

## An increase in sudden unexpected cardiac deaths among young Swedish orienteers during 1979–1992

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**Background** Sixteen cases of sudden unexpected cardiac death, 15 males and one female, are known to have occurred among young Swedish orienteers from 1979 to 1992, of which seven cases occurred between 1989 and 1992. This is considered to be indicative of an increased death rate.

**Results** Histopathological evaluation showed myocarditis in a higher than expected proportion of cases. In one such case, which we studied before the sudden unexpected death occurred, the victim had suffered a *Chlamydia pneumoniae* infection verified by serology, and a nucleotide sequence was found in the heart and lung by means of the polymerase

chain reaction (PCR) that hybridized with a probe specific for that organism. Male Swedish orienteers do not, however, seem to have an increased rate of exposure to this agent. No further sudden unexpected deaths among young orienteers have occurred over the past 3–5 years. At the beginning of that period, attempts were made to modify training habits and attitudes.

(Eur Heart J 1996; 17: 902–910)

**Key Words:** Sudden unexpected death, athlete, myocarditis, arrhythmogenic right ventricular dysplasia, *Chlamydia pneumoniae*.

### Introduction

Orienteering, the task of finding the fastest track through terrain between defined checkpoints by means of map and compass reading in the shortest possible time, has for a long time been a popular sport in Sweden. At present, some 160 000 people of virtually all ages, corresponding to 2% of the entire population, pursue this sport at various levels of competition. A top segment of 3000 are ranked, 70% of whom are men, reflecting the male-to-female ratio within the sport. About 200 of the 3000 compete at the international elite level.

In the summer of 1992, we reported a case of *Chlamydia pneumoniae*-associated myocarditis and sudden unexpected cardiac death in a young Swedish orienteer<sup>[1]</sup>. At that time we were aware of five more sudden unexpected cardiac death cases during the previous few

years among young orienteers in Sweden, all belonging to the ranked elite and in whom inflammatory lesions had been found in the heart at autopsy<sup>[1]</sup>. In previously published studies of sudden unexpected cardiac death in young athletes, myocarditis was the cause in about 10% of the cases<sup>[2]</sup>.

In November, 1992, another young Swedish elite orienteer succumbed to sudden unexpected cardiac death, and a retrospective analysis disclosed additional cases in earlier years. This prompted the Swedish Board of Health and Social Welfare to arrange a meeting of health experts to discuss the current situation. The microbial hypothesis was actualized by the fact that Swedish orienteering had been previously struck by an epidemic of hepatitis B, comprising 564 jaundiced cases in 1958–63<sup>[3]</sup>. The virus was presumed to be transmitted through skin lesions on the legs, resulting from scratches from twigs and brushwood, and common washing tubs which were used after races. It was concluded at the meeting that, although *Chlamydia pneumoniae* had been detected in the myocarditic heart of one case, where tissue sampling had been performed in order to allow for such testing, a broad search for all possible

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# Sudden Cardiac Death In Swedish Orienteers

