Everything You Need to Know about

Osteoporosis

Gaylord Specialty Healthcare

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Speakers

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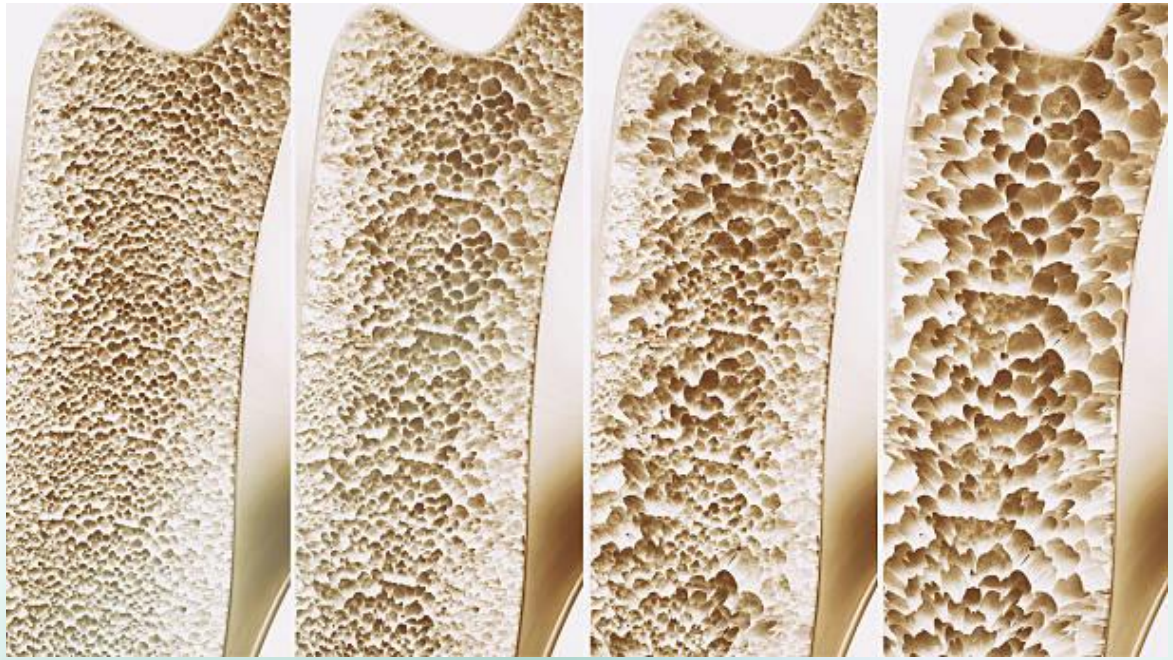
Osteoporosis - Definition

A conditioning characterized by low bone density, resulting in bone fragility and increasing the risk of sustaining a fracture



Osteoporosis – Risk Factors

Non-Controllable Risk Factors

- ➔ **Age greater than 50**
- ➔ **Female**
- ➔ **Post Menopausal**
- ➔ **Family History**
- ➔ **Broken Bones or Height Loss**

Controllable Risk Factors

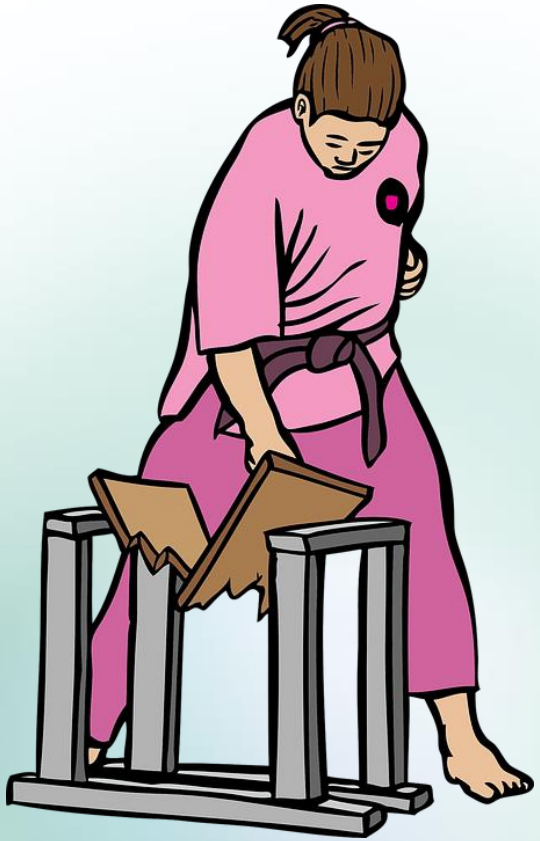
- ➔ **Nutritional considerations**
- ➔ **Activity level**
- ➔ **Smoking / alcohol use**
- ➔ **Low bodyweight/mass**
- ➔ **Bodyweight**

