

# LESSON 3:

## History of Animals Research

### INTRODUCTION

Students are introduced to a brief history of animal research through a timeline mapping activity. Students are asked to order the events in the timeline and highlight the occurrence of significant events. A discussion about significant events and trends helps students understand the impacts of history on today's regulations, governing bodies, and uses of animals in research. An extension to this lesson explores the meaning of the phrase *Not Tested on Animals*.

### KEY CONCEPTS

- There are regulations and guidelines governing use of animals in research. Various government and organizational bodies oversee the adherence to these standards.
- The prevalent use of animals in research developed in response to human diseases, endangerment of human health, and unethical human research.
- Regulations and policies evolve for several reasons:
  - a) Scientific advancements allow for alternatives to animals.
  - b) There is a greater scientific understanding of proper and **humane treatment**, anesthesia, and **euthanasia** of animals.
  - c) The climate in the research community shifts.
  - d) Public voice and action calls for change.
- There is a delicate balance between the need for new discoveries, the need to uphold current regulations, and the need to hold people and organizations accountable when in violation of the regulations.

### LEARNING OBJECTIVES

#### *Students will know:*

- There are regulations and regulatory bodies overseeing animal research.
- Regulations overseeing research on animals and humans evolve as knowledge and understanding grows.

#### *Students will be able to:*

- Identify some significant moments in the history of animal research and human research.
- Examine the role of people in the evolution of regulations and guidelines surrounding animal research.

### CLASS TIME

Two class periods of 50 minutes each.

## MATERIALS

| Materials   | Quantity            |
|---|---------------------|
| Chalk Talk Posters from <i>Lesson One</i>                           | 6                   |
| Marking pens (all the same color)                                   | As needed           |
| Student Handout 3.1— <i>Historical Events in Animal Research</i>    | 1 per student       |
| Teacher Answer Key 3.1— <i>Historical Events in Animal Research</i> | 1                   |
| Teacher Resource 3.2— <i>Timeline Event Cards</i>                   | 1 full set of cards |

## FRAMING THE LESSON

During *Lessons One* and *Two*, students began examining the various questions that scientists ask to determine whether animal subjects are necessary for research, including: for what purpose, which animal, how many, the 3 Rs, etc. In *Lesson Three*, students will examine how the use of animals became prevalent in human history.

Inform students that they are about to learn about many significant events in the history of animal research; some are steps ahead, and some are backward steps. Some of the events will describe atrocious breaches of rights and abuses of dignity for both humans and animals. What is important is not to vilify groups of people or stereotype research, but rather to understand that sometimes it takes horrific lessons for people to move toward positive action. It is critical to understand history so that we will not repeat the mistakes of the past. It is also critical to understand the history of positive change so that we can create preventative measures and action steps that lead to further positive change.

A vast majority of scientists agree that animals should not suffer as a result of research and that animal lives should not be wasted unnecessarily. A vast majority of the general public supports ethical conduct of animal research for medical and biomedical purposes. Unfortunately, the few extreme scientists who have mistreated animals and conducted unethical research and the few extreme animal rights activists who have destroyed property and threatened human lives have made the most memorable marks in animal research history. Again, it is important to examine the timeline with a critical eye so as not to generalize **all** scientists or **all animal welfare** or **animal rights activists**.

The history of animal research timeline is divided into three time periods:

- **Time Period I** details details events occurring from the third century B.C.E. (Before the Common Era) through the 1930s. .
- **Time Period II** details events occurring between the late 1930s and mid 1970s.
- **Time Period III** details events occurring between the late 1970s and into the future.

## TEACHER PREPARATION

- Make copies of Student Handouts.
- Make a set of Timeline Event Cards. Using Teacher Resource 3.2—*Timeline Event Cards*, copy the pages single-sided and then cut them to create separate cards.

## PROCEDURE

### WARM-UP

1. As students enter the room, have them add to the Chalk Talk posters that were posted around the room during *Lesson One*. Provide a different colored marker than you did during *Lesson One* (but be sure you have the same color available for all students) to help distinguish the evolution of thought from day to day.

### ACTIVITY ONE: HISTORY OF RESEARCH TIMELINE

2. Tell students that they will be learning about significant moments in history that shaped human research and animal research.
3. Define the term “vivisection.” Explain that the term will be used on the timeline cards and is often used in animal advocacy language. **Vivisection**—from Latin *vivus* (“alive”) and *sectio* (“cutting”)—is defined as surgery conducted for experimental purposes on a living organism to view living internal structure. The term is sometimes more broadly defined as **any** experimentation on live animals. The term is often used by organizations opposed to animal experimentation, but is no longer used by practicing scientists.
4. Explain to students that they will work together as a class to complete a timeline that covers the third century B.C.E. to the present. Because the time span is so great, the class will work together on one **portion** of the timeline (either **Time Period I**, **Time Period II**, or **Time Period III**) before moving on to the next portion of the timeline. Point out to students that the time periods are not divided equally and that **Time Period I** covers most of the actual time that has passed. Provide an overview of the three time periods:

- **Time Period I (the third century B.C.E. through the 1930s):**

In the early years, few (if any) known rules or regulations protected animals or humans used in research. In fact, the philosophy of this time held that animals were not even capable of feeling pain. Although this view was later disputed, many of the very early scientific advancements used animals (or humans) in ways that would be considered abusive today. Toward the end of this time period, great strides were made in the treatment or control of malaria, diphtheria, diabetes, and other diseases.

- **Time Period II (late 1930s to mid 1970s):**

Nazi atrocities in WWII led to requirements for animal testing. Biomedical research as a field became recognized, supported and funded, creating a demand for research animals. Using what they knew from the past, many scientists used dogs in their research. This demand led to a number of abuses in the acquisition, housing, and transporting of animals, especially dogs. Public outcry resulted in new laws and regulations. It also resulted in use of a new model—mice—which would eventually replace dogs and cats in most research. During this time, a Thalidomide disaster was averted in the U.S., and new treatments or vaccines for polio, leukemia, and smallpox greatly reduced the effects of those diseases.

- **Time Period III (late 1970s and into the future):**

Animal activism became increasingly organized and violent. At the beginning of this time period, the activist focus was on the use of animals for cosmetics testing. Later, much of the protest centered on the use of non-human primates in research, though there were other targets. Regulations for research institutions using animals continued to be strengthened. There was push from both outside and inside the research community to use “lower” animals like zebrafish as research models, and to find alternative testing methods. During this time, contributions to health included advancements in *in vitro* fertilization, treatment for HIV/AIDS and more.

5. Tell students that each card details an event from history. Students first need to decide in which category the event best fits. Go over the categories with students and check for understanding. The categories are:

- **Views of Animals:** Philosophical views on the nature and value of animals (the “moral status” of animals), and humankind’s relationship with animals.

- **Contributions to Health:** Benefits of scientific research that advance health and wellbeing for humans and animals.

- **Mistreatment:** Actions that would be considered abusive to humans or animals.

- **Laws and Regulations:** Rules declared by a regulating body that guide or specify practices.

- **Protest:** Actions by groups of people that object to a certain practice.

