Muscle Contraction

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The Kinetics of Muscle Contraction - David Clifford Stephen White 1975

Biochemistry of Smooth Muscle Contraction - Michael Barany 1996-01-04
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.
Sliding Filament Mechanism in Muscle Contraction - Haruo Sugi 2007-04-27
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.
Muscle Contraction - Setsurō Ebashi 1980

Coupling Between Nerve Excitation and Muscle Contraction in the Opener Muscle of the Crayfish Claw - George Davis Bittner 1967

The Effect of Skin Anesthesia on Muscle Contraction Following Application of Hot Packs - Barbara Marie Fitch 1947

Smooth Muscle Contraction - Kazuhiro Kohama 1995

Regulatory Mechanisms of Striated Muscle Contraction - Setsuro Ebashi 2007-05-14
This volume covers the entire spectrum of research on troponin and related muscle proteins, including pathophysiological and clinical aspects. It details recent advances in work on the genetic disorders of cardiac troponin and ryanodine receptor proteins. Many color figures illustrate the three-dimensional structures of the proteins involved in the muscle functions. The book will help readers understand characteristic features of the regulatory mechanisms of striated muscle contraction and their disorders at the molecular level.
THE EFFECTS OF INCREASED INTRAPULMONIC PRESSURE ON MUSCLE CONTRACTION, AND THE ASSOCIATED RESPIRATORY AND CIRCULATORY CHANGES. - LEONARD HUBERT ELWELL 1951

Biochemistry of Muscle Contraction - John Gergely 1964

The Structural Basis of Muscular Contraction - John Squire 2011-11-01
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.
Muscle Contraction - Clive R. Bagshaw 2012-12-06
The student of biolo,gical science in his final years as an undergraduate and his first years as a graduate is expected to gain some familiarity with current research at the frontiers of his discipline. New research work is published in a perplexing diversity of publications and is inevitably concerned with the minutiae of the subject. The sheer number of research journals and papers also causes confusion and difficulties of assimilation. Review articles usually presuppose a background knowledge of the field and are inevitably rather restricted in scope. There is thus a need for short but authoritative introductions to those areas of modern biological research which are either not dealt with in standard introductory textbooks or are not dealt with in sufficient detail to enable the student to go on from them to read scholarly reviews with profit. This series of books is designed to satisfy this need. The authors have been asked to produce a brief outline of their subject assuming that their readers will have read and remembered much of a standard introductory textbook of biology. This outline then sets out to provide by building on this basis, the conceptual framework within which modern research work is progressing and aims to give the reader an indication of the problems, both conceptual and practical, which must be overcome if progress is to be maintained.

Smooth Muscle Contraction - Newman L. Stephens 1984

Molecular Control Mechanisms in Striated Muscle Contraction - R.J. Solaro 2013-04-17
Molecular Control Mechanisms in Striated Muscle Contraction addresses the molecular mechanisms by which contraction of heart and skeletal muscles is regulated, as well as the modulation of these mechanisms by important (patho)physiological variables such as ionic composition of the myoplasm and phosphorylations of contractile and regulatory proteins. For the novice, this volume includes chapters that summarize current understanding of excitation-contraction coupling in striated muscles, as well as the compositions and structures myofibrillar thick and thin filaments. For the expert, this volume presents detailed pictures of current understanding of the mechanisms underlying the CA2+ regulation of contraction in heart and skeletal muscles and discusses important directions for future investigation.
Calcium in Muscle Contraction - Johann C. Rüegg 2012-12-06
Recent years have witnessed an explosion of knowledge lea- ding to a molecular understanding of the mechanisms of ac- tion of calcium on excitation and contraction coupling and its role in the regulation of contractility. This book highlights the most recent progress as well as providing a historial perspective of the field. It presents a concise and comprehensive overview of our current knowledge regar- ding calcium channels and regulatory proteins as well as in- tracellular calcium handling and the mechanisms underlying the activation of contractile proteins. It also describes how these basic mechanisms have been adapted in various types of muscle, especially in cardiac and smooth muscle.
Coordination of the Two Heads of Myosin During Muscle Contraction - Diane Sue Lidke 2002

