a Position Stand entitled, “Appropriate Physical Activity Intervention Strategies for Weight Loss and Prevention of Weight Regain for Adults.” Based on the research reviewed, the authors concluded that “Resistance Training does not enhance weight loss but may increase fat-free mass and increase loss of fat mass and is associated with reductions in health risk” (page 459).

The ACSM Position Stand referenced studies that reported no effect of resistance training on body fat, studies that reported a modest effect of resistance training for reducing body fat, studies that showed combined resistance and aerobic training superior to aerobic training alone for decreasing fat mass and increasing lean mass, and studies that revealed resistance training and higher protein diets superior to resistance training and lower protein diets for reducing fat weight and retaining lean tissue.

A large-scale study with more than 1,600 participants examined the effects of a basic strength and endurance exercise program on body composition parameters in men and women between 21 and 80 years of age. Consistent with the ACSM exercise guidelines at that time, all of the subjects performed 1 set of 10 resistance machine exercises for 8 to 12 controlled repetitions, and completed 20 minutes of aerobic activity at 70% to 80% of maximum predicted heart rate. After 10 weeks of training, the study participants averaged a 3.1-pound increase in lean weight and a 3.9-pound decrease in fat weight. Although the mean bodyweight loss was less than one pound, the participants averaged a 2-point reduction in percent body fat (28.1% to 26.1%), which actually represented a 7.0 pound improvement in body composition (3.1 pounds more lean weight and 3.9 pounds less fat weight). The study subjects also experienced significant reductions in mean systolic blood pressure (-3.8 mmHg) and mean diastolic blood pressure (-1.8 mmHg) over the 10-week training period. These results supported the ACSM Position Stand that combined resistance and aerobic training as an effective means for decreasing fat mass, increasing lean mass, and reducing health risks.

Recent research also has provided affirmation for the ACSM Position Stand statement that resistance training and higher protein diets may enhance fat loss and lean tissue retention. In a 2013 study, 121 men and women were divided into 3 training groups. Group 1 performed 9 standard resistance machine exercises interspersed with 3 bouts of recumbent cycling (5 minutes each). Group 2 performed the same exercise program and consumed a higher protein diet (1.5 grams of protein per kilogram of ideal body weight on a daily basis). Group 3 performed the same exercise program and followed the same higher protein diet, along with a reduced calorie nutrition plan of 1,200 to 1,500 calories per day for women and 1,500 to 1,800 calories per day for men. After 10 weeks or training, Group 1 (exercise only) experienced a 1.1-point improvement in percent fat (26.9% to 25.8%), adding 1.1 pounds of lean weight and losing 2.4 pounds of fat weight. Group 2 (exercise and higher protein diet) experienced a 1.9-point improvement in percent fat (29.9% to 28.0%), adding 2.8 pounds of lean weight and losing 3.9 pounds of fat weight. Group 3 (exercise, higher protein, and lower calorie diet) experienced a 2.9-point improvement in percent fat (28.9% to 26.0%), adding 1.7 pounds of lean weight and losing 7.1 pounds of fat weight. Based on these findings, the study authors concluded that the higher protein nutrition plan enhanced the effects of the exercise program for increasing lean weight, and that the higher protein plus reduced calorie nutrition plan enhanced the effects of the exercise program for decreasing fat weight without muscle loss. In addition, both exercise and nutrition plans produced significant reductions in resting blood pressure readings.

How Resistance Exercise Affects Energy Requirements

Resistance exercise uses energy during and immediately after the strength training session. In a study by Haltom et al., 20 minutes of circuit strength training burned about 200 calories during the exercise performance, and used about 25% as many additional calories (50 calories) during the first hour following the training session.
A s the U.S. population rapidly ages, it is essential that practitioners and researchers address our changing needs. In 2011, the baby boomers began to turn 65, sparking a dramatic increase in the older population through 2030. According to the Federal Interagency Forum on Aging-Related Statistics, the older population in 2030 will be twice as large as it was in 2000, growing from 35 million to 72 million, which will represent approximately 20% of the U.S. population.

Normal aging is associated with a progressive increase in fat mass through approximately age 65. Nearly 32% of people age 65 and older are considered obese (BMI ≥ 30), which has increased from 22% between 1988 to 1994 (18). Changes in quantity and distribution in body fat occur even in the absence of a change in BMI, principally due to simultaneous decreases in skeletal muscle mass.

