



Neuroscience

with Professor Fay Horak

Talking points

Knowledge

1. What is Parkinson's disease (PD), and how does it affect quality of life?
2. What is dynamic balance?

Comprehension

3. Why is turning a complex process for the brain and body?
4. Why is physical therapy important for people with PD?

Application

5. What do you think are some primary challenges for the team to design exercise regimes for people with PD that they can do at home, as opposed to in the lab?
6. "I have collaborated with experts in engineering, psychology, statistics, physics, medicine, imaging, and many other disciplines," says Fay. Thinking about Fay's work, what do you think were likely reasons for collaboration with each of these disciplines?

Analysis

7. Why do you think older people are typically more at risk of a fall, even if they do not have any specific neurological disorders?
8. How do you think people with PD might benefit from biofeedback about how their legs are moving?

Evaluation

9. The Oregon Health & Science University focuses on moving research discoveries quickly to the clinical trial stage, which involves testing discoveries such as new pharmaceuticals or therapeutic techniques on human participants. What do you think are the advantages and disadvantages of accelerating this process? How might OHSU mitigate the disadvantages?
10. Funding for medical research is always limited. Think about how diseases vary: how common or rare they are, which demographics they affect, the severity of symptoms, and the cost of treatment, for example. What factors would you prioritise if you were in charge of allocating funding for research into different diseases? How do you think this prioritisation process might differ in the real world, and why?

Activities

Choose one of the following neurological disorders:

- Parkinson's disease
- Multiple sclerosis
- Traumatic brain injury
- Cerebral palsy

Poster

Using information from the internet (and Fay's article if you choose Parkinson's disease), design a poster that explores:

- Symptoms of the disease
- How the disease physiologically affects the body (e.g., damage to the brain or central nervous system, and downstream effects on muscles, etc.)
- Current treatments and therapies
- A focus on physical therapy solutions, such as those explored in the Balance Disorder Laboratory

While designing your poster, think about:

- Who your target audience is
- How you can use images, diagrams and colours most effectively
- What level of detail is best and how you can balance accuracy against accessibility.

Project design

Think about your findings on physical therapy solutions for your chosen disease. Now, imagine you are working at the Balance Disorders Laboratory and want to test the effectiveness of a particular therapy on people with that disease.

Design an experiment to test this therapy. Add as much detail as you can. Make sure to answer the following questions:

- What are you testing?
- How will you perform your test?
- What are your independent and dependent variables?
- How will you control all other variables?
- What equipment will you need?
- How can you ensure the privacy, safety and dignity of participants?
- How will you record your findings?

Assuming your experiment had promising results, what would your next steps be? What more would be needed for this therapy to go on to benefit people in the real world?

More resources

- Find out more about the Balance Disorders Laboratory, including their areas of research and opportunities for participation and training: www.ohsu.edu/school-of-medicine/neurology/balance-disorders-laboratory
- This video from CBC News shows a first-hand account of how Deep Brain Stimulation can provide an effective solution for some people with Parkinson's disease: www.youtube.com/watch?v=iG1dCeKUqks
- This article from The Physiological Society looks into the neurology behind balance: www.physoc.org/magazine-articles/the-neuroscience-of-balance
- Read a recent article about Fay's work: katu.com/news/local/heres-how-exercise-improves-the-mobility-of-people-with-parkinsons-disease#