

"Mechanotransduction" is the term for the ability, first described by nineteenth-century anatomist Julius Wolff, of living tissues to sense mechanical stress and respond by tissue remodeling. More recently, the scope of mechanotransduction has been expanded to include the sensation of stress, its translation into a biochemical signal, and the sequence of biological responses it produces. This book looks at mechanotransduction in a more restricted sense, focusing on the process of stress sensing and transducing a mechanical force into a cascade of biochemical signals. This stress has become increasingly recognized as one of the primary and essential factors controlling biological functions, ultimately affecting the function of the cells, tissues, and organs. A primary goal of this broad book is also to help define the new field of mechanomics, which attempts to describe the complete mechanical state of a biological system.

Dr. Mohammad R. K. Mofrad is currently Assistant Professor of Bioengineering at the University of California, Berkeley, where he is also an affiliated faculty member of graduate programs in applied science and technology and biophysics. Dr. Mofrad received his B.A.Sc. degree from Sharif University of Technology. After earning M.A.Sc. and Ph.D. degrees from the Universities of Waterloo and Toronto, respectively, he spent two years at MIT and Harvard Medical School/Massachusetts General Hospital as a post-doctoral Fellow. Before joining the faculty at Berkeley, Dr. Mofrad was a Principal Research Scientist at MIT for nearly two years. At Berkeley, he has developed and taught several courses, including Cell Mechanics and Mechanotransduction and Molecular Cell Biomechanics. He is the founder of the Mechanotransduction Knowledgebase Web site, mechanotransduction.org.

Dr. Roger D. Kamm has long been interested in biomechanics, beginning with his work in vascular and pulmonary physiology and leading to his more recent work in cell and molecular mechanics in the context of cellular responses to mechanical stress. Dr. Kamm has been on the faculty at MIT since receiving his Ph.D. in 1977 and now holds a joint appointment in the Biological Engineering and Mechanical Engineering Departments. He is currently the Chair of the U.S. National Committee on Biomechanics and the World Council on Biomechanics, and he is Director of the Global Enterprise for MicroMechanics and Molecular Medicine. Kamm has a long-standing interest in bioengineering education, directs a National Institute of Health-funded biomechanics training program; co-chaired the committee to form MIT's new undergraduate major in biological engineering; and helped to develop MIT's course on molecular, cellular, and tissue biomechanics.

Cover photo: Courtesy of Brian R. Helmlinger
Cover design: Alice Salmway

CAMBRIDGE
UNIVERSITY PRESS
www.cambridge.org

ISBN 978-1-107-68246-7



9 781107 682467 >