Osteoporosis – Wolff's Law

Wolff's Law:

Bone density will change as a result of the mechanical forces placed upon it

- Bones adapt and increase in density in response to heavier mechanical loading
- The opposite is also true



Mrs. Brit LeBones

- 54 y.o. F
- Sedentary lifestyle
- Family Hx of Osteoporosis
- Difficulty with:
  - standing from chair
  - completing a floor transfer
- DXA: low bone density
- GOALS: decrease risk for falling, improve strength

Osteoporosis – Standard of Care

- **Traditional PT Session**
  - Treadmill Walking / Bike Warm-Up
  - Stretching Exercises
  - Calf Raises
  - Mini Lunges
  - Upper Body Exercises
  - Exercises tend to be similar amongst all patients

Osteoporosis – Standard of Care

- **Traditional PT Session Effectiveness**
  - Not shown to improve bone mineral density
  - Small to no changes found in strength
  - Small to no changes found in general mobility
    - Walking tasks, getting up from a chair, etc.

Osteoporosis – Updated Recommendations

- **Current PT Recommendations**
  - Supervised High Intensity Resistance Training
    - Deadlifts
    - Squats
    - Overhead Press
    - Jumping
  - Exercises are individualized for each patient

Osteoporosis – Updated Recommendations

- **Familiarization period** – therapist coaches and helps patient learn how to execute movements well

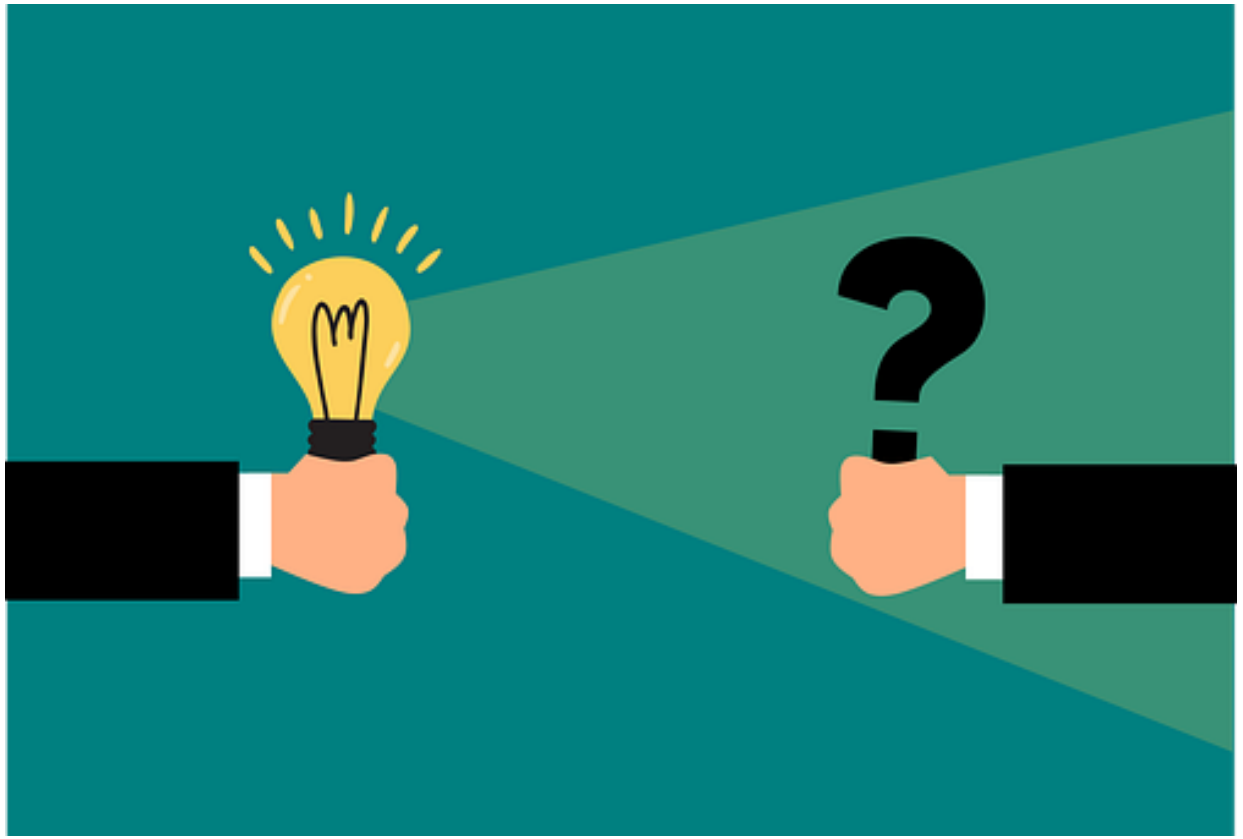
- **Training period** – therapist works with patient to increase resistance and make exercises harder to ensure therapy is effective

