Preliminary Results on the Prevalence of Physiology Students' Homeostatic Misconceptions

Program # 739.5
Poster # T54

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This poster reports on results from two surveys completed by students in a 200 level biology course and 300 level biology courses and students' interviews discussing the Multiple Choice Survey. One survey contained three open-ended questions was used to evaluate students' understanding of homeostasis. The results from the open ended survey was used to validate the multiple choice questions. The other survey is a multiple choice conceptual assessment in homeostasis. Homeostasis has been determined to be a "core concept" in physiology. We used the results from a survey helped inform the development of a conceptual assessment in homeostasis (a concept inventory). Students' a conceptual understanding of an abstract term such as homeostasis. Specifically, the results indicate students wrongly believe heart rate is homeostatically regulated similar to blood pressure.

Overview

1. Previous work of the CAP Project: Progress toward a Conceptual Assessment of Physiology (see 720.4, 2012 Annual EB program)
2. The results from a survey of 47 physiology students' (200 level) indicated 74% of students believe heart rate is homeostatically regulated.
3. Results from a multiple choice conceptual assessment in homeostasis indicate students think heart rate is homeostatically regulated.

Project supported by NSF TUES grant DUE-1043443

Methods:

- **April 2012**: 37 physiology students (200 level) answered an survey with open ended homeostasis questions.
- **September 2012:** Eight physiology students in their 4th week of human physiology or had completed human physiology in the past year were interviewed to get feedback for 17 Homeostasis Multiple Choice Questions MCQs developed by the six faculty member project team.
- **May 2012, January 2013**: Biology Majors (300 level) took the MCQs survey. The survey asked the students how confident they were about their answers.

No incentives to finish the survey. Students took it home and they could turn it in or not.

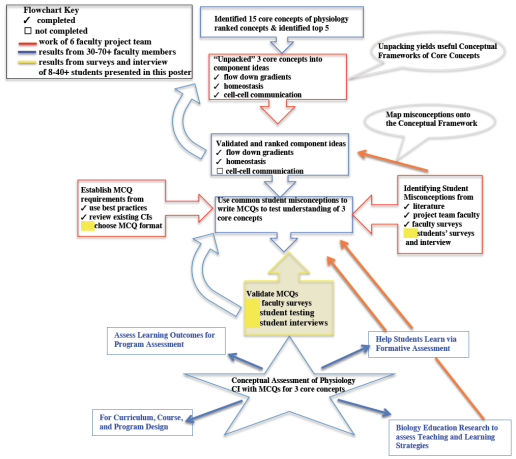
Homeostasis Definition:
Organisms maintain a relatively stable internal environment while living in a changing external environment by actively responding to changes.

What students should understand:
•If a homeostatically regulated variable is perturbed, it will be brought back to within its normal range.

•The process involves a negative feedback system that requires a sensor, a controller and effector(s).

** See handout for a more complete Homeostasis Assessment.*

CAP Project Overview: Progress toward a Conceptual Assessment of Physiology



Homeostasis Open Ended Question Survey

BIOL& 242 Human Anatomy & Physiology 2 3 April 2012
In Class writing assignment (5 points)

Define homeostasis. monitoring the internal enverment to a constant level.

Describe the process (i.e. how it works) by giving a physiological example.
When going outside of the house and the temp out is cold, then the body will try to between the external inviroment

Do you think that either (a) heart rate or (b) blood pressure or (c) both are homeostatically regulated? Circle one of the choices above.

Explain your answer.
I think that heart rate is ~~a~~ homeostasis regulated because the body try to keep it in a constant heart beat.

Results from Homeostasis Open Ended Question Survey

For the question, "Do you think that either (a) heart rate or (b) blood pressure or (c) both are homeostatically regulated? three out thirty seven students choose heart rate, eight students selected blood pressure, and thirty-two students selected both. From these results be believed a major student misconception have, is they believe heart rate is homeostatically regulated.

Heart Rate	9%
Blood Pressure	22%
Both	86%

Conclusion

The results show students incorrectly believe that heart rate is homeostatically regulated. We also wondered if the wording of the question was confusing to students. To further validate this conclusion we looked at the results from the Multiple Choice Question Homeostatic assessment we developed and we are in the process of interviewing students.

Multiple Choice Survey Heart Rate and Homeostasis Questions

Anatomical misconceptions

I.The body has a sensor that measures blood pressure, but does not have a sensor that can measure heart rate. Which of the following are held more or less constant even when the internal or external environment changes?

a. heart rate
b. blood pressure
c. both
d. neither

II. Individuals can measure their pulse/heart rate and electronic devices can measure heart rate, but there is no biological heart rate sensor within the body. Based on this information, you conclude:

a. heart rate cannot change, even when the internal or external environment changes.
b. heart rate isn't maintained more or less constant, even when the internal or external environment changes.
c. heart rate is kept constant for long periods of time, when the internal or external environment changes.

This was asked after each question.

How confident were you of your answer to Question 1?

A. Very Confident
B. Somewhat Confident
C. Not Confident

Results

The results are grouped by population since the various groups took the MCQ survey either before, during, or immediately after a course in physiology.

Conclusion

References

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