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THE CHANGING OF THE GUARD

By James R. Churilla, Ph.D., MPH, Co-Editor

The coming of a new year is typically accompanied by change...

The coming of a new year is typically accompanied by change. ACSM’s Certified News is making one “BIG” one. As co-editor of Certified News over the past two and a half years, I have had the privilege of working with our other co-editor Paul Sorace. Paul and I have worked diligently at maintaining and improving the integrity of this publication, and the feedback we have received has been extremely supportive and greatly appreciated. Paul has been writing for ACSM’s Certified News and ACSM’s Health & Fitness Journal® for over 10 years and his contributions to ACSM and the field of exercise science, fitness, and health do not stop there, as he has served and continues to serve on several ACSM committees. Paul, thank you from your co-editor and everyone at ACSM for your service on Certified News and your contributions to the profession. We look forward to your continued commitment to excellence as you take on yet another new role as the new Chair of the ACSM Publications Subcommittee. Thank you Paul!

Now we must continue to move forward and continue to improve our publication. We at ACSM are pleased to announce Peter Ronai as our new co-editor for Certified News. Peter is a long-standing member of the ACSM and a regular contributor to several ACSM publications. Peter has extensive experience in the field of exercise science and has recently accepted a position as an academician. Please help ACSM in welcoming Peter as our new co-editor and wishing him all the best with ACSM in his new position as an academician.

Welcome, Peter!
Perhaps the biggest health problems we are facing today are from the combined effect of obesity, diabetes, and cardiovascular disease (CVD) (http://www.cardiometabolichealth.org).

Excess weight, in particular, abdominal obesity, causes or exacerbates other cardiovascular and metabolic risk factors, including hypertension, dyslipidemia, insulin resistance, and type 2 diabetes, and increases the risk of gallbladder disease, osteoarthritis, sleep apnea, respiratory conditions, and cancer.14

While the prevalence of some modifiable risk factors, such as smoking, has decreased over the past two decades, the prevalence of obesity has risen. Certified health and fitness professionals (CHFP) deal with the consequences of overweight/obesity in most, if not all of the populations that they work with. The optimal management of clients with or at risk for CVD requires the assessment and treatment of modifiable risk factors. All clients should be assessed regularly for the presence of modifiable CVD risk factors, and when risks are present, efforts should be made to encourage the client to make changes in lifestyle to reduce the risk for CVD.14 Information gained from an assessment of body composition and body fat distribution during a pre-exercise fitness appraisal or health screening can be used to (a) identify and stratify a client’s risk for cardiovascular, metabolic, or pulmonary diseases, (b) set appropriate measurable and attainable goals, (c) track changes over time, and (d) educate the client or patient. The purpose of this article is to present information that will help the CHFP select and correctly interpret assessments of obesity.

Measures and Definitions of Obesity

Obesity is one of the risk factors listed by the American College of Sports Medicine (ACSM) for cardiovascular, pulmonary, and metabolic diseases. There are various methods of assessing body composition that estimate percent body fat (%BF), of which, the simplest model, partition the body into lean mass and fat mass. Because it is not the intent of this paper to discuss individual methods of assessment, readers who are interested in learning about available methods are directed to other sources.10–12

Anthropometric measurements (the measurement of physical dimensions of the body such as height, weight, and circumferences) are used as indices of obesity.1 These include body mass index (BMI) as an indicator of obesity and waist circumference and waist-to-hip ratio (WHR) as measures of body fat distribution (i.e., central adiposity). These are indices of obesity because they do not actually estimate but are correlated with body composition and its health consequences. The medical community, and most, if not all health profession organizations have adopted BMI as an indicator of obesity.

Standardized landmarks for the measurement of waist and hip circumferences are necessary to assure an accurate assessment. ACSM recommends that the circumference of the hip should be measured at the widest portion of the buttocks and the circumference of the waist should be measured at the narrowest part of the torso between the iliac crest and the xiphoid process.7 If there is not a “narrowest” part of the waist because of overweight or obesity, the circumference should be measured on a horizontal plane around the abdomen at the level of the iliac crest.14

The advantage of using indices of obesity and body fat distribution is that when measured correctly, these measures have little source of error (compared to estimates of %BF). As such, they are useful for monitoring changes that occur as a result of diet and physical activity, while providing comparable results across research studies. The CHFP who estimates a client’s %BF also should measure BMI, waist and hip circumferences, and WHR. These measures provide additional information that can be used to educate clients and track their progress over time.

Interpreting Results of Body Composition and Body Fat Distribution Assessments

BMI, waist circumferences, and WHR are used to define obesity and central adiposity (Table) but they do not distinguish between body fat and lean muscle mass.

Obesity also is defined as having a %BF greater than 25% in men and greater than 32% is women but definitions may vary with age.11 The interpretation of %BF values is somewhat obscure since there are inherent errors in any estimate of body composition. The first step in assuring that an assessment of body composition is as accurate as possible and can be correctly interpreted is to eliminate or minimize sources of error in the actual measurement.10 To better understand the limitations to interpreting body composition results, a brief review of statistics is necessary. A method of assessing body composition is valid if it can accurately predict the estimate of %BF by an accepted criterion method. A criterion method, (e.g., DEXA) is believed to give the best estimate of the actual or true amount of body fat. The standard error of estimate (SEE) is a statistic that defines the amount of variability, or error, in a measurement, and is used to describe the validity of a method to estimate %BF. Assuming a bell-shaped curve for normal distribution, 68%

