



## **Strong Bones for Life**

An Update on Osteoporosis

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### **Thanks to our Sponsors:**

- School of Public Health, University at Albany
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- NYS Community Health Partnership

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- NYS Association of County Health Officials
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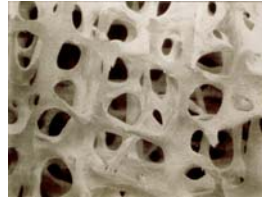
## Definition of Osteoporosis

A skeletal disorder characterized by compromised bone strength predisposing a person to an increased risk of fracture.

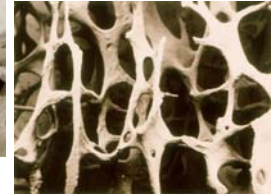
Bone strength primarily reflects the integration of bone quality and bone density.

*National Institutes of Health (USA) Consensus Statement on Osteoporosis Prevention, Diagnosis, and Therapy, 2000*

## Definition of Osteoporosis

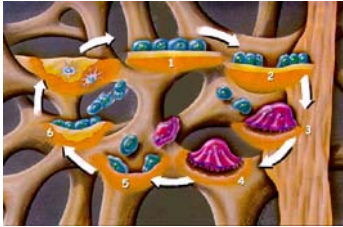


Normal Bone



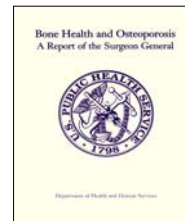
Osteoporosis

## Bone is Alive!



There is a cycle of breaking down and rebuilding bone called bone remodeling

## Bone Health and Osteoporosis A Report of the Surgeon General



Everyone has a role to play in bone health

## NYSOPEP The New York State Osteoporosis Prevention and Education Program



- Established in 1997
- Evidence-based education
- 6 regional centers
- Visit the website [www.NYSOPEP.org](http://www.NYSOPEP.org)

## The Impact of Osteoporosis

- 10 million people have osteoporosis
- 34 million people have low bone mass
- 40% of women over 50 will suffer an osteoporosis-related fracture in their lifetime



## The Impact of Osteoporosis

Cont.

- **HIGH RISK:** Each year, the risk for women of suffering a fracture from osteoporosis is greater than the combined risk of suffering a heart attack, stroke, or breast cancer in women.

## The Osteoporosis Continuum



**50 Menopausal**  
Experiencing vasomotor symptoms

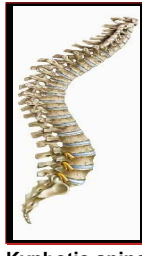
**55+ Postmenopausal**  
At greater risk for vertebral fracture than any other type of fracture

**75+ Kyphotic**  
At risk for hip fracture and vertebral fracture

## The Osteoporosis Continuum



Healthy spine



Kyphotic spine

## Spine Fractures May Cause:



- Pain
- Loss of height
- Stooped posture
- Difficulty breathing
- Stomach pains/digestive discomfort
- Loss of self-esteem
- Increased risk for spine and other non-spine fractures (including hip fracture)

## Hip Fractures Have Serious Consequences

- Only 1 in 10 return to full activity
- 1 in 5 need a skilled nursing facility within a year
- 1 in 4 become disabled
- Many become isolated and depressed
- 1 in 5 die within a year of the fracture

## Risk Factors You Cannot Change

- Family history of osteoporosis and/or fracture
- Older age
- Being female
- Ethnicity (esp. Caucasian, Asian or Hispanic)
- Menopause at an early age
- Certain medications and/or medical conditions that may lead to bone loss or increase the risk for osteoporosis

## Certain Diseases/Conditions

- Diseases that cause poor intestinal absorption (Crohn's disease, celiac disease, liver disease)
- Diseases associated with immobility or bed rest for more than 6 months (stroke, Parkinson's disease, multiple sclerosis)

## Certain Medications

- Steroid medications used for more than 3 months (Cortisone, Prednisone)
- Excess thyroid hormone replacement
- Antiseizure medications
  - Dilantin=phenytoin
  - Depakote=valproic acid
- Some cancer treatments

## Osteoporosis Risk Factors

- Low lifetime calcium and/or vitamin D intake
- Lifetime lack of exercise
- Tobacco use
- Excessive alcohol or drug use
- Being underweight/ Dieting to achieve excessive thinness
- Bulimia/Anorexia
- Hormonal imbalance
- Excessive steroid use

## Primary Prevention

- A disease can be stopped before it starts
- Reduce or eliminate risk factors
- Education/counseling
- Begins at birth; lifelong challenge
- Lifestyle factors are responsible for 10-50% of bone mass and structure

## Reduce Risk Factors

- Maintain a healthy body weight



- Increase calcium and/or vitamin D intake throughout life

## Reduce Risk Factors

Avoid risky behaviors:



