



**National Institutes of Health  
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# Juvenile Osteoporosis

Osteoporosis literally means “porous bone.” It is a disease characterized by too little bone formation or excessive bone loss or a combination of both. People with osteoporosis have an increased risk of fractures. It is most common in older people, especially older women.

Osteoporosis is rare in children and adolescents. When it does occur, it is usually caused by an underlying medical disorder or by medications used to treat the disorder. This is called *secondary osteoporosis*. Sometimes, however, there is no identifiable cause of osteoporosis in a child. This is known as *idiopathic osteoporosis*.

No matter what causes it, juvenile osteoporosis can be a significant problem because it occurs during the child’s prime bone-building years. From birth through young adulthood, children steadily accumulate bone mass, which peaks sometime before age 30. The greater their peak bone mass, the lower their risk for osteoporosis later in life. After their mid-30s, bone mass typically begins to decline – very slowly at first but increasing in their 50s and 60s. Both heredity and lifestyle choices – especially the amount of calcium in the diet and the level of physical activity – influence the development of peak bone mass and the rate at which bone is lost later in life.

## Secondary Osteoporosis

Secondary osteoporosis, which can affect both adults and children, results from another primary disorder or therapy. Some examples are included in the box below.

As the primary condition, juvenile rheumatoid arthritis provides a good illustration of the possible causes of secondary osteoporosis. In some cases, the *disease process* itself can cause osteoporosis. For example, some studies have found that children with juvenile rheumatoid arthritis have bone mass that is lower than expected, especially near

### ***Disorders, Medications, and Behaviors That May Affect Bone Mass\*:***

#### **Primary Disorders**

Juvenile rheumatoid arthritis  
Diabetes  
Osteogenesis imperfecta  
Hyperthyroidism  
Hyperparathyroidism  
Cushing's syndrome  
Malabsorption syndromes  
Anorexia nervosa  
Kidney disease

#### **Medications**

Anticonvulsants (e.g., for epilepsy)  
Corticosteroids (e.g., for rheumatoid arthritis, asthma)  
Immunosuppressive agents (e.g., for cancer)

#### **Behaviors**

Prolonged inactivity or immobility  
Inadequate nutrition (especially calcium, vitamin D)  
Excessive exercise leading to amenorrhea  
(absence of periods)  
Smoking  
Alcohol abuse

\*This is not a complete list. The cause of a child's osteoporosis can best be determined with the help of his or her physician.

the joints affected by arthritis. In other cases, *medication* used to treat the primary disorder may reduce bone mass. For example, drugs such as prednisone, used to treat severe cases of juvenile rheumatoid arthritis, negatively affect bone mass. Finally, some *behaviors* associated with the primary disorder may lead to bone loss or a reduction in bone formation. For example, a child with juvenile rheumatoid arthritis may avoid physical activity, which is necessary for building and maintaining bone mass, because it may aggravate his or her condition or cause pain.

The best course of action when a child has secondary osteoporosis is to identify and treat the underlying disorder. In the case of medication-induced juvenile osteoporosis, it is best to treat the primary disorder with the lowest effective dose of the osteoporosis-inducing medication. If an alternative medication is available and effective, the child's doctor may also consider prescribing it. Like all children, those with secondary osteoporosis also need a diet rich in calcium and vitamin D, and as much physical activity as possible given the limitations of the primary disorder.

### **Idiopathic Juvenile Osteoporosis**

Idiopathic juvenile osteoporosis (IJO) is a primary condition of no known cause. It is diagnosed after the physician has excluded other causes of juvenile osteoporosis, including primary diseases or medical therapies known to cause bone loss. As of 1997, 150 cases have been reported in the medical literature.

This rare form of osteoporosis typically occurs in previously healthy children just before the onset of puberty. The average age of onset is 7 years, with a range of 1 to 13 years. The good news is that most children experience a complete recovery of bone.

**Clinical features:** The first sign of IJO is usually pain in the lower back, hips, and feet, often accompanied by difficulty walking. There may also be knee and ankle pain and fractures of the lower extremities. Physical malformations also may be present. These include abnormal curvature of the upper spine (kyphosis), loss of height, a sunken chest, or a limp. These physical malformations are sometimes reversible after the IJO has run its course.

X rays of children with IJO often show low bone density, fractures of the weight-bearing bones, and collapsed or misshapen vertebrae. However, conventional x rays may not be able to detect osteoporosis until significant bone mass has already been lost. Newer methods such as dual-energy x-ray absorptiometry (DXA), dual photon absorptiometry (DPA), and quantitative computed tomography (CAT scans) allow for earlier and more accurate diagnosis of low bone mass. These are noninvasive, painless tests a bit like x rays.

**Treatment:** There is no established medical or surgical therapy for juvenile osteoporosis, and, in some cases, there may be no need for treatment because the condition usually goes away spontaneously. However, early diagnosis of juvenile osteoporosis is important so that steps can be taken to protect the child's spine and other bones from fracture until remission occurs. These steps may include physical therapy, using crutches, avoiding unsafe weight-bearing activities, and other supportive care. A well-balanced diet rich in calcium and vitamin D is also important. In severe, long-lasting cases of juvenile osteoporosis, some medications called bisphosphonates, approved by the Food and Drug Administration for the treatment of osteoporosis in adults, have been given to children experimentally.

**Prognosis:** Most children with IJO experience a complete recovery of bone tissue. Although growth may be somewhat impaired during the acute phase of the disorder, normal growth resumes – and catch-up growth often occurs – afterward. Unfortunately, in some cases, IJO can result in permanent disability such as curvature of the upper spine (kyphoscoliosis) or a collapse of the rib cage.

## **Distinguishing Juvenile Osteoporosis from Osteogenesis Imperfecta**

Osteogenesis imperfecta (OI) is a rare genetic disorder that, like juvenile osteoporosis, is characterized by bones that break easily, often from little or no apparent cause. However, OI is caused by a problem with the quantity or quality of bone collagen resulting from a genetic defect.

Most children with OI never attain normal bone mass and so suffer from secondary osteoporosis as well. There are several distinct forms of OI, representing extreme variations in severity. For example, a person with OI may have as few as 10 or as many as several hundred fractures in a lifetime. While the number of people affected with OI in the United States is unknown, the best estimate suggests a minimum of 20,000 and possibly as many as 50,000. The clinical features of OI and their severity vary greatly from person to person. Many individuals with OI have only some, not all, of the clinical features. Children with milder OI, in particular, may have few obvious clinical symptoms. The most common features of OI include:

- bones that fracture easily
- ligament laxity (hypermobility joints) and low muscle strength
- family history of OI (present in about 65 percent of cases)
- small stature in moderate and severe types
- sclera (“whites” of the eyes) tinted blue, purple, or gray in about 50 percent of cases
- possible hearing loss in late childhood or early adult years and
- possible brittle teeth (known as dentinogenesis imperfecta).

The features that most often distinguish OI from juvenile osteoporosis are the *family history* of the disease and the *blue, purple, or gray sclera* commonly found in patients with OI. Distinguishing between OI and IJO may require genetic testing or, in some cases, bone biopsy.

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### **For Your Information**

This publication contains information about medications used to treat the health condition discussed here. When this fact sheet was printed, we included the most up-to-date (accurate) information available. Occasionally, new information on medication is released.

For updates and for any questions about any medications you are taking, please contact the U.S. Food and Drug Administration at 1-888-INFO-FDA (1-888-463-6332, a toll-free call) or visit their Web site at [www.fda.gov](http://www.fda.gov).