| Measures and Definitions of Obesity | BMI = body mass index. WC = waist circumference. | WHR = waist-to-hip ratio. See references 2, 3, 7, and 8. |
|------------------------------------|-------------------------------------------------|
| Normal Weight                      | BMI = 18.5 – 24.9 kg/m²                           |
| Overweight                        | BMI = 25 – 29.9 kg/m²                             |
| Obese                             | BMI > 30 kg/m²                                    |
| WC >102 cm in men                 | WC >88 cm in women                               |
| WC >102 cm in men                 | WC >88 cm in women                               |
| Central Adiposity                 | WHR > 0.90 (men)                                 |
|                                  | WHR > 0.85 (women)                               |
|                                  | WC >102 cm in men                                 |
|                                  | WC >88 cm in women                                |
and 95% of the values obtained from a criterion method will fall within ±1 SEE and ±2 SEE of the predicted value, respectively. Predictions of %BF estimate the %BF value that would be obtained from a criterion method. For example, if a client’s %BF was predicted to be 20% using a method whose SEE is ±2 %BF, then the value obtained from a criterion method could be as little as 10 %BF and as great as 30 %BF. An acceptable SEE for body composition devices is 3–5 %BF. For obvious reasons, national organizations have adopted anthropometric measures as indices of obesity.

Educating the Client.

What is the role of the CHFP in helping clients and patients manage their obesity? The CHFP educates clients on the influence of obesity on the risk for cardiovascular, metabolic, and other diseases or conditions and defines, teaches, and reinforces good nutrition and appropriate amounts and types of physical activity to help clients achieve a healthy body weight and composition.

Because obesity is a modifiable risk factor, focusing on lifestyle changes is a critical component of reducing the risk of cardiovascular and metabolic diseases. Certified health and fitness professionals should focus on the preventable nature of CVD since much of the decline in quality of life and many of the cardiovascular events and fatalities associated with CVD are the result of risk factors that are modifiable. More than any other risk factor, the successful treatment of obesity through diet and exercise can positively affect risk of cardiovascular and metabolic diseases. Losing 5% to 10% of body weight reduces the risk of CVD disease and has a positive effect on other risk factors, such as hypertension, blood glucose levels, and blood lipids.

Central adiposity as measured by waist circumference and the WHR increases the risk of cardiovascular (e.g., hypertension) and metabolic diseases (e.g., diabetes, dyslipidemia). Central adiposity is a key component of the cluster of risk factors known as the metabolic syndrome. Clients with the metabolic syndrome are at twice the risk of developing CVD over the next 5 to 10 years as individuals without the metabolic syndrome. Having the metabolic syndrome increases the risk of type 2 diabetes five-fold.

For those people with BMI, waist circumference, WHR, or predicted %BF values above the recommended range, the CHFP should encourage modest and gradual changes in diet and physical activity to achieve a healthy body weight and composition. Moderate improvements in body weight, body fat, and body fat distribution can delay or prevent the onset of diabetes. Because high BMI, waist circumference, and WHR values increase the likelihood of other health maladies, the CHFP must screen for other conditions that need to be considered when prescribing exercise. Exercise recommendations should align with recent minimal physical activity guidelines and the ACSM guidelines for exercise prescription for the management of body weight. When necessary, the exercise prescription should also follow recommendations specific to dyslipidemia, hypertension, metabolic syndrome, and diabetes. The CHFP is in a position to educate clients about the assessment and management of obesity. Assessments of obesity allow the CHFP to define, teach, and reinforce sound nutrition and exercise habits. Through objective measures of obesity and body fat distribution, the CHFP can (a) help the client make realistic, achievable, and measurable goals, (b) devise a safe and effective exercise program that meets the needs and objectives of the client, and (c) provide needed education and encouragement.

References

Sedentary Behavior and Insulin Resistance

In the past few years, researchers have been evaluating the effect of time spent in sedentary behavior during the day in individuals who perform daily exercise. Alibegovic et al. 1 assessed the effects of nine days of bed rest on insulin sensitivity in 20 healthy, young men. Following the extended bed rest, participants were then re-evaluated after four weeks of re-training. These researchers reported that nine days of bed rest resulted in insulin resistance in these otherwise healthy, previously exercising young men. Bed rest also altered more than 4,500 genes within the skeletal muscle. 2 Even though they evaluated the participants after four weeks of re-training, the changes to insulin sensitivity and gene expression were only partly normalized. Bed rest changes the expression of genes involved in insulin resistance and diabetes. 3 The authors concluded, “Lack of complete normalization after four weeks of exercise retraining underscores the importance of maintaining a minimum of daily physical activity.” 1

In a population-based study, Helmerhorst et al. 2 evaluated 376 middle-aged adults (210 women and 166 men) for more than five years. They measured physical activity and time spent in sedentary behavior by heart rate monitoring. They found that time spent in sedentary behavior was predictive of higher concentrations of fasting insulin, regardless of the time spent in moderate and/or vigorous activities. The authors stated, “This highlights the importance of reducing sedentary time in order to improve metabolic health, possi-

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**Table. The International Diabetes Federation Consensus Worldwide Definition of the Metabolic Syndrome (2006)**

Central obesity (defined as waist circumference# with ethnicity specific values) AND any two of the following:

- Raised triglycerides: > 150 mg/dL (1.7 mmol/L), or specific treatment for this lipid abnormality.
- Reduced HDL cholesterol: < 40 mg/dL (1.03 mmol/L) in males, < 50 mg/dL (1.29 mmol/L) in females, or specific treatment for this lipid abnormality.
- Raised blood pressure: systolic BP > 130 or diastolic BP > 85 mm Hg, or treatment of previously diagnosed hypertension.
- Raised fasting plasma glucose: (FPG) > 100 mg/dL (5.6 mmol/L), or previously diagnosed type 2 diabetes. If FPG > 5.6 mmol/L or 100 mg/dL, OGTT Glucose tolerance test is strongly recommended but is not necessary to define presence of the Syndrome.

