

# **Above Knee Prosthetic Gait Training**

## **Above Knee Prosthetic Gait Training: Challenges, Opportunities, and the Path to Functional Mobility**

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Introduction:

Above knee prosthetic gait training (AKPGT) is a complex and multifaceted process aimed at restoring functional mobility to individuals following a transfemoral amputation. It's a journey that demands dedication, patience, and a collaborative approach involving the amputee, prosthetist, physical therapist, occupational therapist, and other members of the rehabilitation team. This article will delve into the intricacies of AKPGT, exploring both the significant challenges encountered and the emerging opportunities that promise to improve outcomes and enhance the quality of life for individuals with above-knee amputations.

Challenges in Above Knee Prosthetic Gait Training:

Several significant challenges can impede successful AKPGT:

1. **Socket Fit and Comfort:** A poorly fitting socket is the foundation of many gait training difficulties. An ill-fitting socket can cause pain, pressure sores, and skin breakdown, hindering the individual's ability to comfortably bear weight and engage in prolonged gait training. Achieving an optimal socket fit often requires multiple adjustments and iterations.
2. **Residual Limb Volume Changes:** Fluctuations in residual limb volume, particularly in the early post-operative period, can significantly impact socket fit and necessitate frequent adjustments. This variability presents a challenge in maintaining consistent gait patterns and can lead to discomfort and gait deviations.
3. **Proprioceptive Deficits:** The loss of sensory input from the amputated limb leads to proprioceptive deficits, affecting balance, coordination, and the ability to accurately sense limb position in space. This makes it challenging to learn and maintain a natural and efficient gait pattern.
4. **Muscle Weakness and Atrophy:** Muscle weakness and atrophy in the residual limb and compensatory muscles are common following amputation. This reduces strength and endurance, making gait training more strenuous and potentially leading to fatigue and frustration.
5. **Pain Management:** Phantom limb pain and pain in the residual limb are significant barriers to successful AKPGT. Pain can interfere with gait training sessions, limit participation, and negatively impact overall progress.
6. **Cognitive and Psychological Factors:** Adaptation to amputation is a significant psychological and emotional challenge. Depression, anxiety, and fear of falling can significantly affect motivation and adherence to the gait training program.
7. **Cost and Access to Care:** The cost of prosthetics and rehabilitation services can be prohibitive for many individuals, limiting access to optimal AKPGT. Geographical location can also affect access to specialized prosthetic care and skilled professionals.

#### Opportunities in Above Knee Prosthetic Gait Training:

Despite the challenges, significant opportunities exist to improve AKPGT:

1. **Advanced Prosthetic Technologies:** Technological advancements have led to the development of more sophisticated prosthetic components, such as microprocessor-controlled knees and feet, which enhance gait control, stability, and energy efficiency. These technologies can significantly improve gait patterns and reduce the energy expenditure during ambulation.
2. **Virtual Reality (VR) and Augmented Reality (AR):** VR and AR technologies are increasingly being utilized in AKPGT to provide immersive and engaging training environments. These technologies can facilitate the development of motor skills and improve balance and coordination in a safe and controlled setting.
3. **Biofeedback and Neuromuscular Electrical Stimulation (NMES):** Biofeedback helps individuals become more aware of their muscle activity and improve neuromuscular control. NMES can be used to strengthen weakened muscles and improve residual limb function, which facilitates improved prosthetic control during gait training.
4. **Personalized Gait Training Programs:** Tailoring gait training programs to individual needs,

abilities, and goals is crucial. This requires a comprehensive assessment of the individual's physical, cognitive, and psychological capabilities. A personalized approach can maximize the effectiveness of training and improve adherence.

5. Improved Collaboration and Communication: Strong interdisciplinary collaboration among prosthetists, physical therapists, occupational therapists, psychologists, and other healthcare professionals is essential for successful AKPGT. Effective communication among team members is vital for coordinating care and ensuring optimal outcomes.

6. Telehealth and Remote Monitoring: Telehealth allows for remote monitoring of patient progress and provides access to rehabilitation services for individuals in geographically isolated areas. This improves accessibility to care and can enhance adherence to the gait training regimen.

