Biomedical imaging

with Dr Jonathan Thiessen and Dr Shawn Whitehead

Talking *points*

Knowledge

1. What is biomedical imaging?
2. What happens during a stroke?

Comprehension

3. What are the similarities and differences between positron emission tomography (PET) and magnetic resonance imaging (MRI)?
4. What are the links between strokes and dementia?

Application

5. "The sum result of PET/MRI systems is truly greater than its parts," says Jonathan. What evidence from the article supports this claim?
6. What types of therapeutic approaches do you think clinicians might use to reduce the chances of stroke patients from developing dementia?

Analysis

7. Why do you think that X-rays are not used to analyse the effects of a stroke on the brain?
8. Why do you think that PET is described as 'minimally invasive' while MRI is described as 'non-invasive'?

Evaluation

9. MRI and PET scans can be very expensive. How do you think clinicians justify this expense? In what circumstances do you think this expense would not be justified, even if a patient could potentially benefit from a scan's results?
10. The pathway from first developing a new imaging method through to rolling it out in the real world can take many years. To what extent do you think that it could be possible to shorten this process? How could this be done?

Activity

Design a game that involves participants matching the following:

- Types of biomedical imaging (e.g., X-ray, ultrasound, computed tomography (CT), MRI, PET)
- The structures and functions that certain imaging technologies can reveal (e.g., bones, brain structure, blood flow)
- The types of diseases or ailments that can be diagnosed or monitored with certain imaging technologies (e.g. dementia, scoliosis, types of cancer)

Use the article and the internet to research what each type of biomedical imaging is used for. Note there will likely be lots of overlaps, where different imaging technologies can be used for the same disease, structure or function.

Use your findings to design a matching game. Make it as fun and engaging as possible, while also being educational and challenging for participants. You can choose the mechanics of the game: for example, if you want it to be based on memory, if it is competitive, cooperative or single player, and if it is a physical board/card game or made digitally.

Test your game out with willing classmates. How well do they perform? What is their feedback? What did they learn from it? What type of biomedical imaging would they like to learn more about? Use their feedback to design a second improved version.

More *resources*

- This article from VeryWell Health explores the links between stroke and dementia: www.verywellhealth.com/stroke-and-dementia-3146422
- This article from Aunt Minnie (a community site for medical imaging professionals) explores new research showing that PET/MRI scans can comprehensively identify signs of cognitive decline: www.auntminnie.com/clinical-news/molecular-imaging/article/15660061/petmri-reveals-separate-alzheimers-biomarkers-in-single-scan
- This video from MRIPETCTSOURCE explores the differences between MRI and PET scans: www.youtube.com/watch?v=xJ4org_elEg