Editorial

New technologies for genetic manipulation of animal models: Forum introduction

Ziyi Li[1] and John F Engelhardt*[1,2,3]

Address: [1]Department of Anatomy & Cell Biology College of Medicine, University of Iowa, 1-111 BSB, 51 Newton Road, Iowa City, IA 52242, USA, [2]Department of Internal Medicine College of Medicine, University of Iowa, 1-111 BSB, 51 Newton Road, Iowa City, IA 52242, USA and [3]The Center for Gene Therapy of Cystic Fibrosis and Other Genetic Diseases, College of Medicine, University of Iowa, 1-111 BSB, 51 Newton Road, Iowa City, IA 52242, USA

Email: Ziyi Li - ziyi-li@uiowa.edu; John F Engelhardt* - John-engelhardt@uiowa.edu

* Corresponding author

The 21st century has emerged as the genetic era. Mapped human and mouse genetic codes are now integral parts of everyday research attempting to understand the mechanisms of disease processes. Improved technologies have made full genome sequencing for other mammalian species feasible in the not-so-distant future. Functional genomics and proteomics approaches are now attempting to translate massive libraries of genome sequences into a comprehensible functional context. In this regard, animal models are playing an increasingly important role in dissecting how complex biological systems integrate numerous genes to carry out functional programs and disease processes in intact organisms. Genetic mouse models have undoubtedly proven invaluable in this regard, but they are sometimes insufficient to address the pathophysiologic processes of certain human diseases. Hence, there is an increasing need for genetic animal models for larger species. Advances in technologies for genome manipulation and somatic cell nuclear cloning have created new opportunities to expand genetic modeling to species other than the mouse. These same technologies will also likely accelerate the field's ability to carry out functional genomic studies in mice by retooling the manner in which transgenic and gene-targeted mouse models are generated. The focus of this forum issue is to highlight recent achievements in somatic cell nuclear transfer cloning technologies and transgenesis, with a focus on the merging of these technologies in the generation of animal models. Topics for review include the use of phage integrase systems to site specifically target integration of gene sequences in transgenic animals, the use of transposable element-mediated transgenesis, and the generation of transgenic and gene-targeted larger animal models. The great potential of these technologies will likely significantly change the future of biomedical research and molecular medicine by facilitating genetic studies in numerous mammalian species.