7. Focus on Functional Outcomes: Gait training should not just focus on achieving a specific gait pattern, but on achieving functional goals that are relevant to the individual's lifestyle and needs. This patient-centered approach leads to greater motivation and improved quality of life.

## Conclusion:

Above knee prosthetic gait training is a challenging yet rewarding process. By acknowledging the obstacles and embracing the opportunities presented by technological advancements, personalized approaches, and interdisciplinary collaboration, we can significantly enhance the quality of life for individuals with transfemoral amputations. Continued research and development in prosthetic technology, combined with a patient-centered approach to rehabilitation, will pave the way for improved outcomes and greater functional independence for those undergoing AKPGT.

## FAQs:

1. How long does above knee prosthetic gait training typically take? The duration varies greatly depending on individual factors, but it can range from several weeks to several months.
2. What are the common types of prosthetic knees used in AKPGT? Common types include single-axis, polycentric, and microprocessor-controlled knees.
3. Is it possible to return to pre-amputation activity levels after AKPGT? While full pre-amputation activity levels may not always be attainable, many individuals can achieve a high level of functional mobility and participate in many of their preferred activities.
4. What role does physical therapy play in AKPGT? Physical therapists play a vital role in strengthening muscles, improving balance and coordination, and teaching gait strategies.
5. What are the signs of a poorly fitting socket? Signs include pain, skin irritation, pressure sores, and difficulty with gait.
6. What are some strategies for managing phantom limb pain during AKPGT? Strategies may include medication, physical therapy modalities, mirror therapy, and psychological interventions.
7. What is the role of occupational therapy in AKPGT? Occupational therapists help individuals adapt to their prosthetic limb and perform daily activities.

8. What are some resources available for individuals undergoing AKPGT? Resources include prosthetists, physical therapists, occupational therapists, support groups, and online communities.
9. What is the expected cost of above-knee prosthetics and rehabilitation? Costs can vary greatly depending on the type of prosthetic, the level of rehabilitation needed, and insurance coverage.

#### Related Articles:

1. "The Impact of Microprocessor-Controlled Knees on Above Knee Prosthetic Gait Training Outcomes": This article examines the effectiveness of microprocessor knees in improving gait parameters and functional mobility.
2. "Virtual Reality-Based Gait Training for Transfemoral Amputees: A Systematic Review": This review summarizes the current evidence on the use of VR in AKPGT.
3. "The Role of Biofeedback in Enhancing Neuromuscular Control During Above Knee Prosthetic Gait Training": This article explores the application of biofeedback techniques in improving prosthetic control.
4. "Strategies for Managing Residual Limb Volume Changes in Above Knee Prosthetic Users": This article discusses strategies for mitigating the challenges posed by residual limb volume fluctuations.
5. "A Comparative Analysis of Different Socket Designs for Above Knee Prostheses": This article compares various socket designs and their impact on comfort and gait.
6. "The Psychological Impact of Transfemoral Amputation and its Influence on Prosthetic Rehabilitation": This article examines the psychological challenges faced by individuals undergoing transfemoral amputation and their impact on rehabilitation.
7. "The Role of Interdisciplinary Collaboration in Optimizing Above Knee Prosthetic Gait Training Outcomes": This article emphasizes the importance of teamwork in AKPGT.
8. "Telehealth Interventions in Above Knee Prosthetic Gait Training: A Feasibility Study": This article evaluates the effectiveness and feasibility of telehealth in AKPGT.
9. "Developing Personalized Gait Training Programs for Individuals with Transfemoral Amputations: A Case Study Approach": This article showcases the benefits of personalized gait training programs.

**above knee prosthetic gait training:** *Atlas of Limb Prosthetics* American Academy of Orthopaedic Surgeons, 2002-01-01 Newly available after being out of print for several years, this is the definitive reference on the surgical and prosthetic management of acquired or congenital limb loss. Covers indications for amputation vs. limb salvage for trauma, peripheral vascular disease, and tumours; indications for prostheses for amputation levels; and rehabilitation approaches.