6. Choose a card from the timeline to read to the class, and decide as a group which category the card best fits. Some cards may fit best in **more than one** category.
7. Explain to students that they will have to use their best judgment to decide in which category a card best fits. For example, early views about animals may seem outdated or abusive to us today. Point out that views on important issues change over time and not every historical event will fit neatly into a category.
8. Begin with **Time Period I**. Hand out one card from **Time Period I** to each student (The *Timeline Event Cards* are found in Teacher Resource 3.2). For small classes, you may hand out more than one card to each student, as long as the cards given to a student are next to each other chronologically. For large classes, you may have students pair up and share one card. There are sixteen event cards for each of the three time periods.
9. Ask students to circle the category on their card(s) into which the event best fits.
10. Tell students that they will be asked to share with the class the event on their card(s). Students should give a brief narrative about the event in their own words, rather than read the card itself. Provide a few minutes for students to review their cards. Students may turn to a neighbor to check for understanding and to practice explaining the events on their cards to each other.
11. Next, ask the students to work together to form a living timeline. Designate one end of the classroom to represent the earliest date in **Time Period I** and the other end to represent the latest date in **Time Period I**. Challenge students to work together—checking the dates on each other’s cards—to line up chronologically.
12. Review the events in the living timeline, moving from the earliest event to the latest event. Each student should share the story of the event featured on their card(s).
13. Lead a class discussion about the events featured in the timeline. Options may include:
  - Discuss the timeline by focusing on each of the five categories (**Views of Animals, Contributions to Health, Mistreatment, Laws and Regulations, and Protest**). Which events fell into each of the categories? Discuss any trends that the students notice within and among the categories.
  - Highlight the cards with an asterisk (\*). These are key events in the time period.

- Discuss any trends in thoughts or practices over time. How are events interrelated? Do some past events impact future events? Is “cause and effect” in play?

14. Instruct students to leave their cards in chronological order and post them where the entire class can access them (i.e., taped to a wall or placed on a long counter). Students may then sit down.
15. Pass out Student Handout 3.1—*Historical Events in Animal Research*. Encourage students to re-read the event cards as needed and work cooperatively to complete the questions related to **Time Period I**.
16. Follow Steps #5-15 for **Time Period II** and **Time Period III**.

## ACTIVITY TWO: THE EVOLUTION OF HUMAN AND ANIMAL RESEARCH

17. **Addressing stereotypes:** There are stereotypes about research scientists, and there are stereotypes about people concerned with animals’ welfare or rights. These stereotypes are based on the actions of a few very visible members of each group. Discuss this concept with students by asking the following questions: Is this similar to stereotypes about teenagers? What does it feel like to have these stereotypes placed on you? How does this understanding inform our views of stereotypes about people for and against animal research?
18. **Trends:** Talk about the **trends** students saw over time related to each of the five categories.
  - **Views of Animals:** Our philosophical views of animals have changed markedly over time. It is difficult to understand early notions that animals could not feel pain. The role of some animals, especially cats and dogs, has changed from workers to members of the family. Point out that in **Time Period I**, both humans and animals were used in research. **Time Period II** brought a push to test on animals before humans. Dogs were often research subjects, though they began to be replaced in many cases with mice and rats. In **Time Period III**, mice account for almost 90% of research animals, and scientists are actively exploring the use of “lower” animals such as zebrafish.
  - **Contributions to Health:** During all three time periods, scientists have pushed to understand physiology, cure diseases, and lessen human suffering.
  - **Mistreatment:** Some advancements to health came at the expense of both humans and animals through actions that would not be considered ethical or

humane by today's standards. Thanks to enforcement of laws and regulations, the care of research animals continues to improve.

- **Laws and Regulations:** *Time Period I* had few laws and regulations. Many new forms of regulations were introduced during *Time Period II*, and these same regulations continue to be both strengthened and challenged during *Time Period III*.
- **Protest:** Protesters have been active in all three time periods. The nature of the protests has become increasingly violent in *Time Period III*.

## CLOSURE

19. Tell students that this timeline exercise has been a skewed presentation; not all discoveries, not all groups, not all advancements in animal welfare, and not all examples of unethical behavior are included in the timeline. At the same time, the proportions of unethical and ethical research have shifted over time, especially with the onset of laws and regulations.
20. Share with students that there is constant need to balance the potential benefits and harms to both humans and animals. This tension requires constant case-by-case analysis as well as examination of overall policies.
21. Methods of educating the public about these issues include the news media, reports from organizations, schools, and propaganda. Ask students to briefly share with the class examples of public education about animal research that they may have seen and how they were influenced by these examples.
22. Tell students that these are real-world, complex, and engaging ethical questions. The information we receive is sometimes very biased toward one end of the spectrum or the other. By learning how to **recognize** the issues, **listen critically** to different viewpoints, and make a **reasoned judgment** about a course of action, students gain experience in critical thinking and grow in their understanding and respect for other points of view. Animal research is a heated ethical topic in science; an understanding of bioethics and decision-making will help students make well-reasoned and informed choices.

## HOMEWORK

- Have students read the “Regulation of Animal Research” section (pages 29-36) of the book *Science, Medicine, and Animals*. The book and an accompanying teacher's guide can be downloaded for free as a PDF.

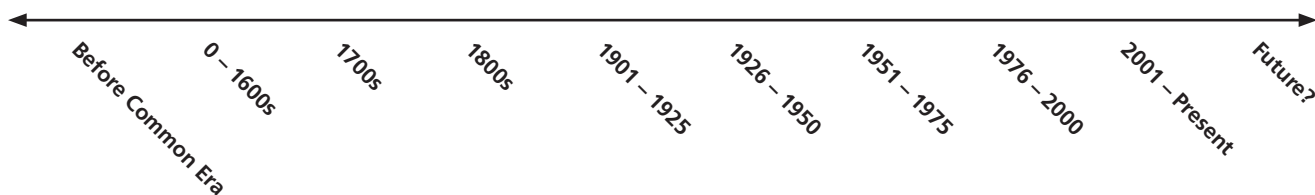
***Science, Medicine, and Animals***

<http://www.nap.edu/catalog/10733.html>

## ADAPTATION

- When working with middle school students or those with lower reading levels, you may choose to use just the cards within each time period that have an asterisk (\*). These cards are most representative of the time period and are simpler to read.
- Students can also approach the activity as an interactive timeline. Cut the date off the Timeline Event Cards and put the date portion inside an envelope. Attach the event description to the outside of the envelope. Working as a class, place each envelope along a timeline in the room, as below:

When students have agreed on the order for the timeline as a group, they may open the envelopes and see the actual time for that event. Students should rearrange the envelopes accordingly.



## EXTENSION

### “Not tested on animals”

Ask students to bring in personal care products such as shampoo, deodorant, soap, or face cream. Ask students if their personal shopping habits are influenced by the “not tested on animals” label. Why or why not?

Examine the labels of the personal care products carefully to determine if the product is a cosmetic or a drug.

**Cosmetics and drugs are regulated differently** by the Food and Drug Administration (FDA). Products that contain drugs are required to identify themselves by listing the Drug Facts (active ingredient) on the label. By law, **all drugs** must go through animal safety/toxicology testing before human clinical trials and marketing to the public.