Skeletal muscle mass is known to decrease with aging, characterized by an approximate 33% reduction between the ages of 50 and 80. This reduction in skeletal muscle mass can lead to sarcopenia, which is known as the relative deficiency of skeletal muscle mass and strength. Several definitions for sarcopenia exist, with the prevalence varying depending on the definition used. In the New Mexico Elder Health Study, sarcopenia was defined as a muscle mass index (appendicular fat-free mass [FFM] [kg] / height [m]^2) two standard deviations below the reference values from young, healthy individuals. According to this definition, the prevalence of sarcopenia ranges from 13% to 24% in persons under age 70, but the prevalence is greater than 50% in people over 80 years of age.

It is now recognized that there is an increasing prevalence of people with both a high fat mass and a low muscle mass — referred to as “sarcopenic obesity.” Although this is a relatively new focus, it has been shown that people with sarcopenic obesity are more likely to have physical disability than those with either sarcopenia or obesity alone. Furthermore, people with sarcopenic obesity were found to have a higher prevalence of metabolic syndrome than those with sarcopenia alone. The prevalence of sarcopenic obesity is expected to increase significantly because 1) the aging of the population, 2) the shifting to a more sedentary population, and 3) the increasing prevalence of obesity in the U.S. Sarcopenic obesity has been referred to as “the confluence of two epidemics,” a major public health issue, and may indicate a “growing financial problem in the health care system in developed countries.” This paper is the first of a two-part series on sarcopenic obesity. Part I is to review definitions of sarcopenic obesity, and to review potential complications of sarcopenic obesity. Part II will provide treatment strategies based on current literature.

DEFINING SARCOPENIC OBESITY

There is no single, widely-accepted definition of sarcopenic obesity, creating several difficulties for practitioners and researchers. The lack of a consistently used definition negatively impacts establishing prevalence, complications, and treatments. Bearing this in mind, one of the first recommendations for future research is to examine diagnostic criteria in effort to establish a consistent definition.

Part of the challenge associated with defining sarcopenic obesity is the existence of several variations of definitions for both sarcopenia and obesity. For example, the definition of sarcopenia has been proposed to include appendicular muscle mass, absolute skeletal muscle mass, and lean mass per unit of fat mass. Obesity can be defined according either BMI or percent body fat. Further complicating the development of a clear definition of sarcopenic obesity is the emerging understanding that the decline in strength with aging is disproportionately greater than the decline in muscle mass. Evidence exists to show that muscle strength is more important than muscle mass in the determination of functional limitation and poor health. As such, incorporating a measure of strength in the diagnostic criteria for sarcopenic obesity is logical, but difficulties exist in establishing a clinically affordable, practical, and valid measure of strength. Although a single current definition of sarcopenic obesity is not used, existing criteria focus on the combination of a high fat mass and low muscle mass.

Baumgartner et al. defined sarcopenic obesity as having a muscle mass index < 2 standard deviations below the mean of young, healthy individuals, and a percent body fat greater than the 60th percentile of the study sample. The actual cutoff values for sarcopenic obesity were a muscle mass index < 7.26 kg/m^2 and a body fat percentage > 27% for men or < 5.45 kg/m^2 and a body fat percentage > 38% in women. Using this definition, the prevalence of sarcopenic obesity was 4.4% in men and 3.0% in women.

Using data from the NHANES III, Davison et al. defined sarcopenic obesity as those in the two lower quintiles of muscle mass (< 9.12 kg/m^2 in men and < 6.53 kg/m^2 in women) and in the highest two quintiles of fat mass (> 37.16% in men and 40.01% in women). Using this definition, the prevalence of sarcopenic obesity was 9.6% in men and 7.4% in women.

Zoico et al. studied physical disability and muscular strength in elderly women, and defined sarcopenic obesity as the two lower quintiles of muscle mass (< 5.7 kg/m^2) and the two highest quintiles for fat mass (> 42.9%). Using this definition the prevalence of sarcopenic obesity was 12.4%.
Complications of Sarcopenic Obesity

Decreased Muscle Quality

Muscle weakness has been repeatedly shown as an independent risk factor for high mortality in older adults. Muscle strength is known to be a function of cross-sectional area; as such, the weakness associated with sarcopenia was initially thought to be a direct function of the reduction in muscle mass. To explore this association within a cohort from the Health, Aging, and Body Composition (Health ABC) Study, Goodpaster et al. examined the 3-year changes in muscle mass and strength in 1,880 men and women aged 70 to 79 years. Body composition was measured using dual-energy x-ray absorptiometry (DEXA), and strength was evaluated using isokinetic dynamometry for knee extensors. Annualized rates of leg strength decline were three times greater than rates of leg lean mass reduction, indicating a deterioration of muscle quality.

