
Preface

Microtubules are at the heart of cellular self-organization and the target of the most widely used anticancer drugs. The dynamic nature of microtubules allows them to explore the intracellular space and mediate the transport of cargoes from the nucleus to the outer edges of the cell and back. They provide physical strength and, through dynamic interactions with subcellular structures, such as kinetochores, cell adhesion sites, or the actin cortex, orchestrate multiple cell biological processes, including chromosome segregation and directional cell migration. Modern methods make it possible to ask for mechanistic principles underlying microtubule dynamics regulation. The main purpose of this book is to provide an up-to-date collection of methods and approaches that are used to investigate microtubule dynamics in vitro and in cells. While it was impossible to cover all available techniques to study microtubule dynamics, I hope this book provides detailed protocols how to perform a broad range of well-established and newly emerging techniques, contributed by experts in the field.

This book was put together with two groups of readers in mind: First, students and postdoctoral researchers starting work in a microtubule laboratory. Second, established researchers in the microtubule field who require a resource for established and new methodologies. The book starts off with a chapter reflecting on how to analyze microtubule dynamics (Chapter 1), followed by detailed descriptions on how to isolate tubulin from different sources and with different posttranslational modifications (Chapters 2–5), methods to study microtubule dynamics and microtubule interactions in vitro (Chapters 6–13), techniques to investigate the ultrastructure of microtubules and associated proteins (Chapters 14 and 15), and assays to study microtubule nucleation, turnover, and force production in cells (Chapters 16–19). Finally, we discover approaches to isolate novel microtubule-associated proteins and their interacting proteins (Chapters 20 and 21). I hope that the combination of in vitro reconstitution experiments, cellular assays, and structural analysis described in this volume will help to build well-informed mechanistic models of dynamic instability and further our understanding of microtubule-mediated processes.

I would like to thank all authors for their enthusiasm and effort in contributing to this collection of methods, as well as Tim Mitchison and Ted Salmon for providing freely accessible online resources of microtubule methods on their lab Web sites (<http://mitchison.med.harvard.edu/protocols.html> and <http://www.bio.unc.edu/faculty/salmon/lab/salmonprotocols.html>), which were an inspiration for many of the chapters and cover additional methods not included in this book. Finally, I wish to thank all those who have suffered from a lack of attention while I was reading and editing the chapters in this book for their patience.

Anne Straube

Microtubule Dynamics

Methods and Protocols

Straube, A. (Ed.)

2011, XI, 319 p. 56 illus., 13 illus. in color. With online
files/update., Hardcover

ISBN: 978-1-61779-251-9

A product of Humana Press