

Brukner & Khan's

# Clinical Sports Medicine

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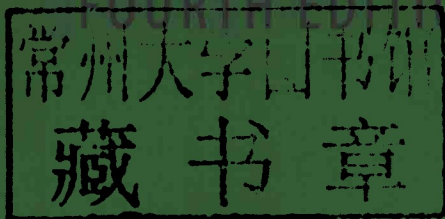
**FOURTH EDITION**



*Keeping you  
one step ahead*

# Brukner & Khan's Clinical Sports Medicine

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Brokner & Khan's

Clinical  
Sports  
Medicine

FOURTH EDITION

*We dedicate this fourth edition to the Clinical Sports Medicine community—to each clinician, educator, and policy maker committed to improving health through the power of physical activity.*



# Foreword to the first edition (1993)

Sport in Australia is ingrained in the national consciousness more widely, deeply, and indelibly than almost anywhere else in the world. When a prominent sportsperson sustains a sporting injury, either traumatically or from overuse, becomes excessively fatigued, or fails to live up to expectations, this assumes national importance. It is even more relevant nowadays with greater individual participation in sporting activities. The same type of problems occur for recreational athletes, middle-aged people wanting to become fit, or older people wishing to sustain a higher level of activity in their later years.

In *Clinical Sports Medicine* the authors take sport and exercise medicine out of the realm of the elite athlete and place it fairly and squarely where it belongs—as a subspecialty to serve everyone in the community who wishes to be active.

The book is organized in a manner that is sensible and usable. The chapters are arranged according to the anatomical region of the symptom rather than diagnostic categories. This results in a very usable text for the sports physician, general/family practitioner, physiotherapist, masseur, or athletic trainer whose practice contains many active individuals.

Practical aspects of sports medicine are well covered—care of the sporting team and concerns that a clinician might have when traveling with a team. In all, this is an eminently usable text which is timely in its production and will find an important place among clinicians involved in the care of active individuals.

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*This foreword was written by the late Professor John Sutton before his untimely death in 1996; it is retained in this textbook out of profound respect for this champion of the integration of science, physical activity promotion, and multi-disciplinary patient care.*

# Foreword to the fourth edition

Humans were not designed to sit at desks all day and in front of televisions all evening, and this physical inactivity is related to a host of health-related issues. Increasing physical activity is one very powerful way to mitigate many of the health issues we face today, and programs such as the Healthy People 2020 initiative and the Exercise is Medicine campaign encourage individuals to remain active throughout their lifetime.

As people become more involved in sport and exercise, sports medicine becomes increasingly important, and *Clinical Sports Medicine* has understandably become what we in the US refer to as the “PDR” (Physicians’ Desk Reference) of sports medicine. For my UK colleagues the translation is “BNF” (British National Formulary). This text is extremely comprehensive, covering fundamental principles of biomechanics, diagnosis and treatment, regional musculoskeletal injuries, and medical problems. The text also addresses those practical issues of sports medicine that are often missing from other texts, such as dealing with athletic teams, covering endurance events, and working with the elite athlete.

The organization of the text makes it remarkably easy to use, including such features as color-coded book sections, flow diagrams to reinforce concepts, and tables that clearly organize information. Vicky Earle’s anatomical drawings are truly among the best in the business. All these features put an astounding wealth of information at the reader’s fingertips. This information has been assembled by a group of over 100 experienced and world-class physical therapists, physicians, and scientists. These co-authors provide up-to-date references when available, and clearly state when evidence is lacking.

This updated, fourth edition includes 200 new photos/graphics and 13 new chapters on current topics, including Integrating evidence into clinical practice, Principles of activity promotion, and Medical emergencies in sport. The editors continue to add to the clinically relevant topics with one of my favorites being what I call “How to manage the patient who has seen everyone and wants a cure from you!” (Chapter 41).

An innovative and exciting addition to this edition is the integration of the *Clinical Sports Medicine* masterclasses that allow you, through videos and podcasts on the *Clinical Sports Medicine* website, to learn directly from the experts. These masterclasses, which will be updated regularly, provide a remarkably dynamic component to the text.

It is exciting to watch *Clinical Sports Medicine* evolve substantially with each edition. The editors’ focus of this text is to “help clinicians help patients” and they have clearly hit their mark. This book is an absolute must-have for any sports medicine professional.

Professor Irene Davis, PT, PhD, FACSM, FAPTA, FASB

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Harvard Medical School

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“Helping clinicians help patients” has been the clear focus of *Clinical Sports Medicine* from its inception. This fourth edition (CSM4) builds unashamedly on its 20-year history. Twenty-year history? The more than 100 contributing authors average 15 years of practical experience each, so you are holding well over 1500 years of distilled clinical wisdom in your hand!