**Jose Milei, Giuseppe Ambrosio**



## **Sudden Cardiac Death In Swedish Orienteers:**

*Sudden Cardiac Death in Swedish Orienteers* Lars Wesslen, 2001      *Sudden Cardiac Death in the Young and Athletes* Gaetano Thiene, Domenico Corrado, Cristina Basso, 2016-03-04 This text atlas focuses on the pathology and molecular genetics of sudden cardiac death in the young and in athletes presenting the state of the art in the field as the basis for development and implementation of more effective prevention strategies including ultimately molecular therapy that will cure the underlying biological defect A wealth of high resolution color images accompanied by clear supporting text are presented to document the anatomic pathology of the cardiac diseases most frequently responsible for sudden cardiac death in this population including coronary artery diseases cardiomyopathies myocarditis valve diseases conduction system abnormalities congenital heart diseases and ion channel diseases The role of the molecular autopsy in overcoming the limitations of morphological investigations and offering new insights and avenues for prevention is explained The approach is however interdisciplinary with close attention also to epidemiologic and clinical aspects The authors draw throughout on their experience gained over 30 years in the course of a prospective study carried out in the Veneto Region North East Italy This text atlas will be of great value not only for cardiologists but also for geneticists sports physicians and residents in cardiology and pathology      *Arrhythmias and Sudden Death in Athletes* Antonio Bayés de Luna, F. Furlanello, B.J. Maron, Douglas P. Zipes, 2013-06-29 Cardiovascular diseases are the most important causes of death in the world today In adults the most frequent heart disease is acute myocardial infarction which can lead to sudden death To prevent these diseases we need to fight against their main risk factors which include smoking lipid disorders hypertension diabetes and a sedentary life style among others It has been demonstrated that physical exercise or sports at any age provide notable benefits and can help to decrease other risk factors and reduce the incidence of cardiovascular diseases Exercise can be simply walking or cycling Aerobic exercise contributes to weight loss and also helps to control blood pressure cholesterol and diabetes It therefore plays an important role in prevention of heart diseases Sports for young people are of great value and advisable not only because they contribute to physical fitness but also because they help in psychological well being Young people should be encouraged to include general exercise and particularly sports into their daily activities The following points however should be kept in mind I Although winning at a sport is important this is only so if it is achieved in natural physical conditions and with the correct training Therefore it is advisable to keep well away from any type of activity which artificially increases physical performance that is drug taking      **Sports Cardiology** David J. Engel, Dermot M. Phelan, 2021-05-06 Providing a critical update and review of salient topics needed for the proper cardiac evaluation and care of athletes this text is designed to be the most up to date and practical manual for all health care providers who evaluate and treat athletes including sports cardiologists general cardiologists sports medicine specialists team doctors and athletic trainers The book is divided into three key sections The first section discusses essential topics pertaining to the pre

participation cardiac screening of athletes providing a framework for how best to perform pre participation cardiac evaluations and optimize the interpretation of cardiac screening test results and a guide to assist the streamlining of appropriate downstream testing when required The second section reviews the management and care of athletes with specific existing cardiovascular disorders providing the reader with fundamental principles to help recognize and advise levels of sport participation to athletes with these disorders The final section deals with acute sideline management of the symptomatic athlete and will again provide practical algorithms for cardiologists and non cardiologists alike who are responsible for athlete health and safety in the sports arenas and training facilities Written and edited by highly regarded experts in the field of sports cardiology including several cardiologists who are collegiate and professional team physicians and who work with professional sports organizations on developing policies for cardiac screening and monitoring Sports Cardiology is an excellent practical resource for all clinicians working in the field

**Pathology of the Heart and Sudden Death in Forensic Medicine** Vittorio Fineschi, Giorgio Baroldi, Malcolm D. Silver, 2006-05-22 Addressing the pathology of the heart and cardiovascular system from a forensic perspective Pathology of the Heart and Sudden Death in Forensic Investigations guides the pathologist toward the effective resolution of cases It critically reviews pertinent facts by revisiting pathologic findings and comparing them to etiopathogenic hypotheses

**Cardiac Arrhythmias 1999** Antonio Raviele, 2012-12-06 Lectures and Structured Symposia

Forensic Medicine Jason Payne-James, Anthony Busuttil, William Smock, 2003 This multi author multinational book has provided a source of information about the forensic aspects of medicine and related fields for those currently involved in the clinical and pathologic aspects of health care forensic assessment investigation and diagnosis for victims assailants and others involved in police or judicial systems

*Case Reports in Cardiology* William C. Roberts, 2023-11-28 From the earliest days of medicine to the present case reports have been a critical aspect of clinical education and knowledge development In this comprehensive volume Dr William C Roberts a renowned expert in the field explores the rich history and ongoing importance of case reports in cardiology Through engaging and insightful analysis the book demonstrates how case reports have provided physicians with crucial insights into rare diseases complex conditions and ground breaking treatments Drawing on a vast range of sources from ancient manuscripts to cutting edge journals it offers a unique perspective on the role of case reports in medical education and management of cardiomyopathy It underscores how case reports can be used to enhance diagnostic accuracy identify new treatment options and promote innovation in the field In addition the book provides valuable insights into the process of writing and publishing case reports including tips for young physicians looking to break into the field The book will be an indispensable guide to the history practice and ongoing significance of case reports for medical students physicians and researchers alike

