

# PRE-EVENT LESSON PLAN

## Pioneers in Science: The World Science Festival



<b>Date:</b>	Friday, 24 <sup>th</sup> March 2017
<b>Event Start Time:</b>	11:30 AM
<b>Duration:</b>	60 minutes
<b>Event Location</b>	Concert Hall QPAC

### Pioneer Biography: Professor Ian Frazer

Why is Professor Ian Frazer a pioneer?

- Professor Frazer and his colleagues developed and patented the HPV vaccine against cervical cancer at The University of Queensland, now marketed as Gardasil and Cervarix.
- The HPV vaccine discovery was achieved through the development of a synthetic papilloma virus; the hardest part of this was in reconstructing the complex coat, or shell of the virus.
- Professor Frazer is the founding CEO and Director of Research of the Translational Research Institute in Brisbane.

### Guiding Question

What do you think is the most important contribution an Immunologist can make to the future of our health?

### Taking Part

Complete the lesson plan on the next page. This lesson plan will guide students to come up with one question which they can submit prior to the festival. Some of these questions will then be chosen the live show on Friday 24<sup>th</sup> March.

To submit questions please fill out the online form before the **24<sup>th</sup> of February**.

<https://marcatoapp.com/forms/https-wsfb2017/pioneer-professor-ian-frazer>

We will contact you via email if your question is chosen for the event on the 24<sup>th</sup> of March.

**LESSON PLAN OVERVIEW AND INSTRUCTIONS****TIME**

90 minutes of work, to be completed either at school or at home.

**LESSON OVERVIEW**

The following activities are designed to prepare students for an informed interaction with Professor Ian Frazer:

- Activity #1 will broadly introduce students to the world of immunology and drug discovery through understanding significant scientific achievements.
- Activity #2 will explore the life and work of Professor Frazer specifically.

Before you begin the lesson, list 5 things that you KNOW about an immunologist:

<b>What I KNOW</b>	
1.	
2.	
3.	
4.	
5.	

**Activity #1** will broadly introduce students to the world of immunology and drug discovery through understanding significant scientific achievements.

**TIME**

30 minutes

**Instructions:**

Complete the following questions on immunoregulation and immunotherapeutic vaccines

**Questions:**

1. **Research**, using your own sources, the following areas of immunology and write your answers below:

How does our immune system work?

What is a virus?

How does a vaccine work?

2. **Examine** the vaccination timeline (Appendix 1). Identify 5 vaccinations you are unfamiliar with and write down what you think are interesting facts.

Unfamiliar Vaccines	
Vaccine 1	
Vaccine 2	
Vaccine 3	
Vaccine 4	
Vaccine 5	

3. **Examine** some of the outstanding research that has won the Nobel Prize in the field of Immunology (Appendix 2). Pick one and answer the following questions below:

**NOBEL PRIZE WINNING RESERCH \_\_\_\_\_**

Why is this research interesting?

How does it influence my life today?

How may it influence my life in the future?

**Activity #2** will explore the life and work of Professor Frazer specifically.

**Time:** 60 minutes

**Instructions:**

In this three-part assignment, students will learn more about the work of Professor Ian Frazer.

- In Part I, students will learn about Professor Ian Frazer's pioneering work on cancer vaccinations.
- Part II introduces students to the life of Professor Frazer.
- Part III will prepare students for their upcoming conversation with Professor Frazer by encouraging them to draft a short list of questions they've developed based on what they've learned.

**Part I**

1. **Watch** "The Story Behind the Development of the Cervical Cancer Vaccine" <https://www.youtube.com/watch?v=s7BfyEPmsRg> and do some research on the Human Papillomavirus. Write down what you think are the top 3 interesting facts about the human Papillomavirus and the vaccination.

My Top 3 interesting facts about human Papillomavirus and Vaccine

1.

2.

3.

2. Professor Ian Frazer is a personal chair as head of the Diamantina Institute and the founding CEO and Director of Research at the Translational Research Institute. Watch <https://www.youtube.com/watch?v=FL7TDGaj9lc> and answer the following questions. Write down your answer in the box below:

What is the difference between basic research and applied research?

