Tips and Tricks for Better Bone Health

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Outline

• What is Osteoporosis?
• What causes Osteoporosis?
  • Risk Factors for Bone Loss
  • Especially in Cancer survivors
  • Risk factors for Falls
• What are some of the initial tests done to look for if someone has Osteoporosis?
• Focus on what someone can do to prevent bone loss or falls
  • Calcium intake
  • Vitamin D
  • Exercise to help maintain leg strength, balance and posture.
What is Osteoporosis?

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

Normal bone

Osteoporotic bone: one can see thinning of connecting bone and big spaces in the bone structure making the bone more fragile.

Bone Density

Bone Quality

Bone Strength

DEXA grams/cm²

Structure/Architecture/Turnover/Mineralization/Damage Accumulation

JAMA 2001;285:785
General Pattern of Bone Development and Bone Loss
As we age or due to other factors, this cycle can tilt in favor of bone loss, causing our bones to become increasingly porous and fragile.
Osteoporosis Numbers...

- 2 million osteoporotic fractures/year
- 1 of every 2 Caucasian women & 1 of every 5 men will have an osteoporotic fracture
- Hip fractures
  - 8-36% risk of 1 year mortality → this is higher in men
  - 20% risk of nursing home placement/Long term Care
- Direct healthcare costs about $19-30 billion per year

Famous faces with Osteopenia or Osteoporosis
Men can have Osteoporosis too!
Hyperkyphosis patient

Excessive curvature of the thoracic spine, commonly known as the "dowager's hump."

Primary Reasons of Hyperkyphosis
- Vertebral fractures
- Degenerative discs
- Genetics
Two Components to Osteoporosis

Risk Factors for Bone Loss

Risk Factors for Falls
Risk Factors for Bone Loss

**Factors you can change**
- Calcium Intake
- Vitamin D
- Quit or cut down Smoking
- Alcohol Intake

**Genetic factors**
- Female
- Certain Ethnicities
- Family history of osteoporosis
- Low body mass or significant decrease in body weight since the age of 25

**Health status factors**
- Oophorectomy
- Estrogen deficiency
- Intestinal malabsorption
- Vitamin D deficiency
- Menopause
- Metabolic disorders (e.g., hyperparathyroidism, hyperthyroidism, diabetes, Cushing’s syndrome)

**Medications**
- Prolonged corticosteroid therapy
- Antacids
- Anticonvulsants
- Lithium
- Seizure medications
Bone Related Effects from Cancer

Chemotherapy
Agents used to help fight cancer cause an increase in bone loss or resorption

Corticosteroids – big component of chemotherapy drug regimen cause bone loss

Weight loss, nutrition effects

Endocrine Therapy
Aromatase inhibitors (AI) inhibit aromatase enzyme leading to a decrease in plasma estradiol.

In men with Prostrate Ca, Androgen deprivation therapy (block testosterone) results in a profound decrease in the levels of testosterone.
Risk Factors for Falls

Intrinsic Factors
- Age-related changes
- Chronic conditions
- Medications

Extrinsic Factors
- LE weakness
- Environmental factors (lighting, toilet seat low)
- Footwear
- Alcohol
- Assistive device
- Balance problems

So let me ask you all:
1. How many times have you fallen in past year?
2. Feel unsteady standing or walking?
3. Do you have a fear of falling?

Factor you can change: Physical Activity

Courtesy of Osteoporosis Clinic
How do you diagnose Osteoporosis?

- The T-score compares an individual’s BMD with the mean value for young adults and expresses the difference as a standard deviation score.
- There are pitfalls to DEXA but we don’t have other great tools.

<table>
<thead>
<tr>
<th>Category</th>
<th>T-score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>-1.0 and above</td>
</tr>
<tr>
<td>Low bone mass (osteopenia)</td>
<td>Between -1.0 to -2.5</td>
</tr>
<tr>
<td>Osteoporosis</td>
<td>-2.5 and below</td>
</tr>
</tbody>
</table>
FRAX is not intended to be used in patients who are already on pharmacologic treatment.

• The model is based on femoral neck BMD only—not spine or hip BMD.

• Limited to 4 racial backgrounds in US.

• It is not obvious that all risk factors carry equal weight in predicting risk.
Who should get a Bone Density Test?
No Guideline Consensus
Who Should Have a Bone Density Test?

- In women age 65 and older and men age 70 and older
- In postmenopausal women and men above age 50–69, based on secondary risk factor profile
- In postmenopausal women and men age 50 and older who have had an adult age fracture to determine degree of osteoporosis
Many Lab Tests that follow

Key Take Home Message: You have to sometimes go beyond the standard bone density test and labs when assessing risk of fractures.
SUCCESS is the SUM of SMALL efforts, REPEATED DAY IN AND DAY OUT.