Regulation of Vascular Smooth Muscle Function - Raouf A. Khalil 2010
In book the role of Ca2+ and other signaling pathways of Vascular smooth muscle (VSM) contraction will be discussed. VSM contraction plays an important role in the regulation of vascular resistance and blood pressure, and its dysregulation may lead to vascular diseases such as hypertension and coronary artery disease. Under physiological conditions, agonist activation of VSM results in an initial phasic contraction followed by a tonic contraction. The initial agonist-induced contraction is generally believed to be due to Ca2+ release from the intracellular stores. Although VSM is unique in that it can sustain contraction with minimal energy expense, the mechanisms involved in the maintained VSM contraction are not clearly understood.
Mechanism of Muscular Contraction - Jack A. Rall 2014-10-21
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.
Control of Muscle Blood Flow During Dynamic Exercise - 2006
The interaction between dynamic muscle contractions and the associated muscle blood flow is very intriguing leading to questions regarding the net effect of these contractions on oxygen delivery and utilization by the working muscle. Study 1 examined the impact of contractions on muscle blood flow at the level of the femoral artery. We demonstrated that muscle contractions had either a facilitory, neutral, or net impedance effect during upright knee extension exercise as intensity increased from very light to ~70% peak work rate. This led to the question of what impact a change in contraction frequency might have on the coupling of blood flow to metabolic rate during cycling exercise. The blood flow/VO2 relationship has been shown to be linear and robust at both the central (i.e., cardiac output/pulmonary VO2) and peripheral (leg blood flow/leg VO2) levels. However, an increase in contraction frequency has been reported to either decrease, have no effect, or increase the blood flow response during exercise. Study 2 determined if the steady state coupling between muscle blood flow and metabolic rate (centrally and/or peripherally) would be altered by varying contraction frequency. Our results indicate that both central and peripheral blood flow/VO2 relationships are robust and remain tightly coupled regardless of changes in contraction frequency. Study 3 examined muscle microvascular hemoglobin concentration and oxygenation within the contraction/relaxation cycle to determine if microvascular RBC volume was preserved and if oxygen extraction occurred during contractions. We concluded that microvascular RBC volume was preserved during muscle contractions (i.e., RBCs remained in the capillaries), which could facilitate continued oxygen delivery. Further, there was a cyclic pattern of deoxygenation/oxygenation that corresponded with the contraction/relaxation phases of the contraction cycle, with deoxyhemoglobin increasing significantly during the contractile phase. These data suggest that oxygen extraction continues to occur during muscle contractions. Significant insight has been gained on the impact of muscle contractions on oxygen delivery to and exchange in active skeletal muscle. This series of studies forms a base of knowledge that furthers our understanding of the mechanisms which govern the control of skeletal muscle blood flow and its coupling to muscle metabolic rate.
Troponin - J. P. Jin 2013-01-01
Muscle contraction is a vital biological activity. In three centuries of scientific pursuit since Leeuwenhoek and Croone observed the cellular structure of striated muscles, the knowledge gained from extensive studies has formed a detailed understanding of muscle function at the molecular and atomic level. Contractions of vertebrate skeletal and cardiac muscles are controlled by Ca2+ signaling through the troponin complex in the sarcomeres, which are contractile machinery consisting of interactive myofilaments. Since the discovery and biochemical characterization of troponin and its three subunit proteins over four decades ago, intensive research from protein structure and genetic diversity to post-translational modification and pathological mutations have comprehensively established the molecular structure of troponin and the mechanistic details of its function in the regulation of muscle contractions. The advanced knowledge from troponin research has contributed significantly to the current understanding of cardiac and skeletal muscle function in health and diseases. It is a timely necessity to comprehensively, yet concisely, summarize the current knowledge and look toward the future direction of troponin research. Contributions to this book

