

The Importance of Nicotine Research with Nonhuman Animals

Nicotine is a powerful addictive substance. Understanding its effects is crucial to improving public health.

Tobacco use is the leading preventable cause of premature death in the United States.

Cancer, lung and heart diseases, and many other conditions caused by tobacco use contribute to premature death, with significant consequences for the nation's health care system. Although safe and effective treatments for nicotine addiction are available, rates of tobacco use remain high, emphasizing the need to develop improved treatment and prevention strategies. These strategies rely, in part, on better understanding the underlying molecular and neurobiology of nicotine and tobacco addiction as well as the environmental factors that contribute to the initiation and maintenance of tobacco use.

Basic research with nonhuman animals has been and continues to be vital to understanding and treating addictions.

Nonhuman animal research plays an integral role in advancing our understanding of biology and behavior. It was through such research that nicotine was identified as the addictive ingredient in tobacco. However, a great deal remains unknown. Those gaps in knowledge are obstacles to progress in reducing addiction and promoting health. For example, we do not know how nicotine interacts with other ingredients in tobacco which might underlie compulsive use of nicotine-containing products. To get a clear understanding, these interactions need to be studied in a controlled manner, which is not possible to do with human research subjects.

Rodents. Research with rodents, such as rats and mice, has been critical for identifying the cellular, molecular, and genetic underpinnings of nicotine use. These animals can be trained to perform a response to receive nicotine through intravenous catheters (referred to as "nicotine self-administration"). The behavior clearly is not smoking, and it never was meant to mimic any of the methods used by humans to deliver tobacco. That is intentional, because the primary goal is to isolate the mechanisms underlying nicotine addiction. But this method has also been applied to determine how other ingredients in tobacco products alter nicotine use. Such studies would not be feasible in humans.

Nonhuman primates. Research with nonhuman primates, such as monkeys, both complements and expands on research with rodents. For example, the metabolism of nicotine in monkeys is more similar to humans than rodents. Moreover, the receptors for nicotine (nAChR) differ between rodents and nonhuman primates, with the molecular structure and brain distribution of nAChR in monkey much closer to the distribution of nAChR in humans. These facts make primate research critical to the treatment development process, especially at later stages of research when a medication is being prepared for clinical trials in humans.

Research with animals is necessary—and their welfare is a priority.

Because addiction represents a complex interaction of the environment, behavior, and biology of the individual, we are not at the point where the actions of nicotine can be fully modeled using cell culture or by computer simulation. Moreover, vulnerability to nicotine addiction, especially during adolescence, is understood poorly and represents one of the greatest challenges to combating nicotine addiction. It is impossible to study the early stages of tobacco use and addiction without the use of experimental animals. Administering tobacco or nicotine to humans who do not use tobacco or nicotine would not be ethical.

Research conducted with animals is regulated at the local, state, and federal levels. The number one priority for the team of scientists, veterinarians, animal care personnel, and federally-mandated university Institutional Animal Care and Use Committees (IACUC) is ensuring the welfare and humane treatment of animals used in ethically and scientifically sound research. Animal research is overseen at the federal level by the Department of Agriculture (USDA) and the National Institutes of Health (NIH) Office of Laboratory Animal Welfare. Voluntary accreditation bodies, such as AAALAC, International also set and enforce standards for the use of animals in research. This multi-level system of oversight ensures the highest standards for humane care and treatment of animals in research.

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Animal research IS in the public interest.

Findings from basic research with animals serve as building blocks for applied research that aims to understand, prevent, and treat various health conditions that affect humans and/or other animals. For example, animal research has played a vital role in our understanding of neurochemical mechanisms that underlie various conditions, including depression, anxiety, schizophrenia, substance abuse, Parkinson's disease, and Alzheimer's disease. This knowledge is critical in the development of both prevention and treatment programs for such diseases.

In addition, by working with and studying other species, behavioral scientists inform best practices for addressing the health and welfare needs of not only laboratory animals but also animals in other settings such as zoos, farms, service animals for the differently abled, animals used in search and rescue, animals used to detect bombs and drugs, as well as family pets in the home.

Animal research is in the public interest. It enables science to advance understanding of basic mechanisms underlying behavior and to develop and deliver treatments to improve the health and wellbeing of people and other animals.

Request: The American Psychological Association encourages Congress to continue support for nicotine research with nonhuman animals, and to oppose bills or amendments that seek to end all research with nonhuman animals.



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