Preface

Adenosine deaminases acting on RNA (ADARs) bind double-stranded RNA and catalyze the deamination of adenosine (A), producing inosine (I) in RNA substrates. Because "I" is recognized as "G" instead of "A", nucleotide substitutions are generated that have the potential to amplify genetic diversity and alter gene product function, thereby affecting a broad range of biological processes. A-to-I editing occurs with both cellular and viral RNA substrates, and in both coding and noncoding regions of RNAs. The importance of ADARs for normal development and physiology, both in the absence and presence of pathogen infection, is illustrated by the phenotypes seen in model organisms and cultured cells following genetic disruption of *adar* genes, and either knockdown or over expression of ADAR proteins. This volume of *Current Topics in Microbiology and Immunology* reviews several aspects of ADARs and A-to-I editing. The volume begins with the two chapters that review the biochemical properties of ADAR proteins: their structure and catalytic mechanism, and their nucleic acid binding activities conferred by repeated dsRNA and Z-DNA binding domains. The next four chapters concern A-to-I editing of coding and noncoding RNA transcripts: editing of coding RNAs that affects the open reading frame and subsequently causes changes in ribosome decoding, resulting in protein products with altered function including cellular neurotransmitter receptors and ion channels and viral proteins; and, the editing of noncoding micro RNAs and mRNA 3′-untranslated regions. Bioinformatic strategies to identify new candidate targets of A-to-I editing are next considered. The volume concludes with three chapters that focus on roles that ADARs play that affect virus-host interactions and innate immunity, and mouse development and Drosophila biology.

The objective of this *CTMI* volume is to provide readers with a foundation for understanding what ADARs are and how the act to affect gene expression and product function. It is becoming increasingly apparent that ADARs may function not only as enzymes that deaminate adenosine in RNA substrates with double-

stranded character, but also as RNA binding proteins independent of their catalytic property. Future studies of ADARs no doubt will provide us with additional surprises and new insights into the modulation of biological processes by the ADAR family of proteins.

Santa Barbara, April 2011 Charles E. Samuel

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