

# Immunology ‘Snot’

## Introduction

This activity has been created to introduce students to immunology in direct relation to snot and the ways in which it is formed, what diseases can cause it, how to get rid of it and what it is made of. It is an interactive type of learning which promotes learning through laboratory experiments to obtain knowledge. By using diagrams, personal/educational questionnaires and entertaining videos, the students will understand all aspects of snot.

## Curriculum Outcomes: Victorian Curriculum F-10

Level 9

### Science Understanding: Biological sciences

- The theory of evolution by natural selection explains the diversity of living thing and is supported by a range of scientific evidence (VCSSU120)

### Science Inquiry Skills:

- Questioning: Formulate questions or hypotheses that can be investigated scientifically, including identification of independent, dependent and controlled variables (VCSIS134)

## Duration of Activity

This activity takes roughly 2 hours to complete.

## Target Audience

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This activity is suitable for students in years 9.

## Teaching and Concept Learning Activities

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In completing this activity, students explore and apply a range of concepts, processes and terms of Immunology “Snot”. Some of these terms, processes and concepts are described, defined and explained below. Within the worksheet, there are three main areas addressed under the following activity titles: get to know about the common cold and snot, how easily can infect spread and let’s become scientists.

There are 3 activities produced as laboratory interactive learning under let’s become scientists:

Activity 1: Making Snot

Activity 2: How Fast Does Snot Run?

Activity 3: Which Snot Works Best?

## Further Discussion Points and Terminology

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How a common cold infection occurs? A common cold is usually airborne or spread via contact. It is most commonly deposited into the nasal passages via airborne contaminants. Small doses of the infection are sufficient to create the illness (1-30 particles).

What are some cold symptoms? Congestion, runny nose, sneezing, loss of smell, redness, post-nasal drip, chills, fatigue, fever, malaise, body ache, watery eyes, itchiness, redness, congestion, sinus pressure, chest pressure, headache, swollen lymph nodes, throat irritation.

Immune Response: releases white blood cells and other chemicals to fight virus and bacteria.

Virus: an infective agent that typically consists of a nucleic acid molecule in a protein coat, is too small to be seen by light microscopy, and is able to multiply only within the living cells of a host.

Rhinovirus: any of a group of picornaviruses including those which cause some forms of the common cold.

Infection: the process of infecting or the state of being infected.

Mucus: a slimy substance, typically not miscible with water, secreted by the mucous membranes and glands of animals for lubrication, protection, etc.

## Background Information

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What are some cold symptoms?

Congestion, runny nose, sneezing, loss of smell, redness, post-nasal drip, chills, fatigue, fever, malaise, body ache, watery eyes, itchiness, redness, congestion, sinus pressure, chest pressure, headache, swollen lymph nodes, throat irritation.

Why Do We Make Snot?

Have you had a cold? What is it like to have a runny nose? How is it possible for a person to produce so much “snot”? Let’s turn to science to find out!



When we catch a cold, we have actually caught the cold virus. It is tiny at only 30 nm big, or 30/millionths of a millimetre! This is a picture of a rhinovirus, this is the virus that usually causes the common cold.

Snot is used to assess the well-being and health of an individual. The respiratory tract produces more than a litre of mucus (snot) per day. The body is constantly getting rid of the mucus which contains the unnecessary composite of the body. Often when bodily functions are working well, snot is swallowed from the nose down the throat. When a virus has entered the body, snot is often more dense and coloured

## Key Concept – Laboratory Activities

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In these activities, students will be doing experiments to understand the basis of how infection spreads and features of snot, such as: texture, viscosity and effectiveness.

## Equipment and Materials

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### How easily can this infection spread?

- Pre-prepared test tubes, half filled with distilled water, one for each student
- One pre-prepared test tube half filled with 0.1M NaOH
- Phenolphthalein solution (indicator)
- Pipettes

### Let's Become Scientists

#### Task A: Making Snot:

- 50 ml boiling water
- 1 teaspoon gelatine
- 1 teaspoon (5 ml) glucose syrup

- 10 ml measuring cylinder
- 2 x 100ml beakers
- 250 ml beaker
- Food colouring (optional)
- Small plastic measuring jug for measuring hot water
- Newspaper
- Stopwatch
- Rulers
- Pipette
- Protractor

### Task C: Which snot works the best?

- 3 transparency sheets
- Particles: flour, glitter, confetti, pompoms (0.5cm diameter pieces)
- Wide sticky tape or small plastic bag
- Different snot mixtures
- Spatula
- Stapler
- Paint brush
- scissors

## Methods

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### How easily can this infection spread?