have been made by leading experts in troponin studies, and its contents include chapters that describe milestone discoveries and recent research advances. This wonderful collection provides a unique reference for students and research investigators who have an interest in muscles, protein structure-function relationships and molecular evolution, as well as cardiac function and myopathies. Readers will not only obtain an in-depth state-of-the-science understanding of troponin structure and function, they will also be exposed to visions that will lead them toward future investigations and the advancement of troponin research.
Regulation of Smooth Muscle Contraction - Robert S. Moreland 2012-12-06
Sixth Annual Graduate Hospital Research Symposium REGULATION OF SMOOTH MUSCLE PROGRESS IN SOLVING THE PUZZLE Every so often a scientific conference comes at a time when everyone has new and exciting information, when old "dogmas" do not seem to be as well established, and when speakers and participants alike are ready to challenge interpretations of old and new experimental data. This was such a conference. What turns on a smooth muscle cell? The precise answer to this question has eluded scientists for much longer than I have been involved in the field. We know that an increase in cytosolic calcium is necessary and we know that phosphorylation of the 20 kDa myosin light chain is an important step in the process. We do not know if other processes are necessary for the initiation and lor maintenance of a smooth muscle contraction nor do we know if other processes modulate the regulation of contraction. The goal of the symposium on which this volume is based was to explore the most current hypotheses for the answers to these questions. I believe that after reading the chapters included in this volume, you will agree that this goal was achieved. The importance of calcium and calmodulin dependent myosin light chain phosphoryla tion in the regulation of smooth muscle contraction was reinforced by many presentations. However, the status of myosin light chain phosphorylation as a simple calcium dependent switch came under serious suspicion.
The Site of Increased Vascular Resistance During Isometric Muscle Contraction - Sarah Delcenia Gray 1966

Muscle Contraction and Cell Motility - Haruo Sugi 2016-11-03
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.
New Concepts in the Control of Muscle Contraction - Gerry A. Smith 2007
This is a collection of papers that presents a novel interpretation of data from the literature to reason logically for an overlooked mechanism of stimulus-contraction coupling in muscle. This mechanism is then used to explain aspects of the puzzles relating to both an important physiological function of the heart, The Frank-Starling Law, and the basis of a common inherited disease state, familial hypertrophic cardiomyopathy (FHCM).
Mechanism of Myofilament Sliding in Muscle Contraction - Haruo Sugi 2012-12-06
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.
Anatomy & Physiology - 2016

Molecular and Cellular Aspects of Muscle Contraction - Haruo Sugi 2012-11-26
This volume presents the proceedings of a muscle symposium, which was supported by the grant from the Fujihara Foundation of Science to be held as the Fourth Fujihara Seminar on October 28 -November 1, 2002, at Hakone, Japan. The Fujihara Seminar covers all fields of natural science, while only one proposal is granted every year. It is therefore a great honor for me to be able to organize this meeting. Before this symposium, I have organized muscle symposia five times, and published the proceedings: " Cross-bridge Mechanism in Muscle Contraction (University of Tokyo Press, 1978), "Contractile Mechanisms in Muscle" (plenum, 1984); "Molecular Mechanisms of Muscle Contraction" (plenum, 1988); "Mechanism of MyofIlament Sliding in Muscle contraction" (plenum, 1993); "Mechanisms of Work Production and Work Absorption in Muscle" (plenum, 1998). As with these proceedings, this volume contains records of discussions made not only after each presentation but also during the periods of General Discussion, in order that general readers may properly evaluate each presentation and the up-to-date situation of this research field. It was my great pleasure to have Dr. Hugh Huxley, a principal discoverer of the sliding fIlament mechanism in muscle contraction, in this meeting. On my request, Dr. Huxley kindly gave a special lecture on his monumental discovery of myofIlament-lattice structure by X-ray diffraction of living skeletal muscle. I hope general readers to learn how a breakthrough in a specific research field can be achieved.
Over the Skin Stimulation Parameters Influencing Controlled Muscle Contraction - José Luis Moreno Aranda 1980

Muscle Contraction - W. F. Harrington 1981

Quick Physiology Review: Sequence of Skeletal Muscle Contraction - E Staff
Learn and review on the go! Use Quick Review Anatomy & Physiology Study Notes to help you learn or brush up on the subject quickly. You can use the review notes as a reference, to understand the subject better and improve your grades. Easy to remember facts to help you perform better. Perfect study notes for all health sciences, premed, medical and nursing students.

