Older Adult Fitness: UNDERSTAND THE

Your facility can benefit from offering exercise programs to older adults, but only if you know the basics about the body and aging. **BY STEPHEN A. BLACK, M.ED., P.T., A.T.C./L., N.S.C.A.-C.P.T.**

WITH A GENERATION of baby boomers approaching retirement, this market can be a boon to the fitness industry. However, the industry must have evidence-based information to appropriately handle the golden years of older adults, and choose to invest in the implementation of this evidence.

Did you know that, every eight minutes, someone turns 50? Over the next 10 years, the 55- to 59-year-old population is expected to increase by 54 percent, and the 60 to 64 age group will increase by 58 percent. By 2020, the number of people in their 40s, 50s and 60s will triple. Older adults comprise a busy and vital group that is looking for more ways to be active. According to the Sporting Goods Manufacturers Association (SGMA), since 1990, the number of health club members ages 55 and older has increased from 1.9 million to a staggering 4.9 million.

We all know that older adults can benefit from strength-training exercises that promote muscular endurance and strength. However, the number of older adults who participate in regular exercise is less than 30 percent, according to a recent study conducted at Indiana University. To effectively, efficiently and safely implement strength and conditioning programs for the older population, you must understand the aging process relative to exercise.

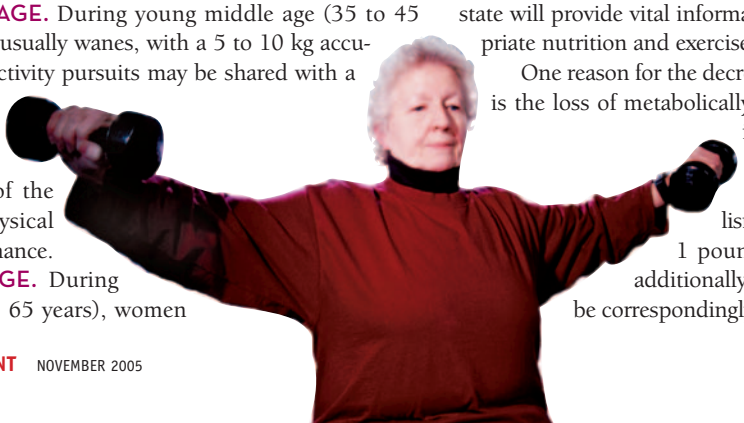
The phenomenon of aging

Atherosclerosis and arteriosclerosis progressively decrease oxygen supply to body tissue. Other tissues change, as well. For example, cross-linkages develop between adjacent collagen fibrils, decreasing their elasticity and facilitating mechanical injury. Keeping these and other factors of aging in mind will allow for the safe development of cardiovascular and musculoskeletal strengthening programs.

Age can be divided into the following classifications:

YOUNG ADULTHOOD. This typically covers the period from 20 to 35 years of age, when both biological function and physical performance reach their peak.

YOUNG MIDDLE AGE. During young middle age (35 to 45 years), physical activity usually wanes, with a 5 to 10 kg accumulation of body fat. Activity pursuits may be shared with a growing family, but it becomes less important to impress either an employer or persons of the opposite sex with physical appearance and performance.



LATER MIDDLE AGE. During later middle age (45 to 65 years), women reach menopause and men substantially reduce their output of sex hormones. This gives rise to the potential onset of osteoporosis or osteopenia. One in eight men over age 50 has osteoporosis. Weight-bearing exercises are critical for this age group and beyond. The good news is that career opportunities have commonly peaked, and a larger disposable income often allows energy and time for recreation and fitness-related activities.

EARLY OLD AGE. In early old age (65 to 75 years), there may be a modest increase of physical activity. (The oldest Ironman finisher to date is 78 years old.)

MIDDLE OLD AGE. During middle old age (75 to 85 years), many people have developed some physical disability, and need additional assistance and expertise in the health club setting.

There are, however, wide individual differences in functional status at any given chronological age. This is why individual testing is essential, and antiquated formulas are obsolete and dangerous. In terms of maximal oxygen intake, muscle strength and flexibility, the best-preserved 65-year-old may out-perform a sedentary 25-year-old.

When assessing fitness in the development of an exercise prescription, decisions should be based on biological, rather than chronological, age. Unfortunately, there are few satisfactory methods of determining a person's biological age, because different biological systems age at differing rates. Attempts to combine such measurements as loss of skin elasticity, a decrease of vital capacity and a decrease in reaction time are best guesses, really. The more appropriate choice is to evaluate these systems and functions individually.

