Discovery EDUCATION

Welcome

Inside the Lab: Bringing Real Biomedical Research to Life

Introductions

Discovery Education

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Charles River Laboratories

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Liz Bowen, Director of Corporate Citizenship

Charles River Fast Facts

+ We are a global company of ~20,000 employees working across 120+ locations in 20+ countries.
+ We provide scientific expertise to hospitals, governments, biotechnology companies, and pharmaceutical companies to support research for new and safe treatments for patients.
+ We offer various products and services to help our clients lower the cost of developing new therapies and decrease the amount of time it takes for these medicines to be available to patients.
+ Our research includes work in many different diseases: cancer, Alzheimer's disease, diabetes, rare diseases, and more. We also worked on all COVID vaccines approved in 2021 in the U.S. and in Europe.
+ In 2025, we employed ~2,400 science professionals with advanced degrees, including veterinary medicine, medical degrees, and other PhDs.

Our Mission:
Together, We Create Healthier Lives

Our Values:
Care, Lead, Own, and Collaborate

Every Moment Matters

CRL has worked on

>80%

of drugs approved by the U.S. Food and Drug Administration (FDA) over the last 5 years
(2021-2025)

10+

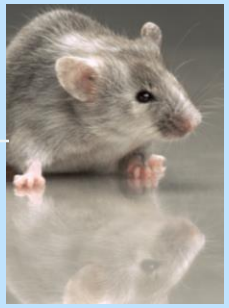
Average number of years to develop a new therapeutic

~$2.5B

Average cost to research and develop each successful drug

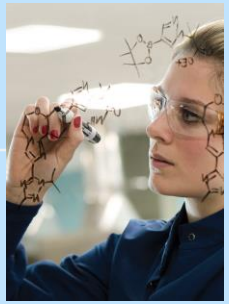
Charles River plays an important role within the biomedical industry, in the research and development of new therapies *(medicines, treatments, and vaccines)*.

We work with clients to discover, develop, and test new therapies.



Research Models and Services

We produce animal models required for research of new medicines. Animal models are foundational tools that clients use to discover new molecules, also known as the building blocks of research



Discovery and Safety Assessment

We perform basic research, early discovery work, and safety testing of new medicines. This work helps advance ideas for new treatments that then get tested in humans (human clinical trials) by other companies

Manufacturing Solutions

We ensure the quality of new medicines and various medical supplies, for example, through:

- **Biologics** – some medicines are made from live cells like human blood or plasma. We test these medicines to check that they are free from contaminants
- **Microbial** – we perform endotoxin testing on medical supplies, such as tubes, needles, and surgical tools, to check these are free from contaminants

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CHANNEL

STEM Careers Coalition

STEM Careers Coalition

Home | Educators | Future Ready Skills | Career Videos | Community | Employee Volunteers | About

STEM at Charles River

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Our Mission

At Charles River, our purpose is clear: together, we create healthier lives. In the past five years, we worked on 80% of the drugs approved by the U.S. Food and Drug Administration (FDA) and 75% of cell and gene therapy drugs. We are proud to know that our work is helping patients around the world!

Featured STEM Careers and Activities

Explore the profiles below to find out about people just like you who are using the skills they learned in school to become the kind of problem solvers that make a difference in their communities. Make the connection from the classroom to careers.

