



AnimalSmart.org

JR ANIMAL SCIENTIST

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LAB RATS!

How Animal Science Can Teach Us About Human Health

A closer look at human health

Thanks to research led by hard-working animal scientists, we have learned a lot about the best foods, housing and medications for keeping animals healthy! This research with animals can also show us the best ways to keep humans healthy.

In fact, a lot of human health research starts with animal science! Experiments with animals have helped researchers develop life-saving treatments, such as organ transplants and blood transfusions. By seeing how these medical treatments work in animals, doctors can discover better ways to help sick people.

When we study an animal to learn about human health, we call that animal a **model**. Rats, mice, zebrafish and even tadpoles are all examples of **animal models**. Livestock animals, such as goats and sheep, are useful animal models too!

You can think of animal models as substitutes or stand-ins for humans. No animal is exactly like a human, but studying an animal model can give us clues to how the human body works. For example, scientists can study how rats respond to vaccines to see how a vaccine might work if given to a person.

When scientists work with animals, they have to follow certain **ethical** practices to keep the animal as healthy and pain-free as possible every step of the way! This animal care is a part of protecting **animal welfare**, and it is extremely important for conducting good research.

In this issue of *Jr. Animal Scientist*, we'll look at how research with animal models can help us all stay healthy!



These rat cages are kept super clean so that the rats can be used for medical research. Rats are important animal models, especially for studying how medications might affect humans. By giving a rat a small dose of a medication, scientists can learn how that medicine might help sick humans!

WORD WATCH

Look for these terms in this issue of *Jr. Animal Scientist*:

Animal model: An animal that we can study to learn more about human health. These animals are very useful for understanding how parts of the human body work and how different medicines may help people.

Clinical research: When scientists study how a new drug or other medical treatment can help humans.

Research ethics: The rules for conducting safe, non-harmful studies that protect animal welfare while also helping to improve human health.

Animal welfare: The practice of protecting an animal's well-being by providing a safe, healthy environment and reducing stress for the animal.

FUN FACT:

These zebrafish don't look much like humans, but they are actually really useful animal models. Some scientists study zebrafish larvae (the babies) and their eggs to learn more about how animals develop. The larvae and eggs are see-through, or transparent. This means scientists can get a good look inside as the animals' cells grow and change. This makes the zebrafish a great model for gathering clues on how other animals, like humans, also develop.



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4 fascinating animal models!

Tadpoles

Tadpoles can teach us a surprising amount about the brain! Scientists who study the brain sometimes use African clawed frog tadpoles in their research because these tadpoles are see-through.

Human heads are not see-through, of course, so these tadpoles are a useful model for understanding how the brain develops! Scientists can actually look through the tadpoles to see how brain cells grow and how they connect to each other.

Research with tadpole models has led to fascinating discoveries about how cells in the eyes send messages to the brain. That means tadpoles have helped us understand how humans see!



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Mice

Scientists have used mice to learn more about how the nose works! Mice are great smellers! So scientists have used mice as models to learn how the nose communicates with the brain.

For example, mice are naturally afraid of cats and will avoid the smell of cat pee. Scientists can do experiments where they have mice smell cat pee. The mice will avoid the pee, and the scientists can learn how the nose shares this “get away!” message with the brain!

Humans use their sense of smell to avoid things too! So using mice as a model to understand smell is a great way to better understand both mouse and human behavior.

Ferrets

Ferrets are small, furry animals similar to weasels. You wouldn't think humans and ferrets have much in common, but it turns out that ferrets and humans have similar respiratory (breathing) systems. That means both ferret and human bodies can have the same symptoms of respiratory diseases.

Because of this similarity, ferrets are good models for understanding how a viral infection called influenza works. Influenza gets a lot of people sick every year. Scientists can use ferrets to better understand how influenza affects the body and how the immune system can fight this virus. Experiments with ferrets have helped scientists develop better therapies and vaccines to keep humans healthy.



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Sheep

Sheep are great animal models for understanding inherited disorders. Inherited disorders are genetic diseases that can be passed down through a family. Diseases like Batten disease and Ehlers-Danlos syndrome are examples of inherited disorders. Sheep can get sick with some inherited disorders that look very similar to human diseases.

Because sheep are bigger than many other animal models, such as mice, their brains are also bigger. This means sheep brains are more similar to human brains and can give us a better idea of how inherited disorders affect the brain. For example, studying sheep has helped scientists understand what is happening in the brains of children sick with Tay-Sachs disease.

Sheep are also useful because they are usually raised on farms with well-documented breeding programs. That means farmers keep records of who the sheep's parents are (the ewe who was the mother and the ram who was the father). Knowing a sheep's genetic line is extremely helpful for tracing how a disease is passed down through a family!

Caring for animals

One reason animal models are important for clinical research is because some medical treatments can be dangerous. It would not be ethical to test an experimental medication in a human, so scientists test the medication in small numbers of animals, such as rats, first.

No one wants animals to feel sick or feel pain from an experimental medical treatment, so researchers work hard to help the animals feel as comfortable as possible. These steps include:

- Animals are given a safe, clean place to live.
- Experts such as veterinarians and animal care technicians help animals stay healthy and comfortable.
- Scientists are very careful and gentle when handling the animals. This keeps the animals from feeling stress or being injured.

Researchers also use as few animals as possible for medical research. Scientists who work with animals also have to follow very important animal welfare rules determined by the government and other scientists.

**Good scientists
provide good
animal care!**



Scrambled eggs!

See how fast you can un-scramble these animal science terms!
The answers are at the bottom of the page—but don't peek!

OLEMD _____

Hint: An animal used to better understand human biology

ELFWRAE _____

Hint: The well being of an animal or person

ATDLOPE _____

Hint: A baby frog. Used in clinical research.

FRTERE _____

Hint: A small mammal similar to a weasel

LUZAENINF _____

Hint: A viral infection that affects humans and ferrets



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