# If BMI is > 30 kg/m², central obesity can be assumed and waist circumference does not need to be measured.

Taken from: http://www.idf.org/webdata/docs/IDF_Meta_def_final.pdf (2006 publication)
bly in addition to the benefits associated with a physically active lifestyle. Though the benefits of exercising daily far outweigh the risks of not exercising; however, the point of this research is to emphasize more activity during the day, outside of the planned exercise activity, which is especially important for people with sedentary jobs.

Therefore, taking the stairs, parking farther away from buildings, sitting on a balance ball while on the computer are all important ways to increase activity throughout the day and may further protect against chronic disease. Meyer et al. examined the effect of stair use instead of elevator use in the workplace. They conducted a 12-week promotional campaign for stair use in a university hospital setting. They reported that, during the intervention, stair use increased significantly compared to baseline stair use. At the end of the intervention, maximal aerobic capacity also significantly increased by about 9%. Furthermore, they reported significant decreases in body weight, fat mass, waist circumference, diastolic blood pressure, and low-density lipoprotein cholesterol. Although these changes occurred in individuals who were previously sedentary, the benefits of being active throughout the day, even if a person exercises regularly, may diminish the negative changes seen in insulin sensitivity reported by others.

Multiple Bouts of Exercise Can Play a Key Role

There has been strong evidence that exercising in multiple bouts throughout the day is equally as effective for both cardiorespiratory fitness and weight loss. Although multiple bouts of planned activity throughout the day may be convenient for some individuals, they may not work for others. Nonetheless, informal bouts of different types of activity throughout the day (such as those previously mentioned), may help to further improve cardiorespiratory fitness in a fit person, decrease risk of obesity and overweight, and prevent insulin resistance.

Summary

It has been well established that regular exercise can prevent chronic disease and improve the quality of life. It also has been established that performing planned daily exercise is important for maintaining fitness. Although regular exercise is important, and individuals who exercise regularly should be commended, those individuals who exercise regularly and who have primarily sedentary jobs should include unplanned physical activity throughout the day. Simply using the stairs each day can further improve cardiovascular fitness and decrease the risk of insulin resistance.

About the Author

Stella Lucia Volpe, Ph.D., R.D., L.D.N., FACSM, is professor and Chair of the Department of Nutrition at Drexel University, Philadelphia, PA. She is a member of the Gatorade Sports Science Institute Network. Her degrees are in both Nutrition and Exercise Physiology, and she also is ACSM Exercise Specialist® certified. Dr. Volpe’s research focuses on obesity and diabetes prevention, using traditional interventions, mineral supplementation, and more recently, by altering the environment, to result in greater physical activity and healthy eating. Dr. Volpe is an associate editor of ACSM’s Health & Fitness Journal®.

Helpful Web sites

American Diabetes Association: http://www.diabetes.org/
American Heart Association: http://www.heart.org/HEARTORG/

References

WOMEN’S HEALTH:
THE BEST STRENGTH TRAINING PROGRAM FOR OSTEOPOROSIS PREVENTION

BY LAUVE METCALFE, M.S., FAWHP

Women achieve peak bone mass in their 20s, and then begin to lose bone with the process accelerating at the onset of menopause. While most will not experience a hip or vertebrae fracture, many may develop low bone mineral density and be at risk for osteopenia or osteoporosis before the onset of menopause. Establishing an exercise program for adult women that addresses osteoporosis can slow down bone loss and reduce the loss of muscle mass over time.

Osteoporosis is a significant health problem in the United States. More than 25 million people are affected, most of whom (80%) are women. Women who are not receiving hormone replacement therapy, are not consuming adequate amounts of calcium, and are inactive can lose 20% to 30% of their peak bone mass between 40 and 70 years of age. As a result, women have a 40% fracture risk throughout their lifetime, with more than 1.5 million fractures per year attributed to osteoporosis. According to the U.S. National Women's Health Resource Center, 59% of women over age 40 have not talked with their physician about bone health or have had a bone mineral density scan.

The BEST Strength Training Program

With this important public health issue, is it possible to develop an exercise program for sedentary postmenopausal women that could improve bone health and prevent osteoporosis? Would these same women engage in a vigorous strength training program three times a week for a year? Would this program make a significant difference beyond bone health in their lives?

These were the fundamental questions that a research team at the University of Arizona considered in the development of the Bone, Estrogen, and Strength Training (BEST) study. The BEST study began in 1995 to examine how strength-training exercise affects changes in bone density in two groups of postmenopausal women: those on hormone therapy and those who were not.

BEST Study objectives

Many of the recommendations to prevent bone loss encourage weight-bearing exercises such as walking, but the value of strength training is often overlooked. Previous research focusing on strength training with postmenopausal women found that bone mass can be significantly increased by a regimen that uses high load, low repetition (6-8 reps) versus low-load, high-repetition (20 reps) resistance exercises.

The BEST exercise program’s main objective was to explore a high-load, low repetition approach in strength training. Considerations underlying the development of the BEST exercise program were to:

- promote exercise at an intensity sufficient to elicit an increase in bone mineral density (BMD) in the hip and lumbar spine
- select exercises specifically designed for function and mobility
- counter the changes in the curvature of the spine and posture of the body that occur with aging (i.e., lordosis)
- develop the small muscle groups of the back that are used for stability, spinal support and posture
- exclude exercises that are counterproductive to maintaining a healthy posture and that put participants at risk for fracture (for example the chest press which pulls the shoulders forward).

During the first year, 266 Tucson, Arizona-area women ranging in age from 45 to 65, who were 3 to 10 years postmenopausal, were recruited. The participants were, sedentary, non-smokers, with no history of bone fractures or osteoporosis. All participants took Citracal® calcium citrate supplements twice daily to provide a total 800 mg of calcium. Women were randomized to either an exercise group or a non-exercise control group. Of the 177 women randomized to exercise who underwent baseline measurements, 142 completed the one-year study period (80% retention).

