

Bone tissue essay sample



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1. Describe bone tissue and the role each component plays in bone physiology and remodeling. What is the difference between compact and spongy bone? (2 points) Spongy bone looks like a sponge hence the name and contains a lot of red bone marrow (medulla ossium rubra). Red bone marrow is what produces red blood cells. Compact bones which consists of medulla ossium flava or yellow bone marrow, is made mostly of fat cells (Openstax College, 2013).

2. Explain the relationship between calcium and bones. (1 point) Calcium is essential for maintaining necessary level of bone mass to support structures of the body. The body uses calcium for heart, blood, muscles and nerves. It can be lost through bodily process like sweating, waste, shedding of hair, skin and fingernails. The close relationship between bone and calcium is the principal processes of calcium metabolism. Bone contains about 99% of calcium in the body and can behave as an adequate buffer for maintenance of a constant level of freely moving calcium in soft tissues, extracellular fluid and blood (Openstax College, 2013).

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. (2 points) Increased blood calcium levels stimulate the secretion of calcitonin from the thyroid and active osteoblasts to build bones thereby reducing blood calcium levels to within their normal range. Decreased blood calcium levels stimulate the parathyroid glands to release PTH which activate osteoclasts which degrade bone and release calcium into the blood stream thereby raising blood calcium levels.

4. Explain specifically how osteoporosis affects the bone matrix and the normal bone remodeling cycle. (1 point) Osteoporosis results from an imbalance in which bone reabsorption outstrips

bone formation. The net loss of bone matrix renders bones weaker and more susceptible to fracture with the fracture risk doubling for every ten percent bone loss (National Osteoporosis Foundation).

5. Discuss what scientists know about the genetics behind osteoporosis. (1 point) Genetic control of osteoporosis is polygenic. Etiology of osteoporosis is multifactorial in nature. From family histories, twin studies and molecular genetics it is evident now that some of the predisposition of osteoporosis can be inherited. 6. List at least 5 controllable and 3 uncontrollable risk factors for this disease. (1 point) Uncontrollable risk factors for osteoporosis is gender/sex, family history or hereditary and age. When it comes to age older women are more likely to get osteoporosis and fractured bones. Controllable factors are not consuming enough calcium and Vitamin D in your regular diet, taking calcium without co-minerals.

Also high acid eating which means diets rich in animal protein add acid to the blood which can accelerate osteoporosis since it depletes bones of calcium, phosphorus and sodium. Excessive weight loss and dieting, not enough physical activity and smoking are all controllable factors to prevent osteoporosis (National Osteoporosis Foundation) . 7. What are the symptoms or telltale signs of osteoporosis? (1 point) In the early stages of osteoporosis there are typically no symptoms. Once bones have been weakened you can have signs and symptoms that include but not limited to, back pain caused by fracture of collapsed vertebra, loss of height over time, stooped posture along with bone fractures occurring more often .

Part II— “ Jeremy” Questions

1. What foods are good sources of calcium? (1 point)

Good sources of calcium are cheese, yogurt, milk, sardines, leafy greens (spinach, kale, turnips, and collard greens), cereals (Total, Raisin Bran, Cornflakes), orange juice, soy beans, soy milk (labeled good source of calcium), breads, grains and waffles.

2. Discuss the importance of Vitamin D to calcium absorption. (1 point) Taking in an adequate amount of calcium and Vitamin D are important to maintain bone density and strength. But calcium and Vitamin D isn't enough themselves other minerals and vitamins are needed in the body as well. Vitamin D helps the absorption of calcium in the intestines. Lack of vitamin D can cause osteomalacia which further weakens the bones and increases risk of fractures.

3. Discuss calcium supplementation and the recommended daily dosages. (1 point) According to the Institute of Medicine, the recommended daily amount of calcium to get is:

* 1-3 years: 700 milligrams daily

* 4-8 years: 1, 000 milligrams daily

* 9-18 years: 1, 300 milligrams daily

* 19-50 years: 1, 000 milligrams daily

* 51-70 years: 1, 200 milligrams daily for women; 1, 000 milligrams daily for men * 71 and older: 1, 200 milligrams daily

4. Discuss the effects of sodium, caffeine, and alcohol on calcium levels in the body. (1 point) Pay attention to foods that cause calcium loss through the urine. You lose calcium daily through the urine. While a certain amount is perfectly natural, there is evidence to suggest that calcium loss through the urine is increased by excess consumption of salt, caffeine and protein. Salt (Sodium) - in excess has been shown to increase the loss of calcium through

the urine. Over 90% of sodium in our diets comes from manufactured food rather than from salt added to food at the table or during cooking. Caffeine – is contained in many beverages, including coffee, tea, cola and certain energy drinks. Recent studies show that caffeine increases calcium loss through the urine.

Most experts agree that two to three cups a day is probably not detrimental provided that calcium intake is adequate. If you consume more than three cups in a day, a good rule of thumb is to have at least one glass of milk for every cup of coffee (or to make some of those coffees café lattés or cappuccinos). Keep in mind that the less calcium in your diet, the more serious the effects of caffeine on this calcium loss. Excessive alcohol intake, such as seen in alcoholic, is associated with osteoporosis and fractures associated with osteoporosis. Alcohol is toxic to bone-forming cells and may interfere with bone metabolism.