The FDA does not specifically require animal testing of cosmetics before human testing or marketing. The FDA requires that cosmetics be safe and properly labeled. It is up to the cosmetics manufacturer to decide which safety tests are necessary since the FDA does not tell them which tests to conduct, nor does FDA review the safety test results before products go on the market.

In the United States, what does “Not Tested on Animals” mean? This claim by cosmetics companies can have multiple meanings:

- The final product was not tested on animals, but the individual ingredients were.
- The manufacturer/distributor did not test on animals, but someone else did.
- The animal tests were done more than five years ago so the manufacturer can claim that the product was “not tested on animals.” This is called the “rolling circle rule.”
- There are no new ingredients in the product so the manufacturer can assemble safety information from the literature that shows previous safety testing and/or a history of safe use for the ingredients in the quantities used. In this case, no additional animal safety tests would be needed.
- The product conforms to European Union laws which banned cosmetic testing on animals in 2009, to take effect by 2013. In this case, the ingredients and final product really were not tested on animals.

More information can be found in Lesson 1 of the **Consumer Awareness** curriculum available at <http://www.nwabr.org>.

## GLOSSARY

**Animal Rights Activist:** A person who believes that animals should be given similar considerations as human beings, should not be considered as property, and should be awarded basic rights.

**Animal Welfare Activist:** A person who believes that it is morally acceptable to use animals for human purposes, as long as the animal's welfare (physical and psychological well-being) is protected.

**Dissection:** Surgery conducted for educational or experimental purposes on a non-living organism to view internal structures.

**Euthanasia:** The practice of ending an animal's life while minimizing pain, distress, and anxiety prior to loss of consciousness. Most often accomplished through the administration of drugs.

**Humane treatment:** Treating animals with a high degree of respect and care.

**Model Organism:** An organism that is used in research because it is easier to study a particular aspect in that organism, rather than in humans and higher organisms. Model organisms tend to be small, able to reproduce rapidly with many offspring, inexpensive to house and maintain, able to be manipulated genetically on the molecular level, and well-studied by other scientists. Major model organisms include E. coli bacteria, yeasts, slime molds, fruit flies, zebrafish, and mice.

**Transgenic Organism:** A living organism in which genes, or gene regulatory regions, have been added, removed, or modified. The change in DNA will cause the organism to exhibit a new property (immune system change, genetic disorder, etc.) which can be passed to its offspring.

**Vivisection:** Surgery conducted for experimental purposes on a living organism to view living internal structures. The term is sometimes more broadly defined as any experimentation on live animals. The term is often used by organizations opposed to animal experimentation and is no longer used by practicing scientists.

## RESOURCES

All About Diabetes

<http://www.medicalnewstoday.com/info/diabetes/discoveryofinsulin.php>

Animal Welfare Act Information Center

<http://awic.nal.usda.gov/>

Association for Assessment and Accreditation of Laboratory Animal Care International

<http://www.aaalac.org/>

*Clinical Diabetes Mellitus: A Problem-Oriented Approach*. John Davidson. Thieme, 2000, p. 6-8.

Edward Jenner and the History of Smallpox and Vaccination

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1200696/>

*Guide for the Care and Use of Laboratory Animals*.

Institute for Laboratory Animal Research. National Academies Press, 2010.

[www.nap.edu/catalog.php?record\\_id=12910](http://www.nap.edu/catalog.php?record_id=12910)

History of AIDS up to 1986

<http://www.avert.org/aids-history-86.htm>

History of Medical Advances Timeline

<http://www.animalresearch.info/en/medical/timeline>

Profiles in Science: The Mary Lasker Papers & the National Institutes of Health

<http://profiles.nlm.nih.gov/TL/iew/Exhibit/narrative/nih.html>

Pro-Test Blog: Standing Up for Science

<http://www.pro-test.org.uk/b2evo/index.php?m=201010>

"Regulation of Animal Research." Institute for Laboratory Animal Research. *Science, Medicine, and Animals*. National Research Council of the National Academies, 2004.

<http://www.nap.edu/catalog/10733.html>

Research Animals: History

<http://www.libraryindex.com/pages/2180/Research-Animals-HISTORY.html>

*Scientific and Humane Issues in the Use of Random*

*Source Dogs and Cats in Research*. National Research Council Committee on Scientific and Humane Issues in the Use of Random Source Dogs and Cats in Research. National Academies Press, 2009.

<http://www.ncbi.nlm.nih.gov/books/NBK32665/>

Silver Springs Monkey Case. "Renewal of Brain is Found in Disputed Monkey Tests." Leary, Warren E. *The New York Times*, June 28, 1991.

<http://www.nytimes.com/1991/06/28/us/renewal-of-brain-is-found-in-disputed-monkey-tests.html>

Thalidomide & FDA Medical Reviewer Frances Oldham Kelsey

[http://permanent.access.gpo.gov/lps1609/www.fda.gov/fdac/features/2001/201\\_kelsey.html](http://permanent.access.gpo.gov/lps1609/www.fda.gov/fdac/features/2001/201_kelsey.html)

*The Rights of Animals*. Tamara Roleff and Jennifer Hurley (editors). Cengage Gale, 1999.

Timeline: Chronology of Landmarks in Animal Based Research and the Key Moral Statements

[http://www.cccac.ca/Documents/Education/timeline\\_tiled.pdf](http://www.cccac.ca/Documents/Education/timeline_tiled.pdf)

US Food and Drug Administration History

<http://www.fda.gov/AboutFDA/WhatWeDo/History/default.htm>



# STUDENT HANDOUT 3.1

## Historical Events in Animal Research

Name \_\_\_\_\_ Date \_\_\_\_\_ Period \_\_\_\_\_

### **Summary Message for Time Period I (The third century B.C.E through the 1930s):**

In the early years, few (if any) known rules or regulations protected animals or humans used in research. In fact, the philosophy of this time held that animals were not even capable of feeling pain. Although this view was later disputed, many of the very early scientific advancements used animals (or humans) in ways that would be considered abusive today. Toward the end of this time period, great strides were made in the treatment or control of malaria, diphtheria, diabetes, and more.

### **QUESTIONS FOR TIME PERIOD I:**

1. Did anything surprise you?
  
  
  
  
  
  
  
  
  
  
2. What are some laws, regulations, or guidelines for animal research?
  
  
  
  
  
  
  
  
  
  
3. Why or how do laws, regulations, or guidelines change?
  
  
  
  
  
  
  
  
  
  
4. What types of animals were used for research? How were they treated?

### **Summary Message for Time Period II (late 1930s through mid 1970s):**

Nazi atrocities in WWII led to requirements for animals testing. Biomedical research as a field became recognized, supported, and funded, creating a demand for research animals. Using what they knew from the past, many scientists used dogs in their research. This demand led to a number of abuses in the acquisition, housing, and transporting of animals, especially dogs. Public outcry resulted in new laws and regulations. It also resulted in use of a new model—mice—which would eventually replace dogs and cats in most research. During this time a Thalidomide disaster was averted in the U.S., and new treatments or vaccines for polio, leukemia, and smallpox greatly reduced the effects of those diseases.

