Why Mice for Biomedical Research?

> We are getting more and more biological and genomic data from people all the time, but for most applications — including true scientific discovery — those data aren't effective for developing new medical advances. Why?

As humans, we are wildly variable from birth, with significant genetic differences between individuals. We live in different environments, eat different foods, sleep at different times — every aspect of how we live affects our response to a drug or other treatment. With our long average life span, it would take decades to uncover anything useful about aging and associated diseases. And, there are myriad ethical issues that prevent researchers from influencing human inheritance, controlling daily environment or behavior, or fully investigating our biology. Clearly there needs to be a different experimental subject.

The best models — stand-in surrogates for humans and our diseases — are mice.

The impact of mouse-based research on biological discovery and medical progress over the past century has been profound. Read the background of most Nobel Prizes awarded in Physiology or Medicine and you'll find mice used for the research — in fact, 26 Nobel Prizes can be directly tied to JAX® Mice.

Today, mice are more important than ever to research. Mice and humans are strikingly similar — genetically and biologically. They get most of the same diseases we do. With groundbreaking genome sequencing and genetic engineering capabilities, we can now create mice that have exactly the same mutations that human patients have. We can observe them throughout their lifetimes to see how environmental, pharmaceutical or other variables affect health and life span. We can even mimic human genetic variability with populations of mice that are deliberately quite genetically different. Introducing a variable — a new drug, for example — leads to different responses. With mice, researchers can readily track the genetics that underlie those differences and use their findings to inform drug development, and more accurate clinical trials.

Mice are the key filling in the blanks of human genomics, and their presence in research is vital for the development of new diagnostics, treatments, and preventative actions.

Why The Mouse?

Why do researchers work with mice?

Press Release | June 08, 2017

Genetically diverse mouse populations reveal secrets of the genome

Discoveries in JAX-founded Collaborative Cross, Diversity Outbred populations show value of multi-parent model organism systems

Genetic Tools, Metabolic Diseases, Precision Medicine, Fertility Research

Search Magazine | January 17, 2017

Rethinking the mouse model in drug development

Australian researcher Sarah Stephenson wanted to fast-track her research of Parkinson's disease, so she shuffled the genetic deck using a new experimental platform at The Jackson Laboratory.

Genetic Tools, Precision Medicine, Parkinson's Disease

Our mice, our hope

For more than a century, scientists have used the mouse as a genetic model of the human being to understand our fundamental biology and to identify and test better treatments and cures for the most devastating diseases.

Research Highlight | April 16, 2019

Genetically diverse mice show human-like responses to heart attack

A research team led by Nadia Rosenthal, Ph.D., documented large differences in survival, cardiac dilation and scar size among a population of genetically-diverse mice.

Cardiovascular, Genetic Tools

Why are mice considered excellent models for humans?

Humans and mice don't look alike, but both species are mammals and are biologically very similar.

Almost all of the genes in mice share functions with the genes in humans. That means we develop in the same way from egg and sperm, and have the same kinds of organs (heart, brain, lungs, kidneys, etc.) as well as similar circulatory, reproductive, digestive, hormonal and nervous systems. These similarities make it possible for scientists to study the physiology of mice to glean information about how human beings grow, develop diseases and age.

This genetic similarity also means that mice and humans inherit traits in the same way. This includes physical traits such as hair color (coat color in mice) and susceptibility to diseases such as heart disease or Alzheimer's.

Because mice live short lives compared to humans — about two years in laboratory care, but much less in the wild — it's possible to learn a great deal about how chronic diseases progress over a lifetime, and about the processes of aging. Mice are small and relatively economical to maintain, making them the ideal laboratory animal model.

Thousands of laboratory mouse strains are now available, so scientists can therefore choose the ideal mouse model to study different diseases and disease processes. And the mouse genome is easily manipulated in order to create even more precise models of specific diseases.

Because scientists have been studying laboratory mice for more than 100 years, more is known about their biology and genetics than any animal except for humans. This sheer volume of data, maintained and provided to the worldwide scientific community by The Jackson Laboratory as the Mouse Genome Database, makes the mouse the model of choice for biomedical research.