**ACTIVITY: Exploring medical research**

**Activity idea**

In this activity, students explore current medical research. They compare current medical care of infectious diseases with research and think about future trends. This activity can be adapted for students to explore other areas of medical research, for example, potentially revolutionary treatments for brain diseases.

By the end of this activity, students should be able to:

* explain some of current research happening in immunology in New Zealand
* compare current medical care of infectious diseases to the research happening at the Malaghan Institute of Medical Research
* describe what could be available in future medical care related to infectious diseases.

[Introduction/background notes](#Introduction)

[What you need](#need)

[What to do](#do)

[Examples of using the Futures thinking tool](#examples)

**Introduction/background**

The Malaghan Institute of Medical Research is a cutting-edge vaccine and immunology research centre based in Wellington. Scientists from this centre are researching drugs and vaccines that may cure or prevent numerous diseases. The problem is that some of this research takes about 20 years and $2 billion before there is a marketable product.

It is interesting for students to be aware of what is happening in the research arena and what scientists are finding out. In this activity, students can explore current research, think about current and past care for infectious diseases, consider what’s causing changes in care and think about possibilities of care or treatment for the future.

**What you need**

* Access to a variety of articles and video clips on [Fighting infection](https://www.sciencelearn.org.nz/resources/165-fighting-infection-introduction) related to the topic students are researching (see below)
* Access to the [Teaching futures thinking](https://www.sciencelearn.org.nz/resources/2438-teaching-futures-thinking) article and the [Futures thinking tool](https://www.sciencelearn.org.nz/resources/2439-futures-thinking-toolkit) activity

**What to do**

1. Tell the class they are going to find out what is new in the field of immunology (check they understand the term). Divide the class into research groups and assign or have them choose a topic:

* Infectious diseases:
* TB
* Rotavirus
* Respiratory syncytial virus (RSV)
* Hookworm and allergies
* Designing and making molecules (This is the most difficult research area and may be more appropriate for higher achieving students.)

1. Have each group look at (individually or together) the relevant articles or video clips (they may need teacher help with terminology and to work through some of the ideas):

* TB – [Reducing infectious diseases](http://www.sciencelearn.org.nz/resources/168-reducing-infectious-diseases), [A new vaccine for TB](http://www.sciencelearn.org.nz/videos/45-a-new-vaccine-for-tb),
* Rotavirus – [Reducing infectious diseases](http://www.sciencelearn.org.nz/resources/168-reducing-infectious-diseases), [Rotavirus](http://www.sciencelearn.org.nz/videos/46-rotavirus)
* Respiratory syncytial virus (RSV) – [Reducing infectious diseases](https://www.sciencelearn.org.nz/resources/168-reducing-infectious-diseases), [RSV](http://www.sciencelearn.org.nz/videos/47-respiratory-syncytial-virus-rsv)
* Hookworm and allergies – [Hookworm and allergies](http://www.sciencelearn.org.nz/resources/172-hookworm-and-allergies), [Hookworm](http://www.sciencelearn.org.nz/videos/52-hookworm), [Hookworm, the immune system and asthma](http://www.sciencelearn.org.nz/videos/53-hookworm-the-immune-system-and-asthma), [A vaccine for hookworm](http://www.sciencelearn.org.nz/videos/735-a-vaccine-for-hookworm), [Allergic reactions](http://www.sciencelearn.org.nz/videos/750-allergic-reactions)
* Designing and making molecules – [Designing drugs and making molecules](http://www.sciencelearn.org.nz/resources/173-designing-drugs-and-making-molecules), [Identifying TB molecules](http://www.sciencelearn.org.nz/videos/54-identifying-tb-molecules), [Making molecules](http://www.sciencelearn.org.nz/videos/56-making-molecules), [Adjuvants](http://www.sciencelearn.org.nz/videos/55-what-is-an-adjuvant)

