

Chapter 11 Reading Guide

1. Why is risk of toxicity of fat soluble vitamins greater than it is of water-soluble vitamins?
2. A) What are the three active forms of vitamin A?
b) Collectively, what are they called? c) Briefly describe each of their individual functions.
3. What common vitamin A precursor is found in plant foods?
4. Where is vitamin A stored in the body?
5. A) What is the name of the visual PIGMENT described in the book? B) what are the two components of that pigment?
6. A) In the absence of light, in what conformation does retinal exist in receptor cells of the retina (name it, and state whether it is straight or bent)? B) what conformation does it convert to with light energy?
7. Describe the series of events that leads to information about vision being sent to the brain, starting when light energy changes the conformation of retinal.
8. Why will a vitamin A deficiency lead to problems with skin and the digestive tract lining?
9. Besides serving as a precursor to vitamin A, what other important role does beta-carotene play?
10. Worldwide, how common are vitamin A deficiencies?
11. Describe some of the symptoms of a vitamin A deficiency.
12. Is it possible to overdose, or have toxicity symptoms, of beta-carotene from food alone? From supplements?
13. Describe symptoms of vitamin A toxicity.
14. Do animal sources of vitamin A provide retinoids or carotenoids? What about plant sources?
15. What food source could potentially lead to vitamin A toxicity if eaten excessively?
16. A) Where is the first inactive precursor to vitamin D made and stored in the body? B) what stimulus releases it and begins the activation process? C) what two organs complete the activation process?
17. Besides vitamin D, list some other factors that are vital for bone growth/maintenance.
18. Describe vitamin D's role in increasing blood calcium.

19. What are some other roles of vitamin D?
20. Name the 3 vitamin D deficiency diseases and describe each.
21. Describe vitamin D toxicity.
22. What are NATURAL food sources of vitamin D (non-fortified)?
23. Describe some factors affecting how much sunlight is needed to activate enough vitamin D.
24. Name the active form of vitamin D: both the chemical name and the hormone name.
25. Which "tocopherol" is active in the body?
26. What is the primary role of vitamin E?
27. What is the primary cause of vitamin E deficiency in the US?
28. Why do red blood cells burst as a result of vitamin E deficiency?
29. Name the anemia caused by erythrocyte hemolysis. What are some other symptoms of vitamin E deficiency?
30. What negative effect can high doses of vitamin E cause?
31. Why do French fries fried in peanut oil have very little vitamin E, even though fresh peanut oil has lots of vitamin E?
32. a) List some food sources of vitamin E. b) Avocado is a fruit that is very high in fat (mostly unsaturated). Do you think avocado is a good source of vitamin E?
33. Besides food, we have one other small source of vitamin K. What is it?
34. What are the two major roles of vitamin K?
35. What is the name of the naturally occurring form of vitamin K?
36. Why are newborn infants at risk of vitamin K deficiency?
37. What two circumstances are the most common causes of vitamin K deficiency?
38. What are symptoms of vitamin K deficiency?
39. What is a free-radical?
40. How can free radical damage help (exacerbate) the development of cancers?
41. How can the antioxidant activity of vitamin E help defend against heart disease? Be sure to mention LDLs.
42. What exactly do antioxidants do to free radicals?
43. Is it most effective to get antioxidants from supplements or from food? Explain and/or provide an example.

44. Summarize the two vitamins covered so far for which vegans should be especially mindful of (one is water-soluble, one is fat-soluble).

Supplemental Lectures

I. A little more on vitamin D and calcium

- a. The active form of Vitamin D (called “calcitriol”), as you know from the reading, is a hormone. Remember, hormones “tell” cells to do things. Calcitriol specifically targets cells lining the small intestine. Remember those cells of a villus, responsible for building tunnels to absorb nutrients? Those are the cells that respond to calcitriol. They respond by building calcium channels; so, calcitriol enables absorption of calcium from the diet. Without enough calcitriol, you will get VERY little calcium from your diet into your blood.
- b. A little bit about the importance of calcium (Ca^{2+}); you’ll see this repeated by the book in chapter 12. We all know that Ca^{2+} is important for bones. However, Ca^{2+} plays a variety of other roles that are crucially important, for example: muscle function, neuron function, and blood clotting. These functions depend on there being enough calcium in the BLOOD. If there isn’t enough Ca^{2+} in the blood to support these functions on a second-by-second basis, you die quickly.

Bones, on the other hand, can spare Ca^{2+} . Therefore, bones serve as Ca^{2+} reservoirs. When BLOOD Ca^{2+} starts to drop, bones will give up their Ca^{2+} to the blood.

Vitamin D (calcitriol) helps maintain bones by ensuring that when you eat something with Ca^{2+} , you actually absorb that Ca^{2+} . This spares the bone calcium, and allows bones to take up excess calcium from the blood.

II. Miscellany-

- a. Vitamin D supplements and food sources are typically in the D3 form; the last inactive precursor, the one that needs to be activated by the kidneys.
- b. Osteomalacia is caused by an acute vitamin D deficiency combined with severe depletion of calcium from the bones; osteoporosis is caused by chronic low-level deficiencies of either (or both) vitamin D and calcium.

*These are the only gaps I perceived in my reading of the chapter. If you feel you need some clarification on points from the chapter I have not covered, please let me know! This is true of all chapters, by the way!