Muscle Contraction

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WERNER PONCE

Muscular Contraction Morgan & Claypool Publishers
Easily understood, up-to-date and clinically relevant, this book provides junior anaesthetists with an essential physiology resource.
The Sliding-Filament Theory of Muscle Contraction John Wiley & Sons
Sliding Filament Mechanism in Muscle Contraction: Fifty Years of Research covers the history of the sliding filament mechanism in muscle contraction from its discovery in 1954 by H.E. Huxley through and including modern day research. Chapters include topics in dynamic X-ray diffraction, electron microscopy, muscle mechanisms, in-vitro motility assay, cardiac versus smooth muscle, motile systems, and much more.
Excitation-Contraction Coupling and Cardiac Contractile Force Springer Science & Business Media
This volume describes the current state of our knowledge on the neurobiology of muscle fatigue, with consideration also given to selected integrative cardiorespiratory mechanisms. Our charge to the authors of the various chapters was twofold: to provide a systematic review of the topic that could serve as a balanced reference text for practicing health-care professionals, teaching faculty, and pre-and postdoctoral trainees in the biomedi cal sciences; and to stimulate further experimental and theoretical work on neurobiology. Key issues are addressed in nine interrelated areas: fatigue of single muscle fibers, fatigue at the neuromuscular junction, fatigue of single motor units, metabolic fatigue studied with nuclear magnetic resonance, fatigue of the segmental motor system, fatigue involving suprasegmental mechanisms, the task dependency of fatigue mechanisms, integrative (largely cardiorespiratory) systems issues, and fatigue of adapted systems (due to aging, under-and overuse, and pathophysiology). The product is a volume that provides compre of processes that operate from the forebrain to the contractile proteins.
Anatomy and Physiology CRC Press
Provides readers with a detailed understanding of the different facets of muscle physiology. Examines motoneuron and muscle structure and function. It is intended for those need to know about skeletal muscle--from undergraduate and graduate students gaining advanced knowledge in kinesiology to physiotherapists, physiatrists, and other professionals whose work demands understanding of muscle form and function.
Keynes & Aidley's Nerve and Muscle Springer Science & Business Media
Concepts of Biology is designed for the typical introductory biology course for nonmajors, covering standard scope and sequence requirements. The text includes interesting applications and conveys the major themes of biology, with content that is meaningful and easy to understand. The book is designed to demonstrate biology concepts and to promote scientific literacy.
Smooth Muscle Contraction Springer Science & Business Media
How is the heartbeat generated? What controls the strength of contraction of heart muscle? What are the links between cardiac structure and function? How does our understanding of skeletal and smooth muscle and non-muscle cells influence our thinking about force development in the heart? Are there important species differences in how contraction is regulated in the heart? How do the new molecular data fit together in understanding the heart beat? What goes wrong in ischemia, hypertrophy, and heart failure? This book paints a modern `portrait' of how the heart works and in this picture the author shows a close-up of the structural, biochemical, and physiological links between excitation and contraction. The author takes the reader through a series of important, interrelated topics with great clarity and continuity and also includes many useful illustrations and tables. The book starts by considering the cellular structures involved in excitation-contraction coupling and then described the characteristics of the myofilaments as the end effector of excitation-contraction coupling. A general scheme of calcium regulation is described and the possible sources and sinks of calcium are discussed in simple, but quantitative terms. The cardiac action potential and its many underlying currents are reviewed. Then the characteristics of some key calcium transport systems (calcium channels, sodium/calcium exchange and SR calcium uptake and release) are discussed in detail. This is then built into a more integrated picture of calcium regulation in succeeding chapters by detailed discussions of excitation-calcium coupling mechanisms (in skeletal, cardiac, and smooth muscle), the interplay between calcium regulatory processes, and finally mechanisms of cardiac inotropy, calcium overload, and dysfunction (e.g., ischemia, hypertrophy, and heart failure). Excitation-Contraction Coupling and Cardiac Contractile Force – Second Edition is an invaluable source of information for anyone who is interested in how the heart beat is controlled and especially suited for students of the cardiovascular system at all levels from medical/graduate students through senior investigators in related fields.
Mechanisms of Vascular Disease Springer Science & Business Media
This book describes the evolution of ideas relating to the mechanism of muscular contraction since the discovery of sliding filaments in 1954. An amazing variety of experimental techniques have been employed to investigate the mechanism of muscular contraction and relaxation. Some background of these various techniques is presented in order to gain a fuller appreciation of their strengths and weaknesses. Controversies in the muscle field are discussed along with some missed opportunities and false trails. The pathway to ATP and the high energy phosphate bond will be discussed, as well as the discovery of myosin, contraction coupling and the emergence of cell and molecular biology in the muscle field. Numerous figures from original papers are also included for readers to see the data that led to important conclusions. This book is published on behalf of the American Physiological Society by Springer. Access to APS books published with Springer is free to APS members.
Cellular Physiology of Nerve and Muscle McGraw Hill Professional