**Key Features**  
Provides a rich repository of diverse case reports in cardiology published by the editor and his colleagues over 61 years  
Features 39 clinical case studies related to Cardiomyopathy and associated morbidities useful for medical students and

practicing cardiologists Valuable resource for young physicians seeking to establish a foothold in medical research and academics *Cardiovascular Pathology* L. Maximilian Buja, Jagdish Butany, 2022-01-22 Cardiovascular Pathology Fifth Edition provides a comprehensive treatise on the pathology of cardiovascular diseases combining presentations of detailed pathology of cardiovascular diseases coupled with contemporary insights into etiology and pathogenesis Twenty two chapters cover general topics including cardiovascular genetics heart failure and transplantation and specific congenital and acquired cardiovascular diseases therapeutic interventions and forensic aspects New chapters address the scope of practice and training in cardiovascular pathology with a focus on major diagnostic approaches used in contemporary practice and research in cardiovascular pathology and a perspective on the field of cardiovascular regenerative medicine linked to the basic pathobiology of cell based therapy The book provides a unique combination of details of pathological anatomy essential for pathologists involved in the evaluation of cardiovascular specimens and cardiovascular diseases and is an excellent reference for anyone interested in the natural history and therapeutic advances in the cardiovascular field Includes expanded coverage of diagnostic guidelines standards and normal values Provides a summary of cardiac catheterization laboratory and diagnostic imaging tests to guide pathologists in clinicopathological correlation Presents a contemporary all inclusive guide to cardiovascular pathology for clinicians and researchers as well as clinical residents and fellows in pathology cardiology cardiac surgery and internal medicine Provides comprehensive coverage including when appropriate Central Concept Figure Definition Epidemiology Clinical Presentation Pathogenesis Molecular Genetics Light and Electron Microscopy Immunohistochemistry Differential Diagnosis Treatment and Potential Complications and a Bulleted Summary

Inflammatory Cardiomyopathy (DCMi) - Pathogenesis and Therapy Heinz-Peter Schultheiss, Michel Noutsias, 2011-01-30 Cardiomyopathy is one of the most frequent causes of heart failure It is often associated with inadequate heart pumping or other heart function abnormalities There are many different causes of the disease therefore many different kinds of cardiomyopathies exist This volume written by a leading expert focuses on inflammatory CM belonging to the Dilated Cardiomyopathies DCMi It covers epidemiology prognosis pathology immunology diagnosis and treatment strategies

*Cardiovascular Medicine* James T. Willerson, Jay N. Cohn, Hein J.J. Wellens, David R. Holmes, 2007-12-06 This book offers the most up to date user friendly guidance on the evaluation diagnosis and medical and surgical treatment of heart and vascular disease The book and DVD package is designed to provide comprehensive coverage of every aspect of cardiovascular medicine The book has consistent chapter organization relevant to modern cardiovascular practice clear design and engaging text The reader will have all the guidance to diagnose and manage the full range of cardiovascular conditions in one textbook resource while also benefiting from access to additional video material from the integral DVD ROM This includes over 100 individual heart sounds **Index Medicus**, 2002 Vols for 1963 include as pt 2 of the Jan issue Medical subject headings **Cardiac Arrhythmias, Pacing & Electrophysiology** P.E. Vardas, 2012-12-06 Europace 97

was held in Athens Greece on 8 11 June Leads were as usual an important topic with the earl 1997 in the city of classical civilisation and learning iest mention of the then new polyurethane leads Future Though now held in modem surroundings and meeting conferences elaborated on these basic topics while pro facilities the influence of the ancient city state was un gressively adding sensors and sensor function dual mistakable with the architecture and learning of antiquity chamber pacing and recognising the development of looming over the city by its influence over the intellectual clinical cardiac electrophysiology activities of the symposium The ancient magnificence of Clinical cardiac electrophysiology and compre the site was matched by the novelty of modem art and hension of arrhythmias has been largely a development science Europace is a European symposium begun in of the twentieth century With the description and 1979 and has occurred every second year since Con recording of the bundle of His depolarisation by direct sistent with its importance and continental reach the actual access and by catheter modem clinical investigation of symposium has moved to different cities throughout arrhythmias and cardiac electrophysiology began The Western Europe The first symposium was held in London disciplines of cardiac stimulation and of investigation of and subsequent symposia have been held in Torremolinos arrhythmias impulse formation and A V conduction Ostend Florence Istanbul and other cities Because of the were essentially separate for many years