### **QUESTIONS FOR TIME PERIOD II:**

5. Did anything surprise you?

6. What are some laws, regulations, or guidelines for animal research?

7. In what way(s) does public opinion influence changes to laws, regulations, or guidelines?

### Summary message for Time Period III (late 1970s and into the future):

Animal activism became increasingly organized and violent. At the beginning of this time period, the activist focus was on the use of animals for cosmetics testing. Later, much of the protest centered on the use of non-human primates in research, though there were other targets. Regulations for research institutions using animals continued to be strengthened. There was push from both outside and inside the research community to use “lower” animals such as zebrafish as research models, and to find alternative testing methods. During this time, contributions to health included advancements in *in vitro* fertilization, treatment for HIV/AIDS and more.

### QUESTIONS FOR TIME PERIOD III:

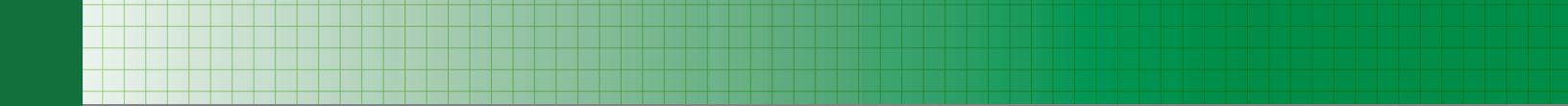
8. Did anything surprise you?

9. What are some laws, regulations, or guidelines for animal research?

10. Do you think the situation surrounding animal research changed for the better? Why or why not?

11. What future steps are required to create further positive change?

12. **Looking forward:** Who are the people involved in animal research today? What are their perspectives?  
Where do we go from here?



# TEACHER ANSWER KEY 3.1

## Historical Events in Animal Research

### QUESTIONS FOR TIME PERIOD I:

1. Did anything surprise you?

Students will provide an example of something that surprised them from **Time Period I**.

Possible answers may include:

- Live criminals were used for vivisection.
- Philosophers believed that animals were incapable of feeling pain.
- Laws against animal abuse existed before laws against child abuse.
- The idea that disease is caused by germs is relatively new (1881).
- Deaths were caused by the use of eyelash and eyebrow dye before safety testing.

| Exemplary (5 points)  | Proficient (3 Points)                                 | Partially Proficient (1 Point)                         | Developing (0 Points)       |
|---|---|--|-----------------------------|
| Provides three or more examples of things that were surprising. | Provides two examples of things that were surprising. | Provides one example of something that was surprising. | Does not provide a response |

2. What are some laws, regulations, or guidelines for animal research?

Student responses should include laws, regulations, or guidelines featured in the cards from **Time Period I**.

Possible answers include:

- 1860s: U.S. law to prevent the beating of horses.
- 1890s: U.S. legislation to outlaw repetition of painful animal experiments.
- 1906: Pure Food and Drug Act (PFDA) passed by U.S. Congress.

| Exemplary (5 points)  | Proficient (3 Points)   | Partially Proficient (1 Point)   | Developing (0 Points)   |
|---|---|--|---|
| Provides three or more examples of laws, regulations, or guidelines used for animal research. | Provides two examples of laws, regulations, or guidelines used for animal research. | Provides one example of laws, regulations, or guidelines used for animal research. | Does not provide any examples of laws, regulations, or guidelines used for animal research. |

3. What types of animals were used for research?

Students should provide the names of animals used in research during **Time Period I**.

Student responses should also include a brief description of how the animals were treated.

Possible answers include:

- Ancient Egypt: Animals were vivisected.
- 150-200: Greek physician Galen vivisected goats, pigs, monkeys, oxen, and dogs.
- 1500s: Vesalius practiced vivisection on animals without anesthesia.
- 1881: Pasteur develops germ therapy by conducting research on silkworms and sheep.
- 1906: Ross conducts malaria research on birds.
- 1913: Von Behring injected diphtheria toxin into rats, mice, rabbits, guinea pigs, monkeys, and donkeys.
- 1922: Dog studies provided information on the role of the pancreas in producing insulin.
- 1922: Banting extracted insulin from beef pancreases.

| Exemplary (5 points)   | Proficient (3 Points)   | Partially Proficient (1 Point)   | Developing (0 Points)   |
|--|---|--|---|
| Provides five or more examples of the types of animals used in research. | Provides three or four examples of the types of animals used in research. | Provides one or two examples of the types of animals used in research. | Does not provide any examples of the types of animals used in research. |

## QUESTIONS FOR TIME PERIOD II:

4. Did anything surprise you?

*Students will provide an example of something that surprised them from **Time Period II**.*

*Possible answers may include:*

- *There were no requirements to test medicines for toxicity; people died from unsafe medicines.*
- *Animal research is a requirement of the Nuremburg Code (in response to WWII atrocities).*
- *A dog was stolen from a family's yard to be used for research.*
- *The movie 101 Dalmatians reflects cultural fears of the time.*
- *Smallpox has been eradicated from the planet.*

| Exemplary (5 points)  | Proficient (3 Points)                                 | Partially Proficient (1 Point)                         | Developing (0 Points)        |
|---|---|--|------------------------------|
| Provides three or more examples of things that were surprising. | Provides two examples of things that were surprising. | Provides one example of something that was surprising. | Does not provide a response. |

5. What are some laws, regulations, or guidelines for animal research?

*Student responses should include laws, regulations, or guidelines featured in the cards from **Time Period II**.*

*Possible answers include:*

- *1938: Food, Drug, and Cosmetics Act (FDC Act) passed by U.S. Congress.*
- *1947: Nuremburg Code drafted.*
- *1959: 3 Rs published.*
- *1960s: As a result of the Thalidomide disaster, new guidelines for testing the effects of drugs on animal reproduction and fetus development were incorporated by the FDA.*
- *1962: The FDC Act was amended to require that all products be effective as well as safe.*
- *1963: Publication of The Guide for the Care and Use of Laboratory Animals.*
- *1965: Formation of the Association for the Assessment and Accreditation of Laboratory Animal Care (AAALAC) which provided guidelines and accreditation.*
- *1966: U.S. Congress passes the Animal Welfare Act (AWA).*

| Exemplary (5 points)   | Proficient (3 Points)   | Partially Proficient (1 Point)   | Developing (0 Points)   |
|--|---|--|---|
| Provides five or more examples of laws, regulations, or guidelines used for animal research. | Provides three or four examples of laws, regulations, or guidelines used for animal research. | Provides one or two examples of laws, regulations, or guidelines used for animal research. | Does not provide any examples of laws, regulations, or guidelines used for animal research. |

6. In what way(s) does public opinion influence changes to laws, regulations, or guidelines?

*Student responses should include examples of how public opinion influenced changes, as featured in the cards from **Time Period II**. Possible answers include:*

- 1938: Public outrage concerning Elixir of Sulfanilamide causes the U.S. Congress to pass the Food, Drug, and Cosmetics Act (FDC Act).
- 1947: Outrage within the scientific community at the atrocities of Nazi doctors inspires the drafting of the Nuremberg Code.
- 1961-65: In fear of having their pet dogs stolen for use in biomedical research (due to 101 Dalmatians, the story of Pepper the dog, and the Life magazine article), the public demanded more accountability in animal research using dogs. The Animal Welfare Act (AWA) was passed in 1966.
- Public outrage at the use of dogs and cats in research influenced researchers to use other organisms, including mice, rats, and zebrafish.

