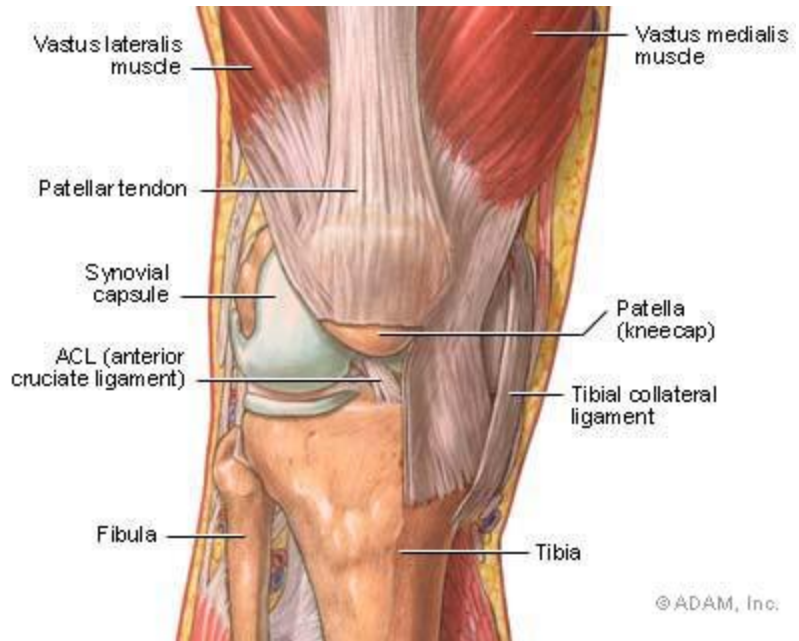


Exercise's Effects on Bones and Muscles

Exercise is critical for strong muscles and bones. Muscle strength declines as people age, but studies report that when people exercise they are stronger and leaner than others in their age group.

Exercise may help kids lower their risk of chronic pain in the future.

Joints are complex structures. They are designed to bear weight and move the body. Above the knee is the femur (thigh bone). Below the knee is the tibia (shin bone) and fibula. The kneecap is also called the patella. It rides on top of the lower portion of the femur and the top portion of the tibia. The muscles and ligaments connect these bones, and the space between them is cushioned by fluid-filled capsules (synovia) and cartilage. When you exercise, the muscles pull on the bones, strengthening them. The range of motion of a joint represents how far it can be flexed (bent) and extended (stretched).



Effects of Exercise on Osteoarthritis

Joints require motion to stay healthy. Long periods of inactivity cause the arthritic joint to stiffen and the adjoining tissue to weaken. A moderate exercise program that includes low-impact aerobics, power, and strength training has benefits for osteoarthritic patients, even if exercise does not slow down the disease progression. Many patients who start an exercise program report less disability and pain. They are

also better able to perform daily chores, and remain independent longer than their inactive peers. Older patients and those with medical problems should always check with their doctor before starting an exercise program.



Click the icon to see an image of osteoporosis.

The following are useful exercises for osteoarthritis patients:

- Strengthening exercises build muscle strength.

Exercises to strengthen leg muscles are a reasonable first step, even before using pain relievers. Health care professionals fear that patients who rely on painkilling drugs may overuse knees, which do not have strong enough muscle tissue to protect the joints from further damage. Strengthening the thigh muscles is certainly protective for those who have not developed osteoarthritis.

- Range-of-motion exercises increase the amount of movement in a joint and muscle. Examples are yoga and tai chi, which focus on flexibility, balance, and proper breathing.
- Low-impact aerobic workouts help stabilize and support the joints. Cycling and walking are beneficial, and swimming or exercising in water is highly recommended for people with arthritis. Patients with arthritis should avoid high-impact sports, such as jogging, tennis, and racquetball.
- Some researchers are now focusing on "power" training, which involves improving the muscle's ability to move more rapidly against resisting forces, such as gravity. For example, such training helps people stand up or climb stairs more quickly. Muscle power declines more rapidly than muscle strength, and may be particularly important in older people.