Villareal et al. compared 52 obese, elderly subjects, 52 non-obese frail subjects, and 52 non-obese, non-frail subjects and found the poorest muscle quality (measured as the ratio of lower-extremity strength to lower extremity lean mass) among the obese elderly participants, despite this group having a higher absolute muscle mass. Similarly, Stenholm et al. reported that people 65 and older with poor muscle strength were twice as likely to be obese when compared to people with normal strength. Parallel results have been reported elsewhere, strongly supporting the idea that decline in skeletal muscle quality is of importance in aging.

Functional Limitation

Of all complications associated with sarcopenic obesity, the most consistent and well-documented is functional limitation. Rolland et al. compared physical function between four groups: 1) Healthy body composition (n=747), 2) Purely sarcopenic (n=90), 3) Purely obese (n=435), 4) Sarcopenic obese (n=36). When compared to women with a healthy body composition, purely obese women had 44% to 79% higher odds of having difficulty with physical functioning, and women with both sarcopenia and obesity had 2.6 higher odds of having difficulty climbing stairs and 2.35 higher odds of difficulty going down stairs.

Stenholm et al. measured body composition, handgrip strength, and walking limitation in 2,208 men and women age 55 and older. They found that prevalence of walking limitation was much higher in people who simultaneously had a high body fat percentage and low handgrip strength (61%). In contrast, only 7% of those with low body fat and low handgrip strength had a walking limitation.

Baumgartner found that in men and women over 60, those with sarcopenic obesity had an 8- and 11-fold higher risk of having 3 or more physical disabilities. Furthermore, the association with functional status impairment was stronger for sarcopenic obesity than either sarcopenia or obesity alone. Subsequently, this same group performed an 8-year follow up to examine the impact of sarcopenic obesity on instrumental activities of daily living disability. Those with sarcopenic obesity at baseline had a 2 to 3 time greater risk of disability as compared to purely sarcopenic or purely obese.

Although there is considerable evidence of functional limitations in people with sarcopenic obesity, it is important to note that some recent evidence does not support an increased functional limitation in this condition. As with any clinical condition, it is key to make treatment recommendations based on the individual situation; if a patient presents with sarcopenic obesity, it is certainly prudent to check functional status.

Inflammation

Low muscle mass/strength and obesity may have a pathological connection, and some evidence indicates that inflammation could be the key to this connection. Adipose tissue has endocrine activity, producing proinflammatory cytokines including interleukin-6 (IL-6), and tumor necrosis factor-α (TNF-α), as well as adipokines, such as leptin and adiponectin, that modulate the inflammatory response. Both IL-6 and TNF-α play a key role in the hepatic production of C-reactive protein (CRP) and other acute phase proteins, impacting systemic inflammation. Systemic inflammation has been linked to diabetes mellitus and cardiovascular disease, and increased mortality.

Inflammation may be specifically damaging to skeletal muscle, contributing to declining mass and strength. Visser et al. examined the relationship of inflammatory markers with muscle mass and muscle strength in a cohort from the Health ABC study. As compared to participants with low levels of IL-6 and TNF-α, those with high levels of IL-6 and TNF-α had significantly smaller muscle area, less appendicular muscle mass, and lower strength. Cesari et al. found that CRP and IL-6 levels in older adults were positively associated with fat mass and negatively associated with FFM.

Conclusion

The prevalence of sarcopenic obesity is almost certain to increase substantially in the coming decades. The development of a universally-recognized definition will help to clarify the prevalence and complications associated with the condition. Clinically, older adults should be assessed for the presence of low muscle mass concurrent with high fat mass, and ideally an assessment of strength would be completed. The second part of the this paper, which will appear in the next issue, will examine strategies to manage sarcopenic obesity.

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According to the World Health Organization, 6% of global mortality can be attributed to physical inactivity. As daunting, one quarter or more of the burden of heart disease, diabetes, breast and colon cancers can be in part, attributed to physical inactivity. As the prevalence of these diseases grows, so should the need for clinical exercise professionals. In the United States, the Affordable Care Act contains numerous potential opportunities for exercise professionals to take a lead in chronic disease management. One example would be the concept of the Medical Home, which provides a structure whereby clinical exercise physiologists (CEPs) could conceivably be engaged as a critical part of the care team that provides holistic long-term services. However, the CEP is far from ubiquitous in these types of settings.