Participants randomized to the exercise intervention were asked to attend training sessions three days per week, on non-consecutive days, in one of four community facilities under the supervision of study on-site trainers. Sessions lasted 60 minutes and included stretching, balance, weight-bearing activities (steps with weighted vests for warm-up or treadmill walking using weighted vests), and weightlifting. Exercise frequency, weightlifting loads, sets and repetitions, steps with weighted vests, and minutes of aerobic activity were recorded in exercise logs that were monitored regularly by on-site trainers. The participant-to-trainer ratio was five-to-one in the first year. Supervision was reduced during the second year, and in the third and fourth years, trainers were available at each facility once per week. After the fourth year participants were exercising on their own or in small self-selected groups and trainer visits were scheduled bi-monthly.

Weightlifting was done using free weights and machines. Six core exercises focused on major muscle groups with attachments on or near BMD measurement sites. These exercises included the seated leg press, lat (latisimus dorsi) pull down, seated row, back extension, one-arm military press (right and left), and squats (wall squats initially, progressing to Smith or hack squats).

Core BEST strength exercises:

- seated leg press
- seated row
- back extension to the Smith squat
- lat pulldown
- one-armed military press
- wall squat, progressing to the Smith squat

Women completed two sets of six to eight repetitions (four to six repetitions for the military press to decrease injury to the shoulder) at 70% (two days per week) or 80% (one day per week) of the one-rep-
petition maximum (1-RM), determined by monthly testing. Repetition maximums were recomputed every six-weeks to adjust loads and offer an opportunity to set goals for the next training period. A detailed description of the exercise program can be found elsewhere.

**What BEST researchers found**

After 12 months, strength training exercises combined with calcium supplementation, significantly improved bone mineral density at skeletal sites at risk for osteoporotic fractures in postmenopausal women. Women taking hormone therapy were most successful at maintaining or increasing BMD, although exercise without hormone therapy also showed positive results.

Four-year data showed that women who supplemented with 800mg of calcium daily showed greater improvement than those who consumed less calcium. Participants with higher attendance showed greater improvement than less frequent exercisers, suggesting a dose-response relationship. Those exercisers that attended more exercise sessions and lifted more weight were those that increased their BMD the most, from 1 to 2%.

Muscle strength improved by 28% to 67% from baseline in women who exercised and used hormone replacement therapy and 25% to 75% in women who exercised without using hormone replacement therapy (see Table). Increases in muscle strength with exercise were statistically significant for exercisers in both groups.

We also compared women who were lifting weights consistently over four years with those who were less consistent. We divided the BEST women into three groups based on their overall weight lifted using the military press as a measure of exercise compliance (see Figures 1 and 2). We found for both femur trochanter and lumbar spine that those who lifted more weight over four years had significantly greater change in bone mineral density.

Six-year data supported the use of regular strength training as a viable long-term method to prevent weight gain. In fact, an average of training just one to two days per week for six years was enough to maintain body weight in comparison to weight gain seen among controls.

**Intervention Support Programs**

The BEST intervention support program was based on social cognitive/social ecological theory constructs and encompassed a variety of interpersonal, intrapersonal, and environmental reinforcement strategies to motivate participants and promote high levels of retention. Goals of the support programs were to create a fun, social environment and to challenge participants to improve daily exercise performance. Participation was based on individual improvement rather than competition among participants. Some examples of the intervention support programs included: orientation workshops, monthly newsletters, Personal Best testing every two months to monitor progress, yearly evaluation results, goal setting logs, personal contracts, motivational meals scheduled every two months, and two major promotional events each year held in January/February and over the summer months at the exercise facilities or at community parks.

The investigators observed strong social benefits related to participating in the exercise program over time. Anecdotal testimonies from the BEST women conveyed the value of the program as a “confidence builder” for life, not just related to their concern of osteoporosis. The participants who have continued with the program and are well into their tenth year of exercise, and are 70+ years of age state that they are emotionally and mentally more resilient to handle whatever life circumstance comes their way. They also have created a remarkable bond with one another and unanimously feel that their exercise program has enriched their lives and given them back their vitality.

**Conclusions**

BEST researchers concluded that the participants who maintained bone density with greater effects were those who lifted weights two or more times per week. Over the four years we found that calcium intake, exercise, and hormone therapy all affected BMD change.

The BEST program was designed as an osteoporosis prevention program, not a program for women with osteoporosis. It is recommended to have the supervision of a trainer who is well versed in the principles of safely exercising with high loads and low repetitions to introduce a

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Table. Changes in Muscle Strength Assessed by 1-Rm in Exercise Groups

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<thead>
<tr>
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<th>EA HR (n = 71)</th>
<th>EA 76 (n = 73)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline*</td>
<td>12 Months*</td>
</tr>
<tr>
<td>Log Press</td>
<td>269±76</td>
<td>420±103</td>
</tr>
<tr>
<td>Lat Pulldown</td>
<td>95±18</td>
<td>121±38</td>
</tr>
<tr>
<td>Seated Row</td>
<td>80±12</td>
<td>101±17</td>
</tr>
<tr>
<td>One Arm Mil Press</td>
<td>20±4</td>
<td>27±6</td>
</tr>
<tr>
<td>Back Extension</td>
<td>119±27</td>
<td>170±35</td>
</tr>
</tbody>
</table>

*Significant differences are indicated by %.
Body intelligence is about how aware you are of your body (body awareness), what you know about your body (body knowledge), and what you actually do for and with your body (body engagement). This concept may sound new, but it is central to the work of fitness and wellness professionals, as well as to your self-care.

