



Muscular conditioning for active-aging athletes





Read on to learn training principles and exercise recommendations for conditioning age 50-plus sports enthusiasts

by Wayne L. Westcott, PhD, CSCS

Do you remember when you were in elementary school, sitting for hours in the classroom and then running outside for recess? You didn't warm up; you just ran as fast as you could playing tag and other stop-and-go games. If you're reading this article, however, those days are long gone. And a warm-up period may be the most important aspect of your activity sessions today.

Equally essential as a warm-up for older sports enthusiasts is a qualitative conditioning program, to ensure that the musculoskeletal system (muscles, bones, tendons, ligaments and connective tissue) is well prepared for the rigors of competitive physical activity. Because everything your clients do requires a certain percentage of their maximum muscle strength, stronger muscles enable them to perform at a higher level.

Consider a study my colleagues and I did with 77 senior golfers who wanted to hit longer golf drives.¹ After just 8 weeks of standard strength training (12 weight-stack machines) and flexibility exercise (6 static stretches), these individuals significantly increased their driving power (6% greater club head speed at ball contact).

Because the senior golfers had not previously engaged in strength training, they performed an overall muscular conditioning program that addressed all major muscle groups, as presented in Table 1 on page 50. The 13 exercises were performed for one set of 8–12 repetitions each in order from larger to smaller muscle groups, to ensure balanced muscular development and to enhance:

- power production (legs)
- force transfer (core)
- swing action (upper body)
- club control (arms)
- head stability (neck)

In addition to improving the participants' driving power, the general strength-training program increased their golfing duration (number of holes per day) and golfing frequency (number of days per week). Perhaps most importantly, none of the golfers reported an injury throughout the entire playing season.

This study was limited to a basic and brief strength-training program using weight-stack machines. It may benefit older-adult athletes even more if you add more challenging exercises to their workouts as they become more physically fit. To do this, I recommend you use a pyramid approach to training.

A training hierarchy

Basic resistance machine exercises form the base of my sports conditioning pyramid (see Figure 1 on page 47). A standard machine circuit provides structural support and fixed movement patterns for previously untrained men and women, who are typically unfamiliar with resistance exercise. In addition to increasing driving power by 6%, our machine-trained golfers gained 3.9 lbs. of lean (muscle) weight, lost 4.1 lbs. of fat weight, increased leg strength by 56%, and reduced mean resting blood pressure by 4.5 mmHg after 2 months of training 25 minutes, 3 days per week.¹ Clearly, machine strength training can be highly effective for increasing muscle mass, muscle strength and performance power in older-adult athletes.

The next level in my sports conditioning pyramid features free-weight exercises, which work the major muscle groups with more involvement of assisting muscles, particularly in the core musculature. Basic free-weight exercises should pre-



The first level of the sports conditioning pyramid involves standard resistance machine exercises, such as the leg press. Model: Claudia Westcott

cede sport-specific functional training, as they are more productive for developing strength in both the target muscles and the core muscles.

It is important for clients to attain a relatively high level of strength before they attempt more challenging functional training, and stable exercises are best for building muscle strength. For example, in a study by Behm et al.,² a stable leg extension exercise provided about 70% more quadriceps (front thigh) force production than an unstable leg extension exercise. Similarly, in a study by Santana et al.,³ participants could perform a supported chest press with 95% of their body weight, yet an unsupported chest press with only 40% of their body weight. With respect to core muscle activation, a study by Hamlyn et al.⁴ revealed significantly more involvement of the low back muscles in standard squat and dead lift exercises compared to the 2 highest-performing functional training exercises (sidebridge and superman).

My preferred free-weight exercises include:

- squats
- bench presses
- bent rows
- shoulder presses
- back (lateral) pulldowns
- triceps pressdowns
- biceps curls
- shoulder shrugs

Continued on page 46



Muscular conditioning for active-aging athletes

Continued from page 43



Free-weight exercises, including the dumbbell squat, are the second level in the hierarchy of training. Model: Dick Raymond

Dumbbell training reduces injury risk, requires greater coordination, and activates more assisting muscles than barbell training, but both types of free-weight exercise are effective for developing strength in active older adults.

Finally, the highest level in the progressively more challenging conditioning pyramid involves a variety of functional training exercises. This training can further improve your clients' balance and power, as well as further reduce their injury potential.