Why do you think it's important to have translational medical facilities?

**Part II**

Now that you've learned about Professor Frazer, it's time to deepen your understanding about his life!

1. **Read** the following article and **Watch** the following video clip to learn more about Professor Frazer:

<https://www.youtube.com/watch?v=laDa2dhj8hg>

To conclude this lesson List 5 things that you LEARNED about Professor Ian Frazer's life and work:

What I LEARNED
1.
2.
3.
4.
5.

**Part III**

1. On Friday, 24<sup>th</sup> March you and your classmates will have the opportunity to ask Professor Ian Frazer about his research and his other work. List 5 questions that you **WANT TO KNOW** related to the work of Professor Frazer and his role as an immunologist.

What I WANT TO KNOW
1.
2.
3.
4.
5.



**Final Activity**

At this point, you have gathered three lists (Refer to the tables titled: “What I Know”, “What I Learned”, “What I Want to Know”). Transfer this information in Appendix 3, p. 15 and come up with one single question in the “What I Want to Know More About” column. If you wish, submit this question as per the instruction on page 1 for your chance to ask your question to Professor Frazer!

DRAFT

## ON THE DAY - Event Run Sheet 24<sup>th</sup> March 2017

If your question for is chosen for the show, you will be asked to ask your question to Professor Ian Frazer in front of a live audience.

### EVENT OUTLINE:

#### I. Opening Remarks (2 minutes)

Moderator opens the conference and thanks all participants. Moderator also gives a general breakdown of the event and reminds students about the basic rules of live Q&A.

#### II. Introduction (10 minutes)

Moderator will provide a brief overview of the event; then they will introduce the guest speaker, Professor Ian Frazer. Professor Frazer will give brief remarks to begin the program.

#### III. Discussion With Peers (40-45 minutes)

Moderator will facilitate the discussion as students are called on to ask their questions (which are pre-approved) to Professor Ian Frazer. Professor Frazer will also have the opportunity to pose questions to the students.

The following are sample questions.

- What were your inspirations in choosing your career path?
- What is the most exciting aspect of your career?

#### IV. Conclusion (3 minutes)

Moderator thanks all students, teachers and guest speaker for participating.

### TIPS FOR STUDNETS SELECTED TO ASK THEIR QUESTIONS DURING THE SHOW:

- When asking Professor Frazer your questions, ***Speak loudly, slowly and clearly*** into the microphone. Express your personality but avoid using slang and be concise whenever possible.
- Please ***say "Thank you" when you conclude your statements*** or questions.
- ***Ask thoughtful questions and respond to all answers with respect.*** Express your opinions in a positive manner. Avoid asking off-topic or inappropriate questions. ***Stick to the subject.***
- Pay close attention to the speakers and the topic at hand. ***Use your facial expressions and nod or smile to express interest,*** attentiveness and participation.
- Have ***paper and pencil/pen available to jot down notes or ideas*** so that you may comment on them when it is your turn.

**THANK YOU FOR YOUR PARTICIPATION!**

**FOLLOW US ON FACEBOOK FOR THE LASTEST UPDATES.**

**Appendix 1**
**Vaccination Timeline**

Use the timeline below to start your research on notable vaccinations that have been developed.

Year	Event
1796	First vaccine for Smallpox
1896	First vaccine for Cholera
1884	Firs vaccine for Rabies
1927	First vaccine for Tetanus
1896	First vaccine for Typhoid Fever
1892	First vaccine for Bubonic Plague
1887	First vaccine for Diphtheria
1927	First vaccine for Tuberculosis
1915	First vaccine for Pertussis (whooping cough)
1935	First vaccine for Yellow Fever
1941	First vaccine for Tick-Borne Encephalitis
1942	First vaccine for Influenza
1955	First vaccine for Polio
1957	First vaccine for Adenovirus-4 and 7
1961	First oral Polio Vaccine
1963	First vaccine for Measles
1967	First vaccine for Mumps
1969	First vaccine for Rubella

