Colorado Center for
BONE RESEARCH

USING EXERCISE MACHINES

Osteoporosis affects each person differently, so it is important to talk with your healthcare provider about your particular situation and the safety of using these or any other exercise machines. Carefully consider the recommendations of your healthcare provider and your own strengths and limitations before using or purchasing an exercise machine.

Research has shown that resistance through the bones can protect them by increasing their density by a small but significant amount. The studies that have demonstrated the most successful results with the fewest injuries are those that have employed the use of resistance gym equipment.

Here are some general guidelines to consider if you are planning to use or purchase an exercise machine. This article is not an endorsement of any of the machines discussed.

RESISTANCE EXERCISE MACHINES FOR BONE PROTECTION

Force necessary for bone protection is site specific. This means that the direction of resistance necessary to maintain and rebuild one bone may be different from that necessary for another bone. Research has also shown that the optimal exercise strain must be unusual, of high magnitude and fairly brief in duration. Using a variety of exercise machines for 2-3 sets of 6-8 repetitions each two times per week had proved beneficial for bone density maintenance, and even mild bone building in people of different ages. The resistance used should be 60-80 percent of an individual's one repetition-resisted maximal effort on any particular machine.

The safest way to judge the amount to start with is to use a weight that feels like moderately hard work after 6-8 repetitions. Less weight is less effective for bone building, and more weight can be dangerous for bones, joints, muscles and cardiovascular health.

Add either weight or numbers of repetitions no more often than every three days of working out. The "light days" in between are good days to spend more time performing aerobic activities, such as long brisk walks and stair or hill climbing. Never lift beyond limits that your doctor or physical therapist has given you! Always give the body at least one day of relative rest from each of the machines. Many people will exercise aerobically several times a week, but will do specific strength training 2-3 times per week.

THE IMPORTANCE OF PROPER WARM-UP AND COOL –DOWN

Warm-up activities should precede each training session. Five to 10 minutes of activities involving multiple muscle groups such as with the treadmill, elliptical trainer, stair climbing or stationary cycling can serve as a warm-up for the single joint muscle strengthening activities. If this is not possible, then performing the actual exercise with light resistance for a few repetitions prior to the training level resistance will help to warm up the area. Slow stretching of the frequently tight muscles is important for injury prevention especially after working out. Some of the most important muscles that need regular stretching are these:

- Hamstrings (back of thigh)
- Quadriceps (front of thigh)
- Gastrocnemius/soleus (calf)
- Ilio-tibial band (side of thigh)
- Latissimus dorsi and pectoralis (upper back and chest)

PROPER BODY MECHANICS

Establishing a stable and correct position is critical, whether an exercise requires lifting free weights or pushing while positioned in or on a machine.

When standing or walking:

- Keep chin “in” and head held high (no forward head position)
- Lift breastbone and keep shoulder blades slightly retracted (pinched)
- Maintain natural arch of lower back as you flatten stomach
- Point feet straight ahead
- Align each knee over second toe (or over point of shoe)
- When walking, do not lock knees (keep slightly bent)
- Land lightly on heels
- Alternate arm swing while walking

When bending or lifting:

- Keep feet flat and about shoulder-width apart from one another.
- Flatten back and stomach muscles at same time to protect back and stomach
- Keep shoulders “square” with shoulder blades retracted
- Both arms should touch ribs or thighs on the sides unless using one hand for support
- Keep object being lifted as close to body as possible
- Keep at least one foot flat on the ground to keep equal force at hip, knee and ankle
- Never bend from waist, but instead bend at the knees and hips and keep back straight

Proper breathing while performing resistance exercises is very important. Make sure that you continue breathing during the activity and never hold your breath. During the most strenuous phase of an exercise, you should be breathing out and, during the less stressful phase you should be breathing in.

RESISTANCE MACHINES ASSOCIATED WITH BONE BUILDING

Research has found the following machines effective for increasing bone density in people with low bone mass:

- Chest press for the arms and spine
- Lumbar extension machine for the spine
- Seated upper body strength machine for the arms and upper back
- Leg press for all the bones of the leg and hip and also the spine
- Knee lift machine for the bones in the leg and hip

MACHINES TO USE WITH CAUTION

Because of the potential of some machines to cause harm for people with fragile bones and those at risk for fractures, certain exercise machines should be avoided, including both the military press and abdominal crunch machines. People with fragile bones should use the elliptical trainer with caution and supervision.

