

Title: Environmental Cost vs. Health Benefit of Radioisotope Usage in Medicine

Overview:

[Provide a brief summary of the module's central theme(s) and purpose(s), emphasizing what humanities questions the module is intended to address]

This module is developed for implementation in a class that discusses the use of radioisotopes in a biomedical setting. The inspiration is a class I teach (*Advanced Biomedical Instrumentation*), which covers the use of radioisotopes as tracers in biomedical imaging (scintigraphy, SPECT, PET, etc.). The goal of the module is to go further in depth regarding the environmental impact of the use of radioisotopes (from their generation to their disposal—keeping track of any radioactive byproducts), and compare that to the potential for benefits in the quality and/or quantity of a patient's life (does using the radioisotopes allow patients to live longer, fuller lives).

Goals:

[Provide a list of specific goals for the module; try to be concrete and specific about what the outcomes of the module are intended to be]

- (1). Learn about the environmental impacts from the production of radioisotopes for biomedical purposes—this includes mining, refining, byproducts, etc.
- (2). Learn about the environmental impacts of the disposal of the radioisotopes—this includes half-life concerns, how it is packaged for transport, how it is disposed, etc.
- (3). Learn about the overall statistics regarding improvements to a patient's quality of life or expected lifespan after receiving radioisotopes for diagnostic or therapeutic purposes—do patients typically live longer or better after using radioisotopes, and by how much?
- (4). Students should be able to form a debatable opinion regarding the environmental cost vs. the human health benefit of using radioisotopes.

User Guide:

[Provide some instructions on how the module could be implemented. You might include specific assignments, instructions on how it should be sequenced, thoughts on how the module could be scaled for different amounts of time, etc.]

After introducing radioisotopes and their use in medicine during normal lectures, this module could be covered. Students will be assigned reading material for before class that discusses the generation and disposal of radioisotopes. During class, this material will be covered, along with the potential benefits to human health. For assessment, the students may be assigned a homework assignment, given a quiz, or asked to write an

essay on their thoughts regarding the justification of use for radioisotopes. Opportunities for in-class discussion should be generous, and the assessment could even be replaced by an in-class debate.

Materials:

[Provide readings, case studies, PowerPoints, etc. that could be used in the module]

The material needed for this module will primarily involve a PowerPoint presentation that is meant to be delivered to the class. There will also be an instruction document (user guide) for the instructor, and a 'refresher' document on radioisotopes that will be made available to the students. The PowerPoint will include links to references. An example quiz will also be included.

Sample Implementation:

[Provide a description of how the module has been or might be used in a specific course. Give an indication of how much class time the module is intended for and (where applicable) how the module might be scaled for different lengths (15 minutes, a whole class period, multiple days, etc.)]

The module will be designed for implementation in a single 75 minute lecture setting, with reading assignments for outside of class. I am designing the course to be implemented in my Advanced Biomedical Instrumentation course (TBS 01370), but it could be implemented in any course that discusses the use of radioisotopes in a medical setting (e.g., health physics, medical physics, radiology, etc.). The module could also probably be split into two 45-minute lectures, with more time for discussion.