Don't smoke



Limit alcohol consumption

## Risk Factors You Can Change

Exercise regularly



Consult a physician about maintaining hormonal balance

## Bone Health for Children

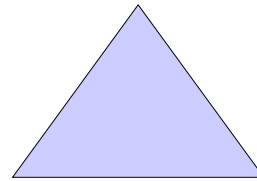
- Use age-appropriate teaching tools
- Encourage healthy bone building habits:
  - Calcium
  - Vitamin D
    - Supplemented for exclusively breastfed
  - Serve fortified foods
- Encourage regular exercise

## Bone Health for Adolescents

- At risk due to rapid growth
  - Calcium (1300 mg)
  - 1 hour exercise
- Avoid risky behaviors:
  - Eating disorders
  - Over-exercising
  - Peer influence: smoking, alcohol, anabolic steroids

## The Female Athletic Triad

Disordered Eating/Over-training



Amenorrhea

Osteoporosis

## Calcium and Vitamin D Key Nutrients for Bone Health



## Goal for Daily Calcium Intake

<u>Age (years)</u>	<u>Calcium (mg)</u>
1 to 3	400
4 to 8	800
9-18	1300
19-50	1000
51+	1200

It may be unhealthy to take more than 2500 mg/day

### Calculating Calcium Per Serving:

- 1. Find the %Ca per serving
  - 2. Drop the %
  - 3. Add a zero
- For example: 30%=300 mg
- 500 mg absorbed at one time

### Calcium Supplements

- Step 1. Calculate calcium needed to meet goal  
 Take Daily Calcium Intake Goal (mg)  
 minus - Dietary Calcium Intake (mg)  
 equals = Calcium Needed (mg)
- If extra calcium is needed:  
 Step 2. First, try adding dietary calcium  
 Step 3. Add supplemental calcium if necessary

### Calcium Supplements

<u>Supplement</u>	<u>Pros</u>	<u>Cons</u>
Calcium carbonate	Largest amount of elemental calcium. Well-absorbed. Lowest cost. Absorbed better with food.	May cause gas or constipation. Increase fluid intake and activity to counteract this effect. If unsuccessful, switch calcium formulation.
Calcium phosphate	Well-absorbed. Does not cause gas or constipation. Can be taken without regard to food.	More expensive than calcium carbonate, less expensive than calcium citrate.
Calcium citrate	Most easily absorbed supplement.	Higher cost. Lower percent of elemental calcium.

### Vitamin D is Key for Healthy Bones



- Increases calcium absorption in the small intestine to help maintain blood calcium levels within the normal range
- Might also have direct effects on bone
- Is required for proper muscle function

### Adequate Intake of Vitamin D (for Healthy Individuals)

<u>Age (years)</u>	<u>Vitamin D (IU per day)</u>
Birth to 50	200
51 to 70	400
71+	600

(Some individuals require much more)

Source- Dietary Reference Intakes, National Academy Press, 1997

### Vitamin D Sources

- Sunlight
  - Take precautions to protect the skin
- Diet
  - Natural Sources
  - Fortified sources
- Supplements
  - Multi-vitamins

## Exercise has the potential to:

- Increase bone density in youth and young adulthood
- Maintain and may modestly increase bone density in adulthood
- Prevent and minimize kyphosis
- Increase muscle mass
- Improve balance and agility
- Reduce the risk for fall-related fractures

## Physical Activity

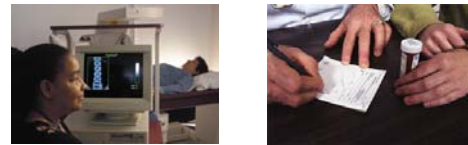
- Weight bearing
  - Put stress through the bone
  - Impact exercises
- Resistance
  - Exercises that cause compression through the bone as the muscle contracts
- Balance training

## Physical Activity

- Weight bearing
  - Moderate intensity, 30 minutes to 1 hour, most days of the week
- Resistance
  - 8 to 10 exercises, 8 to 12 repetitions, 2 times per week
- Balance training
  - Tai Chi, specific exercises

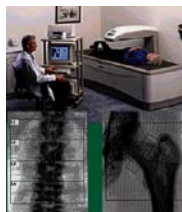
## Secondary Prevention

- Identify people early in the disease to prevent harmful consequences
  - Early detection of those at risk
  - Begin appropriate treatments to prevent fractures



## Bone Mineral Density Tests

- Requires a prescription
  - with a diagnosis
- Dual X-ray Absorptiometry
  - Gold standard: hip and spine
  - Painless, noninvasive
  - Safe: low dose x-ray
  - Can determine mineral content of bone



## BMD Test Recommended for:

- All women by the age of 65
- All men by the age of 70
- Pre-menopausal women only in rare circumstances such as initiating/or on steroid treatment for more that 3 months

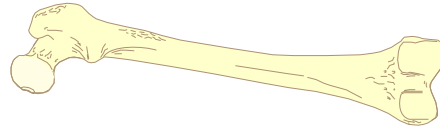
## BMD Test Recommended for:

- 50+ yr old women or men who have clinical risk factors:
  - Adulthood fractures, kyphosis, family history
  - Chronic diseases that increase risk of osteoporosis
  - Medications that increase risk
  - Active or recent smoking
  - Being very thin

## Using T-scores to Define Bone Health

### Diagnosis Based on Bone Density Test

Osteoporosis (- 2.5 and lower)	Low Bone Mass (Between -1.0 and - 2.5)	Normal Bone Mass (-1.0 and above)
...- 3.5 ... - 3.0 ... - 2.5 ...	-2.4 ... -2.0 ... -1.5 ... -1.1...	-1.0...0.0 ...+1.5 ...+2.0...