**above knee prosthetic gait training:** Therapy for Amputees Barbara Engstrom, Catherine Van de Ven, 1999 An interdisciplinary team of experts addresses all aspects of rehabilitation for amputees, from assessments and psychosocial considerations through evidence-based treatment approaches and more. The New Edition is updated to incorporate the latest advances in this field, and to reflect the fact that amputees now receive rehabilitation therapy in a variety of settings.

**above knee prosthetic gait training:** **Active Above-Knee Prosthesis** Zlata Jelacic, Remzo

Dedic, Haris Dindo, 2020-06-16 *Active Above-Knee Prosthesis: A Guide to a Smart Prosthetic Leg* presents original research and development results, providing a firsthand overview of idea generation and prototype production. The book gives insights into the problem of stair ascent for people with above-knee amputation and offers a solution in the form of a physical prototype of an active above-knee prosthesis with an actuated ankle. The book's authors have developed and tested a physical prototype of an active above-knee prosthesis, giving anyone who is researching and designing prosthetic devices firsthand knowledge on how to build on, and continue with, work that has already been done. - Presents state-of-the-art technology in powered prosthetics - Helps readers evaluate design options and create new developments - Provides guidance on the evolution of advanced prosthetic design

**above knee prosthetic gait training: *Lower-limb Prosthetics*** Norman Berger, Sidney Fishman, 1997

**above knee prosthetic gait training: *Biomechanics of Lower Limb Prosthetics*** Mark R. Pitkin, 2009-10-14 Foreword from a Clinical Biomechanist, Applied Physiologist and Prosthetist teaching graduate students in Prosthetics & Orthotics. While there are many books on Biomechanics, arguably the quintessential science of limb prosthetics, none addresses the fundamental principles in sufficient detail and depth to be practically useful to the prosthetist, rehabilitation specialist or researcher. Dr. Pitkin's monograph is an exemplary collection of theoretical principles from his research and others, presented in its clinical and applied biomechanics form. The textbook provides an excellent overview of the many facets of lower limb prosthetic design and engineering for the ardent clinician researcher and student. The book delves into many of the basic concepts that are required knowledge for the clinician and the scientist to have as the foundation for their work. Dr. Pitkin has an eloquent manner in which he reflects on the history and literature to tell the storied evolution of prosthetic design. He takes the reader on a journey to consider his theories, which have substantive foundations to contemplate. By the end of chapter one, we have the basic history and an appreciation for the rationale behind the "rolling joint ankle" with evidence to support his theoretical views.

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**above knee prosthetic gait training: *The Mangled Extremity*** Raymond A. Pinsky, John V. Ingari, 2021-01-20 This practical and generously illustrated text presents the current concepts regarding the management of the mangled extremity, including microsurgery, vascular surgery, free tissue, nerve, hand, and replantation surgery. Since the advent of microsurgical reconstruction, significant progress has been made in the areas of replantation, free tissue transfer, as well as the refinement of skeletal fixation techniques. The scope will encompass the initial triage of a patient with a mangled upper or lower extremity, the initial and subsequent reconstructive efforts, to include skeletal fixation, vascular and soft tissue reconstruction, muscle and tendon transfers, psychological impact, therapy requirements, amputation considerations, and current data on salvage versus amputation in these scenarios. Case examples will be included to add further depth and context to the techniques and recommendations provided. Presenting these surgical challenges in detail, *The Mangled Extremity* will be an ideal resource for orthopedic and trauma surgeons, residents and fellows, as well as emergency surgeons facing these intense, traumatic injuries.

**above knee prosthetic gait training: *Atlas of Amputations & Limb Deficiencies, 4th edition*** J. Ivan Krajchich, MD, Michael S. Pinzur, MD, Benjamin K. Potter, MD, Phillip M. Stevens, MD, CPO, 2018-08-31 The leading and definitive reference on the surgical and prosthetic management of acquired and congenital limb loss. The fourth edition of the *Atlas of Amputations and Limb Deficiencies* is written by recognized experts in the fields of amputation surgery, rehabilitation, and prosthetics.

**above knee prosthetic gait training: *Human Walking*** Jessica Rose, James Gibson Gamble, 2006 Features contributions from experts involved in the study, assessment, and treatment of gait disorders, including physical medicine and rehabilitation, orthopaedics, and more. This book covers: evolution of human walking; adaptation in pregnancy, aging, and alcoholism; walking for health;

simulation of gait; and ten lessons about walking.