Future possibilities are exciting, yet the current employment reality for CEPs is sobering. The Bureau of Labor Statistics (BLS) employment snapshot for CEPs in May 2012 shows a mere 5,820 exercise physiologists (EP) with a mean annual wage of $47,610. However, the BLS estimates a 9.2% job growth for EPs between 2012 and 2022. This national data is indexed under the title of EP, a category added in 2010. The EP is classified under the general heading of “therapists,” which includes physical and occupational therapists among others, so one might assume that the reported job indices and projections for the EP are specific to clinical positions. However, the BLS classification does not differentiate the CEP from the EP. so it is important to have an independent analysis of the types of employment opportunities that are currently available and what the desired educational requirements (i.e., degrees, certifications) are for the EP and CEP.

This study presents a six-month snapshot of CEP employment postings. The goals of analyzing this data include determination of most frequently used professional titles, minimum education and minimum certification requirements. The data will be compared to the BLS data, and should provide a window into the current perception of employers related to the job market for CEPs.

Methods

Within two days of the last day of each month between April and September 2013, the following online job databases were searched: Monster.com, Indeed.com, Careeerbuilder.com, exercisejobs.com, craigslist.org (Dallas, Boston, Chicago, Los Angeles, San Francisco, Detroit, Raleigh-Durham), LinkedIn’s Exercise Jobs, ACSM’s Health Jobs Plus, and usajobs.com. Search terms used in each database were exercise physiologist, clinical exercise physiologist, exercise specialist (ES). Information was collected and coded: month; job title; facility name, type, and location; degree and certification requirements; populations served; and job responsibilities. Only jobs that seemed clinical in nature were included, as determined by facility type, population served, and/or job responsibilities. Facility home pages were accessed if the facility type was unclear from the job post. If multiple certifications or populations were mentioned in one job posting, each one was counted separately. Thus it is possible to have totals that are more than the number of postings.

Results

A total of 234 clinical jobs were posted, 53% in hospital settings and 29% in clinics or medical fitness settings. A total of 155 jobs were titled EP, 38 were titled ES and 7 were titled CEP (Figure 1). A total of 108 job postings (46%) listed a Bachelor’s degree as the minimum requirement, while 48 (20%) listed a Master’s degree. An additional 56 postings (24%) listed a Bachelor’s degree as a minimum, but included the phrase “Master’s preferred.” More detailed analysis of the CEP postings showed six of seven requiring or preferring Master’s degrees. Analysis of EP postings showed 35 of 156 (22.4%) requiring or 42 of 156 (26.9%) preferring Master’s degrees, while 44.9% (70 of 156) requiring Bachelor’s degrees. Approximately 77% of all postings designated a degree in Exercise Science, Exercise Physiology, or Kinesiology as the preferred academic discipline. Approximately 14% designated exercise science “or other allied health degree.” Of the remaining 135 certifications listed in 99 postings, the most frequently mentioned was the CES, with registered clinical exercise physiologist (RCEP) and ACSM included to a lesser degree (Table 1). A total of 219 job postings listed populations served. Most of the job postings were for work with those with cardiac or pulmonary disease. Populations with metabolic diseases or conditions included diabetes, bariatric, and obesity (Table 1). Six of the seven CEP postings were all hospital-based positions in cardiopulmonary rehabilitation. Three of these required a CES certification.
How often the term EP is used in non-clinical job posts is unknown. This data set would be useful in understanding how and whether the term EP is recognized in the fitness industry, or if it represents only clinical positions. The BLS, in placing the EP under the general heading of “therapist” seemingly meant to designate the term as a clinical term. On the other hand, there is a growing population with chronic diseases and conditions seeking to improve their health through the fitness sector. The lines between clinical and fitness sectors are blurry, creating a challenge for national professional organizations to clearly define for employers and the general public the distinctions between clinical and fitness professionals. In other health professions, certification and/or licensure are understood by employers as minimum requirements for practice. Certification demonstrates that a professional has command of knowledge and skills consistent with minimum competency in defined job tasks and domains. Certification renewal, dependent on continuing education, also indicates that a professional is keeping current. In that sense, it is distressing that 58% of these job postings did not designate any certifications. Of the remainder, almost a third listed the CES. Together the RCEP and CES accounted for 47% of certifications listed. The rest were distributed over non-clinical certifications. Clearly, employers do not perceive the importance of certification for clinical exercise professionals, nor do they clearly differentiate between certifications.