**Body Awareness**

Awareness is about being tuned into your body and its signals. It is about being awake to how your body “speaks” to you and what it is telling you, in a whisper or up to a yell. We often have many physical sensations that we ignore and hope will go away. Being conscious of the impacts that certain foods, physical practices, or internal and external stressors have on your body allows you to learn about what promotes health and vitality, and to make adjustments in the moment.

The greater your body awareness, the more you are in control of bodily outcomes. Being attuned to the effects of that first cup of coffee gives you a base for choosing or refusing a second cup. Mindfulness, reflection, experimenting, and learning are important paths forward to greater body awareness. Body awareness questions include:
1. When does your body feel good? Not so good? What do you attribute this to?
2. What are the best and worst you have ever felt physically? How do you think this came about?
3. How do you know something is wrong with your body? What signals do you interpret?

Ways to improve body awareness include body scans throughout our days. Journaling and meditation are wonderful aids as are “stop-and-notice” practices. Cause-effect reflections involve noticing how you are feeling (good or bad) and reflecting on possible influences.

**Body Knowledge**

Body knowledge is akin to what scientists call “health literacy.” How much do you know about accepted evidence-based standards and guidelines for healthy bodily functioning? Knowing scientific facts is an important part of health literacy, along with an understanding of the actions needed to diagnose and treat physical concerns.

But that is not enough, it is important to know our markers for health such as weight, blood pressure, cholesterol, and blood levels of vitamin D and B12. We also need to know about what our bodies need to make us healthy and increase vitality, what supports our bodies to thrive, including habits of exercise, cooking, and eating, relaxation and recharge, sleep, and stress management.

Body knowledge questions include:
1. What do you think you have to know about your body to take good care of it?
2. What is your pattern of checking in with health professionals for checkups, issues, or concerns?
3. What do you know about healthy lifestyles and what is your formula? What should you eat and when? How should you exercise? How should you sleep, recharge, and de-stress?
4. What is your relationship to alcohol, drugs, cigarettes, caffeine, and other addictive substances, and what would you like it to be?

**Body Engagement**

Even with high levels of body awareness and knowledge, engagement does not come easily. Engagement is about doing the best thing repeatedly until you need to switch to the next best thing. Engagement is commitment to intelligent action based on what you need at this point in your life. How can you configure your life so that your body fully supports your work in the world?

Habits are hard to break and build and that is why the industry of professional health and wellness coaching is being developed. Change that lasts requires a solid foundation of self-motivation and self-efficacy to support our stretching beyond our comfort zones and experimenting with new habits. New habits are not just about engaging in healthy behaviors, but engaging in regular activities to bring body awareness to top of mind. Body engagement questions include:
1. What habits do you engage in consistently that make your body feel better?
2. How do you experiment when you are developing a new habit?
3. What works best for you when you are developing a new habit, for example your approach to setting goals and experimenting?
HEALTH BENEFITS OF EXERCISE

REGULAR RESISTANCE EXERCISE

BY WAYNE L. WESTCOTT, Ph.D.

A new article published in a journal of the American College of Sports Medicine (ACSM) advocates for a public health mandate for resistance exercise. The authors of this well-researched article state that “Compared to aerobic training, resistance training has received far less attention as a prescription for general health. However, resistance training is as effective as aerobic training in lowering risk for cardiovascular disease, diabetes, and other diseases. There is a clear ability of resistance training, in contrast to aerobic training, to promote gains, maintenance or slow the loss of skeletal muscle mass and strength. Thus, as an antiscarcopenic exercise treatment, resistance training is of greater benefit than aerobic training; given the aging of our population, this is of primary importance.”

Numerous studies support the authors’ stance, and the available information indicates a strong relationship between strength training and general health. Baechle and Westcott identified a dozen research-based reasons why adults and older adults should perform regular resistance exercise from a health perspective. These are to: (1) maintain/increase muscle mass; (2) reduce fat weight; (3) maintain/increase resting metabolic rate; (4) enhance insulin sensitivity and glucose utilization; (5) increase gastrointestinal transit speed; (6) reduce resting systolic and diastolic blood pressure; (7) improve blood lipid profiles; (8) increase bone density; (9) decrease lower back discomfort; (10) reduce arthritic pain; (11) enhance self-confidence and relieve depression; and (12) improve post-coronary performance.

Although research studies clearly confirm all of these health-related reasons for performing resistance exercise, the strength training benefit of reduced resting blood pressure is undoubtedly the most misunderstood. Many people, including some fitness professionals and medical professionals, have a misconception that resistance exercise elevates resting blood pressure. Consequently, men and women with modest blood pressure concerns, who have much to gain from a well-designed strength training program, may be mistakenly advised to avoid this important physical activity. It would therefore seem well-advised to further examine the effects of resistance training on exercise blood pressure and resting blood pressure.

First, it is true that strength training elevates systolic blood pressure during the exercise set. A 1982 study by Westcott and Howes revealed that systolic blood pressure increases progressively (repetition by repetition) during an exercise set to fatigue using the 10 repetition maximum weight load (10 RM). However, the highest systolic blood pressure readings, recorded during the final repetition of each set, were similar to those attained during an aerobic activity. On average, the subjects’ systolic blood pressure increased 34% (123 mmHg to 165 mmHg) during a 10 RM set of dumbbell curls, which was the same percent elevation that they attained and maintained during a 20-minute bout of stationary cycling at approximately 75% of their maximum heart rate. In a follow-up study, performing 10RM leg presses resulted in higher systolic blood pressure responses, most likely due to the greater muscle mass involved in this exercise. On average the subjects’ systolic blood pressure increased 50% (127 mmHg to 190 mmHg) during the exercise set. In both resistance exercises, the mean peak systolic blood pressure was below the 250 mmHg ceiling level for exercise-related systolic blood pressure recommended by the ACSM. Because intense strength training with heavy weights has been shown to raise blood pressure above 250 mmHg, standard resistance exercise should be performed with moderate loads, proper technique and continuous breathing.

