

BONE DISEASE



The bones of the body are both strong as steel, to support weight, and light as aluminum, to allow movement. A bone is a dense, hard, and slightly stretchy tissue that makes up the connective elements of the body. There are an average of 206 bones in the human skeleton. Bones continually break down and rebuild, renewing the shape during the growing process and after an injury. They offer protection to the internal organs and store most of the calcium phosphorus and minerals needed by the body. Bones seen in a museum seem dry and rigid, but living bones are actually moist. The bone marrow is the soft spongy material that fills the cavities of the bone where red blood cells and some types of white blood cells are produced. The bones surround the spongy tissue that contains blood vessels and nerves.

With the broad range of activities that take place within the bones, many problems and malfunctions can occur. Osteoporosis is a bone-weakening disorder that occurs as we grow older. Exercise and calcium supplements may slow the progress of this disease.



BONE DISORDERS

■ OSTEOMALACIA AND RICKETS

In osteomalacia, the bones are weakened by the lack of calcium and phosphorus. One of the two most common causes of osteomalacia is a problem of fat malabsorption called steatorrhea. In this condition, the body is unable to absorb fats and they pass directly out of the body in the stool. As a result, vitamin D and calcium are poorly absorbed. The other cause of osteomalacia is an increased amount of acid in the body fluids because the kidney function is faulty with tubular acidosis. This problem occurs in persons with congenital or acquired kidney disorders. (See Urinary chapter, Kidney). What this means is the increased acid gradually dissolves the skeleton (similarly, vinegar or acetic acid will dissolve an egg shell). The primary cause of osteomalacia is a dietary shortage of vitamin D.

Today, the cause of osteomalacia is rare with the amount of vitamin D that is manufactured in the skin from sun exposure. Occasionally, an intolerance to milk in children, requires additional vitamin D supplementation. In rickets, the bones become flexible because of a vitamin D shortage, which is needed to allow the body to deal with calcium and phosphorus. Lack of sunlight could be another factor, and the bones may become severely deformed. In children, it is referred to as rickets.

SIGNS AND SYMPTOMS

Pain and progressive weakness in the bones of the arms, legs, spine, and pelvis, with actual tenderness of the bones.

In children - May have bowlegs, develop a pigeon breast (projection of the chest), protruding stomach, and slight fever and restlessness during the night.

TREATMENT

Calcium and vitamin D supplements may be necessary and help correct the bone deformity.

SURGICAL TREATMENT

In extreme cases, particularly in vitamin D-resistant rickets, the deformity may be improved or corrected with orthopedic surgery.

■ PAGET'S DISEASE

Paget's disease or "osteitis deformans" is the reverse of osteoporosis. Paget's disease occurs when too much bone tissue is broken down and rapidly replaced with abnormal bone. The long term effect is weakness and softness of the bony skeleton. Most cases of the condition are diagnosed in persons between the ages of 50 and 70 years. It rarely occurs in young adults and occasionally, has been reported to run in families. Paget's disease occurs most commonly in the skull, spine, pelvis, and leg bones.

SIGNS AND SYMPTOMS

Pain and a sensation of warmth over the involved bones; headache; hearing loss; bowing of a lower limb.



In many people, there are no symptoms, which may delay the diagnosis (it may be inadvertently discovered when a routine screening x-ray or blood test is done).

In rare cases, long term serious complications occur from deafness to congestive heart failure.

TREATMENT

Aspirin and other anti-inflammatory medications are used very successfully.

Calcitonin (a hormone) and drugs, such as edidronate disodium and mithramycin, slow the bone breakdown and have been shown to be effective in reversing the progression of Paget's disease.

SURGICAL TREATMENT

When severe deformities occur, surgery may be performed to correct the problem, but very rarely.

■ FIBROUS DYSPLASIA

This disorder is similar to Paget's disease except the breakdown of the bone is replaced with a fiber-like tissue. This disorder may effect one or several bones. Girls that are affected may have an early start of menstruation and breast development (Albright's syndrome). An involved leg may be considerably shorter than the other leg. Fractures occur easily.

SIGNS AND SYMPTOMS

Bone pain, especially in the lower leg with difficulty walking; rarely, fractures and bone deformity; sometimes, no symptoms.

TREATMENT

This is a progressive disease and is not considered curable. The focus of treatment is to reduce the risk of fractures. It is important to set the fractures promptly and correct the skeletal deformities.

SURGICAL TREATMENT

In some cases, excess fibrous tissue may be removed and replaced with bone grafting.

