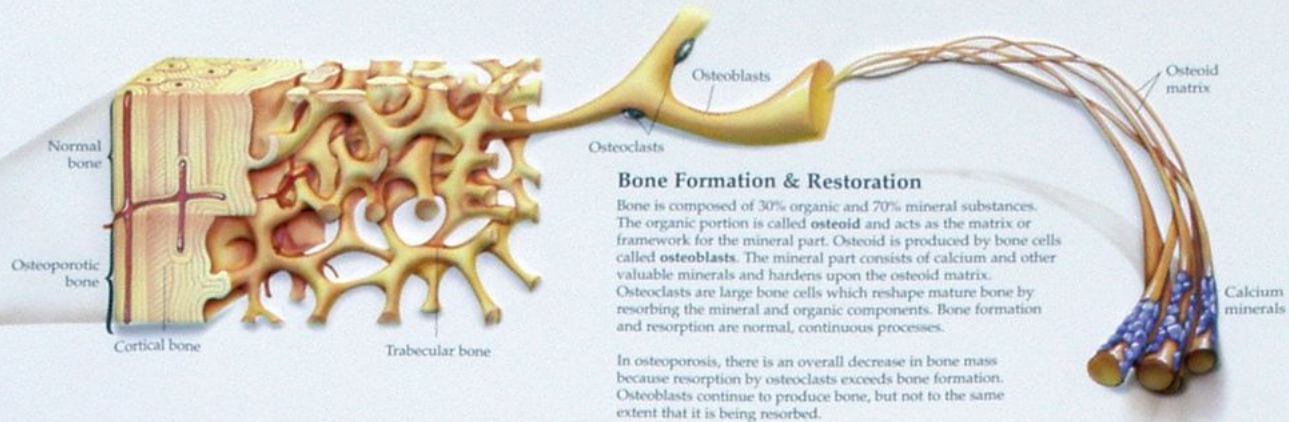
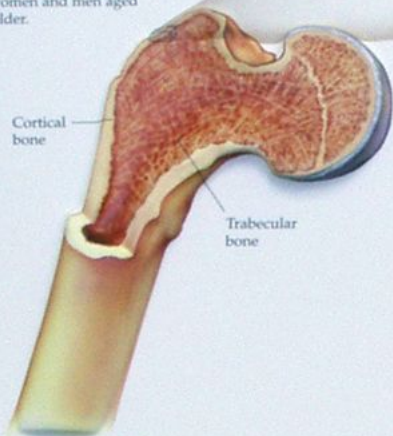


UNDERSTANDING OSTEOPOROSIS

What is Osteoporosis?

Osteoporosis is a metabolic disease affecting the skeleton which causes a reduction in the amount of bone tissue. Bones are weakened as these tissues are resorbed or taken up by local cells. At the core, trabecular bone becomes less dense. On the perimeter, cortical bone loses thickness. Osteoporosis increases the bone's susceptibility to fracture because of thinner bone tissue at the perimeter and more porous bone tissue in the core. Type I, Postmenopausal Osteoporosis, usually occurs in women following menopause. Type II, or Age-Related Osteoporosis, afflicts both women and men aged 70 or older.



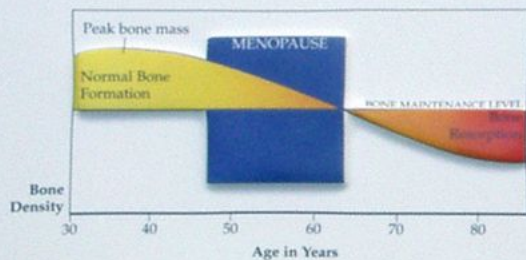
Bone Formation & Restoration

Bone is composed of 30% organic and 70% mineral substances. The organic portion is called **osteoid** and acts as the matrix or framework for the mineral part. Osteoid is produced by bone cells called **osteoblasts**. The mineral part consists of calcium and other valuable minerals and hardens upon the osteoid matrix. Osteoclasts are large bone cells which reshape mature bone by resorbing the mineral and organic components. Bone formation and restoration are normal, continuous processes.