Relaxation training, muscle stretching, and muscle contraction in patients with upper quadrant pain - Antoinette Perring Sander 1987

Molecular and Physiological Mechanisms of Muscle Contraction - Jean Emile Morel 2015-11-05
Thoroughly researched using experimentation and re-examination of all previously published evidence, Molecular and Physiological Mechanisms of Muscle Contraction is a carefully crafted treatise and revision of previous conceptions of muscle contraction. It presents detailed descriptions of new, previously unpublished data and hybrids recent findings with the standard Huxley model. This book demonstrates that traditional concepts cannot fully explain contraction and builds upon previous work. It identifies flaws in the reasoning initially used to explain some results as well as alternative interpretations accounting for inconsistencies. In response to previous bodies of inconsistent or conflicting theories and data, the book synthesizes research based on the Huxley model with more recent experimental and laboratory findings to define a new model. The new model this book proposes is not a replacement for the standard Huxley model of muscle contraction, but a modification based on recent research and synthesized with pre-existing data and conceptions. It reconciles new data with prior information that is contradictory or not entirely explicable in proposing a new integrated and more complete model of muscle contraction.
biomechanical model calculation of muscle contraction forces - albert d. schultz 1987

Muscle Contraction and Cell Motility - H. Sugi 2012-12-06
This volume intends to provide a comprehensive overview on the mecha nisms of muscle contraction and non-muscle cell motility at the molecu lar and cellular level, not only for investigators in these fields but also for general readers interested in these topics. A most attractive feature of various living organisms in the animal and plant kingdoms is their ability to move. In spite of a great diversity in the structure and function of various motile systems, it has frequently been assumed since the nineteenth century that all kinds of "motility" are essentially the same. Based on this assumption, some investigators in the nineteenth century thought that the mechanisms of motility could better be studied on primitive non-muscle motile systems such as amoeboid movement, rath er than on highly specialized muscle cells. Contrary to their expectation, however, the basic mechanisms of motility have been revealed solely by investigations on vertebrate skeletal muscles, since a monumental discovery of Szent-Gyorgyi and his coworkers in the early 1940s that muscle contraction results from the interaction between two different contractile proteins, actin and myosin, coupled with ATP hydrolysis.
The Sliding-Filament Theory of Muscle Contraction - David Aitchison Smith 2019-02-05
Understanding the molecular mechanism of muscle contraction started with the discovery that striated muscle is composed of interdigitating filaments which slide against each other. Sliding filaments and the working-stroke mechanism provide the framework for individual myosin motors to act in parallel, generating tension and loaded shortening with an efficient use of chemical energy. Our knowledge of this exquisitely structured molecular machine has exploded in the last four decades, thanks to a bewildering array of techniques for studying intact muscle, muscle fibres, myofibrils and single myosin molecules. After reviewing the mechanical and biochemical background, this monograph shows how old and new experimental discoveries can be modelled, interpreted and incorporated into a coherent mathematical theory of contractility at the molecular level. The theory is applied to steady-state and transient phenomena in muscle fibres, wing-beat oscillations in insect flight muscle, motility assays and single-molecule experiments with optical trapping. Such a synthesis addresses major issues, most notably whether a single myosin motor is driven by a working stroke or a ratchet mechanism, how the working stroke is coupled to phosphate release, and whether one cycle of attachment is driven by the hydrolysis of one molecule of ATP. Ways in which the theory can be extended are explored in appendices. A separate theory is required for the cooperative regulation of muscle by calcium via tropomyosin and troponin on actin filaments. The book reviews the evolution of models for actin-based regulation, culminating in a model motivated by cryo-EM studies where tropomyosin protomers are linked to form a continuous flexible chain. It also explores muscle behaviour as a function of calcium level, including emergent phenomena such as spontaneous oscillatory contractions and direct myosin regulation by its regulatory light chains. Contraction models can be extended to all levels of calcium-activation by embedding them in a cooperative theory of thin-filament regulation, and a method for achieving this grand synthesis is proposed. Dr. David Aitchison Smith is a theoretical physicist with thirty years of research experience in modelling muscle contractility, in collaboration with experimental groups in different laboratories.
