

# The Vaccine Makers Project

## Teacher's Introduction

**UNIT 1: The Human Immune System**

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## **INTRODUCTION**

The Vaccine Maker's Project is a Medical History Pictures initiative with the sponsoring partnership of the Vaccine Education Center at The Children's Hospital of Philadelphia. The goal of the project is to provide accurate, up-to-date science-based information and educational tools about the immune system and vaccines.

These lesson plans provide resources and tools for educators to present students with engaging material for learning about vaccines and the immune system.

Each lesson plan includes alignment to Next Generation Science Standards and Common Core State Standards. Each lesson follows the 5Es pedagogic model, and also includes a glossary, lesson objectives and key questions.

## UNIT DESCRIPTION

**Overview:** This unit is comprised of three lessons and an optional activity. The lessons cover the organs and tissues of the human immune system, and the innate and adaptive immune systems. The activity and animations from *The Vaccine Makers Project* support the key concepts.

**Why Study This Unit:** The immune system is an organized group of related organs and tissues. By learning about the immune system, students are better informed to make healthy decisions related to the foods they eat, the activities they choose and the medical care they pursue.

**Learning Objectives:** Students determine the identity, location, and function of the main organs and tissues of the immune system in the human body. Students explore key features of the adaptive and innate immune systems and determine differences between the two.

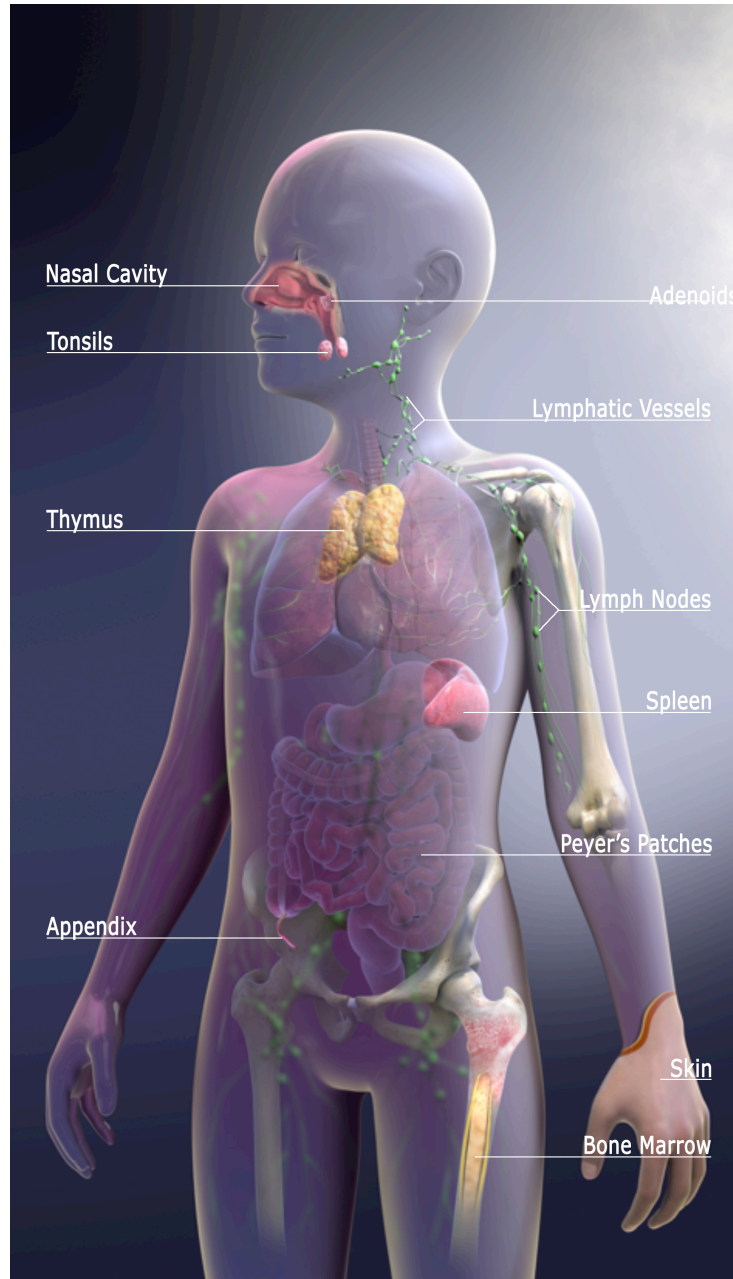
**Success Criteria:** Students identify and locate organs and tissues of the immune system and describe the functions of the main components of the system. Students analyze and compare components of the adaptive and innate immune systems.

## CONTENT OUTLINE

### Lesson 1 – Organs and Tissues of the Immune System

**Description:** Students explore resources related to organs and tissues of the immune system, including associated glossary terms. They create a T-chart of locations and functions of organs and tissues of the immune system and label a diagram of the human body.

