Case Teaching Notes

for

"Mary Keeper's Aching Head"

by

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Introduction / Background

This case study was developed for a two-semester anatomy and physiology course that is aimed at sophomore and junior level undergraduate students. These students are typically biology or health science majors who are pre-med, pre-nursing, or pre-physical therapy.

The case has been used in class sizes of 24 to 96 students. It is introduced about the second week of class (during the second semester) as the endocrine system is being introduced. During the first semester, students would have learned about cell physiology, bone tissue, the peripheral and central nervous system, and skeletal muscle. Over the next four weeks, students will work on this case study to learn the anatomy and physiology associated with the endocrine system.

The case, which consists of three parts or sections, is written for use in a problem-based learning (PBL) context. Students receive each part of the case in a piecemeal fashion over several class periods. With each successive part, or piece, of the problem, the students working in groups must decide what they know about the unfolding problem and what they need to research. They divide up the research tasks among the group members. Next time class meets to discuss the case, the students in their groups share their findings with their teammates. This process is repeated as the case unfolds and a conclusion is reached. In this case, the problem is designed to give students enough obvious clues so that they can determine the medical conditions that the patient suffers from.

Objectives

Content Objectives

Students will learn:

- The difference between a primary and secondary endocrine pathology.
- How negative feedback loops influence thyroid hormones, LH, and FSH levels.
- The physiological function of thyroid and parathyroid hormones.
- That pituitary adenomas affect hormone secretion from the pituitary gland.

Skill Objectives

- Students will learn to work in a cooperative manner to solve a problem. This will engage their communication, organization, and time management skills. This exercise creates an active environment for students to research and engage in the vocabulary of the discipline.

Classroom Management

Because this case is introduced at the beginning of the semester, the students will not have been exposed to a lot of background information on the endocrine system. However, as students progress through the case

(which takes approximately four weeks), the classroom lectures on hormones and the endocrine system will introduce them to homeostatic feedback loops and hormonal function.

This case is an investigative activity that students must complete by themselves; the instructor only serves to facilitate the activity. I encourage students to ask questions; however, I will not directly answer them, but attempt rather to help point them in the right direction.

Students are randomly placed in groups of approximately five students (based on their lab section). This number allows active participation while allowing for students to drop the course, which happens at the beginning of the semester. I have found that groups below four students or above six do not work as well. Too few students causes problems if several of the students are weak academically or do not take responsibility for the assignments. Likewise, too many students allow some individuals to dominate the group, and thus, a couple of students may not actively participate in the process. As mentioned above, students are grouped based on their lab section. This is done so students can meet and communicate with each other during lab, and it provides a sense of community for the students.

The case has three sequential parts. Part I is an exploratory exercise that is used for students to get to know their group members, brainstorm about the problem, and formulate one or more hypotheses about the case. Within each group, students must assume a role, such as group leader, secretary, typist, and editor. Creating roles for students within the group helps to deter students from not participating and enables me to identify where problems may exist. Also, I have students rotate roles for each PBL exercise I assign during the semester. I encourage the group leader to inform me on the group's progress, thus enabling me to prevent the group from misdiagnosing the condition. I devote a lab period to Part I. We usually meet at the library, and after I present the first part of the case, the students proceed to work on this part in their groups. After about 45 to 60 minutes, they are required to submit a group report based on the Part I objectives.

After students submit their group reports, I give them Part II of the problem. They spend the remainder of the lab time identifying the "learning issues" for their group. "Learning issues" are the hypotheses, concepts, and ideas that the group members feel they need to investigate in order to understand and solve the case. Each person in the group is then assigned one of the learning issues to investigate (the idea is that the each person will "learn" while investigating their respective "issue"). Thus, if there are five group members, they will come up with five learning issues. If the group comes up with more learning issues than group members, I encourage them to identify the most significant issues to investigate (often times they will seek my advice) or have a couple of people research the "extra" learning issues. Group members are expected to write an individual report about their learning issue, which is due in one week.

Upon completion of their individual reports, students are given Part III. After handing out Part III, I devote 20 to 30 minutes of class time to let students discuss what each person has found and to get organized for Part III. I also briefly talk about how to diagnose a primary and secondary endocrine pathology and add that the groups should consider that the patient has low GnRH and normal CRH levels. Students complete Part III of the problem outside of class, which is usually due in two to three weeks. I devote more time for the completion of this third part of the case because students will need to meet and communicate as a group for its completion. Upon completion of the final group report in Part III, we have a whole-class discussion concerning the answers to the objectives and how this case is connected to the material discussed in lab and lecture.

Use of Literature by the Students

Students are required to use a variety of sources for their preliminary, secondary, and final reports such as books, textbooks, journal articles, and web-based resources. I only require students to use their anatomy

and physiology textbook in writing their preliminary report. The secondary report must have a minimum of three references, two of which must be text references (not web-based). Helpful text sources are *Gray's Anatomy*, the *Merck Manual*, or various medical dictionaries and medical guides. The final report must have a minimum of seven references, four of which must be text references. The CBE (Council of Biology Editors) style format is followed for citing references.

Grading

For the preliminary and final reports, each person in the group receives the same grade unless I feel that everyone did not participate equally. Individual grades are given for the secondary report. I grade the preliminary report very easily because it just introduces students to the exercise; it is worth five points. The secondary report is graded on the thoughtfulness and quality of their writing and references, and is worth 15 points. Students are graded on their final report in terms of their writing, references, and how thorough they are in their explanations to the objectives given to them for the final report. The final report is worth 40 points. I also have students do an anonymous evaluation of their group members, which is worth 20 points; thus, they give each other a participation grade that lets me see who is contributing to the exercise.

Answer Key

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.

References

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