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Environmental Cost vs. Health Benefit of Radioisotope Usage in Medicine

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Environmental Cost vs. Health Benefit of Radioisotope Usage in Medicine

Cultivating the Environmental Humanities

Faculty Working Group (2018-2019)

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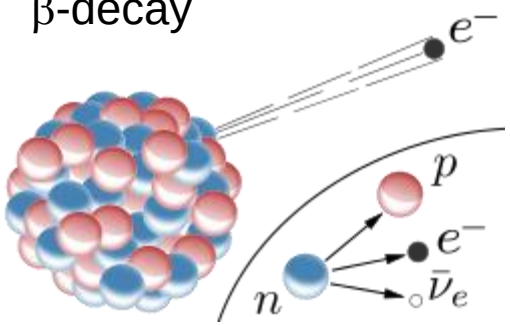
Overview

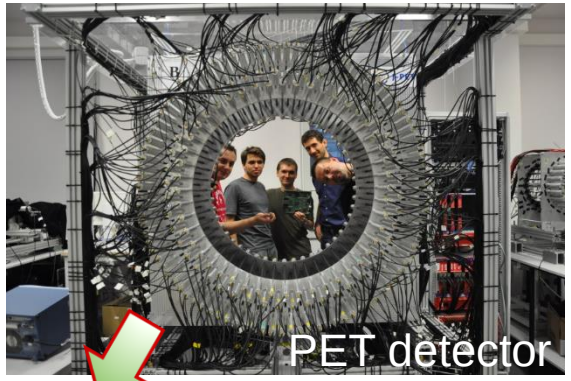
- Radioactive isotopes are used in medicine, from therapy to diagnostics
- Generation, transportation & storage, disposal of radioisotopes have an environmental cost
- How does that weigh against the benefit to quantity/quality of life for the patient?
- Overall theme: comparison of **environmental cost** ***vs.*** **human benefit** for use of radioisotopes in medicine

Inspiration

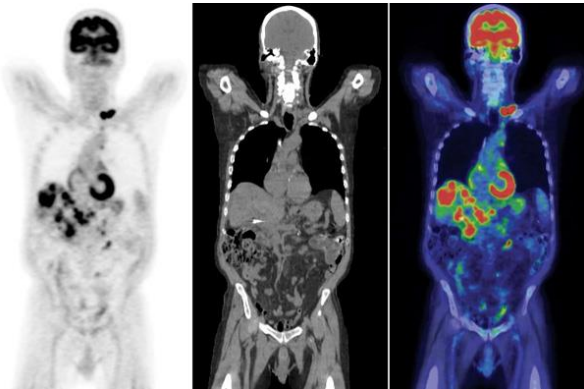
- TBS 01370—Advanced Instrumentation of Biomedical Sciences
- Series of lectures that cover nuclear medicine (scintigraphy, SPECT, PET, therapeutics, etc)
- Discuss the potentially harmful effects to human health due to radiation
- Potential to expand this discussion to environmental effects…

