Exam #4 Study Guide

1. True or False - Approximately 25% of melatonin is produced by the pineal gland in our brains as part of the circadian cycle for sleep and wakefulness linked to dark and light exposure.

2. As discussed in module #12, which of the following summarizes the cell danger response?

    a. Various stressors and environmental threats can all activate the cell danger response producing chronic inflammation and inducing the risk for many disorders.
    b. The combination of these stress factors, along with susceptible genotypes can have synergistic effects. The total load effect of triggers is integrated by metabolism and regulates the CDR.
    c. It is the mitochondria that appear to be the evolved sense organelle of these threats according to the induced changes in electron flow for normal metabolism.
    d. A and C only.
    e. All the above.

3. In module #11, the function(s) of vitamin B12 discussed where?

    a. Methylmalonyl-CoA conversion to succinyl-CoA only.
    b. Homocysteine to methionine conversion only.
    c. Both A and B.
    d. Homocysteine conversion to succinyl-CoA.
    e. None of the above.

4. True or False - In oncology, the Warburg Effect, is the observation that most cancer cells produce energy through a less efficient or “aerobic glycolysis” by glucose uptake, glycolysis, and lactic acid fermentation within the cell despite the presence of oxygen?

5. True or False - As a defense against toxic or pathogenic negative influences, our cells have intrinsic mechanisms that work to protect important biochemical systems such as the cell danger response or apoptosis.

6. True or False - Time-restricted eating is based on the regulation of peripheral circadian clock mechanisms, in part, mediated through the supraventricular nucleus.

7. All the following are correct with regards to cold immersion, except?

    a. Brown adipose tissue (BAT) is robust cells with a lot of mitochondria.
    b. BAT is only found in children.
    c. BAT is present in active adults.
    d. BAT levels are lower in obese individuals.

8. True or False – The metabolism of folate and vitamin B12 is linked to the interconnected function of the mitochondria, sulfur metabolism, glycine, serine, nucleotide synthesis, and histone methylation.

9. True or False – For resveratrol and pterostilbene, the major benefits of both are the ability to mimic beneficial effects of calorie restriction?

10. True or False – Antigen Presenting Cells (APCs), primarily Dentritic Cells (DC), present antigen to the adaptive immune system for naïve T-cell processing.

11. The following are true of the complement system, except?

a. The complement system is linked to innate immunity.

b. Complement can be triggered by various avenues such as tissue injury, PAMPs, and antibodies.

c. This system complements the innate immune response in attempts to neutralize pathogenic threat or sequence immune events for cellular damage control.

d. Imbalances in the complement system can lead to immune deficiency and chronic inflammation.

e. All the above are true.

12. True or False - Vitamin D is essential for Th-17 function, and not T-regulatory function.

13. Considerations for low innate immunity should include all the following, except?

a. Nutritional deficiencies.

b. Malnutrition, i.e., protein.

c. Essential fatty acids.

d. Environmental toxins and metals.

e. All the above should be considered.

14. Which one is incorrect with regards to melatonin supplementation?

a. There is no set dosage specific for age or sex.

b. Melatonin supplementation has no established LD50.

c. There is no established toxicity dose linked to melatonin (at least that is known in current human and animal studies).

d. There is no established duration of time set for melatonin use.

e. All the above are correct.

15. True or False – Only dentritic cells present antigen from the innate immune system to the adaptive immune system?

16. All the following are true of melatonin, except?

a. Scavenges reactive oxygen species and assists in cellular redox homeostasis.

b. Increased SIRT3 activation of *superoxide dismutase.*

c. Inhibits *pyruvate dehydrogenase kinase* (PDK) which allows for upregulation in *pyruvate dehydrogenase complex* activity for pyruvate conversion into acetyl-CoA.

d. Inhibits HIF-1$^{\alpha}$ (and other transcription factors) which can influence gene activity within the nucleus of the cell.

e. All the above are true.

17. All the following are true of the cell danger response, except?

a. The cell danger response is the evolutionarily conserved metabolic response that protects cells and hosts from harm.

b. It is triggered by encounters with chemical, physical, or biological threats that exceed the cellular capacity for homeostasis.

c. The mismatch between available resources and the functional capacity of the cell, particularly the mitochondria, produces changes in the organism.

d. A & B only.

e. All the above are correct.

18. True or False – extracellular mitochondrial DNA is not known to trigger immune activity?

19. True or False - The inactivation of active vitamin D contributes to CDR by increasing inflammation, as well as increasing the development of autoimmunity such as anti-thyroid and anti-folate receptor antibodies.

20. True or False - Each pathogen contains a PAMP (pathogen associated molecular pattern) that is recognized by host cell pattern recognition receptors to a specific PAMP.

21. True or False – ADP is a major purinergic signaling molecule in the cell danger response, but ATP is not?

22. True or False - with long-term persistence of the CDR there can be whole body metabolic and gut microbiome disturbances and alterations leading to multiple organ system impairment and behavioral changes.

23. All the following are correct with regards to natural IgM antibodies, except?

    a. Pathogen neutralization.
    b. Complement activation.
    c. Prevention of autoimmunity.
    d. Immune system homeostasis.
    e. All the above are correct.

24. True of False – the bottom line with calorie restriction is less calories equals less electrons (from food) entering the electron transport chain and less chance of reactive oxygen species creation.

25. True or False - Vitamin D is essential for T-regulatory function?

26. Which is incorrect with regards to innate immunity?

    a. Innate immune function does not require previous antigen exposure to initiate immune response.
    b. Cytokines and chemokines get produced which directs action of immune cells (both innate and adaptive) into action.
    c. Macrophages (“big eaters”) can reside in various tissues, i.e., brain (as microglia), lungs (alveolar), liver (Kupffer).
    d. Macrophage activity can be inhibited by Macrophage Inhibitory Factor produced throughout the body by various triggers, e.g., pathogenic bacteria, trauma, certain parasites.
    e. All the above are correct.

27. All the following are true of the supporting role of Vitamin D, except?

a. Muscle metabolism for improved strength.

b. Bone formation, growth, and repair.

c. Regulates normal levels of blood calcium and phosphorus.

d. Influences gene expression to regulate cellular proliferation, differentiation, and apoptosis.

e. All the above are true.

28. True or False - The cellular self-preservation response which can turn off aspects of normal cell function has a strong correlation to HAMP (homeostasis associated molecular pattern) and can lead to a host of seemingly unrelated symptoms such as: *Chemical, light, and pressure sensitivity, brain fog, buzzing and vibrating sensations, chronic fatigue, etc. depending on which organ system in the body is being affected.*

29. True or False - 25-hydroxyvitamin D (combined measurement of D2 + D3) is the major circulating form and good indicator of Vitamin D status with an approximate half-life of 2 to 3 weeks.

30. True or False – Adenosylcobalamin (adenosyl-B12) is necessary for the conversion of homocysteine to methionine within the methylation cycle?