

PAEDIATRIC SURGERY

WITH DR STEFANO GIULIANI

Talking points

KNOWLEDGE

1. What is neuroblastoma?
2. What is fluorescence-guided surgery?

COMPREHENSION

3. How does fluorescence work and why could it be useful to surgeons?
4. How do antibodies work, and why are they a useful feature of the immune system?

APPLICATION

4. What questions would you ask to find out more about the daily duties of a paediatric surgeon and the qualities that make an accomplished surgeon?
6. The team will be moving onto clinical trials of their research soon. What information do you think they have to communicate with patients, and parents of patients, before confirming volunteers for these trials? How do you think they can most clearly and sensitively communicate this information?

ANALYSIS

7. Fluorescence techniques are relatively widely used in scientific research. Can you think of any potential applications for fluorescence in biomedicine or biochemistry?
8. Surgery specialisms are usually divided by parts of the body (for example, neurosurgery, ophthalmic surgery, thoracic surgery) rather than by the age of the patient, which is what distinguishes neonatal and paediatric surgery. Why do you think neonatal and paediatric surgery have emerged as distinct specialisms?

EVALUATION

9. Using animals in medical research can be controversial. As technology develops, do you think other methods will replace experiments on animals within medical research? Why or why not?

CREATIVITY

10. How would you go about designing a brief presentation explaining the steps that take place from the development of a new idea for a medical technique, all the way through to rolling out the technique in the real world? What would be the main points to convey?

Activity

Design a five minute presentation that communicates the many powerful applications of fluorescence within science, with a focus on medicine, to a general non-scientist audience.

This PubMed article (<https://pubmed.ncbi.nlm.nih.gov/34493858/>) provides an in-depth, though science-heavy, introduction to the topic. Research the topic using this article and other sources across the internet.

When designing your presentation, consider:

- What are the key points you are trying to communicate? Choose no more than five.
- What is a good narrative structure to the presentation? Where is it good to begin and end, and what points require more or less explanation?
- How can you translate complex scientific information into ideas that are easy to understand?
- Think about the presentation format. What is a good balance between text and images to engage your audience?
- Can you use any other media (e.g. videos) to increase engagement?
- Would it be valuable to incorporate audience participation, through quizzes or polls, for example?

Present to your class or group, and watch their presentations too.

Think about:

- What have you learned about the applications of fluorescence within science?
- What is exciting about these applications and their potential for the future?
- As a scientist, what would you investigate using fluorescence?

More resources

- You can read more about Stefano's research group on the UCL website: www.ucl.ac.uk/child-health/giulianis-research-group-image-guided-surgery-childrens-cancers
- The National Health Service explains more about what being a paediatric surgeon entails and how to work towards a career in the field: www.healthcareers.nhs.uk/explore-roles/doctors/roles-doctors/surgery/paediatric-surgery
- This video from SciShow highlights the usefulness of fluorescence as a marker molecule, in this memorable case for genetic engineering: www.youtube.com/watch?v=uP58SYCwC6Q