A version of the OpenStax text
An Introduction to Smooth Muscle Mechanics (2nd Edition) Springer
This second edition is an updated version of an introductory level textbook intended for students who are interested in understanding the mechanical properties of smooth muscle. Compared with skeletal and cardiac muscles, smooth muscle is the least understood in terms of its contraction mechanism and the structure of its contractile apparatus. Nevertheless, it is an important tissue that is vital in many organ functions, such as blood pressure control, intestinal peristalsis, and the emptying of the bladder. Dysfunction of the muscle has been implicated in many diseases such as high blood pressure, asthma, and overactive bladders. This is the only book-length treatment of functional models of a variety of smooth muscle behaviors with their corresponding mathematical descriptions, and offers an easy-to-follow, step-by-step mathematical derivation that will help students to appreciate the muscle cell as a fine-tuned aggregate of mechanisms governed by the fundamental laws of physics. In addition to providing a detailed description of the known subcellular structure and mechanical function of the contractile apparatus of smooth muscle, it also covers experimentation techniques, instrumentation, and data analysis. The book is a must-have information source for anyone interested in smooth muscle cell ultrastructure, physiology, biochemistry, and pharmacology.
Molecular and Cellular Aspects of Muscle Contraction Cambridge University Press
This valuable resource provides a systematic account of the biochemistry of smooth muscle contraction. As a comprehensive guide to this rapidly growing area of research, it covers the structure and characteristic properties of contractile and regulatory proteins, with special emphasis on their predicted function in the live muscle. Also included in this book are intermediate filament proteins, and desmin and vimentin, whose function in smooth muscle is unknown; and several enzymes involved in the phosphorylation-dephosphorylation of contractile and other proteins.
Mysteries in Muscle Contraction Springer Science & Business Media
This book explores the author’s wide-ranging work on muscle research, which spans more than 50 years. It delves into the dogmas of muscle contraction: how the models were constructed and what was overlooked during the process, including their resulting shortcomings. The text stimulates general readers’ and researchers’ interest, highlights the author’s pioneering work on the electron microscopic recording of myosin head power and recovery strokes, and presents a frank discussion on how the original work sometimes tends to be overlooked by competing scientists, who hinder the progress of science.
Biology for AP ® Courses CRC Press
The Encyclopedia of Exercise Medicine is intelligently structured, easy accessible and user-friendly: A-Z format, clear, concise language and uniform essay structure as well as extensive cross references between keywords and related articles enables efficient searches in a user-friendly manner both for experts and newcomers. It is intended to be a comprehensive up-to-date data base on the adaptation of the human body to exercise and on the therapeutic use of exercise with up to 2,000 keywords. It covers all aspects within the full range of modern exercise medicine of each particular scientific discipline (cancer, parasitology, aging, etc.). This includes information on methodological approaches to measuring the principle components of motor fitness, and practical aspects of their enhancement by trainings regimes as well as by nutrition and the application of drugs. Such a wide range of entries, all written by leading experts in their respective fields, will therefore address both the basic/clinical scientist as well as the practitioner. Moreover, the Encyclopedia of Exercise Medicine is aimed at people in related fields, health care professionals, physiotherapists, trainers, students, informed athletes and interested laypersons. It is available both in print and as a fully searchable and hyperlinked electronic online edition.
Anatomy & Physiology Springer Science & Business Media
Muscle contraction has been the focus of scientific investigation for more than two centuries, and major discoveries have changed the field over the years. Early in the twentieth century, Fenn (1924, 1923) showed that the total energy liberated during a contraction (heat + work) was increased when the muscle was allowed to shorten and perform work. The result implied that chemical reactions during contractions were load-dependent. The observation underlying the “Fenn effect” was taken to a greater extent when Hill (1938) published a pivotal study showing in details the relation between heat production and the amount of muscle shortening, providing investigators with the force-velocity relation for skeletal muscles. Subsequently, two papers paved the way for the current paradigm in the field of muscle contraction. Huxley and Niedergerke (1954), and Huxley and Hanson (1954) showed that the width of the A-bands did not change during muscle stretch or activation. Contraction, previously believed to be caused by shortening of muscle filaments, was associated with sliding of the thick and thin filaments. These studies were followed by the classic paper by Huxley (1957), in which he conceptualized for the first time the cross-bridge theory; filament sliding was driven by the cyclical interactions of myosin heads (cross-bridges) with actin. The original cross-bridge theory has been revised over the years but the basic features have remained mostly intact. It now influences studies performed with molecular motors responsible for tasks as diverse as muscle contraction, cell division and vesicle transport.
Botulinum Neurotoxins Cambridge University Press
This volume presents the proceedings of a muscle symposium, which was held as the Fourth Fujihara seminar on October 28 - November 1, 2002, at Hakone, Japan. This volume covers all fields of muscle biology, from molecules to humans. This book provides information about recent progress of