| Exemplary (5 points)  | Proficient (3 Points)   | Partially Proficient (1 Point)   | Developing (0 Points)   |
|---|---|--|---|
| Provides three or more examples of how public opinion influenced laws, regulations, or guidelines used for animal research. | Provides two examples of how public opinion influenced laws, regulations, or guidelines used for animal research. | Provides one example of how public opinion influenced laws, regulations, or guidelines used for animal research. | Does not provide any examples of laws, regulations, or guidelines used for animal research. |

### QUESTIONS FOR TIME PERIOD III:

7. Did anything surprise you?

*Students will provide an example of something that surprised them from **Time Period III**.*

*Possible answers may include:*

- Some mice have human genes.
- People working in research organizations have been harassed and assaulted, and their property has been firebombed and vandalized.
- Zebrafish are becoming a popular research model organism.

| Exemplary (5 points)  | Proficient (3 Points)                                 | Partially Proficient (1 Point)                         | Developing (0 Points)        |
|---|---|--|------------------------------|
| Provides three or more examples of things that were surprising. | Provides two examples of things that were surprising. | Provides one example of something that was surprising. | Does not provide a response. |

8. What are some laws, regulations, or guidelines for animal research?

*Student responses should include laws, regulations, or guidelines featured in the cards from **Time Period III**.*

*Possible answers include:*

- 1979: Research institutions that receive federal money are required to have an Institutional Animal Care and Use Committee (IACUC) to oversee the use of all vertebrates.
- 1985: The U.S. Congress amends the Animal Welfare Act (AWA) to require that researchers minimize animal pain and distress through the use of anesthesia, analgesics, and humane euthanasia.
- 1992: Animal Enterprise Protection Act is passed to protect against acts of “animal enterprise terrorism.”
- 1994: The U.S. Congress passes a law to allow veterinarians to treat animals with drugs approved for humans or other species.

| Exemplary (5 points)  | Proficient (3 Points)   | Partially Proficient (1 Point)   | Developing (0 Points)   |
|---|---|--|---|
| Provides three or more examples of laws, regulations, or guidelines used for animal research. | Provides two examples of laws, regulations, or guidelines used for animal research. | Provides one example of laws, regulations, or guidelines used for animal research. | Does not provide any examples of laws, regulations, or guidelines used for animal research. |

9. Do you think the situation surrounding animal research changed for the better? Why or why not?

*Student responses should provide a position on whether animal research has changed for the better and include an explanation for their thoughts. Exemplary answers will cite multiple examples from the timeline.*

| Exemplary (5 points)   | Proficient (3 Points)   | Partially Proficient (1 Point)   | Developing (0 Points)  |
|--|---|--|--|
| Student states a clear position on whether animal research has changed for the better .<br>-AND-<br>Student response includes an explanation for the position.<br>-AND-<br>Cites one or more examples from the timeline. | Student states a position on whether animal research has changed for the better.<br>-AND-<br>Student response includes an explanation for the position. | Student states a position on whether animal research has changed for the better. | Student does not state a position on whether animal research has changed for the better. |



10. What future steps are required to create further positive change?

*Answers will vary, but should show connections to the events featured on the timeline cards.*

*Possible answers may include:*

- *Using the 3 Rs to guide research will continue to reduce and replace animals used in research:*
  - o *Non-animal models and other alternatives will continue to be developed and relied upon.*
  - o *Higher animals will be replaced with lower animals as model organisms.*
- *As the health and well-being of research animals affects the quality of scientific results, scientists will be proponents of animal welfare.*
- *The enforcement of laws and regulations will continue to improve the care of research animals.*
- *Public outcry over inhumane treatment has changed/created regulations in the past, and will continue to do so in the future.*

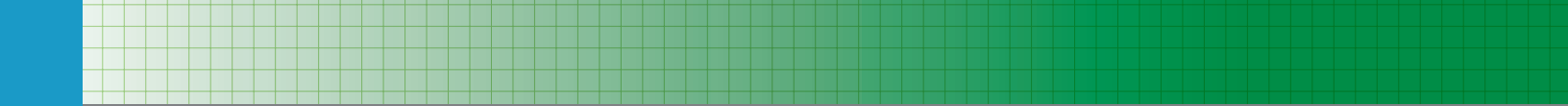
| Exemplary (5 points)                                      | Proficient (3 Points)                           | Partially Proficient (1 Point)                  | Developing (0 Points)                       |
|---|---|---|---|
| Provides three or more examples of possible future steps. | Provides two examples of possible future steps. | Provides one example of a possible future step. | Does not provide any possible future steps. |

11. **Looking forward:** Who are the people involved in animal research today? What are their perspectives?

Where do we go from here?

*Answers will vary, but should show connections to the events featured on the timeline cards.*

| Exemplary (5 points)                                  | Proficient (3 Points)  | Partially Proficient (1 Point)                               | Developing (0 Points)  |
|---|--|--|--|
| Provides an adequate response to all three questions. | Provides an adequate response to two of the three questions. | Provides an adequate response to one of the three questions. | Does not provide an adequate response to any of the three questions. |



# TEACHER RESOURCE 3.2

## Timeline Event Cards

### TIME PERIOD I

**TIME PERIOD I**  
*Third and second centuries B.C.E.*

At the medical school in Alexandria, Egypt, humans and animals were vivisected. Vivisection is surgery conducted for experimental purposes on a living organism to view living internal structures.

Historians believe that more than **600 criminals were subjected to vivisection while they were alive.** Human dissection and vivisection were generally forbidden throughout the rest of Egypt and in the Roman Empire due to moral concerns.

Views of Animals • Contributions to Health  
Mistreatment • Laws & Regulations • Protest

**TIME PERIOD I**  
*150 – 200*

The Greek physician Galen frequently practiced vivisection on animals. Vivisection is surgery conducted for experimental purposes on a living organism to view living internal structures. In particular, Galen vivisected goats, pigs, monkeys, oxen, and dogs.

Galen made some **important anatomical discoveries about the internal structures of animals**, such as the importance of the brain and the presence of blood inside arteries. Galen's writings and teachings formed the basis of Western medical science well into the Middle Ages.

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**TIME PERIOD I**  
*1500s*

Belgian doctor Andreas Vesalius studied blood circulation by **performing autopsies** (dissections on non-living organisms) **on human corpses.** He also **practiced vivisection on animals** without using any sort of anesthesia. Vivisection is surgery conducted for experimental purposes on a living organism to view living internal structures. Vesalius wrote about the importance of autopsies and vivisection in the study of **anatomy** (internal structures and systems).

British physician and anatomist William Harvey performed animal vivisection and dissected the corpses of executed criminals. He discovered the true role of the heart in pumping blood throughout the body.

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**\* TIME PERIOD I**  
*1596 – 1650*

French **philosopher** René Descartes and his followers believed that animals were unthinking, unfeeling machines. This allowed researchers to perform all manner of experiments on live animals without any moral concerns.

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### \* TIME PERIOD I

1764

French **philosopher** François-Marie Arouet de Voltaire noted that vivisection uncovered organs of feeling in animals, proving that animals were not machines, but feeling beings. Vivisection is surgery conducted for experimental purposes on a living organism to view living internal structures.