Career Profile Videos

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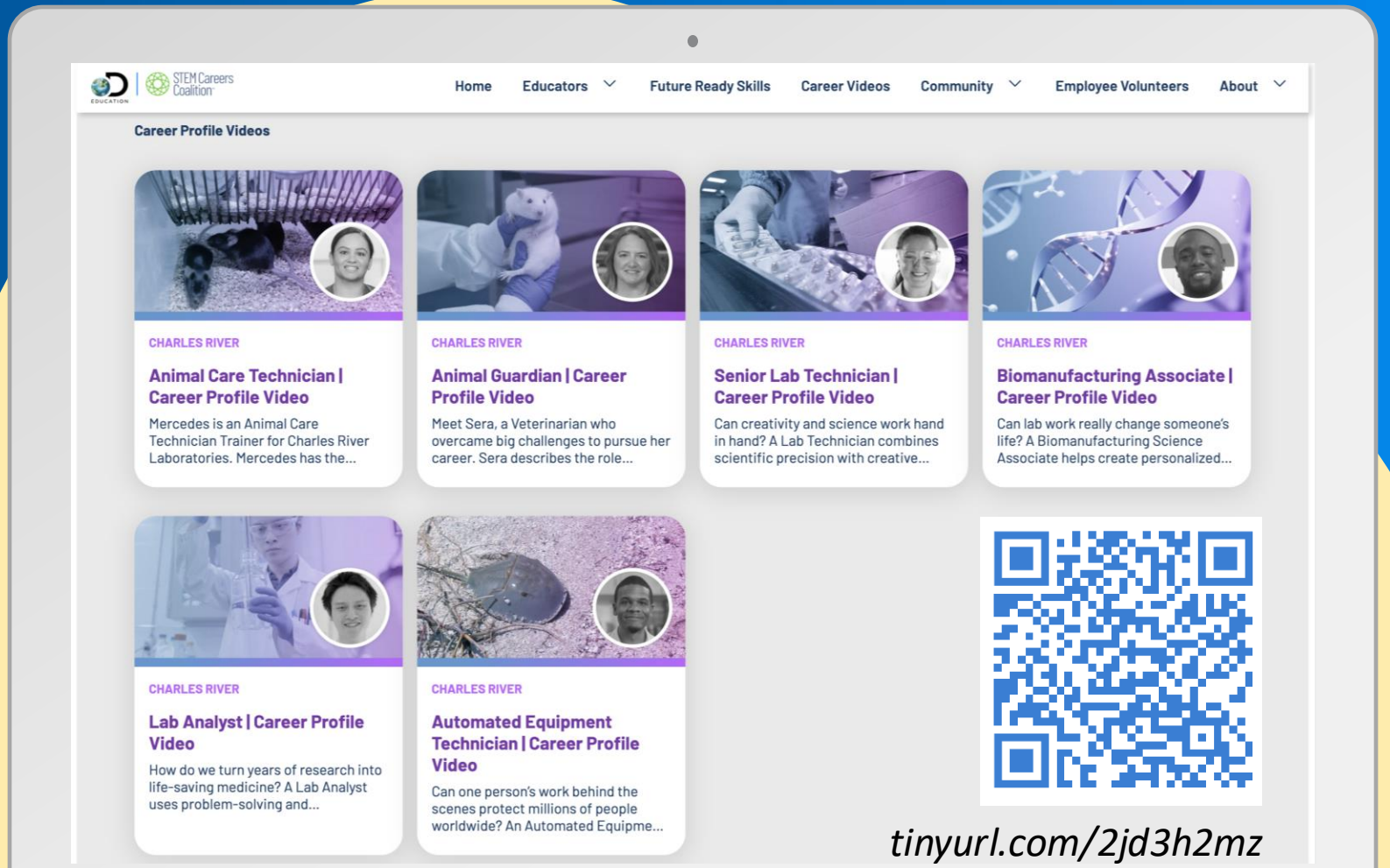
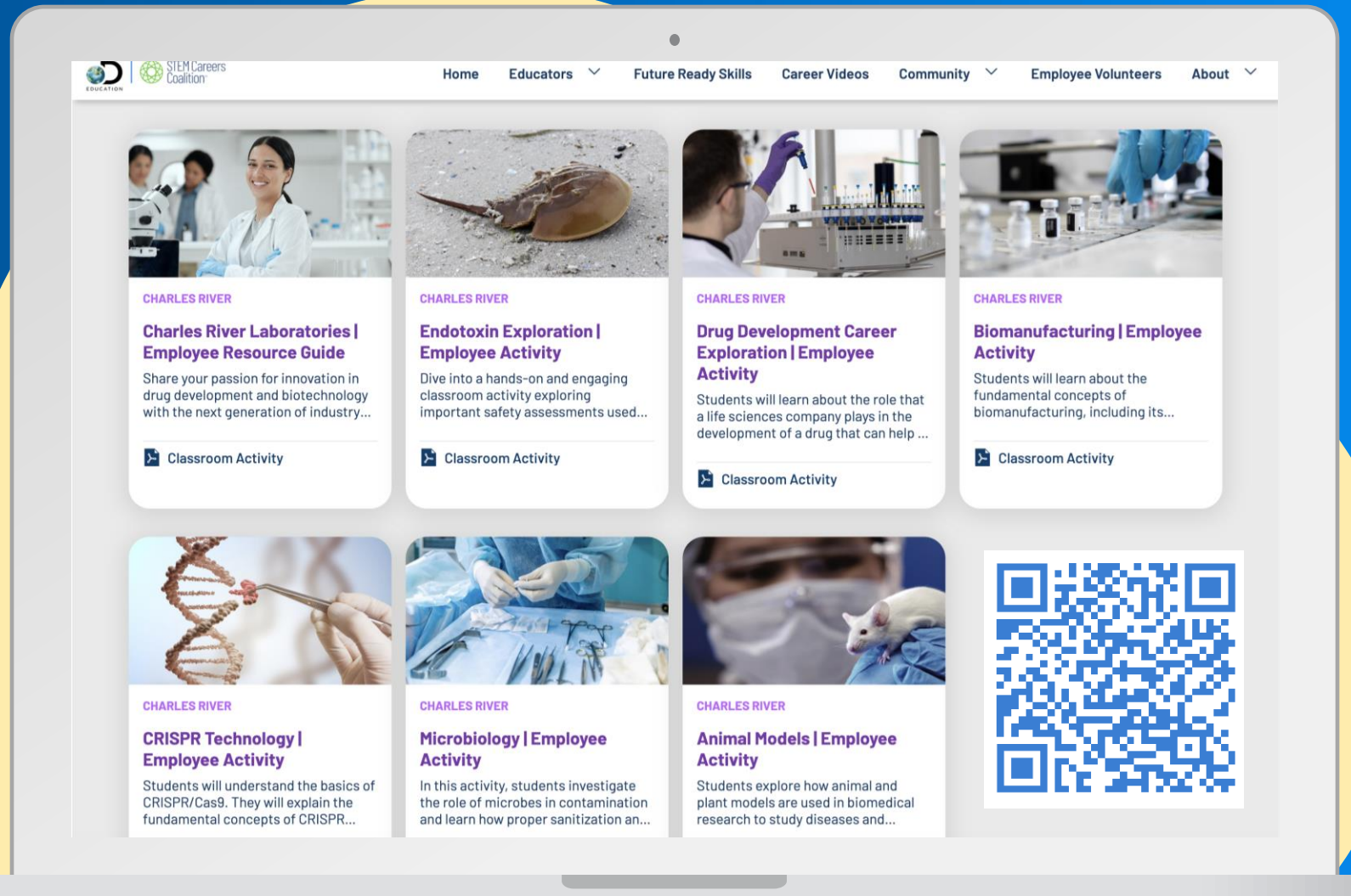
Career Profiles



