MODULE 7: AUTONOMIC NERVOUS SYSTEM CASE STUDY

This lab involves a case study. The Autonomic Nervous system is an incredibly important part of our physiology. The sheer number of drugs that affect this system or work through it in one way or another is immense. You will be asked to read an article that reviews the details of Autonomic Nervous System physiology. Then given your understanding of this system you will answer questions about two medical situations. There will be an online worksheet that you will enter your answers on. You will be allowed to "Save for Later" and "Submit" the worksheet as many times as you want. However, there are a couple of things to keep in mind.

1. You will not be allowed to Submit your worksheet after the deadline. If you do not submit before the deadline, you may be able to work out a way to submit it as a late assignment but there will be point deductions.

2. If you Submit the lab assignment, and then decide to retake it before the deadline, all of your answers will be gone and you will have to retype all answers before submitting again.

The lab worksheet has been reproduced for you on the following pages, so that you can work on things offline. If you have printed the lab manual, you might write notes in the textbox fields, or you might use a .pdf document annotator on your computing device. Whatever you decide to do is fine, but ultimately, only answers entered on the I-learn worksheet can be submitted for grading.

Follow the instructions below very carefully. Many of the items in this assignment require reading or videos or something else to do. Be sure to write your answers completely before submitting the assignment. There is an option in the bottom right to save your answers and come back later, but once you submit this assignment, it will be graded.

Autonomic Nervous System Case Study

The autonomic nervous system (ANS or visceral nervous system) is a part of the peripheral nervous system. The two major divisions are the sympathetic (fight and flight) and the parasympathetic (rest and digest) systems. Afferent neurons carry impulses from all the organs of the body to controlling centers in the central nervous system. This results in reflexive (largely subconscious) responses that help maintain proper function and homeostasis in variables such as heart rate, digestion, respiration rate, salivation, perspiration, diameter of the pupils, micturition (urination), and sexual arousal. A good understanding of the ANS can prepare you to predict responses of the body to a variety of stimuli (including drugs and disease).

This lab requires you to use an article about the autonomic nervous system to help solve questions for 2 case study scenarios (one is drug related and the other is disease related). The two case study scenarios are written at the back of the article. The first case study starts on page 9 of the article and is about a woman who inhales too much insecticide poison. The second case study starts on page 10 of the article and is about a woman with a tumor on her adrenal medulla. Please feel free to research on the internet and use any other study materials you find useful as you gather information to answer these case study questions.

CLICK HERE to go through a quick tutorial that will give you good advice on how to navigate and complete this case study.

CLICK HERE to get the article you will be using for this case study.

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Case #1: Insecticide Poisoning

CD is a 44-year-old woman who had spent much of the day working in her garden. A blustery wind caused her to unintentionally inhale the insecticide that she was spraying throughout the garden. When she began wheezing severely, she was taken to the emergency room. The attending physician observed other symptoms including constricted pupils and a slowed heart rate. CD was treated with the intravenous administration of atropine sulfate.

1. Insecticides contain organophosphates which inhibit acetylcholinesterase. What is the function of acetylcholinesterase?

2. Which types of autonomic receptors are excessively stimulated as a result of this inhibition?

3. Which division of the ANS has been primarily affected, the sympathetic or the parasympathetic?

4. Under what conditions does this division of the ANS normally predominate?

5. Explain how the insecticide resulted in her presenting symptoms?

6. What effects may the insecticide have on the gastrointestinal system? Explain.

7. What effect may the insecticide have on generalized sweating in this patient? Localized sweating? Explain.

8. If exposed to high enough doses, what effect might the insecticide have on the patient's skeletal muscles?

9. Would the administration of a beta-adrenergic receptor antagonist be useful in the treatment of this patient? Why or why not?

10. Would the administration of a beta-adrenergic receptor agonist be useful in the treatment of this patient? Why or why not?

11. Why is atropine an appropriate treatment?

12. The "nerve gas," sarin, is a potent, irreversible organophosphate. What is the likely cause of death resulting from exposure to this extremely toxic agent?

Case Study #2: Pheochromocytoma

AF is a 55-year-old woman who had been experiencing heart palpitations, a throbbing headache, sweating, pain in the abdomen, nausea and vomiting. Because these symptoms had failed to subside, she went to see her primary care physician. A urinalysis revealed the presence of catecholamines and their metabolites, including vanillylmandelic acid (VMA). A subsequent CT scan confirmed the presence of a tumor in the adrenal medulla. Surgery to remove the tumor was scheduled?

13. (1.) What is pheochromocytoma?

14. (2.) What are the catecholamines? Which is the predominant compound?

15. (3.) Describe the relationship of the adrenal medulla to the autonomic nervous system. Under what conditions are the catecholamines typically released?

16. (4.) How are catecholamines normally eliminated from the blood?

17. (5.) Is heart rate slower or faster than average in this patient? Why? What autonomic receptors are involved with this change in heart rate?

18. (6.) Is blood pressure likely to be lower or higher than average in this patient? Why? What autonomic receptors are involved with this change in blood pressure?

19. (7.) Describe the mechanism of excessive sweating in the patient. What autonomic receptors are involved with this sweating?

20. (8.) Would you expect the patient's pupils to be constricted or dilated when her other symptoms are at a peak? What is the clinical term used to describe this condition?

21. (9.) How does the duration of activity of the circulating catecholamines compare to that of neuronally released norepinephrine? Explain.

22. (10.) How does the breadth of activity of the circulating catecholamines compare to that of neuronally released norepinephrine? Explain.

23. (11.) In order to prepare the patient for surgery, what types of autonomic nervous system medications may be used to stabilize her blood pressure within the normal range?