If you will permit us some level 5 evidence (expert opinion—see all-new Chapter 3), CSM4 provides clinicians in sports and exercise medicine and physiotherapy/physical therapy at least five major benefits:

- The wholehearted commitment from leading clinical faculty from all over the English-speaking world means that CSM4 provides the reader with an authoritative text—you can trust these authors.
- At 1270 pages and 67 chapters, CSM4 already carries 25% more pages than the best-selling third edition. Our ruthless editing to focus on clinical relevance means this edition contains 40% new material. CSM4 provides a comprehensive base for your clinical library. We provide some specific examples below.
- With more than 1000 color images (photos and graphics), the book paints a million words (1000 pictures each painting 1000 words!) over and above its 1270 pages! More than 200 of those images are new to this edition—customized for CSM4’s learners—further extending the book’s clarity and usability.
- Every copy of CSM4 comes with a code that gives you online access to more than four hours of assessment and treatment video and audio material. Called *Clinical Sports Medicine* masterclasses, this material is integrated with the text and will be free of charge to book owners for 12 months from registration at [www.clinicalsportsmedicine.com](http://www.clinicalsportsmedicine.com). You have “the expert in the room.”
- Reflecting the expanding evidence base for our field, we include an introduction to evidence-based practice (Chapter 3). All authors aimed to incorporate the best available level of evidence via text, tables, and current references. The online content of CSM4 will benefit from regular updates, adding further to the usefulness of this text for busy clinicians.

In short, CSM4 provides excellent value as an authoritative clinical foundation for physiotherapists, medical practitioners, osteopaths, massage therapists, podiatrists, sports/athletic trainers, sports therapists, fitness leaders, and nurses. It has also proven popular for students in sports physiotherapy, medicine, and human movement studies/kinesiology.

## Editors and authors

As the task of editing a book of this magnitude was beyond the two of us, the CSM4 reader now benefits from the wisdom and productivity of seven sports and exercise medicine greats—Roald Bahr, Steven Blair, Jill Cook, Kay Crossley, Jenny McConnell, Paul McCrory, and Timothy Noakes.

The quality of our chapter authors, representing more than 14 countries, grows with each edition. Among our all-star cast, we are particularly grateful to Håkan Alfredson, Elizabeth Arendt, Carl Askling, Kim Bennell, John Drezner, Richard Frobell, Per Holmich, Mark Hutchinson, Gwen Jull, Pekka Kannus, Ben Kibler, Nicola Maffulli, Lorimer Moseley, George Murrell, Kevin Singer, and Willem van Mechelen.



## New chapters

The new chapters in this edition are:

Chapter 1 Sports and exercise medicine: addressing the world's greatest public health problem

Chapter 3 Integrating evidence into clinical practice to make quality decisions

Chapter 4 Sports injuries: acute

Chapter 5 Sports injuries: overuse

Chapter 16 Principles of physical activity promotion for clinicians

Chapter 23 Wrist pain

Chapter 24 Hand and finger injuries

Chapter 28 Hip-related pain

Chapter 45 Military personnel

Chapter 47 Medical emergencies in the sporting context

Chapter 48 Sudden cardiac death in sport

Chapter 52 Renal symptoms during exercise

Chapter 54 Exercise to treat neurological diseases and improve mental health

## A plethora of new, clinically relevant content

Here is just a sampler of new approaches to specific “hot topics” with a few of the contributing authors:

- The all-new Chapter 28 Hip-related pain clarifies the concept of **femoroacetabular impingement (FAI)**, its diagnosis and management
- The latest **concussion** guidelines based on the Zurich consensus meeting (with Paul McCrory)
- A fully revamped discussion of **neck pain** (with Gwen Jull)
- Further tips on management of **tendinopathies** (with Jill Cook, Hakan Alfredson, and Ben Kibler)
- Discussion of whether **ACL injuries** should be managed operatively or conservatively (with Richard Frobell and Liza Arendt)
- A revolution in **pain science** and its implications for clinical practice (with Lorimer Moseley)
- How to prevent **hamstring problems** from being a major burden—prevention and treatment strategies (with Carl Askling and Anthony Schache)
- A practical approach to **leg pain**, including compartment pressure testing (with Mark Hutchinson and a demonstration on the masterclasses website)
- How to manage **the patient who has seen everyone**—and now wants a miracle cure from you (with Jim Macintyre)
- Prevention of sudden **cardiac death** and a practical approach to **sports cardiology** (with Jon Drezner and Sanjay Sharma)
- **Exercise in the heat** as well as **prevention of hyponatremia** (with Tim Noakes)
- **Drugs**—based on latest WADA guidelines

We could have made this list much longer but instead we use a toll-free part of the *Clinical Sports Medicine* masterclasses website ([www.clinicalsportsmedicine.com](http://www.clinicalsportsmedicine.com)) to take you on a tour.