- **Transitional period** – therapist and patient work together to develop a long-term plan for use after completing therapy (i.e. at home, at a local gym, etc.)

Osteoporosis – Updated Recommendations

- **Current PT Recommendations Effectiveness**
  - Shown to be very safe
  - Small improvements in bone mineral density found
  - Significant improvements in strength
    - Back extensor strength*
  - Significant improvements in mobility
    - Easier to get up from chair, walk faster, change direction, etc.

Osteoporosis
Q & A



Osteoporosis Nutrition Guide

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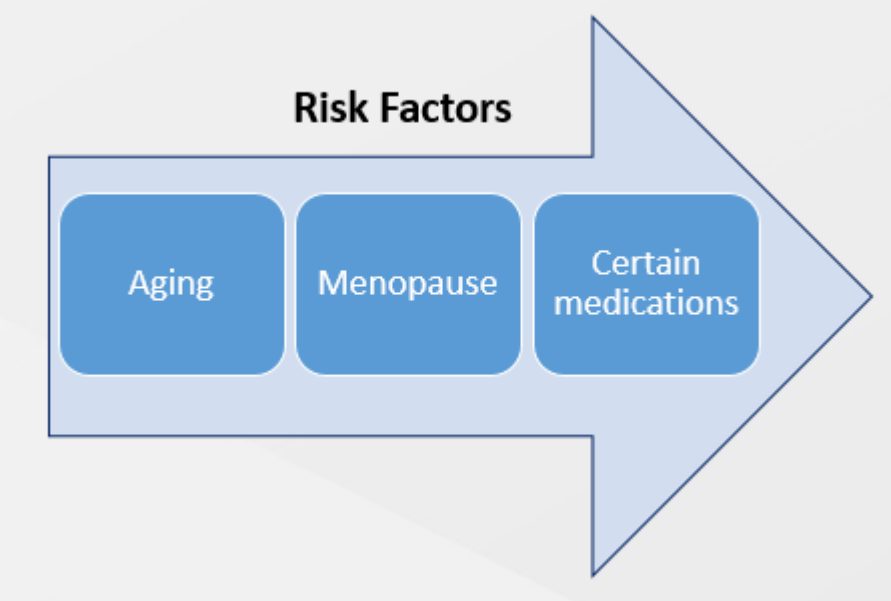
Development of Osteoporosis