Functional training elements

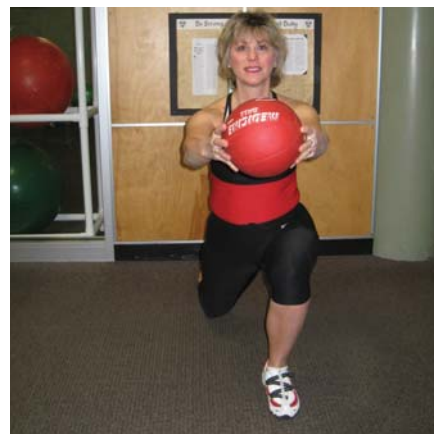
To perform balance work, one element of functional training, individuals can use equipment that lessens body stability, such as Swiss balls, Bosu hemispheres, and wobble boards. Some of these tools can also extend movement range. For example, trunk curls performed on a Swiss ball provide twice as much flexion range—in this exercise, moving the ribcage closer to the hips—as those done on a floor mat.

Power is the most critical component for success in most sports, and power maintenance/development is the major concern for aging adults. Sedentary aging results in muscle loss, but the rate of

atrophy is much higher in the fast-twitch (power) muscle fibers than in the slow-twitch (endurance) muscle fibers. Researcher Joseph Signorile, PhD, at the University of Miami–Coral Gables, has determined that aging adults lose muscle power twice as fast as they lose muscle strength.⁵ Because muscle power is the product of muscle strength (force) times movement speed (velocity), a conditioning program should include some training activities that address both power components.

It is inadvisable for older adults to perform fast movements with free weights and weight-stack machines due to high levels of joint stress in the acceleration phase (overcoming inertia) and the deceleration phase (overcoming momentum). Medicine ball exercises largely eliminate these problems, however, by using lighter objects (2–20 lb. medballs) and releasing the ball at the movement's end (requiring deceleration of body parts only). Our preliminary study of medicine ball training has shown that participants experience more than twice the power improvement when we add 10 minutes of medball throws to our standard 25-minute weight-stack machine workout.

Another essential aspect of functional training exercises is injury risk reduction. Athletes in every sport are plagued by certain injuries due to the muscle overuse and imbalance inherent in its repeated performance (e.g., runner's knee, swimmer's shoulder, tennis elbow). Part of the functional training program should focus on the muscles and joint structures that seem most susceptible to injury in a participant's sport. For example, in the tennis conditioning article published previously in the *Journal on Active Aging*,⁶ I recommended 2 exercises (external shoulder rotation and internal shoulder rotation) to lessen the likelihood of shoulder rotator cuff injuries, and two exercises (wrist flexion and wrist extension) to reduce the risk of tennis elbow problems. Other examples include full-range knee



In the third level of conditioning, clients can use a variety of equipment to perform functional training, as seen in this medicine ball lunge. Model: Rita LaRosa Loud

extension exercises (in which the leg is extended while seated and the knee joint straightened) to lower the risk of runner's knee, and toe-weighted ankle dorsiflexion exercises (in which the foot is flexed upward towards the leg) to lessen the chance of shin splints.

Sample sports conditioning strength-training protocol

So how can you put all levels of the sports conditioning pyramid into an aging athlete's training program?

Keep in mind that participating in any athletic activity takes a lot of time for skill practice and competitive performance. Consider the time requirements for serious golfers, who practice driving, putting and various shots, as well as play three or more competitive rounds of golf every week. Consider also the body's recovery requirements from these accumulated physical activities.

It is generally advisable to incorporate a time-efficient strength-training program into the already busy schedule of most older athletes. Our large-scale studies (2,776 participants) have shown similar rates of muscle development from 2 and 3 strength workouts per week, so I recommend the less frequent training proto-



Functional training, such as this medicine ball throw, offers the most challenge in the training hierarchy. Model: Dick Raymond

col.^{7,8} Two equally spaced training sessions each week (e.g., Monday and Thursday, Tuesday and Friday, Wednesday and Saturday) should produce excellent results.