muscle research as well as the problems that remain to be investigated. This volume will stimulate muscle investigators to design and perform novel experiments to clarify the mysteries in muscle contraction.

Biomechanical Models for Soft Tissue Simulation Cambridge University Press

An overview of biomechanical modeling of human soft tissue using nonlinear theoretical mechanics and incremental finite element methods, useful for computer simulation of the human musculoskeletal system.

Encyclopedia of Exercise Medicine in Health and Disease Elsevier

This book explores the author’s wide-ranging work on muscle research, which spans more than 50 years. It delves into the dogmas of muscle contraction: how the models were constructed and what was overlooked during the process, including their resulting shortcomings. The text stimulates general readers’ and researchers’ interest, highlights the author’s pioneering work on the electron microscopic recording of myosin head power and recovery strokes, and presents a frank discussion on how the original work sometimes tends to be overlooked by competing scientists, who hinder the progress of science.

Skeletal Muscle

This book provides a comprehensive overview of the current progress in muscle contraction and cell motility research. It discusses structural, mechanical, and biochemical characteristics of skeletal, cardiac, and smooth muscles, and cell motility. The experimental objects of the studies described in this volume extend from humans to molecules. A distinct feature of this volume is that, in some chapters, evidence against the textbook view is presented, showing how well-established dogma can be denied by an unexpected discovery. This book is as interesting as it is informative for general readers and young scientists alike, and it is sure to inspire both to challenge the enticing mysteries that still remain in this exciting research field.

Molecular Control Mechanisms in Striated Muscle Contraction Firefly Books

This volume presents the entire proceedings of the symposium organized by one of us (H. S.) on November 11 to 15, 1991 at Hakone, Japan, under the title of "Mechanism of Myofllament Sliding in Muscle Contraction. " Among various kinds of energy transduction mechanisms in biological systems, the mechanism of muscle contraction has been studied most intensively and extensively over many years. Since the monumental discovery by the two Huxleys and coworkers that muscle contraction results from relative sliding between the thick and thin myofilaments, attention of muscle investigators has been focused on the question, what makes the fllaments slide past one another. In response to the above question, A. F. Huxley and Simmons put forward a contraction model in 1971, in which globular heads of myosin (cross-bridges) extending from the thick fllament first attach to actin on the thin fllament, and then change their angle of attachment to actin (power stroke) leading to force generation or myofilament sliding until they detach from the thin fllament. The rocking cross-bridge contraction model seemed to be entirely consistent with the kinetic scheme of actomyosin ATPase published by Lymn and Taylor at the same time, thus giving a strong impression to the people concerned that the muscle contraction mechanism would soon be sorted out. In his review lecture in 1974, however, A. F.

Physics, Pharmacology and Physiology for Anaesthetists Springer

The breakthrough new fitness program for readers who want big gains in little time. "The Max Contraction Training" program maximizes muscle fiber stimulation in the shortest amount of time--leading to faster workouts and more impressive gains.

Fundamentals of Anaesthesia Cambridge University Press

Muscular contraction provides one of the most fascinating topics for a biophysicist to study. Although muscle comprises a molecular machine whereby chemical energy is converted to mechanical work, its action in producing force is something that is readily observable in everyday life, a feature that does not apply to most other structures of biophysical inter est. In addition, muscle is so beautifully organized at the microscopic level that those important structural probes, electron microscopy (with the associated image analysis methods) and X-ray diffraction, have pro vided a wealth of information about the arrangements of the constituent proteins in a variety of muscle types. But, despite all this, the answer to the question "How does muscle work?" is still uncertain, especially with regard to the molecular events by which force is actually generated, and the question remains one of the major unsolved problems in biology. With this problem in mind, this book has been written to collect together the available evidence on the structures of the muscle fila ments and on their arrangements in different muscle cells, to extract the common structural features of these cells, and thus to attempt to define a possible series of mechanical steps that will describe at molecular resolu tion the process by which force is generated. The book cannot be considered to be an introductory text; in fact, it presents a very detailed account of muscle structure as gleaned mainly from electron microscopy and X-ray diffraction.