

CASE TEACHING NOTES for “The Ice Hockey Injury”



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INTRODUCTION

This interrupted case study follows the health of an injured hockey player in the hours after the injury occurred. Students are presented with the symptoms and asked to use their knowledge of anatomy and physiology to diagnose the problem.

The case was developed for a one-semester animal physiology course, which is taken mostly by sophomore and junior biology or general science majors. It could be used in a freshman general biology course, an anatomy and physiology course, or a course in human physiology for non-science majors.

Objectives

- To understand the function of the pleural cavity during breathing.
- To appreciate that each lung has its own pleural cavity.
- To understand the effects of hemorrhaging on blood pressure and orientation.
- To use deductive reasoning to determine a physiological problem.

CLASSROOM MANAGEMENT

The case takes about 75 minutes to fully develop. I run the case during the lab section of the course, where the small class sizes (about 18 students) and longer time period (three hours) lend themselves well to case studies. The case is presented before a series of traditional hands-on laboratory exercises on human breathing. This lab is usually done just after the basic principles of breathing have been covered in lecture, about two-thirds of the way through the semester. Nerve and muscle function have already been covered in the course, as have blood, cardiac, and circulatory physiology. At this point, students have completed four or five other cases and are familiar with the interrupted case study method.

The class is divided into groups of three students. The case works best with four to six groups. Fewer groups restrict the number and scope of student answers, whereas more groups make it difficult for the instructor to address each group and maintain the interest of the entire class.

I use a white board to record student answers and ideas. The white board in my lab has four panels. I use the first to make a list of organs in the injured area, the second to list symptoms, the third for possible diagnoses, and the fourth for tests suggested by students after they have read Part III. Entries are added to the second and third panels throughout the case as more information is provided. If a certain diagnosis loses favor with the class, I ask the original group if it is reasonable to delete their entry. If they (and

the class) agree, I use a colored marker to place an 'x' in the margin next to the entry. I do not erase the diagnosis, because someone may wish to reconsider it at a later date and it is easier to erase an 'x' than write out a diagnosis again.

I distribute Part I to the student groups and ask them to answer the questions. While they are doing that, I set up the white board, writing the headings "Organs," "Symptoms," and "Diagnoses" on the first three panels, then circulate around the class answering any general questions students may have while encouraging them to develop their own ideas. After 10 to 15 minutes, I call the class together to share ideas.

I start the discussion by asking each group to name one organ, which I list on the left panel of the board. I go around the class as many times as necessary, but I am careful to make sure that all students speak. I then ask for symptoms and diagnoses. None are ever dismissed, and the more ideas the better.

I give Parts II and III to students following the same protocol as for Part I. My classroom has computers, and at this point students begin to use the Internet for the rest of the case. During the discussion, I add any additional symptoms and diagnoses to the lists and use student input to link them to the appropriate organ. As we discuss Part III as a class, I list on the far-right panel of the board the tests students wish to use in the emergency room and then link, with student input, these to diagnoses and symptoms.

Part IV of the case gives some hard data. I provide normal values. Some instructors may wish to omit these "normal" values and have students search for ranges on the Internet. In my class, I found this to be time consuming and, because the case is followed by laboratory exercises, I chose not to do this. Some students are frustrated because their test is not included (like x-ray or CAT scan). I tell them that this is a small hospital and these things take time. Students examine the data and discuss whether it fits their diagnoses.

I hand out the last two parts of the case in which the CAT scan and x-ray results are given and the students usually identify the correct diagnosis within a short time frame. Some students find it difficult to interpret the scans, but they seem to enjoy puzzling out the images. These two parts of the case may take very little time if the students have already guessed the correct answer.

Some groups become possessive and cling to their original diagnoses. Under these conditions, the instructor must point out where the students' ideas do not fit the data. I do this by asking questions designed to show where the data do not fit their hypotheses, and then I ask the class what tests can be performed to determine whether these other hypotheses are correct.

I conclude the case by relating a similar incident that actually occurred in the NHL in 1999 (see "Conclusion" in the Answer Key for specifics).

Answer Key

There are rarely any "wrong" answers to the questions posed at the end of each part of the case. In fact, students seem to get more out of this case if they do not get the correct diagnosis at the outset. Instructors should encourage students to think, process the information, and follow their ideas. As they work through the material and are given more information as the case proceeds, students should discuss their ideas and modify their diagnoses.

Answers to the questions posed in the case study are provided in a separate answer key to the case. Those answers are password-protected. To access the answers for this case, go to the key. You will be prompted for a username and password. If you have not yet registered with us, you can see whether you are eligible for an account by reviewing our password policy and then apply online or write to answerkey@sciencecases.org.

Final Remarks

This case can be used to introduce many topics that are not covered in the questions (e.g., dehydration, osmoreceptors, thirst, water retention and kidney function). The regulation of blood pH, acidosis, and blood chemistry can be introduced, as can the effect of adrenalin and the sympathetic nervous system. Cardiac function, blood flow, and circulation can be discussed, as can the effect of gravity on blood pressure, the baroreceptor reflex, and heart function. This type of discussion allows the instructor to tie together different areas of physiology to emphasize the fact that the body works as a unit, rather than as a series of separate units. Of course all of this assumes that students have some background in the area that the instructor is trying to connect to breathing and respiration, and it also assumes there is sufficient class time for any particular idea or topic to be developed.

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