

Post-Transcriptional Regulation by STAR Proteins

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Edited by Talila Volk and Karen Artzt

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Post-Transcriptional Regulation by STAR Proteins

Control of RNA Metabolism in Development and Disease

Edited by

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Title page image: Two littermates, the right one is *quaking*.

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DEDICATIONS

This book is dedicated to my family. —Talila Volk

Dedicated to my mentors: Dorothea Bennett, 1929-1990 and L.C. Dunn, 1893-1974. —Karen Artzt

PREFACE

This book aims to bring to the forefront a field that has been developing since the late 1990s called the STAR pathway for Signal Transduction and Activation of RNA. It is a signaling pathway that targets RNA directly; in contrast to the canonical signal—kinase cascade—transcription factor—DNA—RNA. It is proposed to allow quick responses to environment changes such as those necessary in many biological phenomena such as the nervous system, and during development. The pathway is diagramed in Chapter 1, Figure 1. This chapter is a historical introduction and general review with some new data on theoretical miRNAs binding sites and STAR mRNAs. In Chapter 2, Feng and Banks address the accumulating evidence that the RNA-binding activity and the homeostasis of downstream mRNA targets of STAR proteins can be regulated by phosphorylation in response to various extracellular signals. Then Ryder and Massi review the available information on the structure of the RNA binding STAR domain and provides insights into how these proteins discriminate between different RNA targets. Next Claudio Sette offers an overview of the post-translational modifications of STAR proteins and their effects on biological functions, followed by two chapters dedicated to in depth review of STAR function in spermatogenesis and in mammalian embryonic development. Chapters 7 and 8 discuss what can be learned from STAR proteins in non-mammalian species; in *Drosophila* and Gld-1 and Asd-2 in *C. elegans*. Next Rymond discusses the actual mechanics of splicing with mammalian SF1. Lastly Richard reviews what is known about STAR proteins and human disease including osteoporosis, schizophrenia, cancer, infertility and ataxia. The general intention of the editors is that basic researchers and clinicians will be stimulated to join the “Enterprise” studying the role of STAR proteins in other relevant diseases including dysmyelination and remyelination in multiple sclerosis and disorders of the neural and immune synapse.

Talila Volk, BSc, MSc, PhD
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ABOUT THE EDITORS...



TALILA VOLK is an Associate Professor in the field of Developmental Biology and the incumbent of the Sir Ernest B. Chain Professional Chair. Her major research interests are tissue morphogenesis and organogenesis during embryonic development. She has been studying the function and activity of the STAR family member Held Out Wing (HOW) in the fruit fly *Drosophila* since 1999. She served as the chairwoman for the Society of Developmental Biology in Israel (ISDB). Dr. Volk has gained her BSc from Tel-Aviv University, and her MSc and PhD degrees from the Weizmann Institute of Science, Rehovot, Israel.

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