MAKING THE DIAGNOSIS OF OSTEOPOROSIS

Osteoporosis is a condition of decreased bone mass. This leads to fragile bones which are at an increased risk for fractures. Osteoporosis is a disease that can progress silently over a long period of time. If diagnosed early, fractures associated with the disease can be prevented. Unfortunately, osteoporosis often remains undiagnosed until a fracture occurs.

The term "porosis" means porous, which describes the appearance of osteoporosis bones when they are broken in half and the inside is examined. Normal bone marrow has small holes within it, but a bone with osteoporosis will have much larger holes.

There can be different rates of bone loss in different bones of the body. It affects some bones more than others. Because each person's medical history is different, the progression of bone loss and development of osteoporosis can vary significantly from person to person* In many women, but not all, the sharp decline in estrogen production after menopause can lead to bone loss that is rapid and severe.

While osteoporosis can be treated, it is not curable at this time and requires lifelong management.

Evaluating a person for osteoporosis

A medical evaluation to diagnose osteoporosis may involve several steps:

- Medical history
- Physical examination that includes checking for height changes and evaluating posture to note any curvature of the spine (kyph
- X-rays to detect skeletal abnormalities
- Bone mineral density (BMD) test that can confirm the diagnosis of osteoporosis
- Laboratory tests that reveal important information about the metabolic process of bone breakdown and formation and that provide other information
- Personal history of a fracture as an adult

Before performing any tests, your healthcare provider will obtain information about your medical history and lifestyle and also ask questions related to factors that increase the likelihood of you developing osteoporosis. These are called "risk factors" and include the following:

- Thin and/or small frame
- Cigarette smoking
- Steroid drug therapy for more than 3 months
- Family history of osteoporosis (genetics)
- Diet low in calcium and/or vitamin D
- Drinking alcohol in excess
- Inactive lifestyle
- Postmenopausal, including early or surgically induced menopause
- Abnormal absence of menstrual period (amenorrhea)
- Low testosterone levels in men
- Advanced age
- Anorexia nervosa or bulimia
- Being female
- Being Caucasian or Asian, although African-Americans are at significant risk as well

Secondary Osteoporosis

Certain medications as well as some medical conditions can cause bone loss and eventually osteoporosis. When either a medication or a medical condition leads to osteoporosis, a person is said to have secondary osteoporosis. Treating the underlying cause can help people with osteoporosis, but often there is no known cause. For persons on medications that cause bone loss, it is important to take appropriate measure to protect the bones.

Medications that can cause bone loss:

- Aluminum-containing antacids
- Anti-seizure medications (example is Dilantin)
- Aromatase inhibitors (example is Arimadex)
- Cholestyramine
- Cyclosporine A and FK506 (Tacrolimus)
- Depo-Provera
- Glucocorticoids (examples are cortisone and prednisone)
- Gonadatropin releasing hormone analogues (examples are Lupron and Zoladex)
- Heparin
- Lithium
- Methotrexate
- Tamoxifen (premenopausal use)
- Thyroid hormones in excess

Medical conditions that may be associated with an increased risk of osteoporosis:

- AIDS/HIV
- Blood and bone marrow disorders
- Breast cancer
- Cushing's syndrome
- Eating disorders
- Emphysema
- Female athlete triad
- Gastrectomey
- Hyperparathyroidism
- Idiopathic scoliosis
- Inadequate diet
- Inflammatory bowel disease
- Insulin-dependent diabetes mellitus
- Kidney disease
- Lupus
- Lymphoma and leukemia
- Malabsorption syndromes (examples are celiac disease and Crohn's disease)
- Multiple sclerosis
- Organ transplantation
- Premature menopause
- Prostate cancer
- Rheumatoid arthritis
- Spinal cord injuries
- Stroke
- Thalassemia
- Thyrotoxicosis
- Weight Loss

X-Rays

When osteoporosis results in multiple compression fractures of the spine, the spine shortens and height loss or stooped posture can occur. Because some people feel no pain with compression fractures, an x-ray may be appropriate if you have experience a height loss or change in posture. If you have back pain, your healthcare provider may order an x-ray of your spine to determine if you have had a fracture. However, x-rays are note used to diagnose osteoporosis. X-rays can only detect bone loss after 25-40 percent of the skeleton has been depleted and should not be used to identify the presence of osteoporosis.