**Critical Heart Disease in Infants and Children E-Book** Ross M. Ungerleider,Kristen Nelson McMillan,David S. Cooper,Jon N. Meliones,Jeffrey Jacobs,2018-09-26 Selected for Doody s Core Titles 2024 with Essential Purchase designation in Pediatric Surgery Now in brilliant full color and reflecting recent significant changes in the field Critical Heart Disease in Infants and Children 3rd Edition keeps you abreast of the skills and knowledge required to safely care for children with congenital and acquired heart disease in the ICU Pediatric intensivists cardiologists cardiac surgeons and anesthesiologists from leading centers around the world provide a well rounded perspective on basic scientific principles medical and pharmacologic treatments surgical techniques and equipment Features comprehensive updates throughout the text including indications techniques potential complications in perioperative management of patients and surgical techniques for congenital heart disease Covers recent advances in the treatment of pulmonary hypertension developments in mechanical assist devices heart and lung transplantation and interventional cardiac catheterization Features an all new full color format that speeds navigation and helps clarify complex concepts Contains 27 new chapters with an emphasis on the team approach to patient care in the ICU including creating multidisciplinary teams quality and performance improvement training and challenges and solutions to developing a cohesive team environment Includes a detailed chapter on bedside ultrasound walking you through the techniques you re most likely to encounter in the ICU Employs well documented tables text boxes and algorithms to make clinical information easy to access and more than two dozen video clips provide a more complete understanding of echocardiography imaging modalities pulmonary hypertension and more Describes the basic pharmacology and clinical applications of new pharmacologic agents Examines issues affecting adults with congenital heart disease

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**Diagnosis and Treatment of Myocarditis** Jose Milei, Giuseppe Ambrosio, 2013-05-08 Myocarditis is a clinical syndrome most frequently of infectious etiology that occurs with a broad range of relatively non specific symptoms and consists of an inflammatory process of the heart with necrosis and degeneration of the myocardium by inflammatory infiltration of immune cells The infection can cause direct injury of cardiomyocytes as well as immune mediated destruction of the myocardium leading to cardiac dysfunction In this book the broad aspects of myocarditis are fully presented by leading international experts The texts are devoted to both clinical aspects and pathophysiology and they present comprehensive reviews of the causes of myocarditis its classification diagnosis and treatment as well as myocarditis in special populations such as pediatric peripartum and chronic chagasic myocarditis *Immune Dysfunction and Immunotherapy in Heart Disease* Ronald Ross Watson, Douglas F. Larson, 2008-04-15 Current heart failure therapeutics affects symptoms without appreciably reducing the mortality rate of 50% in five years suggesting a failure in treating the underlying mechanism This book proposes a new mechanism for heart failure immune mediated cardiac remodelling for cardiac dysfunction The outstanding editor team of two internationally recognized immunologists Ronald Watson who has studied heart disease in immune dysfunction for a decade and has a patent for an immunotherapy of heart disease by immune regulation and Douglas Larson whose experience in cardiac transplantation immunology has provided the foundation for research into novel therapeutics for heart failure and hypertension makes *Immune Dysfunction and Immunotherapy in Heart Disease* the definitive reference to the state of the science in this area The four parts of the book address Immune Dysfunction Leading to Heart Disease Induction by Physiological Changes Immune Dysfunction Promoting CVD Induction by Transplantation Drugs Immune Dysfunction Leading to Heart Dysfunction Induction or Prevention by Cardiotherapeutic Drugs Immune Dysfunction Leading to Heart Disease Induction by Pathogens Both researchers and practitioners will find this authoritative volume an excellent source of information on novel immune targeted therapeutics **Encyclopedia of Forensic and Legal Medicine**, 2015-09-29 *Encyclopedia of Forensic and Legal Medicine Volumes 1 4* Second Edition is a pioneering four volume encyclopedia compiled by an international team of forensic specialists who explore the relationship between law medicine and science in the study