<b>1983</b>	First vaccine for Pneumonia
<b>1981</b>	First vaccine for Hepatitis
<b>1985</b>	First vaccine for Haemophilus Influenzae Type B (HiB)
<b>1995</b>	First vaccine for Hepatitis A
<b>1998</b>	First vaccine for Lyme Disease
<b>1998</b>	First vaccine for Rotavirus
<b>2003</b>	First nasal influenza vaccine approved in U.S. (FluMist)
<b>2006</b>	First vaccine for Human Papillomavirus
<b>2015</b>	First vaccine for Malaria
<b>2015</b>	First vaccine for Dengue Fever

## Appendix 2

### **Nobel Prizes won in the field of Immunology**

Below is a list of notable Nobel Prizes awarded to great advancements in the field of immunology.

Source Nobelprize.org [https://www.nobelprize.org/nobel\\_prizes/medicine/immune\\_responses.html](https://www.nobelprize.org/nobel_prizes/medicine/immune_responses.html)

Year	Event
1901	<p><b>Emil von Behring</b></p> <p>Identified factors in blood that neutralize the toxic products from tetanus and diphtheria bacteria, and he showed how these agents could be used to prevent illness and death caused by diphtheria microbes.</p>
1908	<p><b>Ilya Ilyich Mechnikov and Paul Ehrlich</b></p> <p>The immune system works through more than one mechanism: Mechnikov identified phagocyte cells that engulf and devour intruders, Ehrlich's side-chain theory proposed how antibodies released in blood tackle invaders.</p>
1913	<p><b>Charles Richet</b></p> <p>Discovered anaphylaxis, a life-threatening allergic reaction to toxins, which showed how the immune system can damage its host as well as provide protection against disease.</p>
1919	<p><b>Jules Bordet</b></p> <p>Factors in blood serum work with antibodies to destroy bacteria, and Bordet's discovery of these complement proteins allowed the creation of tests that could diagnose many dangerous infectious diseases.</p>
1930	<p><b>Karl Landsteiner's</b></p> <p>Discovery of human blood groups, and his system for typing blood, allowed blood transfusions to be carried out without the risk of adverse reactions.</p>
1960	<p><b>Sir Frank MacFarlane Burnet and Peter Medawar</b></p> <p>The concept of immunological tolerance showed how the body learns to recognize its own cells and tissues, which prevents the immune system from mounting a response against itself.</p>
1972	<p><b>Gerald Edelman and Rodney Porter</b></p> <p>The two scientists independently deciphered the structure of antibodies, which revealed how seemingly identical-looking molecules can target specifically any one of a countless number of invaders for destruction.</p>

<b>1980</b>	<b>Baruj Benacerraf, Jean Dausset and George Snell</b> Breakthroughs from the three researchers helped to build a picture for how a specific set of proteins found on the surface of cells can regulate the immune response.
<b>1984</b>	<b>Nils Jerne, Georges Kohler and César Milstein</b> Jerne's theories provided a clearer image of how the immune system engages antibodies to fight invaders, Köhler and Milstein's techniques for producing specific antibodies on demand helped to create better diagnostic tests and new treatments against diseases.
<b>1987</b>	<b>Susumu Tonegawa</b> By uncovering the genetic mechanism for the construction of antibodies, Tonegawa revealed how the body can generate millions and millions of antibody proteins from a much smaller number of genes.
<b>1996</b>	<b>Peter Doherty and Rolf Zinkernagel's</b> Discovery of how the immune system recognizes virus-infected cells uncovered the general mechanisms used by the cellular component of the immune system to distinguish foreign agents from its own cells and tissues.

DRAFT

**Appendix 3**

**Professor Ian Frazer: Immunologist**

Summarise the tables you completed on Pages 2 and 8.

<b>What I know about immunology</b>	<b>What I learned about Professor Ian Frazer and immunology</b>	<b>What I want to know more about Professor Ian Frazer and immunology</b>

DRAFT