5. Explain what peak bone mass is and its relationship to osteoporosis. (1 point) Bone mass and strength achieved at the end of the growth period, simply designated as “ Peak Bone Mass (PBM)”, plays an essential role in the risk of osteoporotic fractures occurring in adulthood. It is considered that an increase of PBM by one standard deviation would reduce the fracture risk by 50% 6. Describe the types of exercise that help prevent osteoporosis. Why? (1 point) One of the best ways to strengthen your bones and prevent osteoporosis is by getting regular exercise. Even if you already have osteoporosis, exercising can help maintain the bone mass you have. When you exercise, you don’t just build muscle and endurance. You also build and maintain the amount and thickness of your bones. You may hear health

professionals call this “ bone mass and density.” Three types of exercise for osteoporosis are:

- * Weight-bearing
- * Resistance
- * Flexibility

7. What are steroids? What are some examples of steroid prescription medications? What are they used for? (1 point) Steroids (also known as cortisone or corticosteroids) are chemicals (hormones) that occur naturally in the body. Steroids decrease inflammation, suppress the body’s immune system, block DNA from being made, as well as blocking a chemical called histamine (released during an allergic reaction). Steroid medicines are man-made but are similar to these natural hormones. A few common examples of anabolic steroids include

- * Anabol
- * Android
- * Androstenedione
- * Winstrol
- * Deca-Durabol
- * THG
- * Genabol
- * HGH

Steroids are available as prescription medications to be used in cases in which the body does not make enough hormones and supplementation may be required. Some hormone supplements in this pathway include growth hormone and testosterone itself. 8. Explain how long-term use of steroids

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may increase risk for osteoporosis. (1 point) While steroids do decrease inflammation, they also decrease the formation of new bone, increase the breakdown of old bone, and decrease the absorption of calcium from food by the body. In the case of IBD, the development of osteoporosis may be compounded by the already low amount of calcium absorbed by the body. (Tresca, 2014)

Part III— “ Eleanor” Questions

1. Define “ perimenopausal” and explain how menopause affects a woman’s hormonal levels of estrogen and progesterone. (1 point) Perimenopause means “ around menopause” and refers to the time period during which a woman’s body makes its natural transition toward permanent infertility (menopause). (Mayo clinic, 2013) The female hormones estrogen and progesterone are crucial components of a woman’s health. Not only do they contribute to a woman’s menstrual cycle and ability to bear children, but they have an impact on other areas of the body. As most women know, menopause when the body no longer produces estrogen introduces physiological changes.(Dr Craporo, 2015) 2. Explain how estrogen affects calcium levels in bones. (2 points) Maintaining an appropriate level of calcium is important not only for bone growth over time but also for protecting bone strength.

Estrogen supports this activity by aiding in intestinal absorption of calcium. Having low estrogen levels negatively impacts your body’s ability to make use of the calcium you consume. (Morgan, 2013) 3. Explain how smoking affects estrogen levels. How does this in turn affect calcium levels? (1 point)

Smoking lowers a female's level of estrogen. Low estrogen levels can cause dry skin, thinning hair, and memory problems. Women who smoke have a harder time getting pregnant and having a healthy baby. Smoking can also lead to early menopause, which increases your risk of developing certain diseases (like heart disease). Lower calcium absorption in smokers may be one pathway by which smoking affects the rate of bone loss. (Krall, 1990) 4.

What is HRT? Who is it intended for? (1 point)

Hormone replacement therapy (HRT) is given to some women whose estrogen and progesterone levels drop significantly because of the menopause. (MNT, 2014) HRT tops up a woman's levels of essential hormones. HRT may also refer to male hormonal treatment, as well as for individuals who undergo a sex change. 5. In general, and based on medical studies, what are the pros and cons of HRT? (2 points) Cons

- * Pulmonary embolism, a blockage in one of the arteries in your lungs
- * Deep vein thrombosis, a condition where blood clots form in veins deep within your body, often in your legs
- * Stroke
- * Heart and blood vessel (cardiovascular) disease
- * Breast cancer

Pros

- * Symptom relief
 - * Protection for your bones, including a reduced risk of broken bones and osteoporosis
- If you start hormone therapy early in menopause, other possible benefits include:
- * Decreased risk of heart and blood vessel (cardiovascular) disease
 - * Decreased risk of dementia

* Decreased risk of stroke

6. Describe at least two other drug options available to men and women to help prevent and/or treat osteoporosis. (1 point) Alendronate sodium (Fosomax) - Approved for the treatment and prevention of postmenopausal osteoporosis; treatment of secondary osteoporosis due to glucocorticoid (hydrocortisone) use; and treatment of osteoporosis in men. Studies show this osteoporosis medication increases bone mass and reduces the risk of fractures. (Vann, 2009) Risedronate sodium (Actonel) - Approved for the treatment and prevention of postmenopausal osteoporosis; prevention and treatment of secondary osteoporosis due to glucocorticoid use; and treatment of osteoporosis in men. Studies show this osteoporosis medication increases bone mass and reduces the risk of fractures. (Vann, 2009)