■ OSTEOMYELITIS

This is an infection of the bone. It is usually caused by germs that enter the bone at the time of an injury or surgery, a nearby infection, or carried through the bloodstream. It occurs more commonly in children than adults.

SIGNS AND SYMPTOMS

Intense pain and a sensation of heat in the affected site; fever; tenderness and swelling; muscle spasm; fatigue.

TREATMENT

Bed rest and immobilization of the affected bones.

DRUG TREATMENT

An extended course (three weeks or more) of antibiotics drugs.

SURGICAL TREATMENT

In some instances, surgical removal of the infected or dead bone and tissue may be necessary.



■ ENDOCRINE DISORDERS AND THE BONES

Acromegaly, gigantism, hypopituitarism, and hyperparathyroidism all effect the bones. (See Endocrine chapter.)

■ BONE TUMORS

Cancer that originates in the bone is considered a primary cancer, that is, a part of the body where cancer originates. Most often, however, a malignant tumor in a bone is the result of cancer cells that have spread from another part of the body (metastatic cancer, a secondary type of cancer). Cancers that start in the bone usually affect young people. Osteosarcoma is the most common type of tumor that begins in the bone. Multiple myeloma, a blood cancer that begins in the bone marrow, is another primary bone cancer and unfortunately, is not often diagnosed until it has spread to many bones in the body.

SIGNS AND SYMPTOMS

A hard lump on the surface of the bone a physician feels through the muscles; accompanying pain and/or fracture without trauma. If the tumor is benign (nonmalignant), it rarely presents any health risk.

SURGICAL TREATMENT

Benign tumors occasionally require surgical removal but cause no health risk. The cancerous bone tissue of osteosarcoma is removed surgically and anticancer drugs (chemotherapy) are prescribed. If occurring in an arm or leg, removal of only the diseased portion of the bone may be done with reconstruction; however, amputation of the extremity is occasionally considered.



OSTEOPOROSIS

Osteoporosis (porous bone) affects about 25 million Americans, mostly women over age 50, and results in 1.5 million fractures each year. The disease is called “a silent disease” because a person may have osteoporosis without knowing it until a fracture, often spontaneous, occurs. The fractures are usually located in the hip, spine, or wrist.

■ DEVELOPMENT OF OSTEOPOROSIS

During youth, bones are active, and calcium is deposited into bone faster than it is taken out. Calcium deposits peak, and bones are their strongest at about 35 years of age. The calcium then is lost from bones faster than it is replaced, occurring naturally and gradually as the body begins to absorb less calcium from food. This begins at about age 45 in women, and 60 in men. Estrogen levels drop in women after menopause (causing estrogen deficiency), and a consistently low intake of calcium (causing calcium deficiency) is a significant cause for osteoporosis. There may be other hormones mediated through the ovary and adrenal glands that contribute to the aging of bones.

SIGNS AND SYMPTOMS

Often, no symptoms until a fracture occurs; bone mass decreases in the spine, resulting in loss of height and strength.

TREATMENT

Participate in weight-bearing exercise daily (walking is wonderful); eat a well-balanced diet, rich in calcium; consider hormonal replacement therapy during and after menopause (women); if, at high risk, screen for bone mineral density after age 45.

HORMONAL REPLACEMENT TREATMENT

Estrogen is the most common hormone used. In women, estrogen is produced by the ovary and besides playing a major role in the reproductive system, it affects the bones in women. The loss of estrogen due to menopause or surgery, causes bone mineral loss. Androgen (male hormone testosterone) may be added to estrogen therapy. It has been shown that testosterone improves bone mineralization, but this should be determined by your health care provider.

DRUG TREATMENT

Alendronate sodium (Fosamax) has been effective and may even prevent the condition from occurring. This drug is a nonhormonal alternative to estrogen.

SURGICAL TREATMENT

Surgery is only used to manage the complications of osteoporosis, specifically fracture management. The most frequent fractures occur in the hip (hip replacement or pinning), forearms (casting), or compression fractures of the spine (bracing). In rare circumstances, fusing and the use of prosthetic supports are necessary.

REHABILITATION TREATMENT

The complications of fractures may require significant rehabilitation to return to function. For this reason, the prevention of fractures is so important in management.



UNAVOIDABLE RISK FACTORS

Gender	Occurs eight times more often in women than men
Age	Often in the elderly
Early menopause	Before 45 — due to surgery or illness
Race	Caucasians have a higher incidence than other races
Family history	Mothers and/or aunts with osteoporosis

PREVENTING OSTEOPOROSIS

Provide your body with a healthy diet and exercise to prevent osteoporosis.