PILATES

Pilates is an exercise system that involves the use of either Pilates equipment or exercises done on mats. Done correctly with a trained instructor, Pilates can promote back health, strength and flexibility and help prevent injury. It can also improve posture, coordination and musculoskeletal alignment.

It is important that the instructor has had training in the Pilates exercise system and understands back problems. For persons with back pain or osteoporosis of the spine, some of the exercises may need to be avoided. Bending and twisting motions of the torso can place persons with low bone density of the spine at risk for a vertebral fracture.

WEIGHT-BEARING AEROBIC EXERCISE MACHINE

An osteoporosis treatment program usually includes some form of aerobic weight-bearing exercise. Weight-bearing exercise is an activity you do on your feet that works the body against gravity. These exercises include walking, jogging, aerobics and stair climbing.

Weight-bearing exercise helps prevent further bone loss when done over a lifetime, and also improves heart health, sense of balance, and muscle coordination, strength and control. An additional benefit of exercise is that it can help reduce the likelihood of falling. Following is a description of several of these types of machines with advice for home purchase.

TREADMILL

A treadmill is a machine that allows a person to walk, jog, or run indoors on a cushioned platform. Treadmills provide both weight-bearing and impact exercise. Motorized treadmills have platforms; that move at speeds that can be increased or decreased by the push of the button, while non-motorized ones are propelled by the person's walking pace.

What to Look For

Before purchasing a machine, try several. All treadmills should have cushioned platforms to absorb shock and protect joints and safety rails for the person to grasp. These rails should be high enough that the user can hold on without bending or leaning forward from the waist. Experiment with the incline and speed controls.

When you test a treadmill, take it up to top speed or the fastest you can walk/ run. Quality treadmills can reach 8-12 mph. Walk or run for more than a few minutes, then wait a day or two to see how your legs and feet feel.

Motorized or Non-motorized Treadmills

A good, heavy-duty motorized treadmill is expensive, with an average retail price of about $1,000. However, spending a little more money usually ensures a better quality machine. The treadmill motor should be able to handle the strain of your regular training regimen. The higher the horsepower, the stronger the machine.

As a rule, look for machines that have a continuous motor rating of 1.5 horsepower. Given the choice of AC or DC, choose the DC motor. DC motors are quieter, offer a wider range of speeds, start slower and go faster. Choose a control panel with push pads rather than controls that require turning a knob or sliding a lever to adjust speed or height.

Safety Note: *Always choose a treadmill that has an emergency STOP button or a string that attaches from the machine to your clothing so that the machine automatically stops if you lose your balance and begin to fall.*

Some treadmills have built-in programs that automatically vary the length, speed and incline of the exercise routine. These programs are not necessary and often increase the price of the machine.

Non-motorized treadmills are less expensive and take up very little room. They may or may not have an adjustable incline. Your stride has to push the belt backwards, and they provide a serious workout.

Elevation

Both motorized and many non-motorized treadmills come with an incline adjustment that creates the sensation of walking uphill. The ability to change the incline is a valuable feature because walking or jogging flat on a treadmill is like running slightly downhill. Increasing; the incline allows you to make the working harder. Motorized treadmills gradually raise or lower the incline with the push of a button. Elevation changes on a manual treadmill may be as convenient as on a motorized one as long as the hand crank that raises and lower the platform is in front of you and easy to reach.

Belt Size

The belt is what you walk or run on, and it is important to get a treadmill with an adequate belt. Inexpensive treadmills tend to have shorter, narrower belts, which can cause problems. Belts should be at least 50 inches long and 16 inches wide. Longer, wider belts are safest, with the ideal belt being 18-20 inches wide and 54 inches long.

Handrails

A handrail is an important safety feature that can be used in case you lose your balance. However, leaning on the handrail reduces the amount of weight-bearing effort and throws off your posture. You should never grasp the handrails and bend forward at the waist while using a treadmill. When using a treadmill, swing your arms naturally as you do when walking or running. If you don't have an incline feature, consider using hand-held weights to increase your heart workout.