1. Students will model the transmission of a disease by sharing some of their test tubes contents, or bodily fluids, with other students.
2. Each student is to take a pre-prepared test tube and one pipette, with one student unknowingly having the 0.1M NaOH test tube.
3. Students are to walk around the room with their test tubes. When you say ‘Stop!’ each participant is to use their pipette to trade one drop of fluid with the person nearest them. Repeat until three trades have occurred.

4. Now test for the infection! Put one drop of phenolphthalein in each test tube. If the fluid turns pink, the person is infected.

### **Let's Be Scientists!**

#### Task A:

1. Add boiling water and gelatine to 250ml beaker and stir until dissolved.
2. Add glucose syrup and stir until mixed.
3. Let the mixture thicken for 15 minutes.
4. Add one drop of food colouring to make your snot look more realistic.

#### Task B:

1. Dilute the snot mixture in Task A, create two different consistencies of snot.
2. Calculate the dilution factor of each solution
3. Clean the white tile with paper towel and place newspaper on the bench, underneath the tile.
4. Tilt the tile on an angle of 40° (use a protractor to measure the angle).
5. Place 1 drop of three different snot consistencies at the top of a white tile, equal distances apart.
6. Measure the distance travelled down the tile over a specific amount of time.
7. Time or measure your snot running down the nasal passage (white tile).
8. Repeat the experiment.

#### Task C:

1. Drop 3 ml of one snot consistency on to the transparency sheet.
2. Use a paintbrush to paint the snot on to the transparency, keeping 3cm clear of the edges.
3. Repeat with the other snot consistency and the other transparency.
4. Keep one transparency free of snot.
5. Roll each transparency, lengthways, to 6cm in diameter and staple to hold in place. This simulates the nasal passage.
6. Cover one end of each rolled sheet with wide sticky

## Hazards

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Corrosive and harmful chemicals are in use as well as sharp tools. **Risk management**

- Students must be educated about laboratory safety before the activity
- Gloves must be worn during the activity
- Hands need to be washed after the activity.
- Food and drink is not allowed during activity
- Do not touch eyes, mouth or swallow substances.

## References

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- De Toledo-Piza, AR, Mendonca, RZ, De Oliveira, MI, Figueiredo, CA & Negri, G 2018, 'Polyunsaturated Fatty Acids from Phyllocaulis Boraceienses Mucus Block the Replication of Influenza Virus', Archives of Microbiology, vol. 200, no. 6, pp. 961 –970, retrieved 15 Aug 2018, Applied Science & Technology Source, EBCSOhost.
- Everyday Health, 'What is Mucus', Everyday Guides, <<http://www.everydayhealth.com/mucus/guide/>>
- Live Science n.d., Where Does All My Snot Come From?, Live Science - Health, retrieved 25 Aug 2018, <<https://www.livescience.com/54745-why-do-i-have-so-much-snot.html>>
- Mayo Clinic n.d., 'Common Cold', Diseases & Conditions, retrieved 1 Aug 2018, <<https://www.mayoclinic.org/diseases-conditions/common-cold/symptoms-causes/syc-20351605>>
- Oxford Dictionary n.d., 'Virus', Oxford Dictionary, retrieved 1 Aug 2018, <<https://en.oxforddictionaries.com/definition/virus>>
- Oxford Dictionary n.d., 'Virus', Oxford Dictionary, retrieved 1 Aug 2018, <<https://en.oxforddictionaries.com/definition/rhinovirus>>
- Oxford Dictionary n.d., 'Virus', Oxford Dictionary, retrieved 1 Aug 2018, <<https://en.oxforddictionaries.com/definition/infection>>

- Oxford Dictionary n.d., ‘Virus’, Oxford Dictionary, retrieved 1 Aug 2018, <<https://en.oxforddictionaries.com/definition/mucus>>
- Kristiansen, N 2012, ‘Where does all snot come from’, Science Nordic, <<http://sciencenordic.com/where-does-all-snot-come>>
- Rogers, D. F. (2007). Physiology of airway mucus secretion and pathophysiology of hypersecretion. *Respiratory care*, 52(9), 1134-1149
- Thornton, D.J., Rousseau, K. and McGuckin, M.A. (2008). Structure and Function of the Polymeric Mucins in Airways Mucus. *Annual Review of Physiology*.
- Understanding Colds n.d., ‘Common Cold’, Understanding Colds, retrieved 1 Aug 2018, <<https://www.commoncold.org/understand.htm>>

## Acknowledgements

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