

Immunology ‘Snot’

Objectives

Questions with answers in this document will help teacher in providing a guideline for students to have correct solutions for the problems in all the activities of the topic. To ensure that students achieve higher levels of teaching standard.

Activity 1 – Get to Know about Cold and ‘Snot’

Expected answers for Task A

Question 1. What do you feel like when you have a cold?

A cold has various different symptoms and areas that it affects, some including:

Muscle pain, fatigue, chills, cough, dry throat, watery eyes, congestion, runny nose, sneezing

Expect 3-4 symptoms from each student.

Question 2. Where do you think this “snot” comes from? How do you make it? Why is there so much more of it when you have a cold?

The body intakes unwanted elements and snot transports them out. The respiratory system produces the snot largely in the air ways which is a garbage removal for these unwanted elements.

The body intakes

Question 3. Snot helps protect the lungs by capturing dirt and dust as you inhale. Where does it all go?

The body will reabsorb most of the mucus itself. Dirt, dust, and debris are passed out of your system. Bacteria are killed by stomach acids.

Question 4. Look at the picture of respiratory system to see how your nose and mouth connect. Concentrate on breathing in and then swallowing. Can you feel how your nose and mouth are connected?

Students personal experience. Mark according to whether the question was addressed appropriately

Question 5. How do you get this cold virus?

A cold virus can be air borne and caught through someone coughing, sneezing or even being close to you. There are many ways for a cold virus being spread including being in contact with an object which is contaminated, or air borne spread measures listed above.

Expected answers for Task B

1. How much of snot (approximately) in percentage is made up of water? 95 %
2. 80% of humans air filtration occurs in the nose. Therefore, the snot is the first line of defense in the body.
3. Why is a steady stream of mucus needed in the body?

To remove pathogens such as bacteria and virus by breaking them down and removing them before they enter the body.

4. We produce more mucus when were sick to flush pathogens out. Immune cells are send to fight with the pathogens.

ACTIVITY 2 – How easily can this infection spread?

Expected answers for Result

Question. How many people were infected?

Results will differ

Expected answers for Discussion

Question 1. Did the results support your hypothesis?

The students should start with restating their hypothesis and a short description of whether the hypothesis was supported.

Question 2. Suggest one way you could have reduced the spread of disease.

The spread of disease could have been reduced by reducing the amount of people fluids were shared with.

ACTIVITY 3 – “Snot”

Expected answers for ‘snot’ introduction

Question. Is thick or thin snot better? Explain why.

Thicker snot means the body is trying to fight a virus, infection or bacteria. Green thick mucus is a sign the body is at work. Thin clear snot is a sign of a healthy system.

Expected answers for Task B Methods

1. Procedure to dilute the snot: using the original snot mixture, create two different consistencies of snot. Outline how you will do this.

Hint: Start with 10 ml of snot mixture and add a specific amount of water to dilute the snot.

One could be mixed in fast with all products placed in at once while the other can be stirred slowly and the mixture could be placed in portions.

2. Calculate the dilution factor of each solution. Dilution Factor = $\frac{\text{Final volume}}{\text{Initial volume}}$

Calculations will vary. Mark accordingly.

Examples:

$$30 \text{ mL}/50 \text{ mL} = 0.6$$

$$40 \text{ mL}/50 \text{ mL} = 0.8$$

Expected answers for Task B Results

Question 1. How are you going to carry out a controlled experiment?

Draw your experiment.

Drawings will vary. Should demonstrate some form of neutral snot with medium speed mixing running down a white tile.

Question 2. Draw a table to present your results.

Results will vary however all three trials should be listed with numerical measurements and units in the form of a table.

Question 3. List the order of viscosity, from least viscous to most viscous.

Results will vary. Mark accordingly.

Expected answers for Task B Discussion

Question 1. Were you surprised by the results? Explain why or why not.

Results will vary. Mark accordingly. Ensure the student has addressed whether the results were predictable and explained in moderate detail.

Question 2. Why did you repeat the experiment?

Experiments are repeated to ensure as much error is minimized to provide the best/most accurate results. Scientists want to ensure the results are error free so results can be generalized to the public.

Question 3. Account for any differences between your results.

Students should list at least two differences with the different consistencies of snot.

Expected answers for Task C Results

Question 1. What were your results? Draw a table of your results.

Question 2. What other ways could you present your results?

*Students should list two or more of the following.
Bar chart, scatter plot, line graph, histogram.*

Expected answers for Task C Discussion

Question 1. Explain why one transparency is free of snot.

Control measure. Used to compare with samples.

Question 2. Suggest why it is important to complete the experiment in the same way for each sheet.

Repeating experiments in the same conditions is important as it reduces random variables which allows the experiment to be generalised.

Question 3. Was your hypothesis supported or rejected?

Students state whether their hypothesis was supported or rejected.

Question 4. What do your results suggest regarding the ability of mucus to trap different sized particles?

Students should compare and contrast the three different types of mucus having regard to the number of trapped particles.

Question 5. Which type of mucus is more effective to trap particles?

Thicker snot traps the particles more easily and therefore it is more effective. Thinner snot flows more easily.

Question 6. What is the function of snot in your nose? Does it matter if it is runny snot or not? Explain why.

The function of snot is to remove all unwanted particles of bacteria, infection etc. The particles are prevented from entering further in body and affecting the system. All types of snot remove the unwanted particles, however thicker snot is more effective in comparison to thin snot.

Expected answers for Extended Questions

1) Compare and contrast mucus/snot and phlegm.

Mucus	Phlegm
<i>Normal body function used to clear airways and ensure all areas are moist and work properly. Made by cells of the nose and sinuses properly.</i>	<i>Form of mucus that is produced by the low airways in response to inflammation.</i>

2) What causes boogers?

Snot is also made of tiny particles that are in the air we breathe like germs, dust and pollen along with water. When air debris gets trapped in nose hairs, it mixes with snot/mucus and from there, can become a booger.

3) Explain why snot can be different colors.

While a persistent yellow or green color is often a sign of infection, color does not always indicate a health problem. Mucus color may change according to the dust or pollens in the environment. Mucus could be yellowish in spring due to pollen drop or brown/black in polluted areas.

- 4) List the other physical and chemical barriers in the human body and how they respond to invading pathogens. *Hint: write at least 4.*

Skin - barrier between invaders (pathogens) and your body. Skin forms a waterproof mechanical barrier. Microorganisms that live all over your skin can't get through your skin unless it's broken.

Tears/saliva - contain an enzyme that breaks down the cell wall of many bacteria.

Stomach acid - stomach acid kills bacteria and parasites that have been swallowed.

Urine - urine flow flushes out pathogens from the bladder area.

- 5) How do viruses replicate?

The virus attaches itself to a host cell and injects its genetic material into it. During uncoating, replication, and assembly, the viral DNA or RNA incorporates itself into the host cell's genetic material and induces it to replicate the viral genome.

6) Why does your doctor not give you antibiotics for a viral infection?

Antibiotics are useless against viral infections. This is because viruses are so simple that they use their host cells to perform their activities for them. So antiviral drugs work differently to antibiotics, by interfering with the viral enzymes instead.

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