During each session, I suggest a total-body, one-hour workout that includes approximately:

- 25 minutes of level 1 exercises (weight-stack machines)
- 20 minutes of level 2 exercises (free weights)
- 15 minutes of level 3 activities (functional training exercises)

Table 2 on page 51 presents a sample strength-training program for older-adult golfers that incorporates the above conditioning recommendations. Your clients who are sports enthusiasts can gain strength as well as other important benefits by performing such multilevel workouts.

Building strength in active-aging athletes

Older-adult athletes need to address the loss of muscle mass and strength that accompanies the aging process by performing a regular program of sensible

strength exercise. One approach to strength-training activities for your clients is the sports conditioning pyramid, which features a base level of standard machine exercises, a second level of basic free-weight exercises, and a third level of specific functional training exercises. When performed properly and consistently, this relatively comprehensive muscle conditioning program should strengthen all major muscle groups. Further, individuals should improve their balance, coordination and power, while increasing their injury protection and performance potential. As a result, your clients may be able to enjoy their favorite sports activities for years to come. ☺

Wayne L. Westcott, PhD, CSCS, is the fitness research director at the South Shore YMCA in Quincy, Massachusetts. Westcott is also the author of 22 books, including Strength Training Past 50 (2nd edition), which was published by Human Kinetics in 2007.

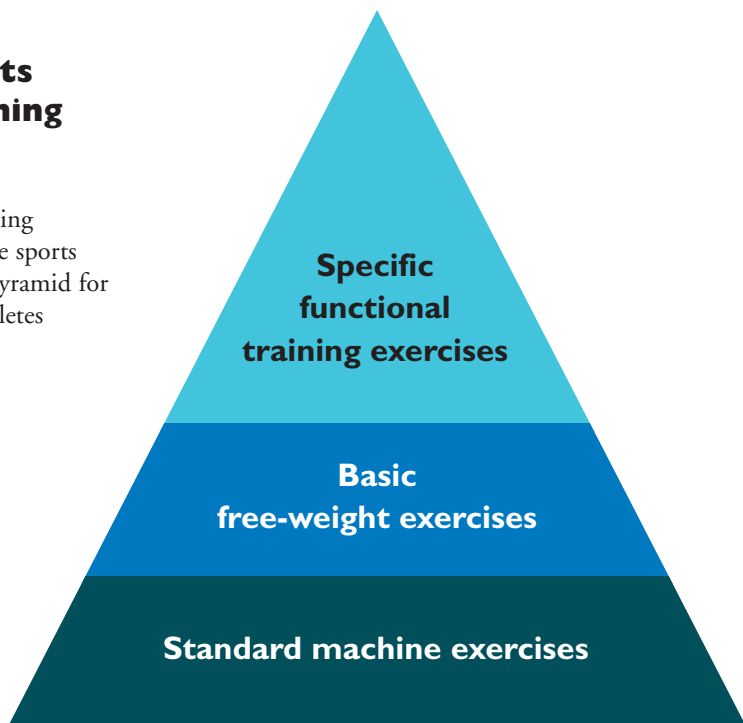
Continued on page 50

More strength conditioning to come

For more from Wayne Westcott, watch for his article about strength conditioning for walkers in the March/April 2008 issue of *Functional U*[®], ICAA's electronic publication on exercise and activity for healthy aging. *Functional U* is available online in the members only section of the ICAA website, www.icaa.cc. To learn more about this publication, call ICAA toll-free at 866-335-9777.

The sports conditioning pyramid

Figure 1. Training hierarchy in the sports conditioning pyramid for older-adult athletes





Muscular conditioning for active-aging athletes

Continued from page 47

Acknowledgements

The author appreciates the assistance of Susan Stoddard, Rita LaRosa Loud and Tammy Petersen in the preparation of this manuscript.

Thanks also go to models Claudia Westcott, 55; Dick Raymond, 57; and Rita LaRosa Loud, 53, who appear in the accompanying photographs.

