

IMMUNOLOGY

with Dr Stuart Weisberg

Talking points

KNOWLEDGE

1. What is a tissue-resident memory T cell (TRM)?
2. What are the two main functions of the pancreas?

COMPREHENSION

3. Why do blood samples provide an incomplete picture of a person's immune system?
4. Why is it important for scientists to study healthy organs as well as diseased ones?

APPLICATION

5. What questions would you ask Stuart to learn more about how he extracts living, unstressed pancreatic tissue cells from donated pancreases?
6. How could you adapt Stuart's research to investigate immunity in the heart?
7. How might Stuart's research inform the development of new treatments for pancreatic disease?

ANALYSIS

8. Malnutrition means not receiving the correct balance of nutrients that the body needs. What types of malnutrition do you think have become more common in recent decades, and why?
9. How is globalisation impacting our immune systems?

SYNTHESIS

10. As societies and the environments in which we live continue to change, how might the focus areas of immunology research change? What topics will researchers need to address to protect the health of our immune systems?

Activities

1. Visit the Human Protein Atlas page about the pancreas (www.proteinatlas.org/humanproteome/tissue/pancreas), read the information and answer the following: What is a transcriptome? What is a proteome? What information can an organ's transcriptome and proteome provide about its function?

In the Human Protein Atlas search bar, type 'TRAC' (the gene encoding part of the T cell receptor) and click on the TRAC option labelled 'Single cell'. This lists the single cells in the body where TRAC can be found. Based on the information provided, what can you infer about the distribution of T cells in organs of the body? What do you find surprising about where T cells are found?

When scientists perform single cell analysis on an organ, what are the limitations of studying the immune cells in that organ? If the other cell types are too numerous relative to the immune cells, what methods might help focus studies on the immune cell lineages?

2. The pancreas has several important functions and a range of ways that these functions can be disrupted. Fill in the table below, using information from the article and your own research using the internet. While doing so, remember that all these functions are interconnected, so a disruption to one function may cause a knock-on impact on others.

Function	Mechanism	Disease	Cause(s)	Treatment(s)
Digestion		Acute pancreatitis		
Glucose regulation		Type 1 diabetes		
		Type 2 diabetes		
Protecting pancreatic tissue		Chronic pancreatitis		
		Infection		
		Pancreatic cancer		

More resources

- Animated Pancreas Patient has a series of animations explaining how the pancreas functions and the causes of and treatments for pancreatic diseases: www.youtube.com/playlist?list=PLYPOY_XiapBVsDBvqL-HgDhAQ9JsHjpm4
- Stuart recommends exploring publicly available datasets about tissue immunity, such as the Human Protein Atlas (www.proteinatlas.org) and the Human Cell Atlas (www.humancellatlas.org)
- The American Association of Immunologists provides educational resources about immunology: www.aai.org/Education