**above knee prosthetic gait training:** Handbook of Human Motion , 2018-04-24 The Handbook of Human Motion is a large cross-disciplinary reference work which covers the many interlinked facets of the science and technology of human motion and its measurement. Individual chapters cover fundamental principles and technological developments, the state-of-the-art and consider applications across four broad and interconnected fields; medicine, sport, forensics and animation. The huge strides in technological advancement made over the past century make it possible to measure motion with unprecedented precision, but also lead to new challenges. This work introduces the many different approaches and systems used in motion capture, including IR and ultrasound, mechanical systems and video, plus some emerging techniques. The large variety of techniques used for the study of motion science in medicine can make analysis a complicated process, but extremely effective for the treatment of the patient when well utilised. The handbook describes how motion capture techniques are applied in medicine, and shows how the resulting analysis can help in diagnosis and treatment. A closely related field, sports science involves a combination of in-depth medical knowledge and detailed understanding of performance and training techniques, and motion capture can play an extremely important role in linking these disciplines. The handbook considers which technologies are most appropriate in specific circumstances, how they are applied and how this can help prevent injury and improve sporting performance. The application of motion capture in forensic science and security is reviewed, with chapters dedicated to specific areas including employment law, injury analysis, criminal activity and motion/facial recognition. And in the final area of application, the book describes how novel motion capture techniques have been designed specifically to aid the creation of increasingly realistic animation within films and video games, with Lord of the Rings and Avatar just two examples. Chapters will provide an overview of the bespoke motion capture techniques developed for animation, how these have influenced advances in film and game design, and the links to behavioural studies, both in humans and in robotics. Comprising a cross-referenced compendium of different techniques and applications across a broad field, the Handbook of Human Motion provides the reader with a detailed reference and simultaneously a source of inspiration for future work. The book will be of use to students, researchers, engineers and others working in any field relevant to human motion capture.

**above knee prosthetic gait training:** Sonomyography Yongjin Zhou, Yong-Ping Zheng, 2021-11-24 This book explains the exciting field of sonomyography (SMG), which makes it possible to use continuous signals detected by ultrasound images in real time to evaluate muscle functions. After an introduction, the book discusses the methods to extract and analyse different SMG signals, including muscle thickness, penetration angle, fascicle length, contraction activity, and muscle cross-sectional areas, etc. It then describes the mono-modal applications of sonomyography: posture recognition, prosthesis control, muscle training, muscle strength (fall risk assessment), fatigue assessment, and the assessment of dysfunctional muscles. The book also shows how to combine sonomyography with additional muscle assessment methods, in particular EMG, MMG, and motion sensors. Lastly, it provides an overview of the potential applications in sport science, rehabilitation, fitness, and elderly health.

**above knee prosthetic gait training: Prosthetic Gait Training Program for Lower Extremity Amputees** Robert S. Gailey, Ann M. Gailey, 1989 A systematic approach to prosthetic gait training which includes a variety of methods for teaching amputees to weightshift, maintain prosthetic control and utilize the pelvis & trunk correctly during walking.

**above knee prosthetic gait training: Prosthetics and Orthotics** Ron Seymour, 2002 Focusing on the lower extremities and spine, this extensively illustrated text presents a problem-solving approach to the evaluation and prescription of prosthetics and orthotics in physical therapy interventions. Prosthetics and Orthotics presents the latest developments in materials and fabrications, an in-depth analysis of gait deviations and interventions, conditions, psychosocial issues, biomechanics, and more. This invaluable resource also includes pediatric and geriatric

perspectives, scientific literature supporting evidence-based practice, exercise and functional activities for the patient, case studies following the APTA's Guide to Physical Therapist Practice, critical thinking questions, lab activities and practical applications.