Although resistance exercise temporarily elevates blood pressure during an exercise set, it does not result in higher resting blood pressure levels following a properly designed program of strength training. In fact, a meta-analysis of research on resistance exercise and blood pressure indicated an average 3% reduction in systolic pressure and a 4% reduction in diastolic pressure after several weeks of strength training. Strength training appears to be as effective as endurance exercise for reducing resting blood pressure, and a combination of strength and endurance exercise has demonstrated significant decreases in resting systolic and diastolic readings. In a 10-week study, more than 1,600 participants who performed 20 minutes of strength training and 20 minutes of endurance exercise, two or three days a week, experienced a 4 mmHg reduction in resting systolic blood pressure and a 2 mmHg reduction in resting diastolic blood pressure.

Contrary to the incorrect assumption that resistance exercise increases resting blood pressure, properly performed strength training actually decreases resting blood pressure. Adults and older adults who understand this fact are less likely to avoid this productive physical activity which provides many more health benefits.

In addition to attaining lower blood pressure readings, strength training participants may experience other physiological adaptations that enhance cardiovascular health. These may include improved blood lipid profiles and lower risk of metabolic syndrome.

According to Braith and Stewart, when taken together these beneficial responses to strength training may provide significant risk reduction for cardiovascular disease.

One of the more remarkable resistance exercise research findings is the positive effect of circuit strength training on muscle mitochondrial content and oxidative capacity. Mitochondria serve as the powerhouse of each muscle cell, but aging is associated with genetic changes that impair mitochondrial function with respect to energy...
production and muscle performance. In the study by Melov and associates, older adults (mean age 70 years) who performed six months of resistance exercise (10 exercises, progressing from 1 to 3 sets of 10 repetitions each, 2 x wk) experienced reversal of gene expression in 179 genes related to age and exercise, resulting in mitochondrial characteristics closer to those of moderately active young adults (mean age 21 years). This demonstration of strength training actually reversing mitochondrial dysfunction would seem to be a compelling reason for older adults to perform resistance exercise.

Finally, with an essentially out of control obesity epidemic, a recently published research study that reveals muscular strength is inversely related to prevalence and incidence of obesity in adult men. This demonstration of strength training actually reversing mitochondrial dysfunction would seem to be a compelling reason for older adults to perform resistance exercise.

It would appear that resistance exercise provides many physiological adaptations that, in addition to increasing muscle strength, endurance and mass, may have a positive impact on a variety of fitness and health factors. With a better understanding of the wide range of physical benefits associated with standard strength training, fitness professionals may be more successful in encouraging participation in this essential exercise activity.

**About the Author**

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**References**

THE RISE OF THE CLINICAL EXERCISE PHYSIOLOGIST

HERE TO STAY

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

The term “Exercise Physiologist” did not exist before the 1970s with respect to the job title of a health care worker. The early pioneers of exercise physiology sought to define the exercise physiologist as someone who was a “doctoral-level research scientist,” thus paying respect to the term “physiologist” as one who aspires to become an independent researcher.

Early pioneers of exercise physiology trained physical educators to use information from the exercise physiology curriculum to assist patients with heart disease to achieve improved functional capacity. Foster also stated that it was the initial ACSM Guidelines for Graded Exercise Testing and Prescription, published in 1975, that launched the profession of clinical exercise physiology (CEP). Since those early days the definition has evolved. Today an exercise physiologist is typically defined as a person who has an academic degree in exercise physiology or a related title (e.g., exercise science, kinesiology), who is able to provide exercise testing and training expertise for individuals, who understands the acute and chronic response to exercise, and who has the ability to assess both adaptation and maladaptation to an exercise stimulus. In the early days of the profession the primary focus was to assist patients with cardiac disease resume normal daily function. Through the 1980s and 1990s the scope of practice widened to include patients with pulmonary diseases and those with a variety of metabolic disordered diseases including obesity, hypertension, lipid disorders, and glucose intolerance. During this period the exercise physiologist was becoming a true clinical practitioner.

Leading the way, ACSM developed a definition of a “Clinical Exercise Physiologist” in the 1990s. This definition built upon the ACSM Clinical Exercise Specialist (CES) certification, which was initiated in the mid-1970s, and was developed in response to the growth of cardiac rehabilitation as a treatment option for patients with heart disease. As these professionals expanded to begin work with the pulmonary and metabolic diseased populations, the field of CEP began to emerge as an accepted allied health profession. What followed was the development of a scope of practice that included the knowledge and skills (KSs) necessary to perform required job duties of someone working in the CEP field. By the late 1990’s the Registry of Clinical Exercise Physiologist was developed by the ACSM. The goal of this registry was to develop a credential to ensure that minimally competent individuals are available to provide exercise management for patients with a broad spectrum of chronic diseases or disabilities. Since 1999, over 750 individuals have been certified as a Registered Clinical Exercise Physiologist (RCEP). The RCEP credentialing committee oversees certification renewals and performs regular reassessments of the profession to ensure adequate certification examinations.

In the past there has been criticism of the CEP vocation, stating that CEP is not an allied health profession. These arguments include: 1) CEP does not have a defined academic program similar to physical therapy or nursing, 2) CEP does not limit who can sit for certification and registry exams, and 3) CEPs are not sanctioned by law to practice (i.e., licensure). The past 10 years have brought developments that have addressed these issues. Academic programs have been refined and many universities have developed specific curriculums for clinical exercise physiology. The ACSM RCEP examination limits those sitting for the exam to have a master’s degree in exercise science, exercise physiology, or kinesiology. And beginning in 2011 the CES certification will limit examinees to those with a bachelor’s degree in one of the stated exercise curricula. Finally, there is ongoing action in many states to work toward state licensure of clinical exercise professionals.

