1. The vitamin K coenzyme directly participating in the gamma carboxylation of osteocalcin is:
   a. Menaquinone
   b. Vitamin K quinine
   c. Vitamin K hydroquinone
   d. Vitamin K epoxide

2. Warfarin is a noncompetitive inhibitor of
   a. Vitamin K gamma carboxylase
   b. Vitamin K epoxide reductase
   c. Vitamin K quinone reductase
   d. Vitamin K dehydrogenase

3. The following is false about vitamin K
   a. It is appreciably stored in the liver
   b. The DV is 80mg
   c. It can be produced by the gut bacteria
   d. There is no UL value

4. Vitamin E in high doses can increase the risk of bleeding with warfarin therapy by
   a. Binding warfarin
   b. Blocking vitamin K epoxide reductase
   c. Blocking gamma carboxylation of clotting factors
   d. Enhancing gamma carboxylation of clotting factors

5. The daily dose at which the reaction in question 4 might likely proceed is
   a. 15 IU
   b. 50 IU
   c. 400 IU
   d. 2000 IU

6. The vitamin E is converted to the inactive vitamin E quinone in the presence of free radicals. An intermediate in this reaction is
   a. A carbon centered radical on the phytol side chain
   b. An oxygen radical at position 6
   c. A carbon centered radical at position 5
   d. All of the above

7. The all natural vitamin E is
   a. SSS-alpha tocopherol
   b. RRR-alpha tocopherol
   c. dl- alpha tocopherol
   d. l-alpha tocopherol
8. The following is false about plant carotenoids
   a. Beta carotene is the most common
   b. They are yellow/orange plant pigments
   c. Not all have vitamin A activity
   d. They are associated with hypervitaminosis A

9. The main storage form of vitamin A in the liver is
   a. Retinol palmitate
   b. Beta carotene
   c. Retinoic acid
   d. All of the above

10. The first sign of hypervitaminosis A is likely
    a. Headache
    b. Diarrhea
    c. Minor bleeding
    d. All of the above

11. A sign or symptom of hypovitaminosis A is likely
    a. Night blindness
    b. Keratinization of skin
    c. Xerophthalmia
    d. All of the above

12. The missing structure in the scheme shown is
    a. 11-cis retinoic acid
    b. 11-cis retinal
    c. 11-cis retinol palmitate
    d. 11-cis retinal palmitate

13. Some think the UL for vitamin A is set too high because at intakes near the UL value, risks occur
    for what?
    a. xerophthalmia
    b. hydrocephalus
    c. hip fractures
    d. headache

14. The best dietary source of vitamin D is
    a. Fish
    b. Nuts
    c. Whole grains
    d. Cruciferous vegetables
15. In severe liver failure a vitamin D deficiency might occur. Which of the following would relieve the deficiency?
   a. Ergosterol
   b. Cholecalciferol
   c. UV light irradiation
   d. 25-hydroxycholecalciferol
   e. all of the above

16. The kidney is involved in the formation of the active metabolite of vitamin D by hydroxylation at the
   a. 1-position
   b. 5-position
   c. 10-position
   d. 25-position

17. A 70 year old diabetic patient with renal disease might take which of the following to best treat osteomalacia
   a. Calcium carbonate and ergocalciferol
   b. Calcium citrate and 25-hydroxycholecalciferol
   c. Calcium carbonate and 1,25-dihydroxycholecalciferol
   d. Calcium citrate and 1,25-dihydroxycholecalciferol

18. The patient in question 17 might, without supplements, exhibit
   a. Hypoparathyroidism
   b. Hyperparathyroidism
   c. Hypercalcemia
   d. None of the above

19. Selenium acts as an antioxidant mineral by its role in
   a. Glutathione peroxidase
   b. Glutathione reductase
   c. Superoxide dismutase
   d. Catalase

20. Vitamin C acts, in part, as an antioxidant by
   a. Keeping iron in the reduced state
   b. Keeping vitamin E in the reduced state
   c. Keeping copper in the reduced state
   d. All of the above

21. A vitamin E deficiency is characterized by
   a. rash
   b. peripheral neuritis
   c. anemia
   d. bleeding

22. A diet rich in oily fish would be especially rich in what two vitamins
   a. vitamins C and K
   b. vitamins E and A
   c. vitamin D and folic acid
   d. vitamins D and A
23. Riboflavin can be essential for the inactivation of reactive oxygen species because of which enzyme being a flavoprotein
   a. glutathione peroxidase
   □ glutathione reductase
   c. glucose-6-phosphate dehydrogenase
   d. superoxide dismutase

24. The megawomen multivitamin product shown below is considered a poor choice because it:
   a. is low in folic acid
   b. has too high a vitamin A content
   c. has low iron content
   □ is low in vitamin K

25. The megamen multivitamin product shown below is considered a poor choice because it:
   a. is low in folic acid
   □ has too high a vitamin A content
   c. has low iron content
   d. is low in niacin

Megawomen

| Vitamin A (75% as mixed carotenoids)  | 10,000 IU |
| Vitamin D                             | 400 IU    |
| Vitamin E                             | 30 IU     |
| Vitamin K                             | 10ug      |
| Thiamin                               | 1.5mg     |
| Riboflavin                            | 1.7mg     |
| Vitamin B6                            | 2mg       |
| Vitamin B12                           | 6ug       |
| folic Acid                            | 800ug     |
| niacin                                | 20mg      |
| vitamin C                             | 200mg     |
| iron                                   | 18mg      |

Megamen

| Vitamin A (retinol palmitate)         | 10,000 IU |
| Vitamin D                             | 400 IU    |
| Vitamin E                             | 30 IU     |
| Vitamin K                             | 10ug      |
| Thiamin                               | 1.5mg     |
| Riboflavin                            | 1.7mg     |
| Vitamin B6                            | 2mg       |
| Vitamin B12                           | 6ug       |
| folic Acid                            | 800ug     |
| niacin                                | 20mg      |
| vitamin C                             | 200mg     |
| iron                                   | 18mg      |