tinyurl.com/2jd3h2mz

Classroom Activities



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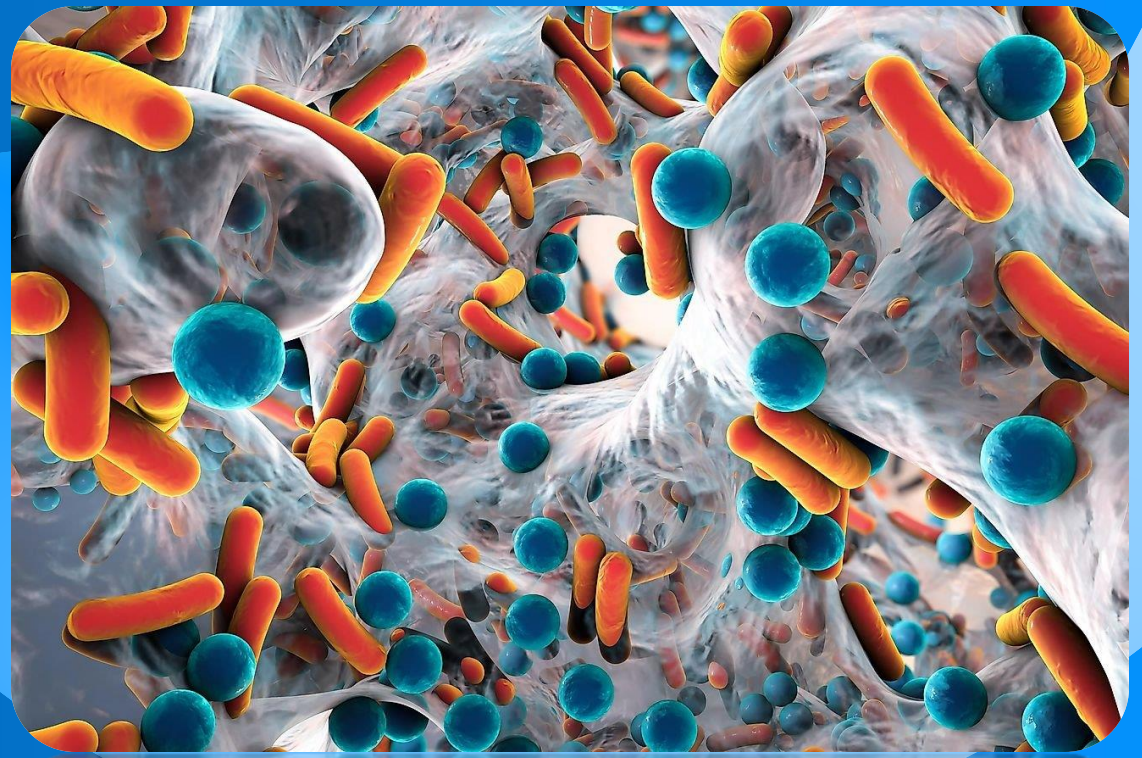
Aseptic Technique

Aseptic Technique

- A procedure that is done under sterile conditions*
- Includes medical and laboratory techniques
  - Cell cultures
  - Surgery

Why do we use Aseptic Technique?

- To prevent contamination of a specific medication we are working with.
- To prevent contamination of the room and personnel with bacteria, or even the medication.



Vocabulary List

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- **Sterile** *(adj)*
- Bacteria *(n)*
- Microorganism *(n)*
- **Aseptic Technique** *(n)*
- Petri plate *(n)*
- Agar *(n)*
- Bench *(n)*
- Antiseptic *(n)*
- Bunsen burner *(n)*
- Gown *(n)*
- To don a glove *(v)*
- To doff a glove *(v)*
- Personal protective equipment (PPE) *(n)*
- Cell culture *(n)*
- Contamination *(n)*
- Drapes *(n)*

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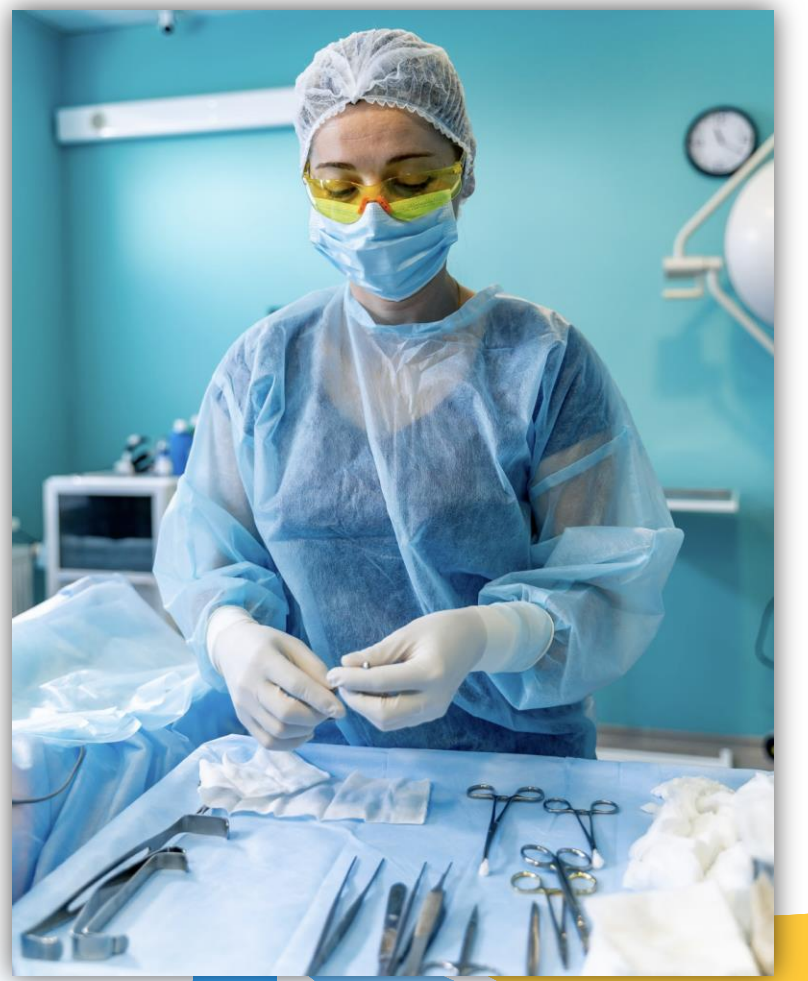
Examples of Aseptic Technique

