Dogs are important models to study cancer because they naturally develop many of the same cancers as humans. This research also benefits dogs with cancer.

Animal research enables researchers to study complex disorders such as:
- Alzheimer’s
- Cancer
- Birth defects
- Diabetes
- Immune diseases

Example

Animal Research Remains the Standard for Biomedical Research

Animals are the only way to evaluate whole-body effects when testing new drugs or treatments. The FDA requires animal studies before new drugs enter human clinical trials.

Are Nonanimal Models Effective?

Organ-on-a-chip
- miniature circuits that attempt to mimic organ physiology

Computer models
- used to simulate biological processes

Organoids
- simplified 3-D version of an organ generated from human or animal cells

Cell culture
- animal or human cells grown outside their natural environment

Nonanimal models (left) are only useful in certain research contexts. Scientists may use these methods to learn preliminary information about a biological process or potential therapy. But, in most cases, results must be validated in an animal model.

Limitations of Nonanimal Models:
- Cannot study whole-body effects and complex living systems
- Cannot study disease onset and progression
- Cannot study whole-body drug metabolism
- Cannot study whole-body developmental biology
Human tumors implanted in mice are used in pre-clinical trials to test the metabolism and efficacy of new cancer drugs.

Pig and human hearts have very similar anatomy. Pigs are essential to developing new cardiovascular devices such as battery-free pacemakers.

Humans and nonhuman primates have very similar immune systems, which makes them indispensable to developing vaccines against diseases like COVID-19.

Cultured cells and computer models are often used to expedite screening of new drugs. Information on drug action may be gained from organs-on-a-chip. These results must then be studied in an animal model to see if new drugs are effective and/or toxic in an intact living system.

Scientists can manipulate organoids to gain some understanding of how organs, such as the pancreas, develop in an embryo.

Nonanimal models cannot reliably or fully mimic complex biological systems.

Nonanimal models can help researchers fulfill the 3Rs—reduction, replacement, refinement—a framework for performing humane animal research.

Scientists are working on nonanimal models to improve their ability to predict risk. Existing models, such as skin irritation hazard screening with cultured cells, are used for limited applications.