As the profession progresses it is important to consider several items that are central to both the profession and the professional.

1. First the issue of licensure for the CEP continues to be pressed in multiple states. To date only Louisiana has passed a CEP licensure bill, but recently states such as Massachusetts, North Carolina, and Utah have either begun discussion toward licensure or have developed bills that have been or will be presented to state legislatures. These are important steps in the profession. These attempts must be made on a state-by-state basis and not all states have solid groups willing to move the process forward. Depending upon the level of support or opposition by other allied health groups within a state the road to licensure can be long and difficult. And not all states or clinical exercise physiologists agree that licensure is the best way to go. What licensure will not do is guarantee that the CEP will become an accepted allied health professional and able to bill for his/her services; nor will it directly affect salaries. However, it may help to develop the profession beyond its current restraints and open the door to allow the public to be under the guidance of qualified CEPs.

2. Next, a professional organization is vital to the ongoing development of a profession. In 2008 the Clinical Exercise Physiology Association (CEPA) was organized. The goal of CEPA is to assist the profession of CEPs with respect to the development of professional education standards and opportunities, to develop a code of ethics with respect to knowledge and conduct, and to advocate for the CEP at the local, state and national levels.

3. The KSs that a CEP must possess are important to both the CEP and the general public. On a four-year cycle, ACSM performs a job task analysis and role delineation study conducted by the Committee on Certification and Registry Boards (CCRB). This committee is charged with the task of developing the survey and sending it to a representative portion of certified CEPs. Data from the job task analysis is used.
by a working group to reshape the current professional certification examination. Additionally, a role delineation assessment is performed to develop expert opinion on best practices of the practicing CEP. These assessments are used to guide the development of professional certifications and for continuing education opportunities for those wishing to remain certified. The most recent KSs are set to be released by ACSM in 2011.

4. The research body of CEP is becoming more robust and independent of other allied health professions. Today, this body includes plenty of independent studies published in a number of clinical and applied exercise physiology journals, position statements, clinical textbooks, and resource texts that have been directly developed by CEPs.

5. Finally, the pay of any professional is important to those working in a given field. Although few choose CEP as their life’s work to get rich, recent data (currently unpublished) compiled by CEPA is encouraging. The Table provides information about salary ranges based on several points including experience, degree, and certification. There are a couple of important items to consider. In 1996 it was reported that ACSM certification advanced salaries by $2,000 to $3,000 over those not certified (3). As noted in the Table, the CEPA data shows that certified individuals make $7,000 to $8,000 more than those without certification. And the annual salary advantage for those with a master’s degree over a bachelor’s was $5,000 to $6,000 in 1996. Today this difference has increased to about $7,000 to $15,000.

As the profession of CEP continues to develop at a seemingly exponential rate, there are several items that prospective and current professionals should be cognizant of in order to stay abreast of the field and help shape its ongoing development, as well as to stay on top of emerging information:

1. Be aware of any development of the licensure process in your state. And you may wish to become involved in this type of effort as the opportunity presents.

2. Join national and regional professional organizations that advocate for the clinical exercise profession and professional.

3. Obtain updates to the KS statements and role delineation results as developed and released by the ACSM to help guide their certification quest and ongoing renewal.

Joining a group such as CEPA (www.acsm-cepa.org) and ACSM (www.acsm.org) is currently the best way to easily obtain this important information in real-time. This is an exciting time to be in the CEP profession. Don’t be left watching from the outside!

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 is also the Director of the hospital’s Clinical Weight Management Program. He served on ACSM’s Committee of Certification and Registry Board from 2000 to 2010 and was chair of the Clinical Exercise Specialist Committee. He also is the senior editor of the 6th 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.

References

Coaching News continued from page 9

4. What life factors help you engage more consistently in a healthy lifestyle?

5. What new habits do you want to develop as your next step?

Conclusion
It is time to consider body intelligence as an important domain for your personal development as a fitness and wellness professional, allowing you to thrive and serve as an inspiring role model for your clients and other important people in your life. What is your body IQ score?

About the Author
Margaret Moore/Coach Meg, MBA, 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. She is co-director, Institute of Coaching, at McLean Hospital/ Harvard Medical School. She co-authored the ACSM-endorsed Lippincott, Williams & Wilkins Coaching Psychology Manual, the first coaching textbook in health care. (www.wellcoaches.com • www.instituteofcoaching.org • www.coachmeg.com • coachmeg@wellcoaches.com)

Reference
HEALTH CARE REFORM AND THE CERTIFIED EXERCISE PROFESSIONAL

BY Tom Spring, M.S., CES

Much political, policy, and philosophical discussion in the United States over the past several years has focused on how to fix our health care system. Ongoing debate exists with some advocating for a complete overhaul of the system, while others argue for modest changes and focus on specific aspects of health care delivery and reimbursement. This article explores potential impacts and opportunity health care reform will have on exercise professionals, particularly related to worksite health promotion and disease prevention programs.

As ACSM certified exercise professionals, we are in a unique position to make a distinct difference in the lives and health of our clients and those we serve. Beginning with the initial contact, the potential to minimize preventable disease and manage existing conditions is great. Learning and understanding a client’s history and goals for their exercise program are part of our training and applying sound principles of exercise science and behavior change allows for clear and succinct advice related to exercise and health maintenance. Whether working with an older adult and chronic health issues, or an athlete and improving performance, the ACSM certified professional is positioned to make profound individual differences.