BONE MINERAL DENSITY (BMD) TEST

There is no method of determining the actual structure of bones without removing a piece during a biopsy (which would not be practical or necessary for a diagnosis). Instead, the diagnosis of osteoporosis is based on special x-ray methods called densitometry. Densitometry will give accurate and precise measurements of the amount of bone (not their actual quality) in different parts of the body. This measurement is called bone mineral density or BMD. Results from this test help your healthcare provider make a definitive diagnosis of osteoporosis and determine your risk for fractures. The BMD test is noninvasive and painless. During a BMD test, either an extremely low amount of radiation or high frequency sound waves are used.

Bone density may be measured at the spine, hip, wrist, finger, shinbone, kneecap or heel. While hip BMD is the best predictor of hip fractures, central DXA of the hip and/or spine is the preferred measurement for diagnosis of osteoporosis and fracture risk. With the DXA test, the amount of

radiation is generally equivalent to the radiation received from flying round trip coast to coast or approximately one-tenth that of a standard chest x-ray.

As defined by the World Health Organization (WHO), a person's BMD test measures current bone mass and compares it to a specific standard or number value that reflects optimal or peak bone density. For women, this number value reflects the bone density of a healthy 30-year old woman. A BMD test compares an individual's bone mineral density to optimal bone density, and the findings are expressed in terms of "standard deviations" as a T-score, or how far above or below the "norm."

Individuals with a T-score of +1 to -1 are considered to have normal bone density. A T-score between -1 and -2.5 indicates low bone mass or osteopenia. A T-score of -2.5 or lower is considered a diagnosis of osteoporosis.

When a patient is diagnosed and treated for osteoporosis, the patient's healthcare provider may repeat a BMD test every one to two years to monitor the effectiveness of the treatment regimen.

BONE SCANS

In some patients, a bone scan may be ordered. A bone scan is different from the bone mass measurement test just described, although the term "bone scan" often is used incorrectly to describe a bone density test. A bone scan can tell the healthcare provider whether there are changes that may indicate cancer, bone lesions, inflammation or new fractures. To perform a bone scan, the patient is injected with a dye that allows a scanner to identify differences in the condition of different areas of bone tissue.

LABORATORY TESTS

Laboratory tests may be performed on blood and urine samples. The results of these tests help your healthcare provider identify conditions that may be contributing to bone loss. The most common blood tests are:

- Blood calcium levels
- Thyroid function tests
- Parathyroid hormone levels
- Estradiol levels to measure estrogen in women
- Follicle stimulating hormone (FSH)
- Testosterone levels in men
- 25-hydroxyvitamin D test to determine whether the body has adequate vitamin D
- Biochemical marker tests

The most common urine tests are:

- Twenty-four hour urine collection to measure calcium metabolism
- Biochemical marker tests

Biochemical Markers: Bone remodeling, the process of removing old bone and forming new bone tissue, results in by-products of bone metabolism called biochemical or bone turnover markers. Blood and urine tests can detect these markers and provide information about the rate of bone removal and formation. These tests appear to identify those who are losing bone at a faster rate than normal. They may help determine whether bone is responding to drug therapy within several months of starting therapy. Because bone markers do not detect low bone density or diagnose osteoporosis, they are not a substitute for BMD testing.

TREATMENT

Once you and your healthcare provider have definitive information based on your medical history, clinical risk factors for osteoporosis, physical examination and diagnostic test results including the BMD test, a specific prevention or treatment program can be developed for you. Recommendations for optimizing bone health include a comprehensive approach that consists of adequate calcium and vitamin D, approp0riate exercise and a healthy lifestyle. It is important to avoid smoking and excessive alcohol consumption and to recognize that some prescription medications and chronic diseases can cause bone loss.

If you have bone loss, your healthcare provider may prescribe an osteoporosis medication to help preserved and build bone density and prevent fractures. If you already have experienced a fracture, your healthcare provider may refer you to a specialist in physical therapy or rehabilitation medicine to help you with daily activities and safe movement and provide you with a program of exercises to improve strength and balance.

The Importance of Testing

Osteoporosis is different from most other diseases or common illnesses in that there is not a single cause.

The overall health of a person's bones is determined by many things, ranging from how well the bones were formed as a youth to the person's physical activity level over the years.

During the first 20 years of life, the formation of bone is the most important factor. After that point, it is the prevention of bone loss that becomes most important. Anything that causes decreased bone formation early in life, or loss of bone structure later in life, may lead to the disease.

Testing will help determine the level of care and changes in lifestyle needed.