1. In consultation with each other, each group produces a summary of their research to present to the class. This could be done as a poster, a mind map, a PowerPoint, brochure, video clip (works well if you have an interactive board in the room).
2. Have each group use the [Futures thinking tool](https://www.sciencelearn.org.nz/resources/2439-futures-thinking-toolkit) to think about medical care related to infectious diseases in the future. The tool asks students to think about current care, trends or changes there have been over time, drivers or what has been behind the changes, what medical care might be available in the future and who might have access to it, and what medical care the students think should be available and why. Students might choose to take one disease and analyse that within the thinking tool – [see examples](#examples). Students could do this as a group in consultation with each other or it could be done individually and could include internet research.
3. Student/group ideas could be shared with the class.

***Variation idea – research into brain disease***

This activity could be used to examine the potentially revolutionary treatments for brain diseases.

The [Futures thinking tool](https://www.sciencelearn.org.nz/resources/2439-futures-thinking-toolkit) is used to get students to think indepth about medical care related to Alzheimer’s disease or stroke in the future.

You’ll need access to the [Futures thinking tool](https://www.sciencelearn.org.nz/resources/2439-futures-thinking-toolkit) as well as any internet resources you think your students require.

Follow steps 3, 4 and 5 above.

**Examples of investigating infectious diseases using the Futures thinking tool**

***Respiratory syncytial virus (RSV)***

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| Current care | No specific treatment. No vaccine. Hospitalised children have airways cleared of mucus. |
| Trends | Increase in RSV especially in New Zealand. Young children are infected. Children are infected in the winter. More dark skinned children are infected than light skinned children. Some children are hospitalised. No treatment to date. Research is being done. |
| Drivers | The reason for research is the high incidence of RSV in New Zealand. Nearly every child suffers from RSV before they are 2 years old. |
| Future care | A vitamin D supplement or increased vitamin D in the food of young children. |
| Three reasons why I think this | * Current research at Malaghan Institute shows that RSV may be a vitamin D deficiency. * They could be right because wintertime is when we have the least sun (and when children suffer from RSV) and darker skins don’t absorb sunlight as readily as light skins so they may get less vitamin D (and more dark skinned children suffer from RSV). * Vitamin D supplements would be an easy solution for children. |
| Three reasons why people might disagree with me | * Vitamin D deficiency may not be the cause or the only cause. * A vitamin D supplement may not work the same as sunlight. * Adding extra concentrated vitamins may be harmful for children in other ways. |

***Asthma***

|  |  |
| --- | --- |
| Current care | Use of inhalers (including preventative inhalers), hospitalisation if very severe, avoiding triggers such as pollens, animal hair or fur, dust mites, excessive exercise etc. |
| Trends | Initially people died because there was no real help. People did not understand what caused it. Early medications had bad side-effects. Many people were hospitalised. Now people have learned what some of the triggers are, they know it’s an inappropriate immune response and there are medications that can alleviate it or help prevent it from happening (such as inhalers for sport-induced asthma). Researchers are exploring possible vaccines. |
| Drivers | Increase in asthma sufferers. High incidence in New Zealand. |
| Future care | The ability to reprogramme (desensitise) the immune system so it doesn’t cause an allergic immune response. This could involve a vaccine (like the hookworm one being researched at Malaghan) or desensitising the immune system with small amounts of certain triggers. |
| Three reasons why I think this | * Research is being done towards producing a vaccine for asthma already (research at Malaghan Institute using the hookworm). * Research is continuing into immune response (Malaghan Institute), and this could led to a way of desensitising or controlling immune response to something like asthma. * Scientists are researching making synthetic molecules that resemble pathogen molecules that affect immune response. Synthetic molecules could be made into a vaccine that might subdue immune response in the case of asthma triggers but not for other pathogens. |
| Three reasons why people might disagree with me | * There are too many asthma triggers, which are different for different people. It would be difficult to desensitise the immune system to stress, for example. * A vaccine for asthma may not work for everyone. * The immune system may not respond to vaccines for asthma in a way we would like. It may allow other harmful things to happen. |