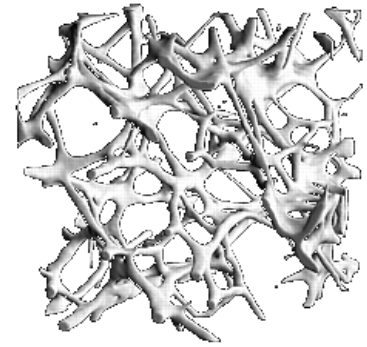


Osteoporosis: Marissa, Jeremy and Eleanor



by
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Question:

I've always been told that calcium is important for strong, healthy bones. My mom says that as long as I drink milk, I won't develop osteoporosis. Is this correct? Is there anything else I can do to protect myself?

Individual Brainstorming:

Using the space provided below, in the next five minutes think of as many relevant questions and/or issues as you can that stem from the basic question above.

Image Credit: Trabecular bone architecture of a lumbar spine bone biopsy of a 42-year-old male (left) vs. that of an 84-year-old woman having clinically manifested osteoporosis (right). Images used with permission, courtesy of Ralph Mueller, Ph.D., ETH Zuerich and Harvard Medical School, Boston.

Date Posted: 12/05/01 nas. Revised 3/10/03.

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Scenario A

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Marissa

Marissa, a petite, Caucasian, 15-year-old, just learned this morning that her 55-year-old grandmother, with whom she has lived since the death of her parents, was diagnosed with osteoporosis after visiting her doctor because of chronic hip and wrist pain.

For the past year, Marissa's life has been one tragedy after another. Her happily married parents were killed in a car crash nine months earlier on the way home from their 16th anniversary surprise party. Her boyfriend of two years moved to a different state a few months back and ended their relationship shortly after. To make things worse, her first year in high school was disastrous. Not only did she fail algebra, she didn't make the soccer team, as she had hoped.

Marissa's grandmother lives far from where Marissa used to, and because she is an only child, Marissa often finds herself feeling lonely and on the brink of depression. The only person she feels she can count on besides her grandmother is her best friend, Tara. She told Tara about her grandmother's disease as soon as she found out. Marissa has no idea what osteoporosis is or what it does to the body. All she knows is that her grandmother is the only close living relative she has and she can't fathom losing another loved one.

Assignment for Group 1

Everyone in Group 1 must be capable of defining osteoporosis and its general effects on the body. In addition, the following concepts must be addressed in detail. It is up to the group to divide the necessary research. Research will be shared with the class. Ultimately, you must address the specific type of therapy, if any, that Marissa's grandmother might use and the risks and benefits of her choice.

Bone Physiology:

1. Describe bone physiology and the bone remodeling cycle. Be sure to emphasize the two types of bone tissue and the roles of osteoblasts and osteoclasts.
2. Explain the relationship between calcium and bones.
3. Explain how the body controls calcium levels in the bones and blood. Be sure to describe the roles of parathyroid hormone (PTH) and calcitonin in detail.
4. Explain specifically how osteoporosis affects the bone matrix and the normal bone remodeling cycle.

Risk Factors:

5. Discuss what scientists know about the genetics behind osteoporosis.
6. List as many risk factors for this disease as you can, both controllable and uncontrollable.

Signs and Symptoms:

7. What are the symptoms or telltale signs of osteoporosis?

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Scenario B

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Jeremy

Jeremy, a lanky, 19-year-old college sophomore, has recently become interested in weightlifting thanks to his friend, Sebastian. He wants to improve his physique, strength, and self-esteem, and impress his girlfriend. Jeremy has been taking asthma medication since the age of seven and he hopes the exercise will also help to improve his condition, which seems to have slightly worsened over the years.

Throughout high school, Jeremy was always teased for being scrawny. Once he entered college, he wanted to put the past behind him. He soon discovered alcohol and its ability to bring people together. Jeremy drank more than his share freshmen year and had a belly to show for it.

Over the summer, he met Sebastian at his restaurant-catering job. Jeremy immediately noticed how muscular Sebastian was and asked him if he lifted weights. The two soon developed a friendship and became gym buddies, and Sebastian recommended a personal trainer for Jeremy.

Jeremy returned to school in the fall in better shape and promised himself to cut down on the drinking. His personal trainer had told Jeremy that he had small bones for a guy and alcohol would only aggravate the problem. Perhaps he should follow his lead and start taking steroids to bulk up. Jeremy wondered what he meant and intended to ask his biology professor.

Assignment for Group 2

Everyone in Group 2 must be capable of defining osteoporosis and its general effects on the body. In addition, the following concepts relating osteoporosis with nutrition, exercise, and drugs must be addressed in detail. It is up to the group to divide the necessary research. Research will be shared with the class. Ultimately, you must consider if Jeremy's activities will have any impact on his chances of developing osteoporosis and the risks and benefits of his behavior.

Nutrition and Osteoporosis:

1. Explain why calcium is vital to bone health.
2. What foods are good sources of calcium?
3. Discuss the importance of Vitamin D to calcium absorption.
4. Discuss calcium supplementation and the recommended daily dosages.
5. Discuss the effects of sodium, caffeine, and alcohol on calcium levels in the body.

Exercise, Drugs, and Osteoporosis:

6. Explain what peak bone mass is and its relationship to osteoporosis.
7. Describe the types of exercise that help prevent osteoporosis. Why?
8. What are steroids? What are they used for?
9. Explain how long-term use of steroids may increase risk for osteoporosis.

Osteoporosis: Marissa, Jeremy and Eleanor

Scenario C

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Eleanor

Eleanor, a 45-year-old perimenopausal woman, is considering hormone replacement therapy mainly to prevent osteoporosis. Lately, she has been experiencing severe hot flashes and nausea. In addition, her back has been sore on and off.

Eleanor has smoked for the past 20 years and has a family history of breast cancer and heart disease. Although she vows every New Year to quit her costly habit, she has yet to follow through completely. Two years ago, Eleanor's mother underwent a double mastectomy after her struggle with breast cancer. The experience was a slap in the face for Eleanor and she vowed to take better care of herself. Aside from smoking, she eats healthier now and doesn't drink. Her husband is an avid walker, and every morning before work they both walk around the park with Tosha, the family Labrador.

Everywhere she turns, Eleanor is reading about hormone replacement therapy (HRT) and women's health. Although she worries how her body will respond to HRT, she doesn't want to risk her bone health like her 58-year-old neighbor, Janice. Janice refused her doctor's advice about taking HRT a few years back and now walks with a cane. Eleanor has lately felt the pressure building to make a decision about HRT. She wants to stay healthy for her husband and 25-year-old son, Chad, but is unsure of the consequences of HRT. She's heard that it might have some bad effects.

Assignment for Group 3

Everyone in Group 3 must be capable of defining osteoporosis and its general effects on the body. In addition, the following concepts must be addressed in detail. It is up to the group to divide the necessary research. Research will be shared with the class. Ultimately, you must address the question troubling Eleanor -- should she start hormone replacement therapy -- considering the risks and benefits of her choice.

Estrogen:

1. Define "perimenopausal."
2. Explain how menopause affects a woman's hormonal levels.
3. Explain how estrogen affects calcium levels in bones.
4. Explain how smoking affects estrogen levels. How does this in turn affect calcium levels?

Prevention and Treatment - HRT:

5. What is HRT? Who is it intended for?
6. Based on medical studies, what are the pros and cons of HRT?

Options Other than HRT:

7. Describe at least four other options (drugs) available to men and women to help prevent and/or treat osteoporosis.