Osteoporosis

What You Should Know

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What is Osteoporosis?

A condition in which the infrastructure of bone becomes thin and weakened.

Weakened bone is at higher risk for fracture to occur from minimal stresses.
Normal & Osteoporotic Bone Architecture

Normal Bone

Osteoporotic Bone

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Who Gets Osteoporosis?

ANYONE could be at risk for Osteoporosis

- Most people are identified after age 50
- Some diseases & conditions increase risk
- Even men & children are at risk
Risk Factors You Can’t Change

- Age
- Gender (4/5 cases are female)
- Postmenopausal status
- Family history, race (Caucasian or Asian), Vit D genetics
- Small frame (<127 lb = osteoporosis risk)
- Hyperparathyroidism, RSD, cancer, organ replacement
- Necessary medications (steroids, antiseizure, anticoagulants, synthroid, many chemotherapies, some diuretics)
Additional Risk Factors

Diseases that Are Often Treated with Glucocorticoid Medications*

Asthma

Bursitis

Crohn’s Disease

Chronic Active Hepatitis

Dermatitis (Severe)

Glaucoma

Lupus Erythematosus

Multiple Sclerosis

Osteoarthritis

Psoriasis

Rheumatoid Arthritis

*Partial List
Risk Factors You *Can* Change

- Diet – inadequate calcium and vitamin D, too much or too little protein
- Some bone-damaging medications
- Unhealthy lifestyle choices
  - Alcohol (more than 2 drinks/day)
  - Smoking (any!)
- Too little exercise
- Under-eating (<127 lb = osteoporosis risk)
Bone Development

- Bones build mass beginning at birth and peak by age 20-30

- Bone growth is promoted by adequate intake of calcium, vitamin D, protein and exercise

- BONE BEGINS TO LOSE MASS AFTER AGE 30!!
Calcium and Bone

- **Recommended daily calcium intake**
  - **Children and Young Adults**
    - 1-10 years 800 mgs
    - 11-24 years 1,200 mgs
  - **Adults** 1,000 mgs
  - **Pregnant and Lactating Women** 1,200 mgs
  - **Postmenopausal Women Not on ERT** 1,500 mgs
  - **Men over the age of 65** 1,500 mgs

- **Excess salt displaces calcium**
  - Is added to almost all canned foods!

- **High phosphates leach calcium from bone!**
  - **Soda** – the worst culprit
Bone Nutrition - Beyond Calcium

◆ Vitamin D
  • 400 – 800 units daily (Dawson-Hughes 1995)
  • 30 minutes of sun to hands & face daily sufficient in sub-tropical latitudes but only the “sunny” 6 months in temperate latitudes

◆ Magnesium
  • 400-600/day – allows calcification as a natural calcium chelator (Barzel US, 1995)
  • Depleted by stress, physical exertion

◆ Protein Intake and Bone - moderation is the key
  • No differences in bone density with MODERATE vegetarians vs MODERATE omnivores: 65-75 g/day (Marsh et al, 1980, 1988)
  • High amounts of protein intake (~200 g/day) associated with decreased bone density (Barzel 1998, Mazess et al 1974, 1997)
  • Low protein diets (<50g/day) associated with decreased bone density (Chiu et al 1997)
Drug Options – FDA approved

- **Anti-resorptives (slow bone resorption)**
  - Calcium and vitamin D
  - Bisphosphonates (alendronate, risedronate, zoledronic acid, pamidronate)
  - Selective estrogen receptor modulators (raloxifene)
  - Calcitonin (Miacalcin)
  - Estrogen
    - risks with long term use outweigh benefits, may be safer with lower dosages
    - Always needs to be given with progesterone when uterus present

- **Anabolic (bone forming)**
  - Parathyroid hormone (Forteo)
Why Do Bones Weaken?

- Bones depend on calcium, other chemicals, and vitamins to keep them strong.
- Bones grow as a response to physical stress being put on them.
- The density (hardness) of bones requires a good diet, some sunlight, and exercise in order to stay strong and not break.
It’s a Big Problem

- Osteoporosis affects more than 10 million people in the US
  - 8 million women
  - 2 million men (but they are catching up)
- 24 million others have low bone mass, called osteopenia
- Osteopenia is a precursor to osteoporosis
**Why is It a Problem?**

- Osteoporosis, by itself, is not a problem. It doesn’t cause pain and you will not know you have it!

- The problem is that it makes bones very brittle and brittle bones can break easily.

- A broken bone is called a FRACTURE.
Fracture Numbers

- Every year there are 1.5 million bone fractures in this country
  - 300,000 hip fractures
  - 700,000 vertebral fractures
  - 250,000 wrist fractures

- Fracture care costs **$3 BILLION** every year!
Fractures cause:

- Pain
- Limited mobility

Prolonged bedrest causes:

- Loss of strength
- Pneumonia

- Disability
- Death (20% of those with hip fractures die within one year, increased mortality with each vertebral fracture)
How Do I Know if I Have It?

