

Biomedical engineering

with Dr Ting-Yim Lee and Dr Marat Slessarev

Talking points

Knowledge

1. What is cerebral blood flow?
2. What happens during a stroke?
3. By how much must a brain be cooled to reduce injury after a stroke?
4. How does the Vortex tube IntraNasal Cooling Instrument (VINCI) cool the brain?
5. How successful was VINCI at improving stroke outcomes in pigs?

Comprehension

6. How and why can cooling the brain reduce brain injury after a stroke?
7. What expertise did Ting and Marat each bring to the development of VINCI? Why was this collaborative nature essential for the success of the project?

Application

8. Imagine you are in Ting and Marat's research team and in charge of leading the clinical randomised controlled trial to test VINCI on humans. What data would you collect from stroke patients before and after treating them with brain cooling or a control technique? How would this information allow you to evaluate the effectiveness of VINCI?

Analysis

9. How successful do you think VINCI will be on humans, and why?
10. What challenges do you think the team will encounter when transitioning from experimenting on pigs to humans?

Evaluation

11. To what extent do you agree that medical treatments, such as VINCI, should be tested on animals, and why?

Activity

Ting and Marat have developed a pioneering new treatment which may significantly improve outcomes for stroke patients. Like most medical advances, before it can be tested on humans, it was first tested on animals. Conduct a debate to explore the arguments for and against using animals in medical research.

- **Research:** Explore the ethical considerations surrounding animal testing in medical research. Look online to find arguments for and against the use of animals in experiments, considering factors such as the potential benefits to human health, animal welfare issues and alternatives to animal testing.
- **Preparation:** Divide into two groups, one advocating for using animals in medical research and the other advocating against it. Each group should prepare their arguments and supporting evidence for the debate. Consider the ethical principles involved, such as minimising harm to animals, the necessity of the research and the potential benefits to society.
- **Debate:** Conduct a structured debate where each group presents their arguments and counters the opposing group's points.
- **Reflection:** After the debate, reflect individually on your personal opinions regarding animal testing in medical research. Consider the points raised during the debate and how they influenced your perspective.
 - Write a short reflection discussing the ethical dilemmas associated with animal testing and your thoughts on balancing the benefits of medical research with the welfare of animals.

Debate questions to consider:

1. What are the potential benefits and drawbacks of using animals in medical research?
2. How can researchers ensure that animal testing is conducted ethically and responsibly?
3. What are viable alternatives to animal testing that could be explored further?
4. Should the benefits to human health justify the use of animals in research, or are there ethical boundaries that should not be crossed?
5. How do cultural, societal and personal beliefs influence views on animal testing?

More resources

- Learn more about the causes and consequences of strokes:
 - www.heartandstroke.ca/stroke
 - www.stroke.org.uk
 - www.stroke.org/en/about-stroke
- Discover how brain cooling is being used to treat sports players with concussion:
 - www.bbc.co.uk/sport/rugby-union/articles/cy0lknlv2ylo