- Sterile equipment
- Environmental controls
- Waste disposal
- Sterile field
- Personal protective equipment (PPE)
- Lab practices
- Bottle flaming
- Antiseptic



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How to Don Gloves Aseptically

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Sterile Gloves

a. Carefully open glove packaging and open protective covering like you would a book. Be careful not to touch the sterile part of the gloving.
b. The non-sterile part of the gloving includes the cuff and the inside of the glove that touches the skin.
c. Pick up the glove by holding the cuff while pulling the glove over the hand. (It is better to start by using the dominant hand.) Then, pull the glove over the hand with care not to touch the sterile parts of the glove. It is okay if the glove isn't on completely.
d. With the sterile part of the glove, pick up the remaining glove by the fingers. With the ungloved hand, place two fingers inside the glove and pull on the rest of the glove.
e. Now that both hands are gloved, fit can be adjusted until secure.

Part 2: Try to Remain Sterile!

1. Assume your desk is the sterile field.
2. Apply shaving cream to your gloved hands
3. Fold a piece of paper into 16 equal sections:
    - fold paper hot dog (½ way the long way)
    - then then long way again
    - open paper
    - fold paper the short way
    - then fold it hamburger (short way) again
    - unfold paper

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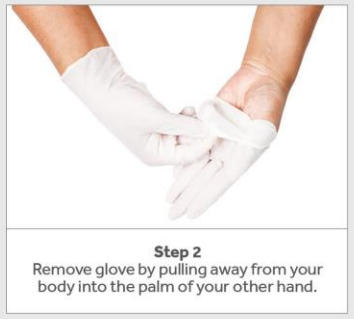
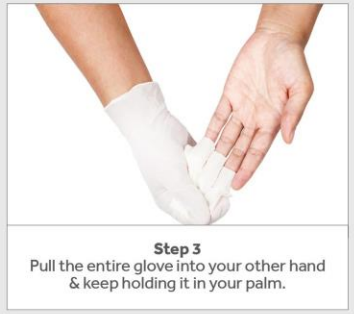
How to correctly doff a glove

Your step by step guide on how to remove a pair of single-use gloves.

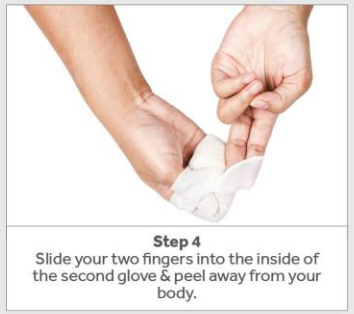
Step 1
Pinch the top of one glove at the wrist



Step 2
Remove glove by pulling away from your body into the palm of your other hand.



Step 3
Pull the entire glove into your other hand & keep holding it in your palm.



Step 4
Slide your two fingers into the inside of the second glove & peel away from your body.

Step 5
Keep the glove turned inside out & leave the first glove wrapped inside as you remove it.

Step 6
Dispose of the gloves safely & wash your hands prior to touching any other surfaces.

santé

Can you take off the gloves without contaminating yourself?

Doffing Sterile Gloves

- **Grasp the glove**: Using two fingers, grasp the outside of the glove near your wrist.
- **Peel away the glove**: Peel the glove away from your hand, turning it inside out.
- **Slide your finger under the remaining glove**: Use an ungloved finger or thumb to slide under the wrist of the remaining glove.
- **Peel off the remaining glove**: Peel the remaining glove off and over the first glove, creating a bag for both gloves.
- **Dispose of the gloves**: Throw away both gloves in an appropriate container.