In osteoporosis, there is an overall decrease in bone mass because resorption by osteoclasts exceeds bone formation. Osteoblasts continue to produce bone, but not to the same extent that it is being resorbed.

Postmenopausal Osteoporosis

This type of osteoporosis usually occurs in women several years after menopause. At this time, women's ovaries produce less oestrogen (a female sex hormone). In the absence of oestrogen, bone resorption increases, dropping overall bone mass below the maintenance density level and risking fracture.



Age-Related Osteoporosis

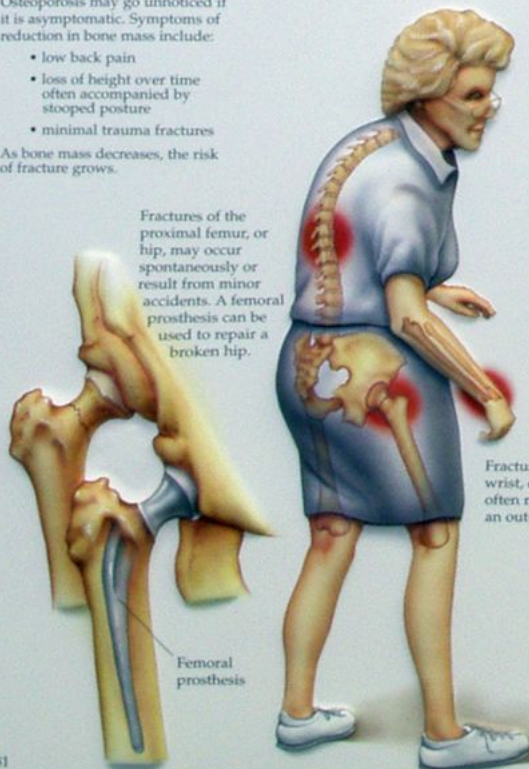
Older age presents several additional concerns about osteoporosis. Adults over 70 have the added risk of low bone mass because bone density peaks at age 35 and decreases gradually. Secondly, the ability to absorb calcium from the intestine decreases, reducing calcium inside the body. Bone formation responds to physical stress, therefore, less activity decreases bone strength. Finally, older adults may be slightly Vitamin D deficient, also leading to decreased calcium absorption from the intestine. All of these factors predispose older people to osteoporosis and risk of bone fractures.

Effects of Osteoporosis

Osteoporosis may go unnoticed if it is asymptomatic. Symptoms of reduction in bone mass include:

- low back pain
- loss of height over time often accompanied by stooped posture
- minimal trauma fractures

As bone mass decreases, the risk of fracture grows.



