Case Teaching Notes for "The Soccer Mom: A Case Study on the Nervous System"

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Introduction / Background

In this interrupted case study, students read about Phyllis Jackson, who at the start of the storyline has fainted while playing a soccer game and thinks that she is dehydrated. Her husband points out that she has been having difficulty concentrating at work and is forgetful at times at home and that dehydration may not be the whole story. Phyllis goes to the doctor, where a series of tests reveal that she is suffering from a neurological disorder. The case presents students with Phyllis's signs and symptoms, which they must interpret in order to diagnosis her problem.

The case was developed for use in a one-semester Animal Physiology course, which is taken by sophomore and junior science majors. As in all of my case studies, I prefer to have covered the content (in this case, neurobiology) prior to the case study. This seems to work for my students because it gives them a knowledge base to work from and, hopefully, extend. This case could also be used in an anatomy and physiology course or in a freshman general biology course, although more time might be needed in an introductory course.

Objectives

- To appreciate the role of myelin and the implication of myelin degeneration.
- To understand how action potentials are conducted along an axon.
- To understand the function of chemical synapses.

Classroom Management

As outlined below time may be allotted for students to do research on the Internet, or the instructor may break up the case and allow students to do research in their own time, continuing the case in the next class period.

I divide my class of 18 students into three groups of six students. The small number of groups makes class management easier and more efficient, and so the case usually takes about 75 minutes to fully develop. At the end of the case, I ask each student to assign a grade to every other student in their group; each student, therefore, gets five grades (one from every other person in the group). After the class, I collate the grades, delete the highest and lowest grades for each student, and then average the remaining three. This number is used to refine the grade I assign to the group, so that each student usually gets a unique final grade for the case.

Board Management

I use a whiteboard in class to record student answers and ideas. The white board in my lab has four panels, which I divide into four equal areas:

- The first area is used to list Phyllis's signs and symptoms.
- The second area is used to list the possible diagnoses.
- The third area is used to provide answers for the flow chart (Part III).
- The fourth area lists the tests suggested by the students.

Entries are made on the first two areas throughout the case as information is provided. If a certain diagnosis loses favor, 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.

Case Management

Students are given each part of the case in sequence and asked to read the passage, discuss the material, and then answer the questions. Students are told how much time they have for each part of the case study and are permitted to use books, notes, and the Internet for reference. After the prescribed time period (typically 10 to 20 minutes for each part), the class is called together to share ideas, with the questions forming the basis for discussion. Groups take turns going first, and different members of each group are called upon for input. In this way, all of the students have an opportunity to participate in the case study.

Part I

I list Phyllis's signs and symptoms as the students give them to me in the first area of the board. Groups (and individuals) are encouraged to suggest diagnoses, which I list in the second area of the board. At this point, many students consider that dehydration may be exercise induced, and that any young mother with two children may be suffering from stress. A discussion of exercise as a stress reliever sometimes ensues.

Part II

We list additional signs and symptoms on the board. Depression may be discussed or given cursory mention by the instructor. If students are not familiar with this topic, they could be given access to the web for research, or they could be given a day for research and the case continued in the next class period. At this stage, many students realize that Phyllis's problem is neurological. The fact that her grandfather was confined to a wheelchair indicates a dysfuction of her grandfather's nerves or muscles, and this usually produces suggestions like amyotrophic lateral sclerosis (ALS; more commonly called Lou Gehrig's disease) and multiple sclerosis (MS). At this point, the pre-med students often come up with suitable tests; non pre-meds sometime feel a little lost. A brief explanation by the instructor of each test as it is suggested can help the class.

Part III

Students may need at least 20 minutes to complete this part of the case. The instructor may decide to have the students fill in the flow chart and then halt further discussion. The chart could be duplicated on the board or projected using an overhead projector or visualizer; if the projector is fixed, the use of the white boards for the various aspects of the case may need to be modified. At this point, students from each group can be randomly selected to fill in a blank in the flow chart by writing on the board. Discussion and student input from anyone in the class can be obtained after each student entry.

If the instructor is satisfied that the class has a good grasp of the basic physiology of action potential production and conduction, the remaining discussion of this part of the case will revolve around myelin, its function during action potential conduction, and what happens when it degenerates. Again, students may be given access to the Internet, or the instructor may give them more time for research outside of class and take up the case again the next time class meets.

Part IV

This part of the study winds up the case. The role of corticosteroids as pain killers may be discussed, and physical therapy to maintain mobility and range of motion may be of interest to some students. The class may engage in a discussion of other auto-immune diseases at this point.

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

National Multiple Sclerosis Society
http://www.nationalmssociety.org/

Multiple Sclerosis Society—UK
http://www.mssociety.org.uk/

Multiple Sclerosis—Medline Plus—National Institutes of Health
http://www.nlm.nih.gov/medlineplus/multiplesclerosis.html

Multiple Sclerosis—Spnser S. Eccles Health Sciences Library, University of Utah
http://medstat.med.utah.edu/kw/ms/

AVONEX (Interferon beta-la) for the Treatment of Multiple Sclerosis
http://www.avonex.com/msavProject/avonex.portal

Controlling Relapses: Common Medications Used—Friends With MS.com
http://www.friendswithms.com/controlling_relapses.htm

Acknowledgements: This case was developed with support from the National Science Foundation under CCLI Award #0341279. Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.