## Steps to Healthy Bones

- Optimal nutrition
- Healthy body weight
- Yearly height checks
- Regular exercise
- Tobacco cessation
- Moderation of alcohol intake
- Fall prevention
- Medication when indicated



## Medicating for Osteoporosis

### SHOULD TREAT people with:

- Prior clinical vertebral or hip fracture
- Prevalent vertebral deformity
- BMD in the osteoporosis range (T-score < -2.5)

## Medicating for Osteoporosis

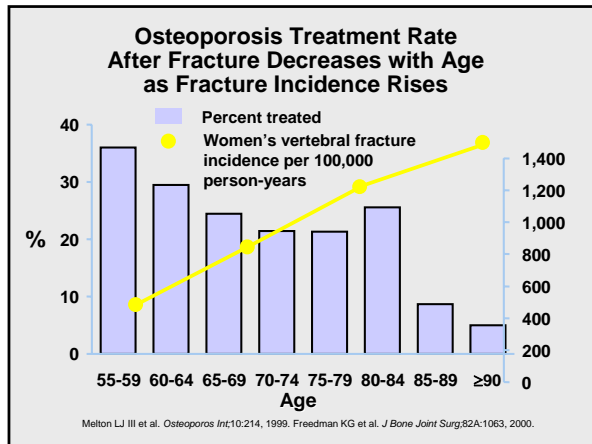
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**MAY TREAT** people with BMD T-scores between -1.5 and -2.5 depending on number and severity of risk factors:

- Prior adulthood fracture (non-spine, non-hip)
- Older age
- family history of fracture
- Low body weight
- High bone turnover
- Medications/diseases
- Smokers

## U.S. FDA-Approved Medications for Osteoporosis

- Antiresorptive medications to reduce bone loss
  - Bisphosphonates:
    - Alendronate sodium (Fosamax) or (Fosamax Plus D)
    - Ibandronate sodium (Boniva)
    - Risedronate sodium (Actonel) or Actonel and Calcium
- Estrogen therapy (ET) or hormone therapy (HT)
- Raloxifene hydrochloride (Evista)
- Salmon calcitonin (Miacalcin)
- Anabolic agents to build bone
  - Teriparatide or parathyroid hormone (Forteo)



**Tertiary Prevention:  
Following a Fracture**

- Block or slow the progression of disability
- Physicians fail to diagnose and treat osteoporosis
  - Bone density testing not performed
  - Calcium and vitamin D supplements not being given
  - Effective medications not prescribed
  - Therapy prescribed often does not conform

**Consequence of Fracture**

- Disability and diminished function
  - Isolation, depression, fear of falls, chronic pain, disfigurement
- Loss of independence
  - 1 in 5 hip fx patients end up in nursing home
- Premature death
  - Mortality: 2.8-4 times greater in hip fx patients in first 3 months

**Following a Fracture**

Aggressive intervention to:

- Maximize bone health
- Minimize morbidity
- Prevent future fractures

May require referral to a specialist

**Following a Fracture**

- Calcium supplements reduce bone loss and fracture
- Vitamin D supplements reduce fractures and falls
- Physical activity preserves bone mass, builds muscle mass, reduces falls, maintains independence
  - Bed rest reduces bone mass
- Medications reduce risk of future fractures

**Fall Prevention**

- One third people over age 65 fall each year; half fall more than once
- 1 in 10 falls results in serious injury
- 90% of hip fractures are the result of a fall
- Activities often decrease after a fall even if not hurt
  - More deconditioned and more likely to fall again

## Risk for Falls

- There are identifiable risk factors for falls
- Changes with aging
  - Balance, coordination, strength, sensory, vision, blood pressure, circulation, cognition
- Use of medications
- Environmental factors

## Fall Prevention

- Targeted interventions: multiple risk factors
- Muscle strengthening/balance retraining
- Professional home hazard assessment and modification
- Stopping or reducing psychotropic medications
- Confidence must be restored after a fall/fracture



## Surgeon General's Report Suggests:

"Federal, State, and local governments (including State and local health departments) join forces with the private sector and community organizations in a coordinated, collaborative effort to promote bone health."



## NYSOPEP

The New York State Osteoporosis Prevention and Education Program

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*Thank you!*

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## Successful Aging

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