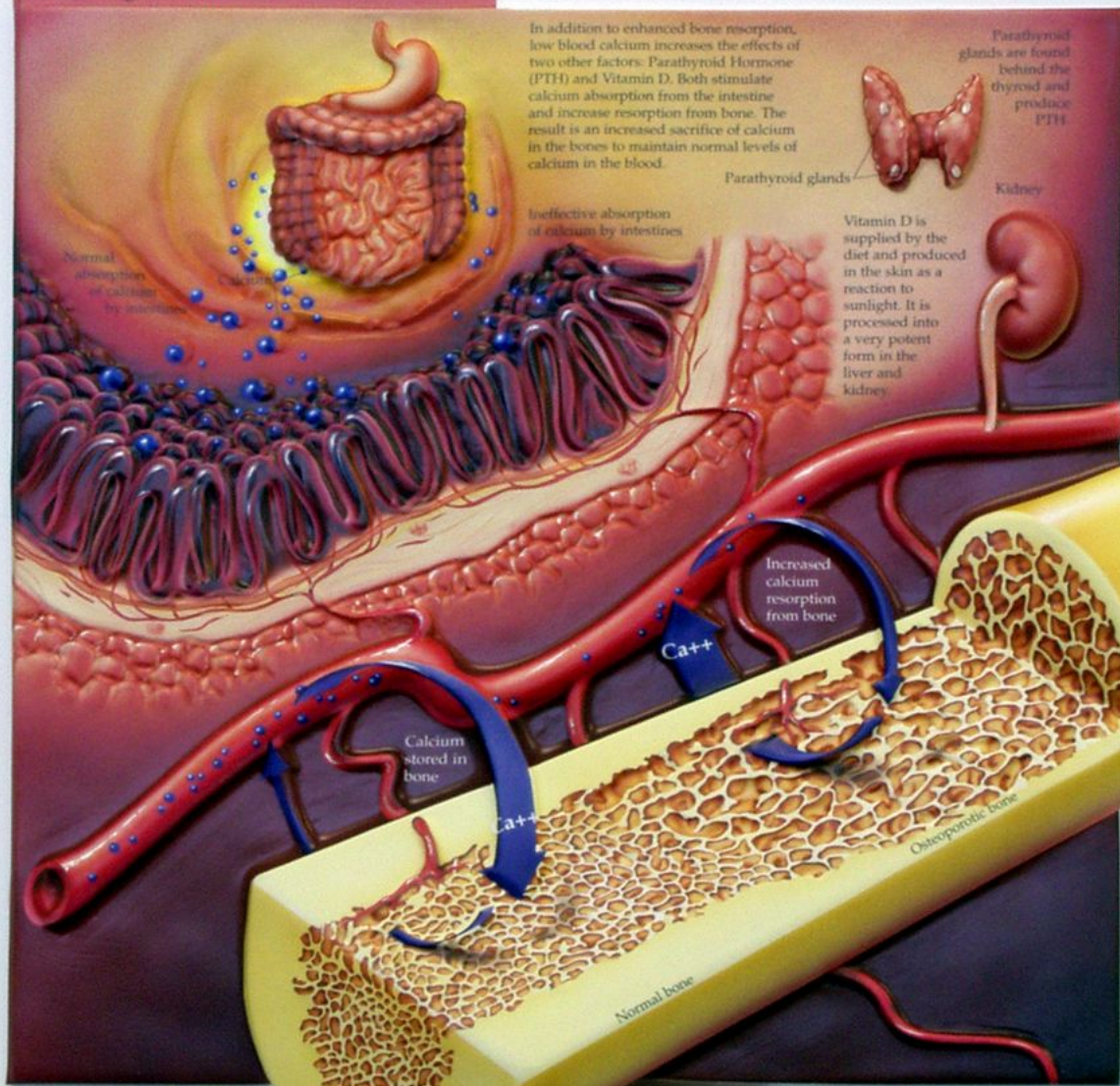
Fractures of the proximal femur, or hip, may occur spontaneously or result from minor accidents. A femoral prosthesis can be used to repair a broken hip.

Fractures of the distal wrist, or Colles' fractures, often result from a fall on an out-stretched hand.

Compression fractures in the lower spine result from a decrease in the trabecular bone of the vertebral bodies. They can be caused by little or no trauma. Deformities of the spine may occur due to a collapse of these injured vertebrae.



Controlling Your Mineral Balance



In addition to enhanced bone resorption, low blood calcium increases the effects of two other factors: Parathyroid Hormone (PTH) and Vitamin D. Both stimulate calcium absorption from the intestine and increase resorption from bone. The result is an increased sacrifice of calcium in the bones to maintain normal levels of calcium in the blood.

Ineffective absorption of calcium by intestine

Parathyroid glands

Parathyroid glands are found behind the thyroid and produce PTH

Kidney

Vitamin D is supplied by the diet and produced in the skin as a reaction to sunlight. It is processed into a very potent form in the liver and kidney

Increased calcium resorption from bone

Calcium stored in bone

Normal bone

Osteoporotic bone

Risk Factors

- Female
- Post-menopause
- Limited physical activity
- Small bone structure
- Low dietary calcium
- Cigarette smoking
- Alcoholism

Keeping Bones Fit

Proper nutrition and a healthy lifestyle are important for the development and maintenance of bones. A physician can determine whether hormone replacement therapy is appropriate for each individual. Activity for youths will build strong bones to last until old age. Eating a recommended daily calcium requirement and exercising will help to maintain skeletal integrity and prevent potential bone fractures in the future.