Later in the century, British **philosopher** Jeremy Bentham summarized his thoughts on the subject: "The question is not, can they reason? Nor, can they talk? but, can they suffer?"

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### \* TIME PERIOD I

1866

The **American Society for the Prevention of Cruelty to Animals (ASPCA)** was the **first humane society** to be established in North America. Humane treatment means treating animals with respect and care.

A law to prevent the beating of horses came about through early action from ASPCA. Later, this law was used to prosecute a parent who was beating her child, as there were no laws at the time preventing the abuse of children. Nine years later the **American Society for the Prevention of Cruelty to Children** was founded.

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### TIME PERIOD I

1871

Harvard University founded one of the first vivisection laboratories in the country, despite opposition from the **Massachusetts Society for the Prevention of Cruelty to Animals (MSPCA)**. Vivisection is surgery conducted for experimental purposes on a living organism to view living internal structures.

Various **anti-vivisection groups were founded**, including the **American Anti-Vivisection Society (AAVS)** and the **New England Anti-Vivisection Society (NEAVS)**. The new anti-vivisection groups tried, unsuccessfully, to outlaw the practice of vivisection.

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### TIME PERIOD I

1881

French scientist Louis Pasteur proved the controversial theory that diseases were caused by microscopic organisms ("germs"). Using yeast, silkworms, and sheep, Pasteur found that microbes could travel through the air and that the **spread of disease could be controlled by sterilization**, which includes the use of heat, chemicals, pressure, irradiation, or filtration to remove or kill microbes. This discovery had wide application to surgical techniques and medicine.

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### TIME PERIOD I

1890s

Legislation was passed in the United States that **outlawed** repetition of painful animal experiments for the purpose of teaching or demonstrating well-known and accepted facts.

Views of Animals • Contributions to Health  
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### TIME PERIOD I

1903

Writer Mark Twain (1835–1910) published a short story called “A Dog’s Tale” in Harper’s Magazine. The story was written to **protest cruelty to animals** and their use in research. It is told from the viewpoint of a dog that lives with the family of a scientist. The dog saves the family’s baby from a nursery fire but later sees her own puppy blinded and killed during an experiment performed by the scientist to impress his friends. Critics condemned the work as overly sentimental, but animal welfarists were pleased that it brought public attention to the issue of animal experimentation.

Views of Animals • Contributions to Health  
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### TIME PERIOD I

1906

Controlling **malaria** was vital to the building of the Panama Canal. Malaria is an infectious disease caused by a parasite that is transmitted through the bite of an infected mosquito. Of the 26,000 people working on this strategic project, over 21,000 were hospitalized for malaria some time during their work.

Biologist Ronald Ross tested the theory that malaria might be caused by mosquito bites by studying the avian (bird) form of malaria in the crow. Work with crows, sparrows, pigeons, weaver birds, and larks led Ross to believe that the parasite accumulated in the salivary gland of the mosquito. This led to a mosquito control program which greatly reduced the incidence of malaria in Panama and elsewhere. Ross was awarded the Nobel Prize in medicine for his discoveries.

Views of Animals • Contributions to Health  
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### \* TIME PERIOD I

1906

The U.S. Congress passed the **Pure Food and Drug Act (PFDA)** which made it against the law to use false or misleading claims about a food or drug. As it applied to “man and other animals,” it also covered animal feed and veterinary drugs. The act did not, however, require any type of testing to ensure that a product was safe or effective.

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### TIME PERIOD I 1907

The **American Medical Association** started to advocate for the benefits of research with animals and developed **regulations for the humane treatment** of animals used in medical schools. Humane treatment means treating animals with respect and care.

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### TIME PERIOD I 1913

Once known as the “strangling angel of children,” **diphtheria** is a highly contagious childhood illness caused by a bacteria. The dreaded disease would begin with cold-like symptoms and lead to death in as little as a week. Death rates for diphtheria were high, and the need for a vaccine was clear.

German scientist Emil von Behring found that low doses of modified toxin (a damaging substance naturally produced by diphtheria bacteria) injected into rats, mice, or rabbits appeared to protect them from the illness. After more than 15 years of research, von Behring produced long-lasting immunity in guinea pigs, monkeys, and donkeys. This research was used in the first vaccination studies on humans.

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### \* TIME PERIOD I 1920s and 1930s

A cosmetics company introduced a brand of eyelash and eyebrow dye called Lash-Lure. The dye contained chemicals (aniline compounds) that were well-known to be **harmful to the eyes**. Doctors reported thousands of eye injuries and even deaths after patients suffered serious infections. Other popular cosmetic products of the time contained **high concentrations of toxic (damaging or poisonous) chemicals** such as silver, lead acetate, or rat poison. Doctors lobbied the U.S. Congress to crack down on dangerous drugs and personal products sold to Americans, but they were opposed by powerful marketing groups. Injuries also prompted calls for products to be tested on animals before being put on the market for human use.

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### \* TIME PERIOD I 1922

For 150 years, doctors had been researching ways to treat **diabetes**, a disease in which a person has high blood sugar levels. Juvenile diabetics would usually fall into a coma and die a year or two after symptoms of the disease first appeared. Through studies with dogs, it was known that the pancreas produced an important substance (“insulin”) that regulated blood sugar.

Canadian doctor Frederick Banting extracted insulin from beef pancreases and used it to successfully treat a 14-year old boy dying of diabetes, who at the time weighed only 65 pounds. Families with diabetic children rushed to Toronto for treatment. The Toronto Star called the extract “one of the greatest achievements in modern medicine.” Banting and colleagues won the Nobel Prize for their work.

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## TIME PERIOD II

### TIME PERIOD II

1937-1938

Nearly 100 people (mostly children) died after drinking a raspberry-flavored product used to treat sore throats called Elixir of Sulfanilamide. The medicine contained drugs dissolved in the same toxic (poisonous) chemical found in antifreeze. It had been tested for flavor, appearance, and fragrance, but not for toxicity—the degree to which it was poisonous or damaging to health. At the time, there were no requirements for safety testing. The product had also not been tested on animals. The public was outraged and pressured the U.S. Congress to strengthen the original **Food and Drug Act** and include cosmetics. The federal **Food, Drug, and Cosmetic Act (FDC Act)** was passed, containing a **requirement for animal testing** for drugs.

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### \* TIME PERIOD II

1947

During World War II, German Nazi doctors performed gruesome **experiments on prisoners** who were Jewish, homosexual, mentally disabled, physically disabled, or children. These prisoners were forced into being test subjects. Several tens of thousands of people died in these experiments, and many of those who survived were disfigured.

In response, the “Nuremberg Code” was developed to describe ethical conduct in human research. The Code was widely adopted in scientific research communities. One of the ten points of the code stated a **requirement for animal research** before human research to minimize the harm to humans.

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### TIME PERIOD II

1950s

During the 1950s, many children were not allowed to go to swimming pools, movie theaters, amusement parks, beaches, and other public places as **fear of the polio virus** grew. This crippling disease involved the spinal cord and brain. Some people who were affected with it could not breathe without a ventilator or “iron lung.”

Scientists grew and extracted the virus from cell and tissue cultures. Because the virus was too small to be seen with available technology, the fluid extracted from the cultures was injected into mice and monkeys in order to check that scientists were actually working with the polio virus. These techniques allowed viruses to be isolated and, eventually, a vaccine to be developed.