- There are many types of screening tests available in the community. Many use a finger or a foot to estimate possible risk.

- The gold standard (the absolute test) for determining the amount of bone density an individual has is a **DEXA test**. It is like an X-ray without the radiation.

- You lie on a table and a scanner passes over you. A computer determines how much bone you have by the information read by the scanner.
What’s a T-score?

- The amount of bone you have is determined by how much has been lost since childhood, assuming you had lots of calcium and activity at that time.
- A T-score is a statistical number which says whether you are above or below “normal”.
- T-scores are such numbers as -1.4 or -3.0 or even +1.0 sometimes.
T-scores

- Normal T-scores range from +1 to -1
- Osteopenia T-scores -1.0 to -2.5
- Osteoporosis T-score less than -2.5 (up to -6.0)
What Should I Do First?

There are 3 major things you can do

1. Talk to your *doctor* about a Bone Density Test

2. Talk to a *physical therapist* about your activity level and an exercise program to combat osteoporosis

3. Talk to a *dietician* to make sure your diet is providing your bones with enough calcium and is balanced correctly
What If I Already Have Osteoporosis?

- Talk to your physician and pharmacist about medications available to help you.
- Make sure your diet includes enough calcium, not too much caffeine or alcohol, and adequate, but not excessive, protein.
- Spend at least 30 minutes/day in sunlight and/or eat foods which are fortified with Vitamin D.
- and..................
See a Physical Therapist

- PTs are able to develop an exercise program for you that will be appropriate for your condition.

- PTs will evaluate your posture, your strength, your range of motion, your balance, and your general endurance status.

- PTs will develop a balanced program which should help keep you fit as well as safe.

- PTs can answer your questions or refer you to others who will.
Studies on Exercise

- Appropriate exercise may slow the rate of bone loss

- Sedentary lifestyles and immobility lower bone density

- Effects of exercise are improved when combined with proper nutrition and medication
Determinants of Osteoporotic Fracture

- Number of osteoporosis risk factors
- Forward bending (trunk flexion)
- Poor balance, or accidents resulting in falls

Vertebral Fracture

Hip Fracture
Fracture Force Risks During Bending and Lifting

- Compression loads imposed on the L3 motion segment (lower back) by **30° of trunk flexion**
  - 1800 N with arms at chest
  - 2610 N with arms in front, **holding 2 kg in each hand** (Schultz et al. 1982)

- 300 to 1200 N enough to fracture an osteoporotic vertebra (Edmondston et al. 1997)

- **Practical Application** - bend and lift in everyday life with the trunk in relative neutral!
Exercise and Vertebral Fractures
(for women with a previous fracture)

Type of Exercise
- Spinal Extension (Back arches/lifts)
- Spinal Flexion (Crunches)
- Combined Flexion and Extension
- No exercise

New Fractures
- 16%
- 89%
- 53%
- 67%

Sinaki and Mikkelson, 1994
Exercise Effect on Bone – Works only when “Regular”

- Postmenopausal women exercised 3 times per week for 9 months
- Stair-climbing for ~ 30 minutes each session
- Spinal bone density ↑ 4% in exercisers
- Spinal bone density ↓ to baseline within 9 months for those who stopped exercising

(Dalsky 1988)
Resistance Training Increases Bone Density Best

- **Landmark study** (Nelson & Fiaterone 1994)
  - Sedentary 50-70 y/o postmenopausal women
  - Resistance training 2 X/wk on 5 machines for 1 year
  - Significant bone density increases in spine, hip, total body

- **Many other studies validate, including:**
  - Cussler EC 2003
  - Kerr D 2001
  - Kelley GA 2001
Principles of Exercise for People with Lowered Bone Mass

- **Posture** is critical in all activities
- **Weight bearing** is important
  - Walking
  - Dancing
  - Stair climbing
- **Resistance exercise** is the best way to strengthen bone & muscle groups
- Avoid activities or positions that move the body into bent (flexed) postures
Prevention of Bone Loss and Minimizing Fracture Risk

- **Healthy lifestyle choices**
  - Exercise
  - Nutrition

- **Early treatment**
  - Screening
  - Individualized therapies

- **Physical Therapy**
  - Resistive weight bearing exercise
  - Correct body mechanics
  - Balance interventions
  - Treat mechanical pain & dysfunction
See a Physical Therapist for More Details!
Find Out More About Osteoporosis

Web sites for up to date information:

www.geriatricspt.org/clients/resources.cfm
www.nof.org
www.surgeongeneral/library/bonehealth
www.osteo.org
www.fore.org