

DYNEINS: STRUCTURE, BIOLOGY AND DISEASE

Edited by Stephen M. King

Dyneins are microtubule-based molecular motors that are involved in a broad array of motile activities within cells including vesicular transport, mitosis, and ciliary/flagellar motility. These enzymes are highly complex. They are built around one or more motor unit (> 500 kDa) and contain multiple additional subunits involved in assembly of the mature enzyme, attachment to various cargoes, and/or regulation of motor activity in response to various external cues. Defects in dynein-mediated motor activity are now known to yield a complex array of phenotypes including brain disorders such as lissencephaly, infertility, situs inversus, and other developmental abnormalities. In addition, dyneins have been implicated in neurodegenerative disease (including amyotrophic lateral sclerosis, Huntington's disease, and a form of Parkinson's termed Perry syndrome) and are co-opted by a large number of viruses (such as HIV, herpes, and rabies) during infection.

This volume provides an essential resource for students, researchers, and clinicians interested in dynein molecular motors and the devastating consequences of their dysfunction. It is divided into five broad sections, *i.* history and evolution, *ii.* structure and mechanics of dynein motors, *iii.* dyneins in ciliary biology, *iv.* cytoplasmic dynein biology, and *v.* dynein dysfunction and disease, with chapters covering the current state of dynein research in these areas.

Topics include:

- History of dynein research
- Evolutionary biology of dynein motor units
- High-resolution structural studies of dynein components
- Biophysics of dynein-based movement
- Subunit composition and isoform diversity
- Genetics and regulation of cytoplasmic and ciliary dyneins
- Mechanism by which the dynactin complex promotes dynein-mediated intracellular transport
- Role of dyneins in mitosis
- Disease consequences of both ciliary and cytoplasmic dynein dysfunction

Key Features

- Broad-based up-to-date resource for the dynein class of molecular motors
- Chapters written by world experts in their topics
- Numerous well-illustrated figures and tables included to complement the text, imparting comprehensive information on dynein composition, interactions, and other fundamental features

Stephen M. King, Ph.D., is Professor of Biochemistry in the Department of Molecular, Microbial and Structural Biology at the University of Connecticut Health Center. He has studied dyneins for over 25 years. His current research employs a broad array of structural, biochemical, genetic, and cell biological approaches to address fundamental questions about dynein assembly, function, and regulation.



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