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### TIME PERIOD II

1959

Members of the research community published *The Principles of Humane Experimental Technique*. One of its core messages, the **3 Rs** (Replacement, Reduction, and Refinement), became widely accepted by scientific communities. In many countries, the 3 Rs are the principles currently guiding the use of animals in research.

Views of Animals • Contributions to Health  
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## TIME PERIOD II

1960s

Francis Oldham Kelsey was a new employee at the **Food and Drug Administration** in 1960 when she was asked to evaluate a drug, **Thalidomide**. At the time, Thalidomide was already in widespread use in Canada and Europe to treat nausea in pregnant women. Her previous work with drug metabolism in pregnant rabbits made her cautious, so she held back Thalidomide's approval for use in the U.S.

The use of this drug elsewhere resulted in more than 10,000 deformed babies, many born without arms or legs. Although the drug had been extensively tested on animals, it had not been tested on pregnant animals. **As a result, new guidelines** for testing the effects of drugs on animal reproduction and fetal development were incorporated.

Views of Animals • Contributions to Health  
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## \* TIME PERIOD II

1961

After World War II, the Federal government began supporting biomedical research in ways it never had before, **increasing the budget** of the National Institutes of Health (NIH) 150-fold between 1945 and 1961. Additional research money created a demand for more research animals.

Dogs, which had played a large part in animal research in the past, were especially sought after. People's fears of dog-napping are reflected in the 1961 Disney movie **101 Dalmatians**, which tells the story of pet dogs stolen by a cruel villain.

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## TIME PERIOD II

1962

The federal **Food, Drug, and Cosmetic Act (FDC Act)** was amended to require that all drugs not only be safe but **effective**. This amendment did not distinguish between medicines for humans and animals. Regulations for animal drugs, medicated feed, and veterinary food additives were strengthened.

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## TIME PERIOD II

1963

A group of veterinarians formed the **Animal Care Panel** and soon published the first edition of **The Guide for the Care and Use of Laboratory Animals**. Currently, the Guide informs scientists on the proper housing of various animals, good practices of veterinary care, training requirements of caretakers, and more.

Views of Animals • Contributions to Health  
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**\* TIME PERIOD II**  
**1965**

Pepper, a Dalmatian dog, disappeared from her family's backyard in Pennsylvania. The family tracked the dog to an animal dealer who had sold her to a hospital in New York City that conducted a pace-maker experiment on her heart, which she did not survive. Pepper's story was widely publicized and an **outraged public** demanded more accountability in animal research, especially research using dogs.

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**TIME PERIOD II**  
**1965**

A group of scientists and veterinarians form the **Association for Assessment and Accreditation of Laboratory Animal Care (AAALAC)**, a nonprofit organization working to increase the standards of care in research institutions. If institutions demonstrated a willingness to go above and beyond the minimums required by law, they received an accreditation or "seal of approval" from AAALAC. Accreditation assured the public that the institution was committed to the **responsible use and treatment of animals** in science.

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**\* TIME PERIOD II**  
**1966**

Life magazine ran an article called "Concentration Camps for Dogs," describing a police raid on a dog dealer's facility. With increased public pressure after the article's publication, the U.S. Congress passed what would become the **Animal Welfare Act (AWA)**. It called for humane care and treatment of animals in research facilities and regulated the "transportation, purchase, sale, housing, care, handling, and treatment" of such animals by the USDA. Animal dealers and laboratories had to be **licensed and inspected**. The act applied to dogs, cats, primates, guinea pigs, hamsters, rabbits, and several other warm-blooded animals, though it did not include rats, mice, and birds.

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**\* TIME PERIOD II**  
**1966 on**

The demand for dogs and cats as research subjects begins to decline due to public opinion, research trends, institutional policies, and the increased use of other animal models, such as mice. The number of dogs and cats used in research will continue to fall significantly in the next 30 years.

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**\* TIME PERIOD II**  
**1973**

**Leukemia** is a cancer of the blood or bone marrow. At this time, nine out of ten children with the most common form of leukemia (acute lymphocytic leukemia) died from the disease.

Scientists working with a leukemia mouse model named Skipper discovered the importance of killing every single malignant (cancerous) cell in a patient's body, as just one cell can divide and eventually kill the patient. This and other discoveries were crucial to advancements in cancer chemotherapy, a combination of drugs that kills cells that divide rapidly, including cancer cells.

Today, about three out of ten children die from this form of leukemia.

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**TIME PERIOD II**  
**1975**

Australian **philosopher** Peter Singer's book *Animal Liberation* brought more coverage to the use of animals in scientific research. The book included disturbing photographs and descriptions of animals being subjected to all sorts of painful procedures for questionable purposes. Singer argued that the pain and suffering inflicted on the animals was **too high a moral price** to pay for scientific research.

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**TIME PERIOD II**  
**1977**

Smallpox is an infectious disease caused by a virus. It causes rashes, fluid-filled bumps on the skin, blindness, and death. Smallpox had been a scourge since ancient times and large-scale epidemics are thought to have affected the course of history. The most virulent (strongest) strain would kill 20-60% of those infected; of those who survived, most were left with disfiguring scars and one-third of survivors were blinded.

A vaccine was developed through over 250 years of research that, at various times, used cows, prisoners, children, and orphans as test subjects. The last case of naturally-acquired smallpox is treated in Somalia. After a ten-year vaccination campaign by the **World Health Organization**, the disease is considered **eradicated from the planet**.

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**TIME PERIOD II**  
**1977**

**Animal Liberation Front (ALF)** is founded. ALF is an animal rights group that believed in militant and **extreme means** to end the use of animals on all fronts. ALF members were involved in various acts, including slashing tires and breaking windows of hunters' cars, setting fire to animal research facilities, raiding chicken breeders and gun shops, releasing or taking animals from fur farms, and verbally harassing employees of such institutions. Spin-off groups of the ALF also sent letter bombs to various companies and placed firebombs under the cars of researchers.

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## TIME PERIOD III

### \* TIME PERIOD III 1977

Animal activists brought awareness to the **testing of cosmetics** on animals, particularly the Draize test, in which chemicals were put into the eyes of rabbits. In full-page advertisements in major newspapers, major cosmetics companies were accused of being **cruel to animals**. Public response was immediate. Several companies, including Revlon and Avon, announced their intention to cease animal testing.

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### TIME PERIOD III 1977

Lesley and John Brown, a young English couple, had been unable to conceive a child for nine years. Lesley Brown had blocked fallopian tubes. Having gone from doctor to doctor for help to no avail, she was referred to Dr. Patrick Steptoe. In 1977, Lesley Brown underwent the very experimental *in vitro* (“in glass”) fertilization procedure in which an egg was extracted from one of her ovaries and fertilized outside her body with John’s sperm. The two-day-old embryo was placed back into Lesley’s uterus and the pregnancy resulted in the first successful **“test tube baby.”** This work was made possible by decades of research with mice, rabbits, and hamsters. Dr. Steptoe’s colleague won the Nobel Prize.