Finally, the distinction between the RCEP and CES is not supported by this data. The RCEP is presumably valued for a broader knowledge base in additional practice areas of immune/neoplastic, musculoskeletal, and neuromuscular. Of 27 jobs working with these populations, 22 were classified as EP and 3 as ES. In conclusion, six-months of clinical exercise job posts show consistency with the BLS data for the EP and does not differentiate between clinical professional levels. The need for clarity in clinical certifications is demonstrated by this data. Specifically, the RCEP in relation to the CES certification is not performing in the job market as intended.

Discussion
There has been much discussion and debate, within and amongst ACSM, the Clinical Exercise Physiology Association, and the American Association of Cardiovascular and Pulmonary Rehabilitation about how to differentiate the CEP versus the CES, and clinical versus non-clinical professionals. In addition, there are some who believe that EP and CEP should be titles limited to Ph.D.-level professionals. Clearly the job market does not follow suit. EP was the most widely used job title in this data set for both B.S. and M.S. clinical job posts involving exercise. This is consistent with the BLS classification. The title CEP was not widely used in job postings, yet nearly half of the positions require or prefer a Master’s degree in exercise science, a factor that may cite for differentiating between the two clinical “levels.” On the other hand, 86% of the CEP job postings required or preferred a Master’s degree, compared with 49% of the EP postings. Unfortunately, the number of CEP postings is too small to draw clear conclusions. The BLS Occupational Employment Statistics shows 59.7% of jobs for EPs in 2012 were in hospitals, with no major changes projected through 2022. This is consistent with the findings presented here.

References

About the Author
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Weight loss (continued from page 9)

Resistance training also increases energy requirements at rest for up to 72 hours after a high-volume or high-intensity workout. In a study by Hackney et al.\textsuperscript{7}, two groups of young men performed a single high-volume strength training session (8 resistance exercises; 8 sets each; 6 repetitions per set). Over the following 3 days (72 hours post-training), the untrained subjects averaged a 9% increase in resting energy expenditure and the trained subjects averaged an 8% increase in resting energy expenditure.

In a similar study by Heden et al.\textsuperscript{9}, untrained young men completed a single high-intensity strength training session (10 resistance exercises; 1 set each; 10 repetitions per set). Over the following 3 days (72 hours post-training), the subjects averaged a 5% increase in resting energy expenditure (approximately 100 calories per day).

These research results support the findings of other studies that have examined the effects of resistance exercise on resting energy expenditure\textsuperscript{4,5,10,11,13,14}. On average, these studies showed a 7% elevation in resting energy expenditure for strength trained subjects from various populations, using different resistance exercise protocols and study durations. This extra energy expenditure most likely represents the muscle remodeling response to the tissue micro-trauma experienced during resistance training workouts.

Monthly Calorie Contribution

If we assume that a 20 to 30 minute circuit strength training session uses 200 calories, 3 weekly workouts would burn approximately 2,400 calories per month (200 calories x 3 days x 4 weeks). If we assume that the resulting elevation in resting energy expenditure is at least 100 calories per day, this would approximate an additional burn of 3,000 calories per month (100 calories x 30 days). The total energy use associated with this relatively brief resistance training program is therefore about 5,400 calories per month, which is roughly equivalent to 1.5 pounds of fat. Interestingly, the amount of fat lost reported in several strength training studies using relatively brief exercise sessions is approximately 1.5 pounds per month\textsuperscript{10,13,14}.

Although a large amount of research indicates that strength training significantly elevates resting energy expenditure\textsuperscript{4,5,8,9,10,11,13,14}, one study did not find an association between resistance training and resting energy expenditure in experienced exercises\textsuperscript{1}. It is possible that the metabolic impact of resistance exercise decreases as muscles become accustomed to a given training program, so it may be prudent to periodically change exercise protocols and procedures.

A recently published paper in the *Journal of the American Medical Association*\textsuperscript{13} calls for an end to the diet debates, stating that “The pursuit of the ideal macronutrient content diet is unidimensional, ignoring 2 of 3 major components of lifestyle intervention: behavioral modification and exercise.” This is sound advice, which correctly contends that attaining and maintaining a healthy bodyweight and body composition require a comprehensive approach to lifestyle change, including proper nutrition, appropriate behavior, and effective exercise. Based on the research reviewed in this column, it would appear that regular resistance training may be a significant factor in successful and sustainable weight management programs.

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