THE EPIDEMIOLOGY of DIABETES MELLITUS

Second Edition

Edited by

Jean-Marie Ekoé *Endocrinologie, Métabolisme et Nutrition, Centre de Recherche CHUM, Montreal, Canada*
Marian Rewers *Barbara Davis Center for Childhood Diabetes, Colorado, USA*
Rhys Williams *Clinical Epidemiology at the School of Medicine, University of Swansea, Swansea, UK*
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Wiley-Blackwell is an imprint of John Wiley & Sons, formed by the merger of Wiley's global Scientific, Technical and Medical business with Blackwell Publishing.

Registered office: John Wiley & Sons Ltd, The Atrium, Southern Gate, Chichester, West Sussex, PO19 8SQ, UK

Other Editorial Offices:
9600 Garsington Road, Oxford, OX4 2DQ, UK
111 River Street, Hoboken, NJ 07030-5774, USA

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Library of Congress Cataloging-in-Publication Data:

The epidemiology of diabetes mellitus / edited by Jean-Marie Ekoé . . . [et al.].—2nd ed.
p. ; cm.
Includes bibliographical references and index.
ISBN 978-0-470-01727-2 (alk. paper)
1. Diabetes—Epidemiology. I. Ekoé, J.-M.
[DNLM: 1. Diabetes Mellitus—epidemiology. 2. Diabetes Complications—epidemiology. WK 810 E641 2008]
RA645.D5E654 2008
614.5'9462–dc22
2008029103

ISBN 978-0-470-01727-2

A catalogue record for this book is available from the British Library.

Set in 10/12 Times New Roman by Laserwords Private Ltd, Chennai, India.
Printed in Great Britain by Antony Rowe Ltd, Chippenham, Wiltshire.

First Impression 2008

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About the Editors

Jean-Marie Ekoé is Professor of Medicine, Endocrinology, Metabolism and Nutrition, Faculty of Medicine, University of Montreal, Quebec, Canada. He is a member of the Epidemiology Research Unit, Research Centre of the Centre Hospitalier Universitaire de Montréal (CHUM). He was the first recipient of the World Health Organization and International Diabetes Federation Kelly West Memorial Lilly Award in 1983. His major clinical and research interests are in the epidemiology of diabetes, diabetic foot problems and other long-term complications of diabetes mellitus.

Dr Ekoé is or has been principal investigator, co-investigator and collaborator of numerous clinical trials and projects involving epidemiology and management of diabetes and its late complications among Caucasian, Native and other populations in Canada and elsewhere. He received the 2004 Annual Award of Specialized Medicine of L'Association des Médecins de Langue Française du Canada and the Sir Alister McIntyre Distinguished Award for the year 2007 from the University of the West Indies Outreach Programme (UDOP). He has served as the Diabète Québec, Canada, Professional Council Chairman since 2006.

Marian Rewers' primary research has been in the area of epidemiology/etiology of type 1 diabetes, as well as insulin resistance and cardiovascular complications of both type 1 and type 2 diabetes. Dr Rewers is the principal investigator of five large active National Institutes of Health-funded projects: the Diabetes Autoimmunity Study in the Young (National Institute of Diabetes and Digestive and Kidney (NIDDK)/National Institute of Allergy and Infectious Diseases), The Environmental Determinants of Diabetes in the Young, the Coronary Artery Calcification in Type 1 Study (National Heart, Lung, and Blood Institute (NHLBI)), the Determinants of Premature Atherosclerosis in Type 1 Diabetes Study (NHLBI), and the Genetic and Environmental Causes of Celiac Disease (NIDDK). In the past, he has directed two additional large NHLBI-funded projects: The Insulin Resistance Atherosclerosis Study (IRAS) and The IRAS Family Study. He serves as the Clinical Investigation & Bioinformatics Core director for the University of Colorado at Denver and Health Sciences Center Diabetes Endocrinology Research Center (DERC). He is a co-investigator on additional multiyear projects in the area of diabetes and autoimmunity.

Dr Rewers is directing one of the studies that have been instrumental in learning the causes and risks of diabetes, the Diabetes Autoimmunity Study in the Young (DAISY). In 2000, Dr Rewers initiated a study of early detection of heart disease in 1400 adult patients with type 1 diabetes and their spouses/partners. The study is pioneering the use of electron beam computed tomography in detecting microscopical calcification of coronary arteries.

In addition to his research endeavors, Dr Rewers is directing a clinical team of 16 physicians and over 50 ancillary staff serving a population of nearly 6000 patients with type 1 diabetes. He received American Diabetes Association (ADA) Michaela Modan Memorial Award and served as the ADA Council on Epidemiology & Statistics Program Chair and Chair from 1996 to 2001. Currently, Dr Rewers serves as the Associate Editor of *Diabetes Care*.