- Bone does not remain static throughout life — it is constantly breaking down and rebuilding as part of normal bone metabolism



Nutrients Important for Bone Health

Food and Nutrition Board Dietary Reference Intakes
(Recommended Average Intakes for Calcium and Vitamin D)

Age (y)	Calcium (mg)	Vitamin D (IU)
3–8	800	200
9–17	1300	200
18–50	1000	400
51–70	1200	400
>70	1200	600

Institute of Medicine: "Dietary Reference Intakes for calcium, magnesium, phosphorus, vitamin D and Fluoride." Food and Nutrition Board, Institute of Medicine. Washington, DC: National Academy Press, 1997.

Individuals should ensure to include the following nutrients and foods in their diet to keep bones healthy:

Nutrient contents per 100 g of commonly used products.

Source	Calcium (mg)	Phosphorous (mg)	Potassium (mg)	Vitamin D (IU)	Protein (g)
Whole fat milk	119	93	151	*	3.3
Skimmed milk	122	101	156	*	3.4
Swiss cheese	791	567	77	20	26.9
Cheddar cheese	721	512	98	24	24.9
Cream cheese	98	106	138	*	5.9
Yogurt low fat	183	144	234	*	5.3
Ice cream	128	105	199	0	3.5
Wild salmon	9	0	360	600–1000	38
Eggs	56	197	138	20	12.5

*The best time to get optimal supplementation from the sun is at noon!

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Nutrients Important for Bone Health

POTASSIUM

Apart from its role in the maintenance of an alkaline state in the body, potassium can also increase the accumulation of calcium in the kidneys.

→ Found mostly in fruits and vegetables, such as potatoes, avocados, bananas, tomatoes and oranges.

→ Because lack of potassium is rare, there is no recommended daily allowance (RDA) for this mineral.

Nutrients Important for Bone Health

MAGNESIUM

Magnesium is also necessary for calcium metabolism. After potassium, magnesium is the second most abundant intracellular cation.

→ Found in most whole foods, such as green leafy vegetables, legumes and nuts.

→ The RDA of magnesium are 310–360 mg and 400–420 mg for women and men, respectively.

Nutrients Important for Bone Health

PROTEIN

- Approximately 50% of bone volume and about a third of bone mass is composed of protein
- The main sources of protein in healthy diets come from meat, fish, poultry, eggs and dairy products.
- More recent meta-analyses have reported that a higher protein intake—more than 0.8 g/kg body weight/day, is associated with a higher BMD, reduced risk of hip fracture and slower rate of bone loss.
- It has been demonstrated that there is no adverse effect of higher protein intakes on bone.

Nutrients Important for Bone Health

VITAMIN C

- Improves bone health because of its antioxidant properties.
- Suppresses osteoclast activity. It also acts as a cofactor for osteoblast differentiation and participates in collagen formation.
- Vitamin C is a marker of a healthy dietary pattern rich in fruit and vegetables.
- A systematic review and meta-analysis that compiled observational studies concluded that a greater dietary vitamin C intake was positively associated with BMD at the femoral neck and lumbar spine.

Nutrients That May Impair Bone Health

SALT

- According to the National Institute of Arthritis and Musculoskeletal and Skin Diseases, overconsumption of salt can cause the kidneys to excrete calcium.
- The optimal intake of sodium for calcium conservation and to meet the American Heart Association (AHA) guideline is 2400 mg per day. An adequate intake of calcium allows a more liberal use of sodium in the diet.
- Recently, the Dietary Approaches to Stop Hypertension (DASH) diet was shown to reduce bone turnover.

Nutrients That May Impair Bone Health

ALCOHOL

- A trial of 51 postmenopausal women were randomized to no, low or moderate alcohol intake over eight weeks.
- Compared with no alcohol, one or two drinks/day had no significant impacts on any bone markers.
- Drinking heavily can lead to bone loss.