of forensics This important work includes over three hundred state of the art chapters with articles covering crime solving techniques such as autopsies ballistics fingerprinting hair and fiber analysis and the sophisticated procedures associated with terrorism investigations forensic chemistry DNA and immunoassays Available online and in four printed volumes the encyclopedia is an essential reference for any practitioner in a forensic medical healthcare legal judicial or investigative field looking for easily accessible and authoritative overviews on a wide range of topics Chapters have been arranged in alphabetical order and are written in a clear and concise manner with definitions provided in the case of obscure terms and information supplemented with pictures tables and diagrams Each topic includes cross referencing to related articles and case studies where further explanation is required along with references to external sources for further reading Brings together all appropriate aspects of forensic medicine and legal medicine Contains color figures sample forms and other materials that the reader can adapt for their own practice Also available in an on line version which provides numerous additional reference and research tools additional multimedia and powerful search functions Each topic includes cross referencing to related articles and case studies where further explanation is required along with references to external sources for further reading

*Cumulated Index Medicus* ,1989      *Textbook of Sports Medicine* Michael Kjaer,Michael Krogsgaard,Peter Magnusson,Lars Engebretsen,Harald Roos,Timo Takala,Savio L-Y. Woo,2008-04-15 The Textbook of Sports Medicine provides comprehensive coverage of both basic science and clinical aspects of sports injury and physical activity More than one hundred of the World s leading authorities within exercise physiology clinical internal medicine sports medicine and traumatology have contributed with evidence based state of the art chapters to produce the most complete integration ever of sports medicine science into one book Great attention has been given to providing balanced coverage of all aspects of sports medicine with respect to the relevance and clinical importance of each area The book isolates solid principles and knowledge and the documentation to support these as well as identifying areas where further scientific investigation is needed The topics dealt with and the degree of detail in the individual chapters makes the book ideal for both educational programs at University level within exercise science and sports medicine as well as for post graduate courses within all aspects of sports medicine In addition the book will be excellent as a reference book in any place where professionals whether doctors exercise scientists physiotherapists or coaches are dealing with supervision or treatment of sports active individuals Finally the book is well structured to act as an introduction to research in the field of sports medicine

**Oxford Textbook of Medicine** David A. Warrell,2003 The Oxford Textbook of Medicine provides all that any doctor needs to know to practice top level internal medicine It gives comprehensive coverage of the epidemiology aetiology and mechanism of disease as well as clear unambiguous coverage of the diagnosis practical management and prevention of the entire spectrum of medical disorders There are major introductory sections on the scientific basis of disease and in the system based clinical sections genetic predisposition pathophysiology pathogenesis molecular mechanisms and cell biology



are covered in depth for all significant medical syndromes Clinical descriptions of diseases are clearly and memorably written based on the experience and insight of the authors many of whom are among the world's most distinguished medical scientists Chapters are not only evidence based but also on clinical experience and a thorough survey of all the relevant literature Throughout the approach of OTM is humane and ethical and at the same time factual reliable honest especially where knowledge is limited and rigorously scientific This is not just a textbook of First World medicine It provides practical guidance for doctors working in a variety of medical setting the value of a logical clinical approach rather than immediate resort to expensive imaging and laboratory tests Moore of the contributing authors than ever before are from outside Europe including strong representation of North American medicine The new editorial team has ensured that the OTM continues to reflect rapid changes in medical practice there are new sections on intensive care alcohol and drug abuse clinical pharmacology and therapeutics world health clinical trials and evidence based medicine adolescent medicine sports medicine and emergency medicine more than half the contributors are new for this edition and most of the text has been heavily revised The striking new page and cover design reflect the significant changes made in this new edition The Textbook is illustrated by over 2000 two color diagrams and many color Plates The index is the most detailed and user friendly of any major medical textbook in an emergency the reader can access information quickly whether on the ward in office or at home Like its predecessors OTM4 will be the trusted and ultimate reference in libraries hospitals doctors consulting rooms solicitors offices press offices and primary care practices worldwide

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