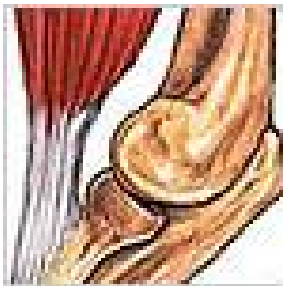
Exercises Effect on Fractures and Falls

Exercise is very important for slowing the progression of osteoporosis, and extremely important for reducing the risk of falling, which causes

fractures. Falls are one of the leading causes of death in people over the age of 65. Exercise helps build balance and flexibility, which reduces the risk of falling.

Specific exercises may be especially helpful for reducing the risk of fractures:

- Weight-bearing exercise is very beneficial for bones in people of all ages, including older people. This approach applies tension to muscle and bone, and the body responds to this stress by increasing bone density, in young adults by as much as 2 - 8% a year. Careful weight training can also be very beneficial for elderly people, particularly women. In addition to improving bone density, weight-bearing exercise reduces the risk of fractures by improving muscle strength and balance, thus helping to prevent falls.
- Regular brisk long walks improve bone density and mobility. In one 2002 study, for example, older women reduced their risk of hip fracture by over 40% by working out just four hours a week.
- Exercises specifically targeted to strengthen the back can be beneficial in improving posture, and may even reduce kyphosis (hunchback) in people with osteoporosis.



- Low-impact exercises, particularly yoga and tai chi, which improve balance and strength, have been found to decrease the risk of falling. In one study, tai chi reduced this risk by almost half. Click the icon to see an image of the bone-building exercise.

Note on Female Athlete Triad. Some young female athletes who exercise very intensely, and are subject to intense pressure to remain thin, are at risk for the female athlete triad. This syndrome is a combination of three disorders -- an eating disorder, loss of menstrual periods, and osteoporosis.

Effect of Exercise on Back Pain

People who do not exercise regularly face an increased risk for low back pain, especially during times when they suddenly have to perform stressful, unfamiliar activities. These activities may include shoveling, digging, or moving heavy items. Although no definitive studies have been done to prove the relationship between lack of exercise and low back pain, sedentary living is probably a contributing risk factor for this condition.

Lack of exercise leads to the following conditions that may threaten the back:

- Muscle inflexibility can restrict the back's ability to move, rotate, and bend.
- Weak stomach muscles can increase the strain on the back and can cause an abnormal tilt of the pelvis (hip bones).
- Weak back muscles may increase the load on the spine and the risk of disk compression.
- Obesity puts more weight on the spine and increases pressure on the vertebrae and disks. Studies report only a weak association between obesity and low back pain, however.

Benefits for Chronic Back Pain. People with sudden and severe back pain should not exercise. Exercise plays a very beneficial role in relieving chronic back pain, however.

Exercise should be considered as part of a broader program to return to normal home, work, and social activities. In this way, the positive benefits of exercise not only affect strength and flexibility but they also alter and improve the patients' attitudes toward their disability and pain.

Repetition is the key to increasing flexibility, building endurance, and strengthening the specific muscles needed to support the spine. Some exercise programs used for prevention or treatment of chronic low back pain include the following:

- **Low-impact Aerobic Exercises:** Low-impact aerobic exercises, such as swimming, bicycling, and walking, can strengthen muscles in the abdomen and back without over-straining the back. Programs that use strengthening exercises while swimming may be a particularly beneficial approach for many patients with back pain..
- **Lumbar Extension Strength Training:** Exercises called lumbar extension strength training are proving to be effective. Generally, these exercises attempt to strengthen the abdomen, and improve lower back mobility, strength, and endurance. They also enhance flexibility in the hip and hamstring muscles, and in the tendons at the back of the thigh.
- **Yoga, Tai Chi, and Chi Kung:** These exercises combine low-impact physical movements and meditation. They are based on principles of disciplining the mind to achieve a physical and mental balance, and can be very helpful in preventing recurrences of low back pain. This approach deserves further research.
- **Flexibility Exercises:** Whether flexibility exercises alone offer any significant benefit for chronic back pain is uncertain.
- **Retraining Deep or Core Muscles:** Studies are finding a link between low back pain and poor motor control of deep muscles in the back and trunk. According to these studies, contraction exercises specifically designed to retrain these muscles may be effective for patients with both acute and chronic pain.

It is important for any person who has low back pain to have an exercise program guided by professionals who understand the limitations and special needs of back pain, and who can address individual health conditions.

<http://www.nytimes.com/health/guides/specialtopic/physical-activity/exercise%27s-effects-on-bones-and-muscles.html>