Aging and energy consumption

A major fraction of total daily energy demand arises from resting metabolism. It is, thus, important to note that resting metabolism decreases with aging by about 10 percent from early adulthood to the age of 65, and a further 10 percent subsequently. Establishing resting metabolic rate by assessing O_2 and CO_2 in a resting and fasted state will provide vital information in the development of an appropriate nutrition and exercise plan.

One reason for the decrease in metabolism as people get older is the loss of metabolically active muscle mass and the parallel increase in metabolically inert fat. In later old age, there may also be some overall reduction in cellular metabolism. Contrary to popular belief, for every 1 pound of lean mass only 50 calories are additionally expended per day. Food intake must be correspondingly adjusted if body fat is not to increase

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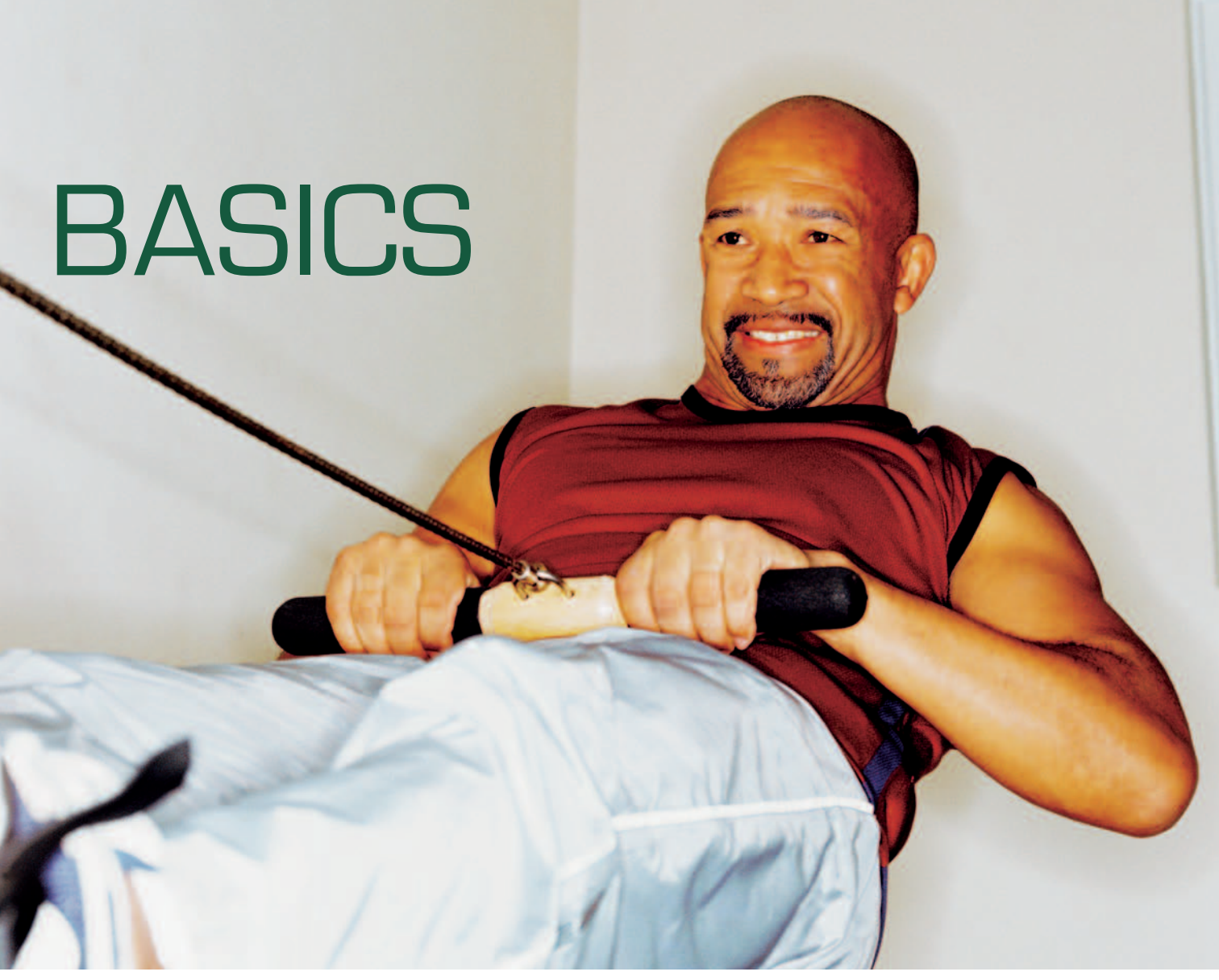

Muscle strength can be greatly improved by as little as eight weeks of resistance training, even in 90-year-old subjects.

further. However, a low total intake of food may fail to satisfy daily requirements of protein and other key nutrients, particularly calcium.