No single profession has all the answers required to treat the ill or injured sportsperson and to provide exercise advice as needed. CSM4 was created by a champion team of co-authors and critical reviewers tremendously committed to the vision of “Helping clinicians help patients.” We are confident that whatever your training, *Clinical Sports Medicine* fourth edition will reinforce and refine existing knowledge and techniques, and introduce useful new approaches for your clinical practice as well as for your teaching of our wonderful vocation. Enjoy this first hybrid print and digital *Clinical Sports Medicine*.

# About the authors



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Associate Professor, Centre for Health, Exercise and Sports Medicine, The University of Melbourne

Honorary Fellow, Faculty of Law, The University of Melbourne

Adjunct Professor, School of Human Movement Studies, The University of Queensland

Adjunct Professor, Liverpool John Moores University, UK

Visiting Associate Professor, Stanford University, USA 1997

Executive Member, Australian College of Sports Physicians 1985–2000

President, Australian College of Sports Physicians 1991–92, 1999–2000

Board of Trustees, American College of Sports Medicine 2000–02

State and Federal Council Member, Sports Medicine Australia 1984–90

### Team physician

Socceroos, 2007–10, Asian Cup Finals 2007, World Cup Finals 2010

Australian Olympic Team, Atlanta 1996, Sydney 2000

Australian Commonwealth Games teams, Edinburgh 1986, Kuala Lumpur 1998

Australian team, World Student Games, Edmonton 1983, Kobe 1985, Zagreb 1987

Australian Athletics team 1990–2000, World Championships Tokyo 1991, Gothenburg 1995, Seville 1999

Australian team, World Cup Athletics, Havana 1992

Australian Mens Hockey team 1995–96

Australian team, World Swimming Championships, Madrid 1986

Melbourne Football Club (AFL) 1987–90

Collingwood Football Club (AFL) 1996

### Editorial boards

*Clinical Journal of Sport Medicine*

*The Physician and Sportsmedicine*

*Current Sports Medicine Reports*

*British Journal of Sports Medicine*

### Editor

*Sport Health* 1990–95

### Co-author

*Food for Sport* 1987

*Stress Fractures* 1999

*Drugs in Sport—What the GP Needs to Know* 1996, 2000

*The Encyclopedia of Exercise, Sport and Health* 2004

*Essential Sports Medicine* 2005

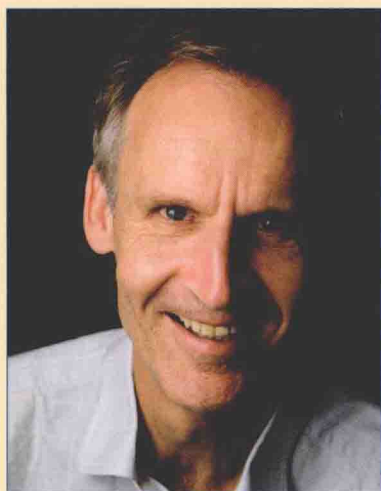
*Clinical Sports Anatomy* 2010

### Awards

Medal of the Order of Australia 2006

Inaugural Honour Award, Australian College of Sports Physicians 1996

Citation Award, American College of Sports Medicine 2000



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Visiting Professor, School of Human Movement Studies, The University of Queensland, Brisbane, Australia

Clinical Professor, Centre for Musculoskeletal Studies, School of Surgery, University of Western Australia, Perth, Australia

Exercise is Medicine Committee, American College of Sports Medicine

Medical Education Committee, American College of Sports Medicine 2002–04

Research Evaluation Committee, American College of Sports Medicine 2005–07

Scientific Subcommittee, Aspetar Hospital, Doha, Qatar 2011–

### Team physician

Olympic Games Sydney 2000, Basketball Competition Venue

Australian Women's Basketball (The Opals) 1991–96

The Australian Ballet Company 1991–96

The Australian Ballet School 1991–96

Australian team, World Student Games 1993

Australian team, Junior World Cup Hockey 1993

### Editorial boards

*BMJ* (International Advisory Board) 2008–

*Scandinavian Journal of Medicine and Science in Sport* 2007–

*British Journal of Sports Medicine* (North American Editor) 2005–07

*Journal of Science and Medicine in Sport* 1997–2001

*Year Book of Sports Medicine* 2008–10

*Clinical Journal of Sport Medicine* 2003–06

### Editor-in-chief

*British Journal of Sports Medicine* 2008–

*Sport Health* 1995–97

### Co-author

*Physical Activity and Bone Health* 2001

*The Encyclopedia of Exercise, Sport and Health* 2004

### Selected awards

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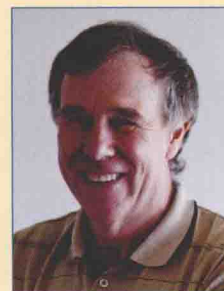
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