R. Collier

I can't do it

VITAMIN D
Calcium: Key Points

- Nerves and muscles need calcium to function.
- The bones do need calcium to repair damage and maintain strength.
- But excess calcium will not help the skeleton.
- Bones take what they need, and the rest must be removed by the kidney, or it will build up in the wrong places (blood vessels, kidneys themselves).
Calcium...

- Most of the clinical guidelines suggest **calcium intake of 1,000 mg/day**.
- It would be best to get this from dietary sources: Yogurt, Cheese & Milk
Protein: Tofu (with Calcium), Garbanzo Beans, Soy Beans, green, boiled

Veggies: Bok Choy, Kale, Broccoli

https://www.nof.org/patients/treatment/calciumvitamin-d/a-guide-to-calcium-rich-foods/
Nutrition Labels

Take the 20% Ca and ADD ‘0’ for total Calcium in mg
20 + 0 = 200mg
Calcium Supplements

Two main types of calcium supplements
Remember: Please Read the labels – not FDA regulated

**Calcium citrate**
*i.e., Citracal*
Easier on stomach,
Take with or without food

**Calcium carbonate**
*i.e., Caltrate*
Less expensive,
Take with food
Can cause constipation
Vitamin D

- Cholecalciferol (name for active vit D or 1,25 (OH)2 vit D)
- Vitamin D increases calcium absorption from the gut, and regulates Parathyroid hormone or PTH production (hormone that is important for calcium regulation)

1,25 (OH)2 vit D increases calcium absorption from the gut

Ca enters blood stream
Active Vitamin D Pathway

UV

7-Dehydrocholesterol → Cholecalciferol (D3) → Calcidiol (25 Cholecalciferol) → 1,25 (OH2) Cholecalciferol (Calcitriol) → Active Vit D

Ergocalciferol (D2) → 25-hydroxylase

1 Alpha - hydroxylase

This is Complicated! It’s a Hormone!
Vitamin D Supplements and Prevention of Cancer and Cardiovascular Disease

JoAnn E. Manson, M.D., Dr.P.H., Nancy R. Cook, Sc.D., I-Min Lee, M.B., B.S., Sc.D.,
William Christen, Sc.D., Shari S. Bassuk, Sc.D., Samia Mora, M.D., M.H.S.,
Heike Gibson, Ph.D., David Gordon, M.A.T., Trisha Copeland, M.S., R.D.,
Denise D’Agostino, B.S., Georgina Friedenberg, M.P.H., Claire Ridge, M.P.H.,
Vadim Bubes, Ph.D., Edward L. Giovannucci, M.D., Sc.D., Walter C. Willett, M.D., Dr.P.H.,
and Julie E. Buring, Sc.D., for the VITAL Research Group*
Supplementation with Vitamin D did not result in a lower incidence of Invasive cancer or CV events than placebo.
Key Take Home Points about Vitamin D

• It’s a Hormone – there is a range it should be at.

• Vitamin D is still controversial but data is accumulating to support Institute of Medicine recommendation of 800 IU/day to achieve levels of 20 – 50 ng/mL.

• Takes at least 3 months for new steady-state in your lab levels

• Pearl: If you take too much and levels are high, there are side effects. Eg – too much calcium in your urine.
Exercise and Bone Health

• Mechanical Strain is beneficial for the skeleton (again not to make you exceed fracture threshold)
• Mechanical Strain reduces sclerostin and allows osteoblast formation (bone forming cells) to let bone formation happen in sites of stress
• So relatively higher Bone density is observed among physically active individuals (there are exceptions).
Exercises

• **Strength training:**
  • use of free weights
  • resistance bands or your own body weight to strengthen all major muscle groups, especially spinal muscles important for posture.

• **Weight-bearing aerobic activities**
  • aerobic exercise on your feet, with your bones supporting your weight.
  • walking, dancing, low-impact aerobics

• **Stability and balance exercises**
  • tai chi can improve your stability and balance.
  • Stand on one leg
Exercises

Play video 1

Exercises

• Play Video 2
Leg Strength
Modified Squat

Stand close to the chair – feet hip distance apart

Keep a straight back, hinge at hip

Squat back and hover over chair

Hold as long as you can, work up to 30 seconds
Balance Exercise & Tips

Safety

- **Stop** Exercising and Contact your Dr if during exercise you feel
  - Chest pain
  - Dizziness
  - Shortness of Breath
- **Hold** onto support while performing all Balance Exercises

Goal

Improve and Maintain
- Balance
- Strength
- General Fitness

Tandem Stance:
Hold Support for balance
Place one foot in line with other foot, touching heel to toe;
Hold position for 30 sec x 3 each side

Sit to Stand:
Using hands as needed
Stand up and sit down from chair
Repeat sets of 10 up to 3x10 reps

Courtesy of Meg Wojtowicz, Osteo Clinic
Thank You! Questions?