OSTEOPOROSIS

DO YOU HAVE SAD BONES?

http://realfoodlovesyou.blogspot.ca/

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PGY1 HealthWise Resident
What is Osteopenia and Osteoporosis?

- **Osteopenia** - low bone mineral density
  - Less severe than osteoporosis

- **Osteoporosis** - “porous bone”
  - Thin, porous, weak, and brittle bones
  - Increased risk for fracture
  - PREVENTABLE disease

From: https://lymediseaseguide.org
Osteoporosis Facts

- More common in women than men
  - Incidence in the United States
    - 8 million women
    - 2 million men
  - Prevalence increases with age
    - 4% of women 50 to 59 to 44%-52% of women >80
  - The risk of hip fracture is more than the breast, uterine, and ovarian cancer combined!
Classification of Osteoporosis

- **Normal bone mass**
  - T-score $\geq -1$

- **Osteopenia**
  - T-score between -1 and -2.5

- **Osteoporosis**
  - T-score $\leq -2.5$
Bone Loss

- Bone looks like a honeycomb
- Throughout our entire lives, our body gets rid of old bone and replaces it with new bone
- When this balance between bone loss and bone replacement is messed up, osteoporosis occurs
  - The spaces in the honeycomb get larger and more porous

Bone Mineral Density

- Affected by:
  - Genetics/family history
  - Age
  - Gender
  - Diseases
  - Medications
## Risk Factors

<table>
<thead>
<tr>
<th>Nonmodifiable</th>
<th>Modifiable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>Smoking</td>
</tr>
<tr>
<td>Increasing Age</td>
<td>Alcohol (&gt;1 drink for women and &gt;2 drinks for men)</td>
</tr>
<tr>
<td>Menopause (decreased estrogen)</td>
<td>Lack of Exercise/Sedentary</td>
</tr>
<tr>
<td>Asian and Caucasian</td>
<td>Low Calcium and Vitamin D Intake</td>
</tr>
<tr>
<td>Small Frame and Body Weight</td>
<td>Increased Caffeine Intake</td>
</tr>
<tr>
<td>History of Broken Bones</td>
<td>Not Eating a Well-balanced Diet</td>
</tr>
<tr>
<td>History of Height Loss</td>
<td>Medications</td>
</tr>
<tr>
<td>Family History of Osteoporosis</td>
<td></td>
</tr>
<tr>
<td>Certain Diseases</td>
<td></td>
</tr>
</tbody>
</table>
Risk Factors: Medications

- Steroids
  - Prednisone, Methylprednisolone, Prednisolone, Dexamethasone, Betamethasone

- GERD/heartburn medications (Proton pump inhibitors)
  - Nexium, Omeprazole, Lansoprazole, Pantoprazole

- Levothyroxine

- Depression medications (SSRIs)
  - Citalopram, Lexapro, Sertraline, Fluoxetine, Paroxetine

- Depot medroxyprogesterone acetate

- Seizure/mood medications
  - Phenytoin, Carbamazepine, Phenobarbital, Valproic acid
Risk Factors: Diseases

- Post menopause (hysterectomy)
- Kidney disease
- Rheumatoid arthritis
- Organ transplant
- Inflammatory bowel disease
- Celiac’s disease
- Gastric bypass
- Diabetes
- Ovarian failure
Fractures

- Typically occur in the hip, spine, and wrist
  - Result from the bones being fragile, NOT trauma
    - “Low-trauma fracture”
- Decreased quality of life and ability to perform normal activities
- Increased risk of death

From: https://boomerserviceinfo.com
Prevention

- Bone health and the prevention of bone loss and osteoporosis is important from birth.
- Peak bone mass occurs from 18 to 25 years old.
- 20% of females older than 50 yo who do not follow bone prevention measures will have a fracture because of osteoporosis.
- No smoking.
- Zero to minimal alcohol.
Prevention: Diet