Aging and aerobic performance

Maximal oxygen intake declines by about 5 ml/kg/min. per decade from age 25 to 65 years of age (Shepard, 1987). It is difficult to be certain how much of this loss is inevitable, and the extent to which the decline results from a progressive decrease in physical activity. There have been studies that demonstrate that individuals who become vigorously physically active can sustain an unchanged maximal oxygen intake for many years, but a critical review of the data suggests that once such subjects decrease their overall activity, they resume a relatively normal rate of aging. So, there is credence to the saying "move it or lose it." Keep in mind that even for highly trained athletes who maintain their daily training volume, the rate of decrease of maximal oxygen intake is only a little slower than in the general population. Potential causes of the age-related loss in aerobic power include decreases in maximal heart rate, stroke volume and oxygen transport.

Heart rate

Maximal heart rate decreases mainly because of decreased responsiveness of circulating stimulants and inhibitors. Therefore, using the classic formulas for guessing maximum heart rate are not appropriate for older populations. Formulas tend to overestimate an older individual's max heart rate, and underestimate a younger individual's max heart rate, with the age transition being 30 years of age (Tanaka, 2001). Testing for maximum heart rate is not appropriate unless it is in a laboratory under physician supervision. The preferred methodology is to test for VO_2 and anaerobic threshold (AT). Basing cardiovascular training on a percentage of VO_2, or beats above/below AT, are appropriate and safe ways to improve cardiovascular conditioning.

Appropriate cardiovascular activity promotes energy/fat balance while providing beneficial alterations to obesity/overweight-related comorbidities and mortality. Also, cardiovascular exercise influences whether the fate of dietary fat is storage or oxidation. Evidence from research conducted by the Department of Nutritional Sciences at the

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University of Wisconsin-Madison suggests that exercise at moderate intensity (below AT) yields the most cumulative (during and post-exercise) fat grams used for energy in the average individual. All intensities of exercise, however, promote fat oxidation during the post-exercise period. It is further suggested that it is the effects of exercise on 24-hour fat balance that are most important in the prevention of fat accumulation and obesity.

Muscles

Strength peaks around 25 years of age, plateaus through 35 to 49 years of age, and then shows an accelerating decline, with 25 percent loss of peak force by the age of 65 years. Muscle mass decreases, apparently with a selective loss of type II fibers. It is unclear whether there is a general hypotrophy of skeletal muscle, or a selective hypoplasia and degeneration of type II muscle fibers. Changes are greater in the legs than in the arms, possibly because there is a greater decrease in use of the legs with aging. Muscular endurance at a given fraction of maximal voluntary force apparently improves with age, in part because the muscles now contain a larger proportion of type I fibers.

Loss of strength progressively impedes everyday living, and women are limited by a loss of strength at an earlier age than men. However, muscle strength can be greatly improved by as little as eight weeks of resistance training, even in 90-year-old subjects. Stronger muscles further enhance function by stabilizing osteoarthritic joints, reducing risk of falls and lessening the extent of dyspnea.

It was once thought that resisted exercise might cause a dangerous rise in blood pressure, provoking a heart attack. However, if the

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Sample Cardio Training Progression for Older Clients

Weeks 1-6

Progressively increase duration from 20 to 60 minutes of sustained cardio exercise at an intensity equal to 10 beats below anaerobic threshold (AT). Repeat three or four times a week.

Weeks 7-12

Progressively increase duration from 30 to 50 minutes of sustained cardio exercise at intensity equal to AT. Repeat three or four times a week.

Weeks 13-20

Three times a week, have clients perform sustained cardio for 45 to 60 minutes at 10 beats below AT.

Once a week, have clients perform sustained cardio for 20 to 40 minutes at AT.