**above knee prosthetic gait training:** Atlas of Amputations and Limb Deficiencies Douglas G. Smith, John W. Michael, John H. Bowker, 2004 Presents the major advances in the field since the last edition in 1992. New chapters cover amputee care in wartime, the role of the Krukenberg procedure in developing countries, the rise of the amputee consumer movement, and the rapidly expanding role of sports and recreation for amputees, as well as the more controversial topics of osseointegration and transplantation. The major influence of orthopaedic surgeons in the development of both amputation surgery and prosthetics is noted in the greatly expanded chapter on the history of these fields. A chapter on absence of the lumbar spine and sacrum has been added, as well as a chapter on surgical revision.

**above knee prosthetic gait training: Care of the Combat Amputee** Paul F. Pasquina, Rory A. Cooper, 2009 This resource addresses all aspects of combat amputee care ranging from surgical techniques to long-term care, polytrauma and comorbidities such as traumatic brain injury and burns, pain management, psychological issues, physical and occupational therapy, VA benefits, prosthetics and adaptive technologies, sports and recreational opportunities, and return to duty and vocational rehabilitation.

**above knee prosthetic gait training:** Prosthetic Restoration and Rehabilitation of the Upper and Lower Extremity Alicia J. Davis, MPA, CPO, FAAOP, Brian M. Kelly, DO, Mary Catherine Spires, PT, MD, 2013-12-19 Prosthetic Restoration and Rehabilitation of the Upper and Lower Extremity is a well-illustrated, state-of-the-art reference on the science and practice of post-amputation care, prosthetic restoration, and functional rehabilitation, designed to maximize patient independence and quality of life. Chapters are written by physiatrists, prosthetists, surgeons, and therapists at the University of Michigan, clinicians and teachers who work with amputees on a daily basis. Clinically oriented, it covers both lower and upper extremity restoration and rehabilitation and serves as a handy reference for busy practitioners to support sound clinical decision-making. Beginning with basic anatomy, kinesiology, and a recap of surgical decisions principles and post-operative care for amputees, the book discusses biomechanics, clinical assessment, prosthetic options, how to write a complete and detailed prescription for the prosthesis, restoration and management of specific problems by region, and rehabilitation programs and strategies. Common medical issues such as phantom limb sensation and pain, skin problems, and sexual and psychological considerations are discussed as well. In-depth coverage of prosthetic restoration is provided for special populations such as infants, children, the elderly, athletes multi-extremity amputees, and those who have lost limbs to cancer. Chapters are written in expanded outline format for ease of use and feature numerous full-color diagrams, photos, and other illustrations. This text will guide physicians, trainees, and other members of the care team through the fundamentals of restoring function to individuals who have lost limbs or body parts. Key Features: Provides a state-of-the-art, accessible, clinical approach to post-amputation care, prosthetic restoration, and functional rehabilitation Covers both upper and lower extremities Addresses prostheses for special populations and sports and recreation Includes boxed clinical pearls at the start of each chapter, illustrated quick reference tables, and full-color photos throughout Supports clinical decision making and addresses practical questions and problems Advises on new requirements for Medicare and Medicaid patients, and includes patient education materials and sample prescription forms that can be customized for use in any clinic Outlines important information for returning to the community after amputation

**above knee prosthetic gait training: Fundamentals of Amputation Care and Prosthetics** Douglas Murphy, MD, 2013-08-28 Written by experienced physiatrists, prosthetists, and therapists, this book provides an introduction to the field of amputee care and prosthetics. Dedicated chapters guide you through prescription of prostheses for the various levels and types of amputations in both the lower and upper extremity and address recent advances in functionality and safety. Pre- and post-operative care, prosthetic troubleshooting, gait issues and medical management of the residual

limb are also addressed. With concise key information highlighted throughout, this handbook is a welcome point of care resource or study tool for trainees and practitioners in any field who work with amputees to restore function and help enrich the lives of these individuals. Fundamentals of Amputation Care and Prosthetics features: Concise, practical manual; covers the basics of upper and lower extremity amputee care and prosthetics Succinct presentation, well-illustrated; information is easy to find Portable; perfect for use on rounds or in the clinic State-of-the-art distillation of current thinking and practice; excellent transitional book for residents or ready reference for experienced practitioners

**above knee prosthetic gait training:** *Postgraduate Orthopaedics* Paul A. Banaszkiewicz, Deary F. Kader, 2012-08-16 The must-have book for candidates preparing for the oral component of the FRCS (Tr and Orth).

