PROBLEM-BASED LEARNING
WITHIN ENDOCRINE PHYSIOLOGY LECTURES

Marian R. Walters

Department of Physiology, Tulane Medical School, New Orleans, Louisiana 70112

Methods were needed to improve the interest of medical students in the 10-lecture Endocrine Physiology block at the end of the second semester of study. Other incentives for improvement included the possibility of attracting students into endocrine research electives and the pressure to improve teaching approaches that results from the high tuition they pay. The principal approach adopted was that of whole class problem-based learning sessions (PBLS) in which the lecture period begins with a brief overview of one to three simplified cases, followed by the usual didactic lecture. At the end of the lecture, each PBL case is read in detail, with several questions posed to the students. Their answers are then used to reinforce concepts from the lecture material. This method can also provide some continuity between lectures, either by using a case in several lectures to illustrate different points, or by posing a question at the beginning of class that illustrates a point from the prior lecture. The outcome of this approach has been very successful: student evaluations of the lecture block and their attendance have significantly improved.

STATEMENT OF THE PROBLEM

The difficulties attracting students to the endocrine lectures are multifold. A large part of the problem is the placement of the endocrine lecture series at the end of the first year of medical school, when the students are exhausted from the constant pressures of the first year’s intensive curriculum. In addition, the grading system is pass/fail (with a high pass/honors option). This grading system further contributes to the problem, since students can calculate how low a grade they can tolerate in the endocrine block and still “pass” the course. Finally, lecture style is likely to be a factor. Although I am a well-organized lecturer, my sense of humor is usually expressed as subtle word play, which does not come through well in the large-class format. Thus, in my hands, the traditional lectures are, for the most part, rather serious.
ENDOCRINE PHYSIOLOGY AT TULANE MEDICAL SCHOOL

To understand how the whole class PBL approach can fit into a curriculum, it is useful to know some key information about Tulane Medical School and the Human Physiology course. The medical school is in a process of ongoing curriculum reform, with pressures to increase PBLS and other small group sessions and to reduce lecture hours. However, overall, the basic science curriculum retains a rather traditional format (Human Physiology: 75–80 lecture hours), with increasing integration across courses. In recent years, Human Physiology and its course director (Dr. Norman Kreisman) have received numerous teaching awards. The medical school faculty (~60 faculty in basic science departments) is smaller than at comparable institutions. Nevertheless, in 2001 there are 19 faculty participating in the team-taught Human Physiology course, with only one lecturer in the endocrine section (excluding the reproductive series of 7 additional lectures). Being the sole lecturer for this 10-lecture endocrine block (outlined in Ref. 2) is advantageous, since there is time for the students to become familiar with the lecture approach, and there are opportunities for continuity between lectures and for reinforcing important concepts through the lectures.

Although most of our basic science faculty consider research to be the principal academic mission, there were many reasons to seek methods to improve the educational aspects of the academic efforts. For example, I have a keen commitment to the educational enterprise that is the platform for my faculty appointment, even though it does not require a major time commitment. Moreover, through the years, I have been fortunate to have numerous medical students choose to do research rotations in my laboratory, so there can be a distinct research benefit from success in reaching the students during the educational effort. Finally, at Tulane Medical School, tuition is rather high, which provides additional incentive (as well as some pressure) to try to reach all students with our educational efforts.

IMPLEMENTATION

To begin, the instructor needs a collection of patient case descriptions relevant to the topics being taught. Collecting cases is the most time-consuming part of the process. Fortunately, this effort can be spread out over time, for example, by searching for case collections in the publishers’ exhibits at scientific meetings. Once cases are identified, they are usually much more elaborate than appropriate for first-year medical students. Thus simplified versions should be developed, including only information that reinforces essential concepts. I also recommend eliminating all complex terms. Once a case is selected, the steps to finalize for classroom use take at most a few hours.

To improve continuity between the lecture topics, some cases can be used in two or more lectures to illustrate different points. Such multiple use requires more planning to avoid excess repetition. For example, the case illustrated in Table 1 is used in the pituitary lecture to underscore the variety of endocrine systems controlled by pituitary hormones and to illustrate the result of overgrowth of other cells by a cell type-specific pituitary tumor. An expanded version of the case is used again in the growth hormone lecture to illustrate some consequences of acromegaly.

<table>
<thead>
<tr>
<th>Patient</th>
<th>38-yr-old woman</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-yr history of treatment for hyperthyroidism (goiter)</td>
<td></td>
</tr>
<tr>
<td>Recent changes: increased ring and shoe size</td>
<td></td>
</tr>
<tr>
<td>menstruation ceased</td>
<td></td>
</tr>
<tr>
<td>acne</td>
<td></td>
</tr>
<tr>
<td>abnormal lactation</td>
<td></td>
</tr>
</tbody>
</table>

Exam: BP 142/80
Not obese

Lab tests: Decreased: LH and FSH
Elevated: growth hormone, prolactin, blood glucose
Normal: TSH, thyroid hormone

Questions
1. What might cause abnormal lactation in a nonpregnant woman?
2. What might cause the menstrual problems?
3. What is the explanation for the normal thyroid hormone levels?
4. What is the principal cause of this patient’s clinical problems?

This table has been adapted from J. M. Neal (1). BP, blood pressure; LH, luteinizing hormone; FSH, follicle-stimulating hormone; TSH, thyroid-stimulating hormone.
Each lecture begins by projecting one to three relevant cases (i.e., Table 1) with a quick reading of key points, followed by a statement that the students will be able to answer the questions posed by the end of the lecture. If a question can be answered from material from a prior lecture, the students are asked for their answers at that time. The didactic lecture is then given as usual. At the end of the class period, each case is read in detail, and each question is posed to the students. Their answers are used to highlight the basic material covered in the lecture.

A key component of this teaching modality is the facilitated “problem-based learning session” at the end of class. It is during this session that the students quiz themselves about the lecture material, and it is the instructor’s use of their spoken answers that further reinforces the lecture concepts. This aspect is the most unique and most useful part of this teaching modality. However, it does have one negative point: discussing the cases reduces the time available to present additional concepts during the lecture. In my mind, this is not a serious drawback when weighed against the increased student interest in the lecture material.

OUTCOME

Incorporating simple clinical problems into the didactic endocrine lectures has been highly successful, as judged by several criteria. Student ratings of the lecture block, collected every year or so as part of the course evaluation process, have improved from a grade of B to B+ or from good to excellent. Their accompanying comments have been very pointed: “very good clinical correlations as we learned the material”; “I like the way she emphasized the clinical problems”; “Good clinical examples... liked relating the material clinically”. In a related section, students also commented on the more recent transfer of the lecture material to computer-assisted display: “PowerPoint was awesome”.

As an instructor, the whole class PBL approach makes the classroom sessions much more enjoyable, in part because there is improved dialogue with the students, and they are more interested in the lecture sessions.

Address for reprint requests and other correspondence: M. R. Walters, Dept. of Physiology SL39, Tulane Medical School, New Orleans, LA 70112 (E-mail: mwalters@tulane.edu).

References