Learning how to Doff Gloves Aseptically

Can you take off gloves without contaminating yourself?

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Animal Models

Animal Models

High School STEM Activity

Objective

This lesson introduces students to the concept of using animal models in biomedical research by using cutting-edge methods such as gene transfer, drug testing, and surgical procedures. This will help students understand how scientists safely study diseases and develop treatments for diseases. After learning about the important role that animal models play in the biotech and pharma
correctly match model characteristics and research
around the room, discussing evidence, and placing
groups to investigate real genetic diseases that aff
commonly used to study or treat each one.

ach featuring one
dent Handout (1 p
rent colors (6)
and Research App
and Disease Rese
iPad, cell phone fo
block paper

5 minutes)
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e group.
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eatments may be u

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Animal Models | Employee Activity

Students explore how animal and plant models are used in biomedical research to study diseases and...

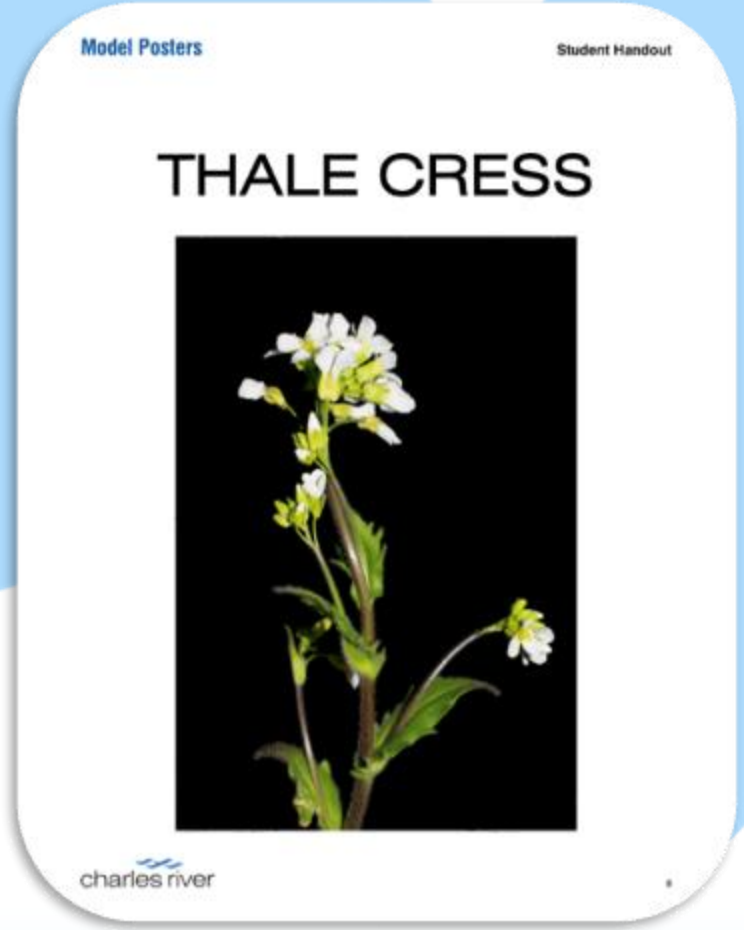
Classroom Activity

Engage: 15 minutes
Model Mystery Relay

Form groups of 3-8

Supplies:

- Stack of colored sticky notes
- Model Descriptions Student Handout
- Research Applications Card Set



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Model Descriptions

Thale Cress (plant)

The thale cress is a small p
plant model because it has
humans. The thale cress h
makes it easy to grow. Its
also helps researchers ma
can be used to map the ge
contains similar mechanisi
and cell signaling. Additio
researchers regulate gene
process called RNA silenc

Terms/Definitions

Fluorescence
Occurs when something glows under a special light. In science, it's used to make cells or parts of the body light up so researchers can watch what's happening inside.

Gene Editing
Changing a gene inside a living thing. Scientists can add, remove, or fix genes to help learn about or treat diseases.

Generation Time
How long it takes for one living thing to become an adult and have offspring. Shorter generation times mean scientists can study changes faster.

