

Editorial

Animal Models of Human Pathology

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Animal models of human pathologies, including naturally occurring, induced, or engineered animals, are valuable tools for understanding the physiopathology of the disease and discovering novel therapeutic targets and drugs. In fact, although scientific research has always relied on the use of cell cultures, information that is obtained through *in vitro* studies can be extrapolated to the biomedical research only when analyzed within a complex organism with metabolic functioning. Therefore, one avenue holding tremendous potential to find therapies against human diseases is the use of intact living systems, where complex biological processes can be examined.

However, all animal models of human disease have embedded limitations. Some of these limitations are due to the differences between animals and humans. The normal anatomy and physiology of an organ can differ among species. Furthermore, certain species may not be suitable for modelling some aspects of human disease. Moreover, most laboratory animals are kept in highly controlled environments with limited exposure to environmental pathogens that may affect innate responses to pathological processes. Finally, while inbreeding has the advantage of producing genetically identical offspring leading to highly reproducible experimental findings, it also may produce strain-specific phenotypes that are not relevant outside of that strain.

Despite all these limitations, there are still many advantages in animal studies. As any clinical investigator is well aware, the rate of human studies is slow, the majority of human tissues is not routinely accessible for research purposes, and there is a very limited opportunity for interventional studies. By contrast, large numbers of animals (especially rodents) can be bred and studied in short time periods, interventional studies are easy to do, and established

and emerging tools for targeted manipulation of levels of gene expression facilitate insight into the function of mediators in both health and disease.

In this special issue, we collected original research articles as well as review articles describing researches in which animal models, ranging from small vertebrates to large animals, have been used for either understanding the molecular events underlying a disease or for improving therapy in various fields of medicine (immunology, neurology, cardiovascular, oncology, etc.). On the one hand, a large group of papers describe animal models of human diseases and how they have allowed gaining a deeper insight to their pathogenesis. On the other hand, another group of papers describe the usefulness of animal models for improving the diagnosis of a disease and the development of new therapeutic strategies.

The goal of this special issue is to familiarize the reader with the commonly used animal models of human diseases. The strengths and limitations of the various models have been discussed as have been the degree to which individual models mimic human disease. It is our hope that this special issue will serve as a resource for biomedical investigators at all levels, both those engaged in animal research and those seeking to understand the literature.

We sincerely appreciate the outstanding contributions of all the authors and anonym reviewers for their enthusiasm and hard working. We extend our whole-hearted thanks to the Editorial Board for agreeing to publish these papers as a cluster in this special issue and for facilitating efficiency and rigor in the peer review process.

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