Always land heel first on the belt, and keep your head up.

SKI MACHINE

A ski machine provides weight-bearing exercise with little or no impact, so it is easy on the joints of the knee and hip. Some machines allow you to adjust the resistance and the incline to change the difficulty of your workout.

A ski machine has a front upright bar that has a padded bolster against which you lean your stomach. It has either movable ropes or poles for arm movement and either ski-like boards on rollers or foot pads on wheels for leg movement.

What to Look For

There are two types of ski machines. Those with "dependent" skis have skis that are linked. In this case, moving one ski forward pushes the other ski backward. Those with "independent" skis allow you to move each ski individually-each ski slides back and forth separately. The dependent skis force the legs into an awkward, still shuffle, while independent skis feel more natural but require coordination and to master. When you get your arms and legs moving properly, you will mimic the action of cross-county skiing.

Despite the greater difficulty mastering the independent ski machine, you will probably enjoy it more. The gait is smoother, more ski-like, and provides a potentially more vigorous workout. However, if you have tried to master the motion of the independent machines without success, the dependent motion machine is a good alternative.

STAIR CLIMBER

Stair climbers consist of two pedals that alternately drop your weight to simulate climbing up stairs or ladder rungs. Steppers may come with handles that are stationary or mobile. Motorized stair climbers allow the user to change the resistance or effort required for each step, which allows a more intensive workout.

While stair climbers tend to provide less impact and, therefore, less jarring to the knees and hip joints, they do strengthen the muscles in the legs, hips and spine. Stair climbers provide weight-bearing exercise with more impact than the ski machine but less impact than the treadmill.

Stair climbing machines require a lot of effort on the part of the user and may be too difficult for people who are out of shape. Raising the weight on ;the input program 50 pounds higher than your own weight will change the program so that the pushes are slower and more powerful, which may be more protective of bones than quick light steps.

What to Look For

Make sure that the machine is sturdy, i.e., it can't be tipped over if you lean too far in any direction. When you use the stair climber your feet should remain parallel to the floor. The stair climbers most commonly seen in health clubs have pedals that function independently of each other, remain parallel to the ground, and allow the resistance to be adjusted.

EXERCISE BICYCLE

Of all the available exercise equipment, exercise bicycles are the easiest to use. The drawback to cycling is that the activity uses fewer muscles than the other machine workouts, and it provides no impact, so it is not as good for the bones. In the reclining position especially, the skeleton does not bear much weight.

Compared to other equipment, exercise bicycles require the least learning, balance or coordination. On models with rigid handlebars, you can even read while exercising. Exercise bicycles are also the most durable of the machines discussed in the article. The pedals on exercise bicycles turn a large flywheel, fan or both. Resistance can be changed on flywheel models without increasing speed. On fan models, the only way to increase the resistance is to pedal faster.

The user can pedal in two different positions: the conventional, upright position with a small bicycle seat or the reclining bike which has a bucket-type seat that allows you to sit back on a comfortable chair and

pedal in front of your body. Each version exercises different muscles. Reclining cycles are safest for people with balance problems or back, neck or shoulder problems.

Exercycles are bicycles that are motor driven and programmable. You can choose the degree of difficulty and resistance.

What to Look For

The seat should feel comfortable and be adjustable. The height should adjust so that your legs extend almost completely when the pedal is all the way down. Alignment of your knee and ankle is also important.

The flywheel or fan should not stop turning the moment you stop pedaling. If it does, it is very difficult to resume pedaling.

WHAT TO CONSDER BEFORE MAKING YOUR PURCHASE

Before purchasing any machine, try it out for at least 5 to 10 minutes. In fact, it would be best if you could use the machine on several different occasions before purchasing it. Regardless which type of machine you buy, it should feel sturdy, move smoothly, be reasonably quiet, and allow you to get on and off easily. The machine should also fit your body size comfortably without cramping your movements or forcing you to lean forward, stoop, stretch or twist.

However, an exercise machine should be considered in addition to, or to vary, your existing exercise program, not a substitution for it. Some exercise machines provide too little weight-bearing or impact type exercise to protect current bone health.

Adapted from a National Osteoporosis Foundation pamphlet