Genomics
The study of all the DNA in a living thing. DNA is like an instruction book that tells the body how to grow and work. Genomics helps scientists understand how genes affect health and traits.

Genome
All the DNA inside a living thing. It includes every gene that tells the body how to grow, look, and function.

Nema
A type
inside
cells ar
and ea

Patho
The sci
disease
tissues,

Physi
The stu
organs
keep o

Self-R
Someth
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Vertel
Animal
column

Zebrafish

Southern Asia is home to a small tropical freshwater fish species that has been vital to the advancement of biotechnology and disease **pathology**. Due to their unique characteristics, zebrafish are typically used to study vertebrate diseases. Because their stripes are formed from cells called melanocytes, these fish can be helpful in the study of melanoma, a type of skin cancer. With its high reproduction and development rate, observing the development of zebrafish involves relatively low maintenance. Their small size is also a favorite of researchers because it helps maintain a cost-effective environment. Zebrafish eggs are externally fertilized and laid, making it easier to manipulate the DNA or RNA of the eggs to then create knock-out or **transgenic cell lines**. Another benefit of using a zebrafish model is the organism's ability to self-regenerate, which allows zebrafish to reuse stem cells to stimulate the healing process.

C. elegans

Roundworm or *C. elegans* is a transparent **nematode** that is used to study various genetic diseases and biological processes such as aging. They are typically used to study neural processing due to their similarity to human **genomics**. Their transparent body can also be used for **fluorescence** to concurrently observe developmental changes. Another benefit of using a roundworm model is their small size, low maintenance, and cost effectiveness. Additionally, the adult roundworm has the same number of adult cells which permits researchers to study the effects of **gene editing**. Due to the roundworm's unique traits, they are used in various disciplines and applications.

Mouse / Rat

The use of mice or rats in studying genetic diseases was historically a model of choice due to their many applications and shared genetics and **physiology** with humans. Their high reproductive rate allows researchers to study the development and progression of many diseases and their genomic effects. While both mice and rats are common **small-animal models**, sometimes one species is preferable over the other in certain studies. Mice are easier to genetically modify and have large, inbred strains which aid in analyzing and mapping genes. However, some physiological differences between them limit human application for studying certain diseases. Additionally, mice are not as reliable to study behavior because they are not as complex as rats. Rats have a larger brain and are therefore a better model to study neuropsychiatric disorders and learning. Rats are used to study toxicologically complex traits and neuropsychiatric disorders.

Model Characteristics & Research Applications Cards

Used to study development biology

The study of how multicellular organisms grow and develop from a single cell into complex individuals.

Model lacks certain physiology, restricting the study of biological process

Model is easy to genetically modify

Model used to mimic various human diseases

Used to study neurological conditions

Used to study metabolic diseases

Used to study development disorders

Used to study the genetic process of a disease

Used for observing the effects of a drug on developing tissues as they occur

Used for transgenesis

The process of introducing DNA from one organism into the genome of another.

Used to study biological processes

Used to study aging

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Model Characteristics & Research Applications Cards | Answer Key

Used to study neurological conditions	**Zebrafish, Mouse/Rat**
Used to study metabolic diseases	**Zebrafish, Mouse/Rat**
Used to study development disorders	**Zebrafish, Mouse/Rat**
Used to study the genetic process of a disease	**C. elegans, Zebrafish, Mouse/Rat**
Used for observing the effects of a drug on developing tissues as they occur	**Zebrafish, Mouse/Rat**
Used for transgenesis (the process of introducing DNA from one organism into the genome of another)	**Zebrafish, C. elegans, Mouse/Rat**
Used to study biological processes	**All models**
Used to study aging	**C. elegans, Zebrafish, Mouse/Rat**

Used to study development biology (the study of how multicellular organisms grow and develop from a single cell into complex individuals)	**All models**
Used to study a gene mutation	**All models**
Model lacks certain physiology, restricting the study of biological process	**C. elegans, Thalecress**
Model has a transparent body	**Zebrafish, C. elegans**
Model is easy to genetically modify	**Mouse/Rat, Zebrafish**
Model has a high reproductive rate	**All models**
Model used to mimic various human diseases	**All models**

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Q & A

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Thank You

*closing slide will be provided by DE Marketing