futurum
Inspiring the next generation

ANIMATION SCRIPT

BEDSIDE TO BENCH: A UNIQUE WAY TO TREAT LUNG INJURY

DR JULIE BASTARACHE

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

- Stick it in your book as a record of watching Julie'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 Julie through the comments box at the bottom of her article: **www.futurumcareers.com/bedside-to-bench-to-bedside-a-unique-way-to-treat-lung-injury**

SCRIPT:

Acute respiratory distress syndrome, or ARDS, can develop in patients after an infection such as pneumonia or sepsis, or after severe trauma such as a bad car accident.

Patients have difficulty breathing because fluid collects in the air sacs of their lungs, reducing the amount oxygen that can enter the bloodstream. Despite being a common problem, many people still die from ARDS and currently there is no specific treatment.

Dr Julie Bastarache is physician-scientist at Vanderbilt University Medical Center. She spends part of her time working in a hospital as a medical doctor, and part of her time working in a laboratory, researching the medical issues she encounters while on the ward.

Julie runs her research laboratory with two other physician-scientists, Drs Lorraine Ware and Ciara Shaver. Together, they mentor fellows, residents and students who are studying various aspects of ARDS during critical illness. Julie is using her unique role as a physician-scientist to better understand ARDS, and she hopes to develop a treatment that will enable doctors to prevent or reverse lung damage.

Julie uses a 'bedside to bench' approach. Her scientific discoveries begin as observations made at a patient's bedside, with the causes of her patients' symptoms then studied at a laboratory workbench.

ANIMATION SCRIPT

Using this method, Julie has discovered a link between cell-free haemoglobin and ARDS. Healthy red blood cells contain haemoglobin, which carries oxygen around the body. Blood cells have a flexible membrane, allowing them to squeeze through small blood vessels.

But if someone is ill, the cell membrane can become thinner and stiffer. This causes the blood cell to burst as it squeezes through blood vessels, releasing haemoglobin into the bloodstream.

This cell-free haemoglobin no longer binds oxygen in the blood, and it injures the cells lining the blood vessels and lungs. These cells become leaky, causing blood plasma to enter the air sacs of the lungs.

All of which make it difficult for the patient to breathe and get oxygen into the blood, leading to ARDS.

After collecting blood samples at the bedside of her hospital patients, Julie and her team, which includes graduate students, post-doctoral fellows and research assistants, analysed them at the bench in the laboratory. They discovered that patients with ARDS had high levels of cell-free haemoglobin in their blood, suggesting this may be a contributing factor to the condition.

To test whether this was true, Julie's team used experimental models including human cells grown in the lab and mouse models of sepsis. They found that cell-free haemoglobin does make blood vessels leaky in both cultured cells and animals.

Julie hopes that the results of her research in the laboratory can be translated back to the bedside, to provide treatments for patients with ARDS.

Physician-scientists play an essential role in medicine, providing a link between patients in hospitals and research laboratories trying to treat the diseases these patients have.

By working with patients in a hospital and studying their illnesses in a laboratory, what cures will you discover?

What could you achieve as a physician-scientist?