β-decay

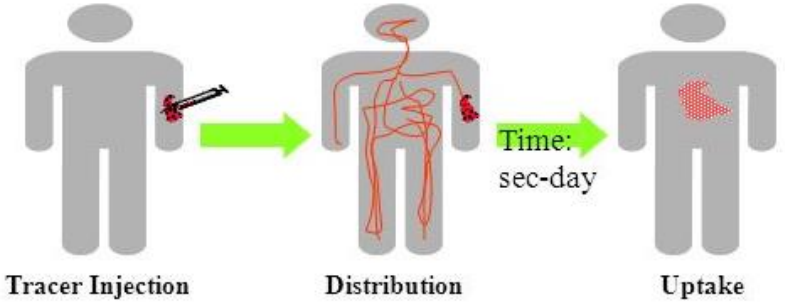




PET **CT** **Overlay**



Student Goals



i. Examine the environmental impacts from production of radioisotopes

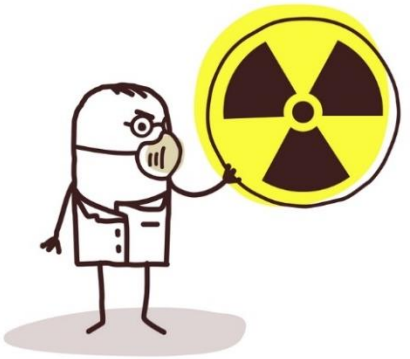
ii. Study the environmental aspects of radioisotope use & disposal

iii. Statistical analysis of improvements to patient outcomes from use

iv. Formation of a debatable opinion regarding **environmental cost *vs.* human health benefit** from radioisotope usage

How It Works

- Module should be covered within the context of a class that discusses the use of radioisotopes in medicine



- Students are assigned reading material prior to the module
  - Generation & disposal of radioisotopes
- This material, plus medical implementation, is discussed in class
- Assessment can be handled by an in-class discussion (or debate)
  - Can also implement a short quiz or essay

Materials Under Development

- Collection of reading materials for students prior to the module
- Presentation (30-40 slides) to be delivered in class (can also be posted to Blackboard)
- ‘User guide’ for the instructor
- Example quiz, essay questions, and discussion prompts
- References

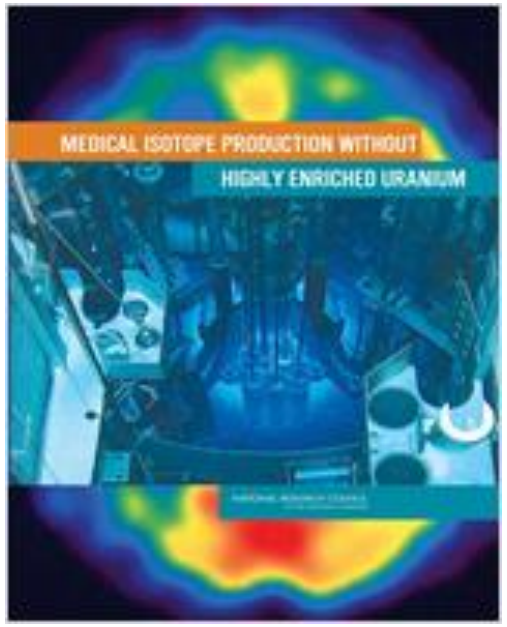
Harvard cyclotron ca. 1940’s

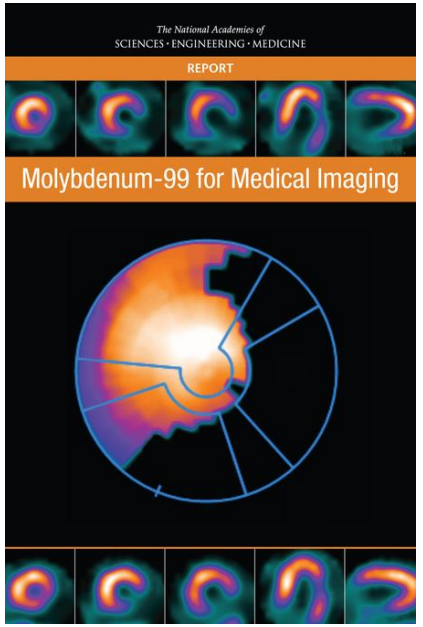
Suggested Implementation

- Single 75-min course lecture setting (plus outside reading assignment)
  - Or—two 45-min lectures with additional discussion
- Any upper-level course that discusses the use of radioisotopes in medicine
  - Of interest to medical physics, radiology, pre-med, radiation physics, etc.

Reference & Material Sources

IAEA
International Atomic Energy Agency





NNSA
National Nuclear Security Administration

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Radiopharmaceutical Therapy in the Era of Precision Medicine*

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