- Healthy diet with enough vitamin D and calcium
- Well-balanced diet with vitamins and minerals
- Minimal caffeine, soda, and alcohol
  - These can decrease bone density
- Low salt
<table>
<thead>
<tr>
<th>Food</th>
<th>Nutrient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy products such as low-fat and non-fat milk, yogurt and cheese</td>
<td>Calcium. Some dairy products are fortified with Vitamin D.</td>
</tr>
<tr>
<td>Fish</td>
<td></td>
</tr>
<tr>
<td>Canned sardines and salmon (with bones)</td>
<td>Calcium</td>
</tr>
<tr>
<td>Fatty varieties such as salmon, mackerel, tuna and sardines</td>
<td>Vitamin D</td>
</tr>
<tr>
<td><strong>Fruits and vegetables</strong></td>
<td></td>
</tr>
<tr>
<td>Collard greens, turnip greens, kale, okra, Chinese cabbage, dandelion greens, mustard greens and broccoli.</td>
<td>Calcium</td>
</tr>
<tr>
<td>Spinach, beet greens, okra, tomato products, artichokes, plantains, potatoes, sweet potatoes, collard greens and raisins.</td>
<td>Magnesium</td>
</tr>
<tr>
<td>Tomato products, raisins, potatoes, spinach, sweet potatoes, papaya, oranges, orange juice, bananas, plantains and prunes.</td>
<td>Potassium</td>
</tr>
<tr>
<td>Red peppers, green peppers, oranges, grapefruits, broccoli, strawberries, brussels sprouts, papaya and pineapples.</td>
<td>Vitamin C</td>
</tr>
<tr>
<td>Dark green leafy vegetables such as kale, collard greens, spinach, mustard greens, turnip greens and brussel sprouts.</td>
<td>Vitamin K</td>
</tr>
<tr>
<td><strong>Fortified Foods</strong></td>
<td></td>
</tr>
<tr>
<td>Calcium and vitamin D are sometimes added to certain brands of juices, breakfast foods, soy milk, rice milk, cereals, snacks and breads.</td>
<td>Calcium, Vitamin D</td>
</tr>
</tbody>
</table>
Prevention: Exercise

- Exercise
  - Especially important early in life in order to stimulate bone deposition and achieve peak bone mass
  - Moderate intensity exercise 30 minutes most days of the week
  - High impact exercise is best such as jogging, tennis, dancing, hiking, jumping rope
  - Low impact exercises are not as good, but are an alternative if cannot do high impact
    - Fast walking, elliptical, stair-step machines
  - Resistance activity/muscle-strengthening activity twice weekly for 20 to 30 minutes
    - Elastic bands, weight machines, free weights

From: https://www.vitalitmed.com
Prevention: Calcium

- Important for bone health
- If not getting enough calcium should take a supplement
- Foods high in calcium
  - Milk, cheese, yogurt
  - Calcium-fortified orange juice
  - Dark green, leafy vegetables: broccoli, bok choy, collard
  - Sardines and canned salmon
  - Almonds
Prevention: Calcium

- Supplement dose
  - Calcium
    - Females and Males 1-3: 700 mg
    - Females and Males 4-8: 1000 mg
    - Females and Males 9-18: 1300 mg daily
    - Females and Males 19-50: 1000 mg daily
    - Males 51-70: 1000 mg daily
    - Females ≥51 and males ≥71: 1200 mg daily
<table>
<thead>
<tr>
<th>Dairy</th>
<th>Serving Size</th>
<th>Estimated Calcium*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ricotta, part-skim</td>
<td>4 oz</td>
<td>335 mg</td>
</tr>
<tr>
<td>Yogurt, plain, low-fat</td>
<td>6 oz</td>
<td>310 mg</td>
</tr>
<tr>
<td><strong>Milk, skim, low-fat, whole</strong></td>
<td><strong>8 oz</strong></td>
<td><strong>300 mg</strong></td>
</tr>
<tr>
<td>Yogurt with fruit, low-fat</td>
<td>6 oz</td>
<td>260 mg</td>
</tr>
<tr>
<td>Mozzarella, part-skim</td>
<td>1 oz</td>
<td>210 mg</td>
</tr>
<tr>
<td>Cheddar</td>
<td>1 oz</td>
<td>205 mg</td>
</tr>
<tr>
<td>Yogurt, Greek</td>
<td>6 oz</td>
<td>200 mg</td>
</tr>
<tr>
<td>American Cheese</td>
<td>1 oz</td>
<td>195 mg</td>
</tr>
<tr>
<td>Feta Cheese</td>
<td>4 oz</td>
<td>140 mg</td>
</tr>
<tr>
<td>Cottage Cheese, 2%</td>
<td>4 oz</td>
<td>105 mg</td>
</tr>
<tr>
<td>Frozen yogurt, vanilla</td>
<td>8 oz</td>
<td>105 mg</td>
</tr>
<tr>
<td>Ice Cream, vanilla</td>
<td>8 oz</td>
<td>85 mg</td>
</tr>
<tr>
<td>Parmesan</td>
<td>1 tbsp</td>
<td>55 mg</td>
</tr>
</tbody>
</table>

