Using MCQs to assess causal reasoning

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All physiological phenomena are the result of the operation of causal mechanisms. Learning physiology requires students to build mental models of these mechanisms. Thus, one way to assess student understanding of physiology is to ask them to solve problems about these causal mechanisms. This can be accomplished by asking students to make qualitative predictions (increase/decrease/no change) about the response(s) of the components of a system that has been perturbed experimentally or by pathology.

Students' ability to carry out causal reasoning can be assessment with the use of a "prediction table," a matrix-like arrangement with the rows representing physiological variables and the columns representing phases of the response to the perturbation. The errors that students make in filling out prediction tables can be used to assess student mastery of important physiological phenomena. The patterns of errors that students make can also be diagnostic for the presence of misconceptions.

Formative and/or summative assessment in large enrollment classes often requires the use of machine scored multiple-choice questions (MCQs). Student understanding of a causal mechanism such as the baroreceptor reflex has, for many years, been assessed with MCQs employing a wide variety of novel perturbations to the system. Such an approach is thus applicable at all levels of physiology courses.