**above knee prosthetic gait training:** *Orthotics and Prosthetics in Rehabilitation* Michelle M. Lusardi, Caroline C. Nielsen, 2007 Whether you are a student or a clinician, if you work with patients with neuromuscular and musculoskeletal impairments, you will find this text supplies a strong foundation in and appreciation for the field of orthotics and prosthetics that will give you the critical skills you need when working with this unique client population.

**above knee prosthetic gait training: Standards for the Management of Open Fractures** Simon Eccles, Selvadurai Nayagam, 2020 Standards for the Management of Open Fractures provides an evidence-based approach for the management of open fractures, focussing on lower limb injuries. It builds on and expands the NICE Guidelines to provide a practical approach with supporting evidence. The new edition has been extensively updated and expanded to include key aspects of management, ranging from setting up an orthoplastic service, through to dealing with the bone and soft tissue injuries, complications such as infection, and patient rehabilitation and psychological care. The book is primarily aimed at trainee plastic, orthopaedic and trauma surgeons (particularly for expanding knowledge and examination revision) but would also appeal to established surgeons to improve patient care. Standards for the Management of Open Fractures is an open access title. It is available to read and download as a free PDF version on Oxford Medicine Online. It has been made available under a Creative Commons Attribution-Non Commercial No Derivatives 4.0 International licence.

**above knee prosthetic gait training: Congenital Lower Limb Deficiencies** Ali Kalamchi, 2012-12-06 Edited by the respected pediatric orthopaedic surgeon Ali Kalamchi, M.D. with contributions from other experts in the field, Congenital Lower Limb Deficiencies is a single source reference guide for rare complex congenital defects of the lower limb. The text is divided into three sections. The first section discusses normal limb development; the genetic, familial, and historical nature of lower limb defects; and the evaluation and categorization of such defects in pediatric patients. The second section characterizes and classifies the congenital defects and covers early long-term planning of patient management based on clinical and radiographic findings. The third section analyzes the treatment modalities, including several chapters on the relationship of sports therapy to the treatment plan. In addition, the authors contribute their wealth of expertise by sharing their experiences and preferences in the treatment of congenital lower limb defects. The team approach for geneticists, pediatricians, orthopedists, therapists, prosthetists and other health care professionals involved in each case is emphasized.

**above knee prosthetic gait training: Musculoskeletal Cancer Surgery** Martin M. Malawer, Paul H. Sugarbaker, 2006-02-24 Steven A. Rosenberg, MD In the past two decades significant progress has quality of life. The use of local radiation therapy has occurred, in the management of patients with mus- had a profound impact on the ability to achieve local loskeletal cancers, that has improved both the survival control. Cooperation between surgeons and radiation and the quality of life of afflicted patients. Changes in therapists often results in the tailoring of surgical p- the management of these patients have mirrored cedures to maximize the combined application of these trends in the entire field of oncology. two effective treatment modalities. Although impact on The most significant change has been improvement overall survival has not been demonstrated due to



the in the surgical techniques for the resection of musculo- addition of radiation therapy, important advances in skeletal cancers based on a detailed understanding of improving the quality of life of patients receiving this the anatomic features of each particular tumor site, as combined-modality treatment have been evident. well as an appreciation of the natural biology that affects A third change impacting on the survival of patients the local spread of these tumors. The current volume of with musculoskeletal cancers has been the aggressive Musculoskeletal Cancer Surgery: Treatment of Sarcomas and resection of metastatic deposits.

**above knee prosthetic gait training: Core Topics in Foot and Ankle Surgery** Andrew Robinson, James W. Brodsky, John P. Negrine, 2018-04-19 This concise guide offers an ideal overview of both the practical and theoretical aspects of foot and ankle surgery for trainees and junior consultants. Easy to read chapters cover all areas of surgery, from examination, imaging, and the biomechanics of the foot and ankle, to specific conditions including amputations and prostheses, deformities, arthritis, cavus and flat foot, sports injuries, Achilles tendon, benign and malignant tumors and heel pain. Fractures and dislocations of the ankle, hind-, mid- and forefoot are also covered, as are the foot in diabetes and pediatrics. Written by a team of international experts, the text is an accessible way to prepare for postgraduate examinations and manage patients successfully.