Disease prevention, health maintenance and promotion have never been more important than in our current situation. Nationally, health care costs have risen to over 17% of the Gross Domestic Product (GDP) without a reduction in sight. Annually, health plans across the country are absorbing 5% to 15% increases in health coverage administration, with consumers being asked to pay out of pocket at much higher rates. Health care reform, as presented by our government, attempts to radically change several aspects of reimbursement, universal coverage and payment, pharmaceutical coverage and benefits, and hospital administration overhead expenses. Ultimately for health care reform to be successful, personal health responsibility will become a major focus and underlying requirement, thus underscoring the importance of ACSM and their body of certified professionals.

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Behavior modification to include exercise, nutritional habits, and the importance of ACSM and their body of certified professionals. Becoming a major focus and underlying requirement, thus underscoring health care reform to be successful, personal health responsibility will become a major focus and underlying requirement, thus underscoring the importance of ACSM and their body of certified professionals. Becoming a major focus and underlying requirement, thus underscoring the importance of ACSM and their body of certified professionals. Becoming a major focus and underlying requirement, thus underscoring the importance of ACSM and their body of certified professionals. Becoming a major focus and underlying requirement, thus underscoring the importance of ACSM and their body of certified professionals. Becoming a major focus and underlying requirement, thus underscoring the importance of ACSM and their body of certified professionals. 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SELF-TEST #1 (1 CEC): The following questions are taken from “Assessment and Management of Clients with Obesity” published on page 3.

1. Which of the following have most health profession organizations adopted as an overall measure or indicator of obesity?
   a. Percent body fat.  b. Waist circumference.  c. Waist-to-hip ratio.  d. BMI.
2. The optimal management of clients or patients at risk of cardiovascular and metabolic disease requires the assessment of ________.
   a.modifiable risk factors  b. unmodifiable risk factors  c. genetic markers for the disease  d. the metabolic syndrome  e. all of the above
3. The exercise prescription for a client or patient with increased BMI, waist circumference, and waist-to-hip ratio values should or may ________.
   a. at least meet the guidelines for minimal amounts of physical activity  b. adhere to the exercise guidelines for weight loss  c. adhere to the exercise guidelines for the metabolic syndrome  d. adhere to the exercise guidelines for hypertension and diabetes  e. all of the above
4. Which of the following are used as measures of central adiposity?
   a. Waist circumference and waist-to-hip ratio  b. BMI  c. BMI  d. BMI and %BF.
5. You estimate the percent body fat of a client or patient to be 21% using a method that has a SEE of 4 %BF. What would you expect (with 95% confidence) the %BF from a criterion method to be?

SELF-TEST #2 (1 CEC): The following questions are taken from “Insulin Resistance – Not just for people with diabetes!” published on page 5.

1. Insulin resistance means ________.
   a. high blood glucose levels  b. high blood insulin levels  c. inability for insulin to bring glucose into the cells  d. all of the above
2. The metabolic syndrome is not solely characterized by central obesity.
   True  False
3. Bed rest was shown to change the genes involved in ________ and ________.
   a. insulin resistance and diabetes  b. insulin resistance and cardiovascular disease  c. diabetes and cancer  d. none of the above
4. Multiple bouts of physical activity led to ________ and ________.
   a. increased body weight and healthier eating  b. weight loss and cardiorespiratory fitness  c. weight loss and muscle hypertrophy  d. none of the above
5. Incorporated unplanned exercise within a day, even when a person has completed planned exercise, is important for overall health.
   True  False

SELF-TEST #3 (1 CEC): The following questions are taken from “Women’s Health: The BEST Strength Training Program for Osteoporosis Prevention” published on page 7.

1. One of the primary objectives of the BEST exercises was to promote exercise at an intensity sufficient to elicite an increase in bone mineral density (BMD) in the hip and lumbar spine.
   True  False
2. The six core BEST exercises are:
   a. leg press, chest press, squat, seated row, lat pulldown, leg extension
   b. lat pull down, lunges, seated row, one arm military press, crunches, chest press
   c. seated row, one arm military press, squat, lat pull down, leg extensions, leg curls
   d. leg press, lat pull down, squat, one arm military press, seated row, back extension
3. A major principle of the BEST exercise program was that bone mass can be significantly increased by a regimen that uses low-load, high-repetition (20 reps) resistance versus high load, low repetition (six-eight reps).
   True  False
4. Some examples of the intervention support program include:
   a. monthly newsletters, goal setting logs, motivational meals, yearly evaluation results
   b. two major promotional events, personal contracts, Personal Best testing, orientation workshops
   c. competition among participants, all you can eat buffets, personal contracts, paying cash for exercising
d. a and b
5. The participants who maintained bone density with greater effects were those who lifted weights two or more times per week.
   True  False

SELF-TEST #4 (1 CEC): The following questions were taken from “Health Care Reform and the Certified Exercise Professional” published in this issue on page 14.

1. What percentage of the Gross Domestic Product is spent on health care?
   a. 12%  b. 50%  c. 17%  d. 6%
2. The health care reform bill is called the:
3. How many medical fitness centers exist today?
   a. 2,100  b. 1,100  c. 100  d. 3,100
4. Government agencies being formed to examine prevention programs have been appropriated funds to support efforts at this level:
   a. $500  b. $500 thousand  c. $200 million  d. $500 million
5. The following ACSM certified individuals will benefit from a governmental focus on workforce wellness and disease prevention:
   a. CPT  b. HHFS  c. CES & RCEP  d. PAPHS  e. All of these

To receive credit, circle the best answer for each question, check your answers against the answer key on page 2, and mail this entire page with check or money order payable in U.S. dollars to: American College of Sports Medicine, Dept 6022, Carol Stream, IL 60122-6022

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Health Care Reform continued from page 14

The ACSM certified professional is extremely well positioned to become involved in health promotion, disease prevention, and advocacy for healthier communities and a more fiscally stable nation.

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REFERENCES