DIET

Calcium (1500 mg/day)
Legumes (peas, broccoli, spinach, green vegetables)
Tofu (bean curd)
Fish
Dairy products (vegetarians or lactose intolerant patients may need a supplement)
Vitamin D (to absorb calcium) in foods and multivitamin tablets
(Exposure to sunlight increases vitamin D effectiveness)

ACTIVITY

Walk 45 minutes per day to sustain a good metabolic condition
Weight bearing exercise is necessary
Walking can be substituted for aerobic exercise or playing tennis

WHAT TO AVOID

Too much protein
Carbonated soft drinks, high in phosphorus
Smoking, alcohol, and excessive caffeine
High impact exercises (jogging or aerobics) that can lead to injury
Nonweight bearing exercises (swimming, cycling)
Corticosteroid drugs

Because prevention is the most sensible and effective management, people at risk should seek educational and therapeutic programs before the osteoporosis becomes crippling.



LATEST FINDINGS

A study in May 1996 found that women with osteoporosis who took Fosamax (mentioned in the Drug Treatment) were only half as likely to break a hip as women who didn't take it. This means the drug could help save lives since 20 percent of women with hip fractures die within a year. The downside to Fosamax is that it has to be taken exactly as directed: on an empty stomach, half an hour before breakfast, with a full glass of water. Otherwise, it can severely irritate the esophagus or stomach.

Another new treatment is Calcitonin, which is prescribed as a nasal spray called Miacalcin. It is a synthetic hormone that slows down bone-eating cells. It builds about half as much bone as Fosamax does but it is easier to use. A patient can take one daily spritz at any time, and it has few side effects.

Diseases of the bones and joints are among the most common causes of poor health and disability, especially in the elderly. However, some are preventable. The strength of the bones in later life depends on a person's health in their early adult life. Being overweight increases the risk for bone problems, while a calcium-rich diet, combined with regular exercise, reduces the risk of a variety of bone disorders.

Scientists are investigating the interactions between human genes and the environmental factors to solve the mystery of why some bone diseases affect only a small percentage of the population. Bone strength and structure are affected by nutrition, hormones, and conditions that occur throughout life. Some people are born with a bone deformity such as a shortened or partially absent limb. These birth defects affect only a small percentage of people but the bone-weakening disorder, osteoporosis, gradually occurs with age in virtually everyone. When blood calcium levels drop, calcium is taken out of the bones to maintain levels in the blood for other body parts.



ON THE HORIZON



Plastic artificial hips are lifesavers for millions of Americans, but they often wear out before their owners do. A new metal artificial hip made of cobalt, chrome and titanium promises to last nearly twice as long. The improved implants should be on the market in about five years.

Ultrasound, known by many patients as the machine used for the first glance of their baby, is becoming more versatile. It may speed up the healing of bone fractures by stimulating the bone cell formation. If administered within several days, stress fractures have been found to heal faster than those without treatment.

A lot of women bypass screening for osteoporosis because the test can be costly. Consequently, a vast majority go undiagnosed and untreated. In 1998, Medicare began covering bone density tests for women over 65; and the FDA approved several ultrasound devices that scan for bone loss in the heel or shin which provides a faster and cheaper screening test than the x-ray machines used today.



WHAT TO DO

SEVERITY LEVEL	SYMPTOM	POSSIBLE DIAGNOSIS
 <p data-bbox="268 305 411 385">Seek Medical Help Immediately!</p>	<p data-bbox="472 302 833 396">Hard lump on surface of bone (felt through muscle), pain and/or fracture without trauma</p>	<p data-bbox="998 369 1136 396">Bone tumor</p>
 <p data-bbox="268 462 401 566">Make an appointment to see your doctor</p>	<p data-bbox="472 465 925 566">Bone pain, especially in the lower leg, difficulty walking, fractures and bone deformity</p> <p data-bbox="472 587 915 684">Intense pain and sensation of heat in the affected site, fever, tenderness, and swelling with muscle spasm</p> <p data-bbox="472 706 901 738">Pain, progressive weakness in bones</p> <p data-bbox="472 789 825 888">Pain and warmth over a bone, headache, hearing loss, bowing of a lower limb</p>	<p data-bbox="998 535 1200 566">Fibrous dysplasia</p> <p data-bbox="998 651 1162 684">Osteomyelitis</p> <p data-bbox="998 706 1219 769">Osteomalacia and/or rickets</p> <p data-bbox="998 857 1179 888">Paget's disease</p>