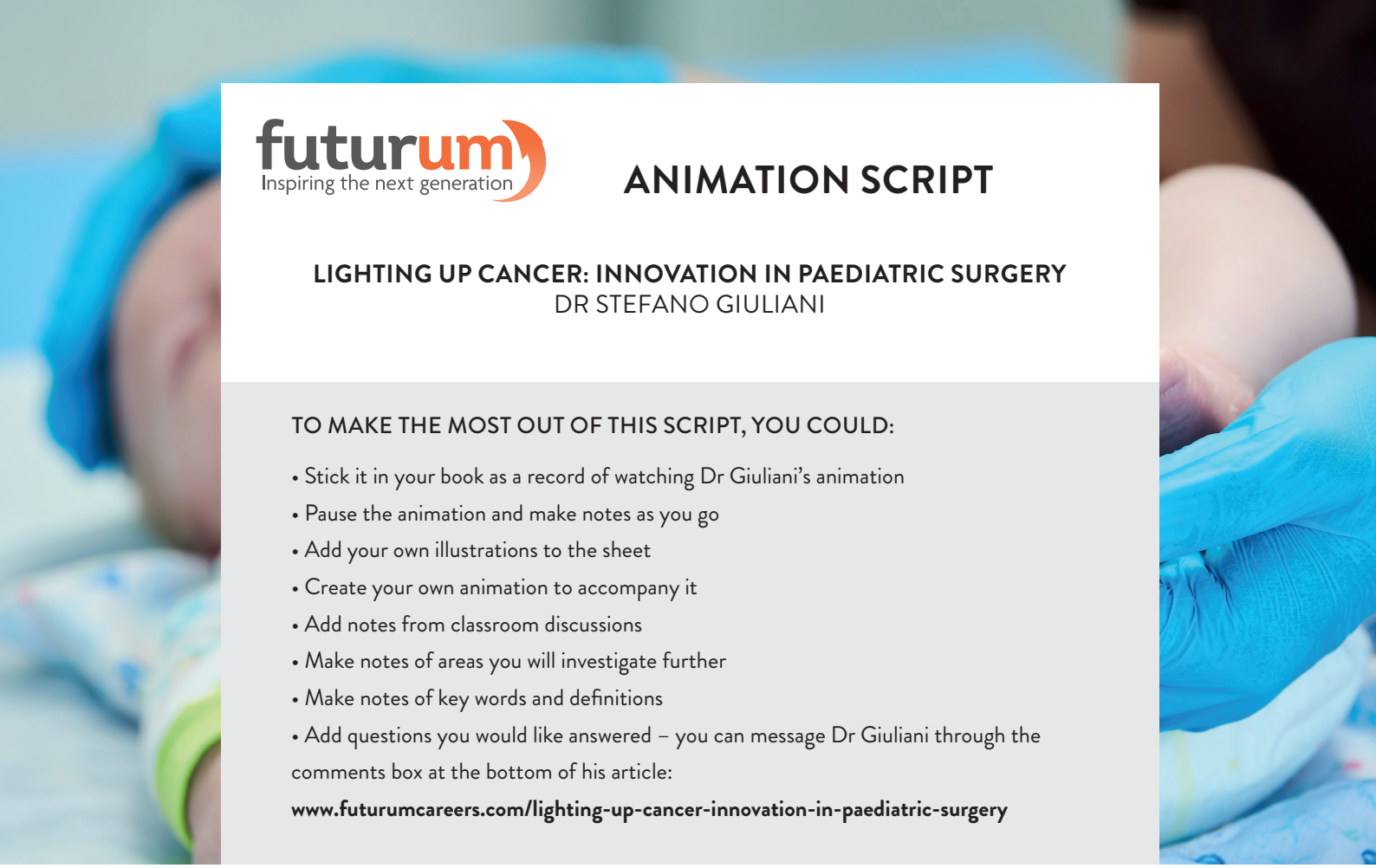

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ANIMATION SCRIPT

LIGHTING UP CANCER: INNOVATION IN PAEDIATRIC SURGERY
DR STEFANO GIULIANI

TO MAKE THE MOST OUT OF THIS SCRIPT, YOU COULD:

- Stick it in your book as a record of watching Dr Giuliani's animation
- Pause the animation and make notes as you go
- Add your own illustrations to the sheet
- Create your own animation to accompany it
- Add notes from classroom discussions
- Make notes of areas you will investigate further
- Make notes of key words and definitions
- Add questions you would like answered – you can message Dr Giuliani through the comments box at the bottom of his article:

www.futurumcareers.com/lighting-up-cancer-innovation-in-paediatric-surgery

SCRIPT:

Cancers come in a range of shapes and sizes and can affect different parts of the body in different ways.

Neuroblastoma is a type of cancer that occurs principally in babies and young children. Worldwide, it accounts for approximately 6% of all childhood cancers. In the UK, it affects around 100 children every year and, in its more aggressive form, has a low survival rate.

Neuroblastoma occurs when specialised nerve cells, called neuroblasts, are left behind from the child's time in the womb and become cancerous. It is an aggressive cancer which has often spread to multiple organs by the time it is diagnosed.

Dr Stefano Giuliani is a consultant Neonatal and Paediatric Surgeon at Great Ormond Street Hospital and Associate Professor at UCL Great Ormond Street Institute of Child Health, both in London in the UK. Funded by the Wellcome /EPSRC Centre for Interventional and Surgical Sciences (WEISS), he is working on a pioneering research study that could dramatically improve survival rates for children with this cancer.

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Treatment for neuroblastoma involves surgically removing the entire tumour, but this is challenging because neuroblastoma grows around the largest and most critical blood vessels, nerves and organs in the body, and it is not easy to tell the difference between cancerous tissue and normal healthy tissues. This raises the risk of damaging these tissues during surgery, which can lead to dangerous situations such as severe bleeding.

Fluorescence-guided surgery could solve this issue, so Dr Giuliani and his team are developing specific fluorescence probes which can clearly highlight cancer cells.

The team uses fluorescent molecules that have the ability to emit visible light when exposed to specific wavelengths, like infrared. These fluorescence probes are formed using a clever biochemical technique.

The main way the body's immune system detects cancer cells as abnormal is by recognising molecules on their surfaces that are not normally expressed by healthy cells. This causes the production of antibodies and activates the immune system. The same strategy is used by researchers when developing antibodies that are directed against these specific molecules. Biomedical scientists have developed an antibody specific to neuroblastoma, that Dr Giuliani and his team can modify in a lab to attach a fluorescent particle to it.

When these modified antibodies are introduced to the body, they attach to the neuroblastoma cells and nowhere else. This means that when the tumour is exposed during surgery, it is literally 'lit up' against surrounding tissue by all the fluorescent molecules attached to it.

This makes it much easier for surgeons to distinguish cancerous cells from healthy cells and remove the tumour accurately.

Dr Giuliani and his team have obtained good data in vitro and in animal models for this technique and will now translate their findings to humans in a clinical trial.

They hope this new technology will be saving children's lives within five years. Surgery will be more precise, leaving less cancer behind and improving survival rates. In time, this technique could be extended to treat many different types of cancer, potentially saving many lives worldwide.

What could you achieve in the field of neonatal and paediatric surgery?