Rhys Williams is Dean of Medicine and Professor of Clinical Epidemiology at the School of Medicine, Swansea University. He is the Head of Learning and Teaching at the School and the chair of the Centre for Information, Research and Evaluation. His main research interests relate to diabetes epidemiology and health care, metabolic syndrome and childhood obesity. He is Chair of Diabetes UK's Wales Advisory Council and, until recently, was a Vice President of the International Diabetes Federation (IDF), chair of the IDF's Task Force on Diabetes Awareness and Editor-in-Chief of IDF's in-house magazine *Diabetes Voice*. He is a

member of the IDF's Prevention Task Force and of the *Diabetes Atlas* Editorial Board. He is also a visiting consultant to the World Health Organization, Geneva.

Paul Zimmet is Director of the International Diabetes Institute and Hon. Professor at Monash University in Australia. He co-chairs the International Diabetes Federation Task Force on Epidemiology and Prevention. He designed and leads the team carrying out the 'AusDiab Study,' the first national diabetes and obesity study in Australia. He is widely recognized for his studies in Indian and Pacific Ocean populations, which have provided new insights into the genetic and environmental contribution to type 2 diabetes and obesity as well as the role of socio-cultural change. He has received numerous international awards for his research, including the 2007 international Novartis Award for accomplishments in research that have had a major impact in diabetes. He received the national award of Officer of the Order of Australia for distinguished services to medicine, nutrition and the biotechnology industry.

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Foreword

The epidemiology of diabetes has become a growth industry over the past 25 years—since WHO and NDDG revised the criteria for the classification and diagnosis of diabetes. This occurred shortly after the unique observations of very high prevalence rates of type 2 diabetes in Pacific islanders and Amerindians and the pioneering international comparative studies by Kelly West. Epidemiology as a discipline has matured and become much more refined over the same period. Diagnostic criteria for diabetes and the classification have been updated as knowledge has increased—and intermediate degrees of hyperglycaemia introduced as risk states for diabetes. The first edition of this book broke new ground as the definitive text focusing on the epidemiology of diabetes. At that time it was obvious that an epidemic of diabetes—particularly type 2—was in progress & much of the focus of the book was to discuss the reasons for this and tactics needed for primary prevention. Do we need a further edition—the answer is a resounding yes! Knowledge has increased greatly over the intervening years, our knowledge of the prevalence and incidence of both type 2 and type 1 diabetes has increased, and more knowledge is available on prevention. We also have better information on the complications of diabetes, the emergence of the Metabolic Syndrome as a risk state and awareness of the increasing occurrence of type 2 diabetes in young people and children.

Type 1 diabetes has perhaps received less attention than type 2 over the past decade—primarily because people with this sort of diabetes are far outnumbered by those with type 2. Nonetheless, numbers are increasing almost everywhere with Finland and Newfoundland for example now reporting alarming rates. This has massive consequences for healthcare—and for affected individuals. Knowledge on genetic aspects of type 1 and ethnic differences has increased although we are still frustratingly far from realistic preventive or curative strategies. Up to date accounts of these areas are presented in this volume.

Type 2 diabetes now presents as one of the great pandemics of the 21st Century. In some populations more than half of adults either already have the disease or are at high risk with evidence of IGT, IFG or metabolic syndrome. It affects all peoples but particularly some of our rapidly developing groups. South Asians appear to have a particular predisposition to diabetes—and the Indian subcontinent will have nearly one-third of the world's type 2 diabetic people. The disorder is however emerging as a massive threat to health everywhere. In particular diabetes increases the risk of developing macrovascular disease and is now one of the major factors behind the resurgence of heart disease and stroke world-wide—and in particular their increase in the developing world. They also of course carry the risk of the microvascular complications, particularly when glycaemic control is inadequate.

The only real solution is prevention. The results of prevention trials were beginning to emerge at the time of the last edition of this volume with much hope engendered by the large trials in the USA and Finland. Several further trials have now reported & it seems clear that by focussing on high risk people (those with IGT or IFG or both) the development of tp2 diabetes can be delayed in more than 50% with lifestyle adjustment and or metformin & even more with glitazones. Obviously this now needs testing formally in whole communities and in ''real life''—and also the thorny question of the safe long term use of drugs with potential side effects has to be tackled.

Prevention of development of the long-term complications is of course vital for those who have already developed diabetes. New drug entities are appearing which will help—as will improving blood glucose control. Here patient and professional education become all important and there is a massive task ahead if we are to get at everyone with diabetes—and all their carers.

The epidemiological background to these problems—and others—is presented exhaustively in this volume. There is an excellent introduction on the clinical syndrome and on current views on classification and diagnosis. Broad chapters on type 2 diabetes and obesity, physical activity and nutrition then provide the backdrop against which detailed accounts are given of type 2 diabetes in all the major continents and many individual countries. Type 1 diabetes then follows with separate chapters thereafter on each of the complications. There are then informative essays on mortality and economics.

Undoubtedly this book will provide a *vade mecum* for all those interested in not just diabetic epidemiology but diabetes in general.

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June 2008