**above knee prosthetic gait training: The Scientific and Clinical Application of Elastic Resistance** Phillip Page, Todd S. Ellenbecker, 2003 Covering the use of elastic resistance bands and tubes, this work includes the scientific applications and exercise applications for different areas of the body, and sport-specific applications for ten different sports.

**above knee prosthetic gait training: Total Knee Arthroplasty** James Alan Rand, 1993 This comprehensive reference on total knee arthroplasty describes all surgical techniques and prosthetic designs for primary and revision arthroplasty, discusses every aspect of patient selection, preoperative planning, and intraoperative and postoperative care.

**above knee prosthetic gait training: Research Methods in Biomechanics, 2E** Gordon Robertson, Graham Caldwell, Joseph Hamill, Gary Kamen, Saunders Whittlesey , 2013-09-25 Detailing up-to-date research technologies and approaches, Research Methods in Biomechanics, Second Edition, assists both beginning and experienced researchers in developing methods for analyzing and quantifying human movement.

**above knee prosthetic gait training: Technologies for Development** Silvia Hostettler, Eileen Hazboun, Jean-Claude Bolay, 2015-05-04 The book presents case studies from Africa, Asia and Latin America addressing global development issues in the fields of health, energy, ICT and urbanism in an interdisciplinary way. The book illustrates key issues at the interface of technology, human, social, and economic development. Bringing together the best papers of the 2014 EPFL-UNESCO Conference on Technologies for Development, this book explores innovative technologies in the global South. It will be a valuable reference for researchers from engineering, natural sciences, information management, quantitative social sciences, and business faculties, as well as for development practitioners and policy makers. It shows the development potential of technologies, and discusses successful processes to develop and deploy them, as well how to evaluate their impact. The introduction to the book begins with a reflection on key issues regarding technologies for development. The following four sections focus on; (i) Innovative Technologies for Development, (ii) Open Source-Open Access-Open Innovation, (iii) Medical Technologies for the Global South, and (iv) Impact Assessment of Technologies for Development. Individual chapters explore issues such as a need for solid standards for newly developed technologies, how to successfully up-scale technology to a larger region, and how to involve private industry in the development of a technology.

**above knee prosthetic gait training: The Biomechanics and Motor Control of Human Gait** David A. Winter, 1991

**above knee prosthetic gait training: Isokinetics** Zeevi Dvir, 1995 It is over 25 years since isokinetic dynamometry was first introduced into clinical practice and exercise science. Physical

therapy, in particular, has benefited significantly from this technology, which rapidly became the tool of choice in hundreds of research papers as well as the cornerstone of quantitative muscle performance assessment in the clinical setting. About 1984, the technology behind isokinetic dynamometry made considerable progress when computers were incorporated to control the hardware, that is the integral power sources and the on-line processing of mechanical signals. This enabled users to establish a common basis for carrying out eccentric contractions and to obtain comprehensive information on muscle strength immediately. This book does not pretend to cover all the topics that have been examined under isokinetics. Nor is it intended to be a quick and superficial introduction to clinical applications. Rather, it is aimed at those who have at least some experience and are at a stage where they are beginning to ask some very serious questions and would not necessarily be happy with very simple answers.

**above knee prosthetic gait training:** Pediatric Gait Shriners Hospitals for Children, 2000  
Theses conference proceedings cover subjects pertaining to clinical care and motion analysis technology.

**above knee prosthetic gait training: Rehabilitation** Luc H. V. Woude, 2010 This book is a collection of summarized papers and poster presentations from the 4th International Congress Rehabilitation: Mobility, Exercise & Sports, which will be of interest to all those involved in the field of human movement sciences and the rehabilitation professions. Rehabilitation medicine is a relatively young discipline, as is the science of human movement, but both have progressed rapidly from their inception in the latter half of the 20th century to take their current place as important, multi-disciplinary, evidence-based, academic and clinical research subjects.