Nutrients That May Impair Bone Health

SOFT DRINKS

- A small-scale study on 11 healthy men (aged 22 to 29 years) found that high intake of cola (2.5 L per day) increased bone turnover when coupled with a low-calcium diet over a ten-day period.
- Subsequently, authors concluded that cola and other soft drinks should not replace milk in the diet, as this appears to contribute to low calcium intake, having adverse effects on bone health.
- Consumption of cola in particular is associated with altered bone metabolism, low bone density, and fractures

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Nutrients That May Impair Bone Health

PHOSPHORUS

- Essential nutrient for functions such as energy metabolism, structure of cell membranes, acid/base balance, and intracellular cell signaling
- 85% of the body's phosphorus is found in bone mineral
- Deficiency is often rare due to being naturally found in many foods and our body's high capacity to absorb it
- Phosphorus intake in the U.S. generally exceeds recommended requirements
- Recommendation for healthy adults: EAR is 580 mg/day and RDA is 700 mg/day
- Key Recommendation: limit intake of phosphate additives found in fast food, canned or bottled drinks, spreadable cheese, and processed foods

Role of “Anti-nutrients”

PHYTATES AND OXALATES

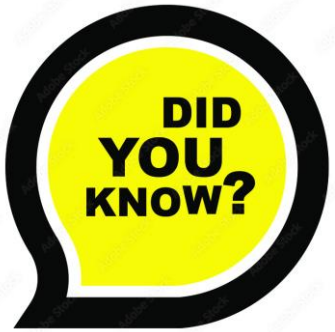
- Phytates and oxalates are a compound found in some common foods in very small amounts. They do not harm your bones directly, but can reduce the amount of calcium available to your bones by binding with calcium and other minerals that are eaten at the same time.
- If your diet contains plenty of calcium, you don't need to worry or make any adjustments.

Foods containing phytates include:

plant foods
bran
nuts
wholegrain cereals
dried beans
seeds
grains

Foods containing oxalates include:

most plant foods
tea
rhubarb
spinach



- In adult Caucasian women, a daily intake of **200–250 mL** of milk has been associated with a **5% or higher reduction** in fracture risk.

- Another large prospective study recently showed a significant **8% reduction** in the risk of hip fracture for **each daily serving of milk**, in men and women combined, which was evaluated every 4 years.

- Moreover, milk intake was shown to **reduce the risk of osteoporotic fractures by 5–15%** in an individual patient data cohort, especially in older patients (≥80 years)

Clinical Research Spotlight

Research supports that enjoying 5-6 prunes per day is a valuable food-based strategy that can be used to preserve hip bone mineral density and reduce inflammatory mediators in postmenopausal women.

Cooking tip: Swap prune puree for butter in your favorite recipe.

- Reduces the nutrients we need to eat less of (saturated fat)
- Adds potassium and fiber to benefit bone and overall health

Dietary Patterns

MEDITERRANEAN DIET

- Animal studies have suggested that antioxidant-rich fruits have a marked effect, increasing trabecular bone volume, number, and thickness, and decreasing trabecular separation through the stimulation of bone formation and suppression of bone resorption
- Olive oil has a high proportion of phenols, which can prevent the loss of bone mass.

