

Lesson 8: Exploring the 3Rs and Reciprocity in Animal Research

The **principles of the 3Rs** (Replacement, Reduction and Refinement) were developed over 60 years ago providing a framework for performing more humane animal research. Since then they have been embedded in national and international legislation and regulations on the use of animals in scientific procedures. At Humanimal Trust we believe there should be a 4th R added - Reciprocity.



Learning Objectives

Students will learn:

- The 3R Principles and how they have affected humane research
- To teach students about the 4th R, that Humanimal Trust think should be included, and why we should encourage medics to incorporate Reciprocity



Learning Outcomes

By the end of the lesson, students will be able to:

- Explain what the 3Rs are and their function
- Identify why Humanimal Trust wish to add a 4th R
- Know that the 4th R is reciprocity.



Resources Required

Resource 1:

Powerpoint

Resource 2:

Teacher's notes

Resource 3:



Key Words

3Rs, 4R, replace, reduce, refine, reciprocity, one medicine, collaboration, interdependency, empathy

NC Links

Aims and objectives of Science: understand how society makes decisions about scientific issues and how the sciences contribute to the success of the economy and society

Working scientifically - informing students of the role of science in understanding the causes of and solutions to some of the challenges facing society.

Development of scientific thinking: appreciating the power and limitations of science and considering ethical issues which may arise.

Subject content, 8:2 use knowledge and understanding to pose scientific questions, define scientific problems, present scientific arguments and scientific ideas

evaluate the role of the scientific community in validating new knowledge and ensuring integrity

Develop scientific language to articulate scientific concepts clearly and precisely.

Activity	Description	Timing
Introduction	Introduce the concept of 3Rs, ask the students to work in pairs to decide what the 3Rs may be. Give them 3 minutes per word to create a definition of the 3 Rs	10 min
Do the Maths	Slides 7 - Do the maths. Work out how many animals were used in experiments in 2021? Answers on Teacher's notes sheet	15 min
What is the 4th R?	<p>Ask students if they know what Reciprocity means: The definition is: "Reciprocity is the exchange of something between people or groups of people when each person or group gives or allows something to the other."</p> <p>Slide 13 - Complete the Reciprocity worksheet, either individually (worksheet in resources) or as a class - answer the who, why, where, what, how and when?</p>	20 min
Persuasive speech activity	Write a persuasive speech to give at a conference of vets, doctors and researchers as to why they should include the 4th R, in their work	30 min

Key questions:

Why is it ethically important to care about humane research?

What do Humanimal Trust want to see in regards to animal testing?

Plenary/ Assessment of Learning



Assessing Progress

Spend five minutes with a partner (or 3s depending on group size) on the benefits of reciprocity. What are the benefits of reciprocity?

Fewer animals used in research for specific conditions, use life cases studies which give the benefit of long term data.

Save money on research.

Speed of research reaching the people and animals that need it.

Can the students explain the 4th R and why it is important?

Extension activities



Find one area of life that animals are the same as humans, in their feelings, behaviour or intelligence. It can be of any species.

Create the outline of a poster showing the benefits of One Medicine. It could be placed in, for example, your student café or used as a focus for a discussion with your peers.

Ask the students to create a dictionary type definition of the 4 Rs.



Teacher's Notes/Observations

Teacher's Notes

Additional Information:

Spend two minutes on each word within the 3Rs, write a definition of what each means. (Visit website <https://nc3rs.org.uk/3rs-public>)

Article and useful diagrams on 3Rs <https://kids.frontiersin.org/articles/10.3389/frym.2018.00044#fig1>

Slide 5: In 2020, A new research centre that aims to revolutionise medical research and drug development using micro-engineered Organs-on-Chips has opened at Queen Mary University of London.

Further details can be found here: [Organ on chip technology](#).

Organ on a chip studies: Organs-on-Chips contain tiny hollow channels lined by living human cells that recreate the microenvironment experienced by cells within the human body. As miniaturised living systems with human cells, Organs-on-Chips can predict human response with greater precision and detail than today's cell culture or animal-based testing, and can be used in a laboratory to test drugs and understand how the body works.

Slide 12: Students to write a persuasive speech to give at a conference of doctors, vets and researchers as to why they should add the 4th R, reciprocity, into their working day

Slide 7: Do the maths!

How many animals were used for research in 2020? 6% is 183,600, so the previous year they used 2,876,394.

Can you work out, how many mice, fish, rats and birds were used in 2021 in animal experiments? 2,937,600

Can you work out how many cats, dogs and primates were used in 2021 in animal experiments? 3,060

Slide 11: After point three, give the students five minutes to work out what the 4th R may be. Ask students to write the words on the whiteboard.

Ask students if they know what Reciprocity means, and ask them for ideas: The definition is: "Reciprocity is the exchange of something between people or groups of people when each person or group gives or allows something to the other."

How do you think that applies to Humanimal Trust? Give students time to assess and come up with an answer.

Slide 12: We are talking about collaboration – the passing of information both ways from human and animal medicine with researchers and other professionals for the benefit of everyone. It will save time, save lives and save money

Interdependency – between human animals, other animals and the environment

Empathy – animals that are used in laboratories do not have normal lives, they are kept in unnatural environments, often without company, shortened lives and given illnesses that they would not have naturally. It would be much better to study these naturally occurring illnesses and have a long study without animal suffering. This is not acceptable in this day and age, when we have many alternatives.

Give the example of in vitro and organ on a chip, see notes.

In vitro - In vitro in glass or in the glass. It is testing that occurs in a laboratory and usually involves studying microorganisms or human or animal cells in a culture. They have been used to gain insight into the risk of adverse effects of compounds, without the complications of other factors affecting the results.