Views of Animals • Contributions to Health  
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### \* TIME PERIOD III 1979

Each research institution that uses animals and receives federal money is required to have an **Institutional Animal Care and Use Committee (IACUC)** to oversee the use of all vertebrates—animals with backbones (including rats, mice, fish and birds). The IACUC has to include five members with expertise to regulate animal welfare at that institution—at least one scientist familiar with animal research, at least one veterinarian, and at least one community member not associated with the institution or animal research. Though not required of private companies not funded by the federal government, many private facilities adopt these practices and seek AAALAC accreditation.

Views of Animals • Contributions to Health  
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### \* TIME PERIOD III 1980

The first transgenic mouse is created. A transgenic organism is a living organism in which genes, or gene regulatory regions, have been added, removed, or modified. The change in DNA will cause the organism to exhibit a new property (immune system change, genetic disorder, etc.) which can be passed to its offspring.

Scientists create mice with human genes. To more effectively study human diseases and cures, these **transgenic** mice become the research subject of choice. Currently, **more than 90%** of animals used in research are mice.

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### TIME PERIOD III

1981

The national **Cosmetics, Toiletries, and Fragrance Association** funded the founding of the **Center for Alternatives to Animal Testing (CAAT)** at Johns Hopkins University. CAAT promotes humane science by supporting the development and use of alternatives to animals in research, product safety testing, and education. They work with scientists to find new ways to **replace** animals with non-animal methods, **reduce** the numbers of animals used in research, or **refine** methods to make them less painful or stressful to the animals involved

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### TIME PERIOD III

1981

A little-known organization called **People for the Ethical Treatment of Animals (PETA)** gained national prominence with an exposé on research that involved depriving monkeys of sensory input into their spinal cords to give them numbed arms. The monkeys gnawed and licked their arms, producing wounds. A co-founder of PETA worked as a laboratory assistant, photographed the monkeys, then reported the lab to authorities. A subsequent raid led to the filing of **animal cruelty charges**, loss of funding, and the end of the research. The incident came to be known as the **Silver Springs Monkey Case**.

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### \* TIME PERIOD III

1985

Congress amended the Animal Welfare Act to require that researchers **minimize animal pain and distress** whenever possible through use of anesthesia (numbing drugs), analgesics (painkilling drugs), and humane euthanasia (drugs that cause death). New requirements were added regarding the physical and psychological well-being of dogs and primates used in research work. The act also addressed employee training and searching for ways to reduce or replace animal use.

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### \* TIME PERIOD III

1986

Research on rats, mice, dogs and primates led to the development of **Azido-thymidine (AZT)**. AZT became the first approved drug **treatment for HIV and AIDS**, which affected about 10,000 people worldwide at this time. Originally developed in the 1960s as an anti-cancer agent but never licensed, AZT slowed the progress of HIV in humans. Six months into a human clinical trial, only one member of the group receiving AZT died, compared to 19 deaths in the placebo group (the people enrolled in the study for comparison purposes who did not receive AZT). Since the results were positive, the trial was stopped early so that AZT could be given to the placebo group, giving them a better chance of survival.

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### TIME PERIOD III

1990

All charges against the researcher involved in the **Silver Springs Monkey Case** (inhumane treatment of monkeys in a research lab) were overturned by 1983. The researcher contended his work was scientifically valid and the monkeys were neglected while he was on vacation and the care of the animals fell to the lab assistant who took the exposé photos. After almost a decade of custody battles in the courts for the monkeys, the monkeys that had not been disabled were given to a zoo. The research monkeys were euthanized and autopsied. Analysis showed a remarkable degree of brain restructuring (“neuroplasticity”) that was previously thought to be unlikely. The knowledge gained from this research is now used widely with stroke patients.

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### TIME PERIOD III

1992

In response to **destruction and damage** caused by animal activists, the **Animal Enterprise Protection Act** was enacted against “animal enterprise terrorism.” The law prohibits “causing physical disruption to the functioning of an animal enterprise.” Animal enterprises included food and fiber production, research, testing, zoos, aquaria, circuses, rodeos, fairs, and others.

Views of Animals • Contributions to Health  
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### \* TIME PERIOD III

1995

Scientists search for a vertebrate (having a backbone) **animal that could function as a model organism** because it is easier to study rather than humans and higher organisms, making it a **more ethical research subject**. A model organism tends to be small, able to reproduce rapidly with many offspring, inexpensive to house and maintain, able to be manipulated genetically on the molecular level, and well-studied by other scientists.

Many scientists advocate for the use of zebrafish as a model organism. Zebrafish are commonly found in pet shops and home aquaria. They are small, hardy, breed readily, lay many eggs, and have genes more closely related to humans than fruit flies or worms. Their eggs are fertilized externally and embryos develop quickly, are transparent, and can be genetically manipulated. Zebrafish were therefore particularly attractive for studying developmental biology and modeling human disease. Currently, there are at least **600 laboratories** around the world that use zebrafish, and several researchers use only zebrafish in their research.

Views of Animals • Contributions to Health  
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### \* TIME PERIOD III

1999

A new animal rights group calling itself **Stop Huntingdon Animal Cruelty (SHAC)** began using radical and violent means against Huntingdon Life Sciences (HLS), one of the largest companies employing animal research in England and later the U.S. HLS employees were **harassed** and sometimes **assaulted**. Cars were **firebombed** and homes **vandalized**. Actions included splattering homes with paint, filling locks with glue, breaking windows, and setting off smoke bombs in offices. SHAC also picketed companies with ties to HLS (banks, brokerage houses, and investment companies) and flooded them with threatening letters, faxes, and e-mails.

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### TIME PERIOD III

2002

The Coulston Foundation (TCF) facilities housed hundreds of primates. These facilities were closed after **violations of the Animal Welfare Act (AWA)** were brought to light by an animal welfare group called **In Defense of Animals**. TCF was also cited by the USDA numerous times for housing and care violations and lack of qualified veterinarians. TCF was also in trouble with the Food and Drug Administration (FDA) regarding its animal testing procedures. **Save the Chimps**, an organization that had formed a small, well-respected chimp sanctuary in southern Florida, raised millions of dollars to buy out TCF.

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### TIME PERIOD III

2009

The European Union (EU) **bans the use of animals to test cosmetic ingredients**. They also implement a “marketing ban” that prohibits the sale of products from outside the EU that contain ingredients tested on animals. The marketing ban will be implemented slowly, with some animal tests allowed until 2013. The European Union is uncertain whether the 2013 deadline can be met because replacement tests have not yet been fully developed. The ban also contradicts laws requiring safety testing of certain chemicals.

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### TIME PERIOD III

Current

The vast majority of the scientific community agrees that **healthy and well-maintained** animals are beneficial to and necessary for quality research. Most institutions voluntarily comply with regulations that are above and beyond what is mandated by law.

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### TIME PERIOD III

Current to Future

As technology and information improve, so do models used to carry out simulated experiments **in place of experiments on animals**. Currently, computers model the structure and actions of new drugs and predict their safety. A model of the human placenta and fetus helps treat problems affecting unborn babies. A 3-dimensional human skin model has been internationally approved for assessing skin irritation from new drugs and products. Hopes for the **future** include computer models of **whole biological systems** with which “virtual” experiments can be conducted as alternatives to experiments on animals.

Views of Animals • Contributions to Health  
Mistreatment • Laws & Regulations • Protest