Dietary Patterns

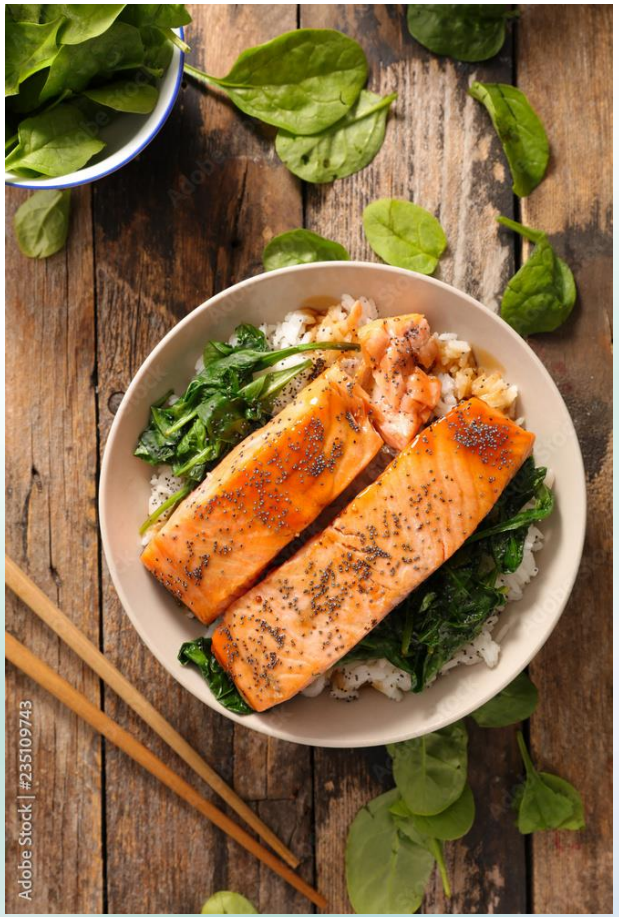
WESTERN DIET

- Individuals with diets high in processed protein foods have shown a lower BMD compared to other groups of subjects.
- A high fat intake, derived mostly from refined carbohydrates and fat products, can directly interfere with intestinal calcium absorption and also increase fat accumulation and obesity, which lead to a decrease in osteoblast differentiation and bone formation.

Dietary Patterns

ASIAN DIET

- Asian populations have dietary patterns in which soy and fish intake are high.
- They have a significantly lower incidence of osteoporotic fractures.
- Evidence from epidemiological studies supports the idea that dietary soy isoflavone intake attenuates the bone loss induced by menopause, improving bone formation and decreasing bone resorption.



Dietary Patterns

VEGETARIAN DIET

- Vegetarian diets have been proven to contain lower amounts of calcium, vitamin D, vitamin B-12, protein and n–3 fatty acids, all of which have important roles in maintaining bone health.
- However, healthy vegetarian diets usually contain greater quantities of several protective bone-related nutrients such as magnesium, potassium, vitamin K, and antioxidant and anti-inflammatory phytonutrients.

Food Labels

- 5% or less is low
- 20% or more is high

Nutrition Facts

8 servings per container

Serving size **2/3 cup (55g)**

Amount per serving

Calories **230**

	% Daily Value*
Total Fat 8g	**10%**
Saturated Fat 1g	**5%**
Trans Fat 0g	
Cholesterol 0mg	**0%**
Sodium 160mg	**7%**
Total Carbohydrate 37g	**13%**
Dietary Fiber 4g	**14%**
Total Sugars 12g	
Includes 10g Added Sugars	**20%**
Protein 3g	
Vitamin D 2mcg	10%
Calcium 260mg	20%
Iron 8mg	45%
Potassium 235mg	6%

*The % Daily Value tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

Source of labels: U.S. Food and Drug Administration

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1 Day Sample Menu

Breakfast	• 8 oz orange juice with calcium and vitamin D • 1 cup ready-to-eat cereal fortified with vitamin D • 4 oz skim milk
Lunch	• 2.5 oz extra-lean ground beef on a bun with: 1 slice nonfat American cheese, 1 lettuce leaf, 2 slices red tomato • 1 green salad with: 1 hard-boiled egg 2 Tbsp low-calorie dressing 8 baby carrots • 8 oz skim milk
Snack	• 1 orange
Dinner	• 2.5 oz chicken breast • ½ cup broccoli • ¾ cup rice • 2 slices French bread with 1 tsp margarine • 1 cup strawberries with 2 Tbsp lite whipped topping

Approximate Nutrition Analysis: Calories: 1,500; Protein: 94g; Carbohydrate: 205g; Fat: 33g; Sodium: 1,825mg; Potassium: 3,336mg; Calcium: 1,560mg; Vitamin D: 10mcg (400 IU)

Questions?

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