

Neuroscience, Brain, and Behavior Talking Points

- The FDA requires all new medications to be validated using animal models prior to clinical trials. Most medications are tested first in cells, then multiple species of animals prior to humans. Different species provide different information about how drugs work.
- Animals help us understand the mechanisms underlying complex human diseases such as Parkinson's Disease. Mice and rats have helped us understand the complicated damage to dopamine systems that underlies motor impairments in Parkinson's Disease (PD). Rodent models of PD also allow us to explore new medications to prevent and treat human patients.
- Most people think that since psychological disorders are a "human" problem, we cannot gain knowledge by studying animals. However, there are lots of animal models of complicated human disorders including substance use disorder, schizophrenia, and depression.
 - Genetic knock-out mice that lack the NMDA glutamate receptor have provided insight on the role that glutamate may play in the development of certain symptoms of schizophrenia, including aggressive and social symptoms.
 - Mice, rats, and rhesus monkeys have all contributed to medications developed for addiction (substance use disorder) and smoking cessation
 - We don't know if animals experience emotions the same way that humans do, but we do know that animal models are highly predictive at determining promising new drugs that might help to treat symptoms of depression in humans.
 - Animal models of chronic stress have provided insight into the neurobiological mechanisms underlying anxiety disorders including post-traumatic stress disorder.
 - An understanding of the biology and neurochemistry underlying these and other psychological disorders is critical to move the science forward toward understanding how to better treat and prevent these conditions in humans.
- Prior to conducting experiments with animals, a team of qualified experts, veterinary professionals, and members of the community must first evaluate the design, methods, and potential outcomes of an experiment. Biomedical research in the United States is subject to this oversight from Institutional committees to promote the highest care for animals in research, ethical standards, limiting pain and unnecessary stress, and the best research environment.
- The brain of a rat is a lot smaller than the brain of a human; however, they share a lot of the same neuroanatomy and neurochemistry.
 - For example, the brain regions that mediate sexual behavior in humans also do so in rats. In fact, drugs that decrease sexual behavior in rats also cause sexual dysfunction in humans, which allows us to anticipate potential side effects of medications prior to moving them into clinical trials.
 - The brain regions that mediate feeding in humans also mediate feeding in rats. In fact, drugs that decrease feeding in rats are appetite suppressants in humans, which allows us to examine potential medications for obesity in rodent models.
 - The brain regions that mediate sleep in rats also mediate sleep in humans. We can examine medications for sleep disorders in animal models of narcolepsy and insomnia, before testing them in human clinical trials.