

Introduction

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Mammalian disease models are key to translational studies that lead from profound insights into biological mechanisms to significant changes in treatment and clinical practice. Animal models provide a critical tool for studying the genetic bases of disease systems and understanding the physiological and pathophysiological mechanisms involved. In addition, the mouse in particular is an important and powerful tool for validating and interpreting the outputs of human GWAS studies that are elaborating the underlying genetic pathways for disease in the human population. Through these and other studies it is possible to identify novel targets and potential therapeutic strategies that go beyond current treatments. Moreover, disease models are themselves vital in pre-clinical assessments of therapeutic interventions, throwing further light on the mechanisms involved in disease states. With continuing advances in genomic technologies and the enormous expansion in genetic resources in the mouse and other mammalian model systems, the contribution of disease models to translational studies will continue to grow and be an important part of the translational pipeline.

The collection of reviews in this Special Issue serves to illustrate the latest developments in the contributions of disease models to the translational engine, covering examples from mouse, rat and dog in a variety of disease systems. The reviews illustrate the broad-ranging impact that mammalian disease models are already making to the understanding of disease mechanisms and the development of novel therapeutic strategies.

In all the areas discussed, from autoimmune and inflammatory diseases to type 2 diabetes, neurodegenerative diseases to platelet homeostasis, the value of mouse genetics and mouse models is apparent from the considerable progress in elaborating genetic pathways and mechanisms, and in some cases from the utility of the models in evaluating therapeutic approaches. We also include two reviews that discuss the rat and the dog as model systems and which elaborate some of the important developments in these two organisms and how they are contributing to providing a wide spectrum of approaches to translation studies and new therapies.

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