From: https://hsph.harvard.edu
<table>
<thead>
<tr>
<th>Produce</th>
<th>Serving Size</th>
<th>Estimated Calcium*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collard greens, frozen</td>
<td>8 oz</td>
<td>360 mg</td>
</tr>
<tr>
<td>Broccoli rabe</td>
<td>8 oz</td>
<td>200 mg</td>
</tr>
<tr>
<td>Kale, frozen</td>
<td>8 oz</td>
<td>180 mg</td>
</tr>
<tr>
<td>Soy Beans, green, boiled</td>
<td>8 oz</td>
<td>175 mg</td>
</tr>
<tr>
<td>Bok Choy, cooked, boiled</td>
<td>8 oz</td>
<td>160 mg</td>
</tr>
<tr>
<td>Figs, dried</td>
<td>2 figs</td>
<td>65 mg</td>
</tr>
<tr>
<td>Broccoli, fresh, cooked</td>
<td>8 oz</td>
<td>60 mg</td>
</tr>
<tr>
<td>Oranges</td>
<td>1 whole</td>
<td>55 mg</td>
</tr>
<tr>
<td><strong>Seafood</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sardines, canned with bones</td>
<td>3 oz</td>
<td>325 mg</td>
</tr>
<tr>
<td>Salmon, canned with bones</td>
<td>3 oz</td>
<td>180 mg</td>
</tr>
<tr>
<td>Shrimp, canned</td>
<td>3 oz</td>
<td>125 mg</td>
</tr>
<tr>
<td>Fortified Food</td>
<td>Serving Size</td>
<td>Estimated Calcium*</td>
</tr>
<tr>
<td>----------------------------------------------------------</td>
<td>--------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>Almond milk, rice milk or soy milk, fortified</td>
<td>8 oz</td>
<td>300 mg</td>
</tr>
<tr>
<td>Orange juice and other fruit juices, fortified</td>
<td>8 oz</td>
<td>300 mg</td>
</tr>
<tr>
<td>Tofu, prepared with calcium</td>
<td>4 oz</td>
<td>205 mg</td>
</tr>
<tr>
<td>Waffle, frozen, fortified</td>
<td>2 pieces</td>
<td>200 mg</td>
</tr>
<tr>
<td>Oatmeal, fortified</td>
<td>1 packet</td>
<td>140 mg</td>
</tr>
<tr>
<td>English muffin, fortified</td>
<td>1 muffin</td>
<td>100 mg</td>
</tr>
<tr>
<td>Cereal, fortified</td>
<td>8 oz</td>
<td>100-1,000 mg</td>
</tr>
</tbody>
</table>
Prevention: Calcium

- How to take calcium supplements
  - Max amount per dose is 500 to 600 mg of calcium
  - Max amount per day is 2500 mg of calcium
  - Calcium carbonate: 40% elemental calcium
    - Take WITH meals
  - Calcium citrate: 21% elemental calcium
    - Will need to take more tablets than calcium carbonate to get recommended dose
    - Take WITHOUT regard to meals
Prevention: Calcium

- Side effects
  - Constipation
  - Stomach upset/gas
  - Decreased incidence with citrate over carbonate
Prevention: Vitamin D

- Increases the absorption of calcium
- Decreases fracture risk
- Rare side effects

Supplement Dose

- Vitamin D
  - Cholecalciferol (D3): 800-1000 units daily for ≥50
Calculating Dietary Calcium and Vitamin D

- Calcium
  - Add a zero to % calcium per serving to estimate how much calcium they are having
    - Example: patient eats a serving of a food product which contains 20% of the daily serving of calcium, this would equal 200 mg

- Vitamin D
  - Multiply the % daily value of vitamin D by 4 to get the amount of vitamin D present in a serving
    - Example: patient eats a food product with 10% of the daily serving of vitamin D, this would equal 40 units
Diagnosis

- Diagnosed using a central dual energy absorptiometry (DEXA) scan
- Most patients do not have symptoms and are diagnosed after a fracture
- Possible signs and symptoms
  - Loss of height
  - Bone pain
  - Changes in posture

From: https://ziim.us
Treatments

- Once diagnosed with osteoporosis, there are several available treatments
  - Over-the-counter calcium and vitamin D supplements
  - Prescription medications
    - Estrogen after menopause will increase bone density, but is not typically recommended due to risks
Summary

- Osteoporosis is porous, brittle bones which are more likely to fracture
- Osteoporosis is a preventable disease
- There are both modifiable and non-modifiable risk factors
- A scan of the bones called a DEXA scan is used to diagnose osteoporosis
- There are many available treatments for osteoporosis