**above knee prosthetic gait training:** Orthotics and Prosthetics in Rehabilitation E-Book Kevin K Chui, Milagros Jorge, Sheng-Che Yen, Michelle M. Lusardi, 2019-07-06 \*\*Selected for Doody's Core Titles® 2024 in Orthopedics\*\* Gain a strong foundation in the field of orthotics and prosthetics! Orthotics and Prosthetics in Rehabilitation, 4th Edition is a clear, comprehensive, one-stop resource for clinically relevant rehabilitation information and application. Divided into three sections, this text gives you a foundation in orthotics and prosthetics, clinical applications when working with typical and special populations, and an overview of amputation and prosthetic limbs. This edition has been updated with coverage of the latest technology and materials in the field, new evidence on effectiveness and efficacy of interventions and cognitive workload associated usage along with enhanced color photographs and case studies - it's a great resource for students and rehabilitation professionals alike. - Comprehensive coverage addresses rehabilitation in a variety of environments, including acute care, long-term care and home health care, and outpatient settings. - Book organized into three parts corresponding with typical patient problems and clinical decision-making. - The latest evidence-based research throughout text help you learn clinical-decision making skills. - Case studies present real-life scenarios that demonstrate how key concepts apply to clinical decision-making and evidence-based practice. - World Health Organization disablement model (ICF) incorporated to help you learn how to match patient's limitations with the best clinical treatment. - Multidisciplinary approach in a variety of settings demonstrates how physical therapists can work with the rest of the healthcare team to provide high quality care in orthotic/prosthetic rehabilitation. - The latest equipment and technology throughout text addresses the latest options in prosthetics and orthotics rehabilitation - Authoritative information from the Guide to Physical Therapist Practice, 2nd Edition is incorporated throughout. - A wealth of tables and boxes highlight vital information for quick reference and ease of use. - NEW! Color photographs improve visual appeal and facilitates learning. - NEW! Increased evidence-based content includes updated citations; coverage of new technology such as microprocessors, microcontrollers, and integrated load cells; new evidence on the effectiveness and efficacy of interventions; and new evidence on cognitive workload usage. - NEW! Authors Kevin K Chui, PT, DPT, PhD, GCS, OCS, CEEAA, FAAOMPT and Sheng-Che (Steven) Yen, PT, PhD add their expertise to an already impressive list of contributors.

**above knee prosthetic gait training: Muscle Function Testing** Vladimír Janda, 2013-10-22

Muscle Function Testing provides information pertinent to the muscle functions. This book evaluates the method of examination that provides information about the strength of individual muscles or muscle groups that form a functional unit. Organized into three sections encompassing four parts, this book begins with an overview of the size, extent, and progress of peripheral nerve lesions. This text then discusses the nature of the simple movement pattern seen in muscle function testing. Other chapters consider the conditions for analytical physiotherapy and determination of the work capacity of the part of the body being tested. This book discusses as well the possible errors and mistakes that might occur during testing and might decrease the validity of the assessment. The final chapter deals with the demand for a better and a more rational method to therapeutic exercise. This book is a valuable resource for physiotherapists, orthopedic surgeons, physiologists, neurologists, and rheumatologists.

**above knee prosthetic gait training:** *Whittle's Gait Analysis* Jim Richards, David Levine, Michael W. Whittle, 2012-07-13 *Whittle's Gait Analysis* – formerly known as *Gait Analysis: an introduction* – is now in its fifth edition with a new team of authors led by David Levine and Jim Richards. Working closely with Michael Whittle, the team maintains a clear and accessible approach to basic gait analysis. It will assist both students and clinicians in the diagnosis of and treatment plans for patients suffering from medical conditions that affect the way they walk. Highly readable, the book builds upon the basics of anatomy, physiology and biomechanics Describes both normal and pathological gait Covers the range of methods available to perform gait analysis, from the very simple to the very complex. Emphasizes the clinical applications of gait analysis Chapters on gait assessment of neurological diseases and musculoskeletal conditions and prosthetics and orthotics Methods of gait analysis Design features including key points A team of specialist contributors led by two internationally-renowned expert editors 60 illustrations, taking the total number to over 180 Evolve Resources containing video clips and animated skeletons of normal gait supported by MCQs, an image bank, online glossary and sources of further information. Log on to <http://evolve.elsevier.com/Whittle/gait> to register and start using these resources today!

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