

Animals in Eye and Vision Research

Eye disorders and vision loss is projected to cost the United States \$373 billion by the year 2050

What is an animal model?

Most laboratory research with animals involves mice, rats, rabbits and zebrafish. These animals serve as models for eye diseases that affect patients of all ages, including:

- **Diabetic retinopathy** – affects 4.2 million people in the U.S., 30 million worldwide.
- **Age-related macular degeneration** – affects 11 million people in the U.S., 170 million worldwide.
- **Glaucoma** – affects 3 million people in the U.S. and 76 million worldwide.
- **Dry eye disease** – affects approximately 16 million people in the U.S. Global prevalence ranges from 5% - 50% per country.
- **Ocular trauma** – affects approximately 55 million people worldwide, resulting in blindness or significant loss of vision in 42% of the cases
- **Corneal dystrophies** – estimated to affect approximately 280,000 people in the U.S., and is a predominant cause for corneal transplant worldwide
- **Corneal infections (keratitis)** – results in approximately 2 million cases of unilateral blindness per year worldwide
- **Retinitis pigmentosa** – affects approximately 100,000 people in the U.S. and 1.5 million people worldwide.

Why do researchers use animal models?

Whenever possible, laboratory techniques like cell culture and

computer modeling are used as an alternative to animal models. However, the eye and brain are complex structures that can sometimes only be studied in living organisms.

Rarely, researchers may have critical research questions that can only be answered by studying diseases in species that more closely resemble humans, such as dogs, cats or primates.

What do veterinarians think about animal models?

Veterinarians are our partners in this effort to recognize the connection between the health of humans and animals. The treatments pioneered through animal model research, though ultimately intended for human use, help restore sight in their patients too!

Animal models allow for the assessment of safety and efficacy of new medical therapies, interventions, vaccines, and surgical procedures. For example, cyclosporine is an example of a drug first used in animals to treat dry eye disease. Through animal studies, a modified version is now used in humans to treat dry eye disease. Other examples include corneal transplants, cataract surgery and retinal detachment surgery before testing them in human patients. Once perfected, these advances help restore vision to thousands of people.

What is the potential of animal models?

Animal models used in research share a large percentage of their



genes with humans – up to 95% – so there is tremendous potential to identify and understand new genetic causes and develop new treatments for inherited eye diseases in humans and animals. For example, studies in dogs with inherited retinal disease – equivalent to the blinding pediatric disease Leber's Congenital Amaurosis – provided dramatic proof-of-concept for innovative gene therapy, which was approved by the FDA as the first of its kind in human patients.

Additional Resources:

- [One Health Initiative](#)
- [Foundation for Biomedical Research](#)
- [National Association for Biomedical Research](#)
- [Understanding Animal Research](#)
- [Speaking of Research](#)



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