**Model of the immune system in this lesson:**



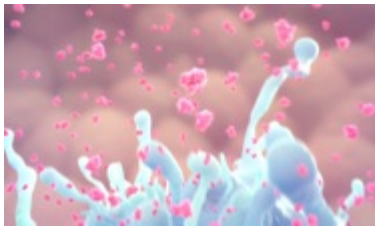
## Lesson 2 – The Innate Immune System

**Description:** Students focus on the main cells and tissues involved in the innate immune system. Students distinguish the innate immune system from the adaptive immune system. Students conduct hands-on activities to learn the structure and function of major components of the innate immune system including chemical mediators, neutrophils, macrophages, and natural killer cells.

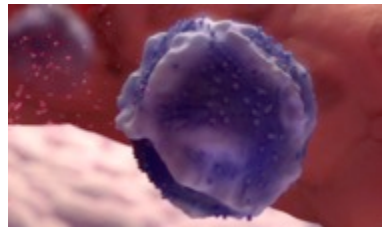
Activity 1. Students play a castle and moat game to model the skin and mucous membranes as the first line of defense against infection. Students describe the protective role of the skin and mucous membranes. Students analyze quantitative laboratory data and apply simple statistics to that data.

Activity 2. Students learn vocabulary associated with the innate immune system as well as how those components interact. Students answer summary questions and create a poster showing a concept map of interactions among components of the innate immune system.

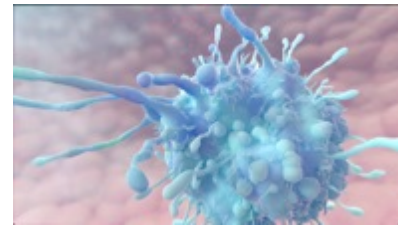
### Innate immune system concepts in this lesson:



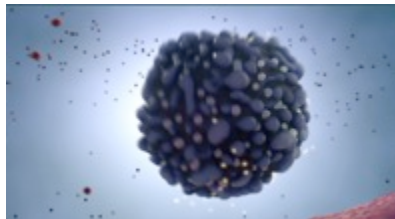
Cytokines



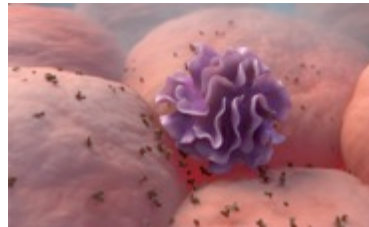
Neutrophil



Macrophage



Natural Killer Cell

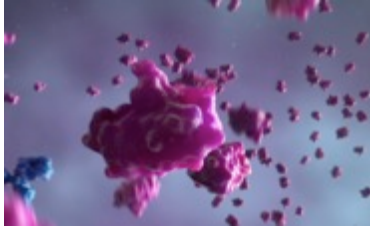


Dendritic Cells

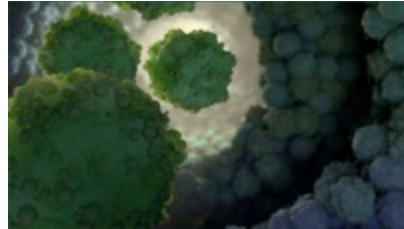
### Lesson 3 – The Adaptive Immune System

**Description:** Students focus on structure and function of the adaptive immune system including antigens, B cells, T cells, antibodies, dendritic cells, and how these relate to the innate immune system using animations from *The Vaccine Makers Project* to support their exploration. Students create a concept map of the adaptive immune system incorporating organs and tissues of both the innate and adaptive immune systems.

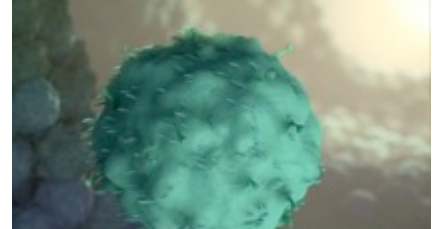
**Adaptive immune system concepts in this lesson:**



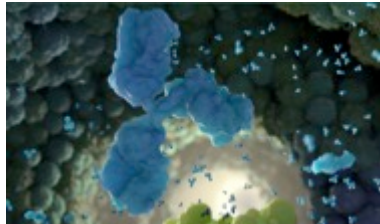
Antigens



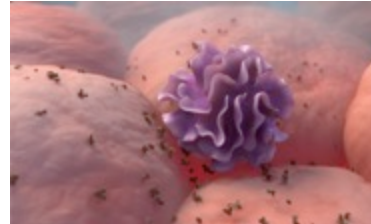
B Cells



T Cells



Antibodies



Dendritic Cells