Molecular Mechanism of Muscle Contraction - Haruo Sugi 1988-05
It is now widely recognized that fundamental progress in science is made not in a continuous manner but in a stepwise manner. In the field of the molecular mechanism of contraction in striated muscle, the stepwise progress was achieved by three great investigators in 1940's and 1950's. In the early 1940's, Albert Szent-Gyorgyi and his associates showed biochemically that muscle contraction is essentially an interaction between actin and myosin coupled with ATP hydrolysis. Then, in the 1950's, Hugh E. Huxley together with Jean Hanson demonstrated that striated muscle is composed of a hexagonal lattice of two kinds of interdigtating myofilaments consisting of action and myosin respectively, and made a monumental discovery that muscle contraction results from the relative sliding between the actin and myosin filaments. Andrew F. Huxley, who also participated in the discovery of the sliding filament mechanism of muscle contraction was attributed to the attachment-detachment cycle between the cross-bridges extending from the myosin filament and the complementary sites on the actin filament. After the above stepwise progress, however, muscle research appears to have entered into a period of so-called 'normal science' where detailed knowledge has been accumulating around the well established 'central dogmas' but without fundamental progress. More specifically, most experiments on muscle contraction mechanisms have been designed, carried out and interpreted on the basis of the Huxley's 1957 and the Huxley-Simmons' 1971 contraction models, as well as the kinetic scheme of actomyosin ATPase; but the molecular mechanism of contraction still remains to be a matter for debate and speculation. For further fundamental progress in this field of research, we feel it necessary to reconsider the validity of these dogmas and to interpret the results more freely. In 1978, one of us (H.S.) organized a symposium in Tokyo based on the above idea, and we published the proceedings under the title of "Cross-bridge Mechanism in Muscle Contraction" (ed. H. Sugi and G.H. Pollack, University of Tokyo Press/University Park Press, 1979). The unusual interest of muscle physiologists in this symposium encouraged us to organize a second symposium on muscle contraction in Seattle in 1982, and proceedings was

again published under the title of "Contractile Mechanisms in Muscle" (ed. G.H. Pollack and H. Sugi, Plenum Publishing Corporation, 1984). We were again very much encouraged by the intense interest of the people at the symposium as well as by readers of the proceedings, and became convinced that the symposia of this kind would greatly accelerate the progress in this field. The present symposium was organized by one of us (H.S.) as the third "Cross-bride" symposium. Though most papers are concerned, as in the previous two symposia, with experiments on intact and demembranated muscle fibers and isolated myofibrils, where the three-Dimensional muofilament-lattice structures have been preserved, the results are frequently discussed in connection with the kinetics of actomyosin ATPase, reflecting the recent development of experimental methods connecting physiology and biochemistry. It has also become possible to obtain direct information about the orientation and configuration of the cross-bridges as various stages during muscle contraction.

Muscular Contraction and the Reflex Control of Movement - John Farquhar Fulton 1926

This book includes a valuable and extensive bibliography with historical introduction on pages 3-44. It is a detailed study of the physiology of skeletal muscle.

˜Anœ Investigation of the Effects of Autosuggested Muscle Contraction on Muscular Strength and Size - Louis Elmo Bowers 1964

The Regulation of Muscle Contraction - Alan Grinnell 1981

Mysteries in Muscle Contraction - Haruo Sugi 2017-12-22

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.