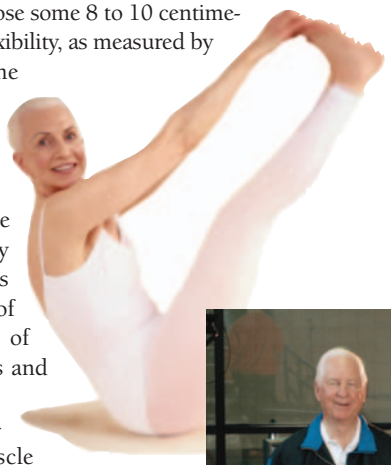
Once a week, have older clients perform interval training:

- Have clients complete a 10-minute warm-up at 10 beats below AT.
- Have clients progress from three to 10, 15- to 30-second intervals at 10 beats above AT, with recovery between intervals down to 10 beats below AT before starting the next interval.
- Have clients complete a 10-minute cool-down at 20 beats below AT.

client avoids performing a Valsalva maneuver (holding breath), and individual contractions are held for no more than three seconds at 60 percent of peak voluntary force, the rise of blood pressure is no greater than would be anticipated during a typical bout of cycling exercise.

Flexibility

The elasticity of tendons, ligaments and joint capsules is decreased as scar develops between adjacent muscle fibers. Over the span of life, adults lose some 8 to 10 centimeters of lower-back and hip flexibility, as measured by the sit and reach test. The restriction in the range of movement at the major joints becomes more pronounced during late old age.



Flexibility is thought to be conserved or improved by gently taking the main joints through their full range of motion daily. The benefits of gentle forms of yoga, Pilates and tai chi are significant for the maintenance and enhancement of flexibility. If muscle weakness and arthritis are already advanced, such activities are best attempted in warm water. Buoyancy then supports body weight, and warmth increases the immediate flexibility of the joints. Don't infer that yoga in extreme heat is an alternative for warm water. On the contrary, this yoga form may be contra-indicated for older adults.

Bone structure

There is a progressive decrease in the calcium content and deterioration in the organic matrix of the bones with aging. However, the defining line between normality and pathology is unclear, and it is also uncertain how far a decrease of habitual physical activity contributes to the age-related calcium loss. Changes are more marked in women than men due, in part, to sex differences in the hormone profile, and to a lower intake of calcium and good quality protein in women. Calcium loss can begin as early as 30 years of age, and, in women, the process accelerates for some five years around menopause.

Regular load-bearing exercise can halt and sometimes even reverse bone mineral loss through the eighth decade of life. Such a regimen is particularly effective when accompanied by a high calcium diet (1,500 mg a day). The controversial administration of estrogen for women may assist in the maintenance of bone health.

Risks of exercise

The risk of cardiac emergency is increased substantially when a person is actually exercising. Some physicians have thus argued that older people who intend to exercise should undergo exhaustive preliminary screening, including exercise electrocardiogram. In all cases, it is important to follow the guidelines as established by the American College of Sports Medicine. A prudent professional will abide by these standards and recommendations for liability and ethical reasons. Also, the immediate availability of, along with instruction on proper use of, an automated external defibrillator (AED), is imperative for all health-related facilities and staff.

The person who begins an exercise program is at a lower overall risk of sudden death than a sedentary peer, and, perhaps because of a less ambitious attitude toward exercise, the relative risks of physical activity (death when exercising vs. deaths when sedentary) decrease rather than increase as a person becomes older.

Certain precautions can increase the safety of exercise for the older individual. The recommended dose of exercise is that it should do no more than leave the participant pleasantly tired on the following day. Recovery processes proceed slowly, and vigorous training should thus be pursued on alternate days. In individuals with pre-existing articular disease, walking should be substituted for running. Fast walking offers an adequate training stimulus with less risk of slipping, and a much smaller impact force on the knees. Weight-supported activities such as swimming are particularly helpful for those with joint problems.

Vision, hearing and balance are all poorer in older adults. The aged person should thus avoid sports where there is a risk of collision with opponents or stationary objects. If there is a history of falls, special care is needed in pursuing activities that require a good sense of balance. Including balance and stability exercises are essential for older adults.

Keep in mind that appropriate moderate progressions are indicated with this group. Environmental extremes are poorly tolerated, and, if the weather is extremely hot or cold, activity should be taken inside a temperature-controlled facility. For those who are extremely frail, some physical conditioning can be achieved by performing exercises in a sitting position.

Benefits of exercise

Exercise training cannot restore tissue that has already been destroyed, but it can protect the individual against a number of the chronic diseases of old age. More importantly, it maximizes residual function. In some instances, biological age is reduced by as much as 20 years. Life expectancy is increased, partial and total disability is delayed, and there are major gains in quality-adjusted life expectancy. Exercise is thus a very important component of healthy living for all. **FM**

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