References

- Westcott, W., Dolan, F., & Cavicchi, T. (1996). Golf and strength training are compatible activities. *Journal of Strength and Conditioning*, 18(4), 54–56.
- Behm, D., Anderson, K., & Curnew, S. (2002). Muscle force and neuromuscular activation under stable and unstable conditions. *Journal of Strength and Conditioning Research*, 16, 416–422.
- Santana, J., Vera-Garcia, F., & McGill, S. (2007). A kinetic and electromyographic comparison of the standing cable press and bench press. *Journal of Strength and Conditioning Research*, 21(4), 1271–1279.
- Hamlyn, N., Behm, D., & Young, W. (2007). Trunk muscle activation during dynamic weight-training exercises and isometric instability activities. *Journal of Strength and Conditioning Research*, 21(4), 1108–1112.
- Signorile, J. F. (2005). Power training and aging: a practical approach. *Journal on Active Aging*, 4(1), 34–45.
- Westcott, W. (2006). Strengthening active older adults for better tennis, fitness and health. *Journal on Active Aging*, 6(5), 58–66.
- Westcott, W., & Guy, J. (1996). A physical evolution: Sedentary adults see marked improvements in as little as two days a week. *IDEA Today*, 14(9), 58–65.
- Westcott, W., & Winnett, R. (2006). Applying the ACSM guidelines. *Fitness Management*, 22(1), 50–54.

Images courtesy of Wayne L. Westcott

Table 1. Basic strength-training exercises for overall muscle conditioning in active older golfers

Exercise	Muscles	Sets x reps	Effect on golf swing
Leg press	Quadriceps; hamstrings; gluteus maximus	1 x 8–12	Power production
Leg curl	Hamstrings	1 x 8–12	Power production
Leg extension	Quadriceps	1 x 8–12	Power production
Low back extension	Erector spinae	1 x 8–12	Power transfer (lower to upper body)
Abdominal curl	Rectus abdominis	1 x 8–12	Power transfer (lower to upper body)
Torso rotation	Internal obliques; external obliques	1 x 8–12	Power transfer (lower to upper body)
Chest cross	Pectoralis major	1 x 8–12	Swing action
Back pullover	Latissimus dorsi	1 x 8–12	Swing action
Lateral raise	Deltoids	1 x 8–12	Swing action
Arm curl	Biceps	1 x 8–12	Club control
Arm extension	Triceps	1 x 8–12	Club control
Wrist flexion/extension	Forearm flexors; forearm extensors	1 x 8–12	Club control
Neck flexion/extension	Neck flexors; neck extensors	1 x 8–12	Head stability

* Participants should perform each exercise at a moderate movement speed over a full (pain free) movement range. When they can complete 12 repetitions with good technique, increase the weight load by approximately 5%. If time permits, add hip adductions for the inner thigh muscles and hip abductions for the outer thigh muscles, as these are effective for improving lateral stability and side-to-side movements.



Table 2. Sample strength-training program for older-adult golfers

Level 1 exercises – 25 minutes*		Sets x reps
1. Machine leg extension		1 x 8–12
2. Machine leg curl		1 x 8–12
3. Machine hip adduction		1 x 8–12
4. Machine hip abduction		1 x 8–12
5. Machine low back extension		1 x 8–12
6. Machine abdominal curl		1 x 8–12
7. Machine torso rotation		1 x 8–12
8. Machine chest cross		1 x 8–12
9. Machine back pullover		1 x 8–12
10. Machine lateral raise		1 x 8–12
11. Machine arm curl		1 x 8–12
12. Machine arm extension		1 x 8–12
13. Machine neck flexion/extension		1 x 8–12
Level 2 exercises – 20 minutes*		Sets x reps
1. Dumbbell squat		2 x 6–10
2. Dumbbell bench press		2 x 6–10
3. Dumbbell bent row		2 x 6–10
4. Dumbbell shoulder press		2 x 6–10
5. Back pulldown		2 x 6–10
6. Dumbbell shoulder shrug		2 x 6–10
Level 3 exercises – 15 minutes*		Sets x reps
1. Bosu hemisphere body weight squats		1 x 4–8
2. Swiss ball trunk curls		1 x 12–16
3. Swiss ball pushups		1 x 8–12
4. Medicine ball overhand throws		1 x 4–8
5. Medicine ball chest push throws		1 x 4–8
6. Medicine ball underhand throws		1 x 4–8
7. Elastic band shoulder internal rotation		1 x 8–12
8. Elastic band shoulder external rotation		1 x 8–12

* Use a resistance that permits participants to complete the prescribed number of repetitions, except for body weight exercises which may be performed for more repetitions as muscular fitness improves.

Participants should rest approximately one minute between exercises, and between the paired sets of free-weight exercises.