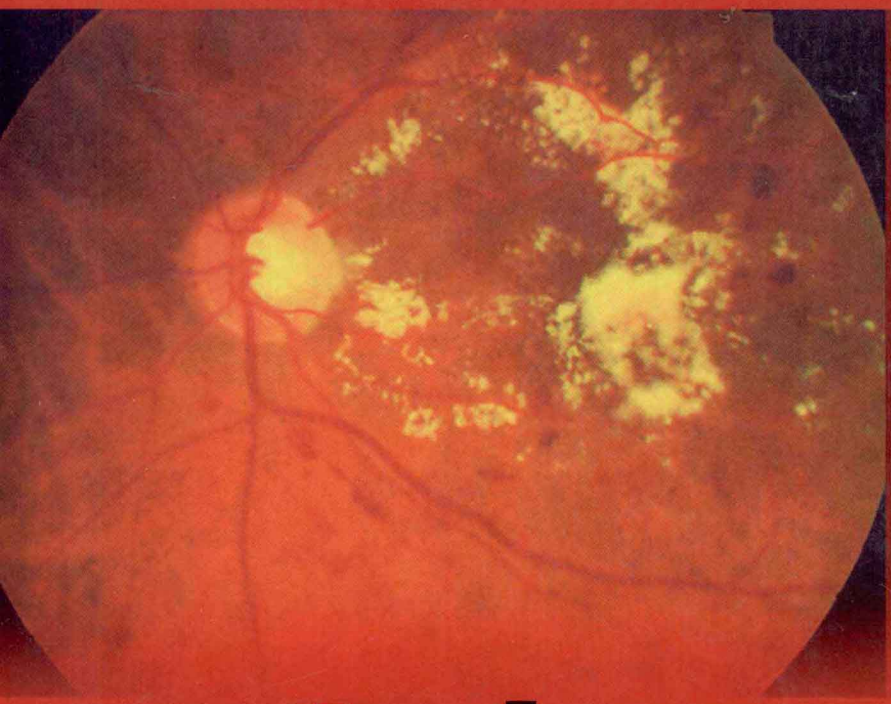

Diabetes dp in Practice

Diabetes

Chronic Complications

Editors Kenneth M. Shaw and Michael H. Cummings

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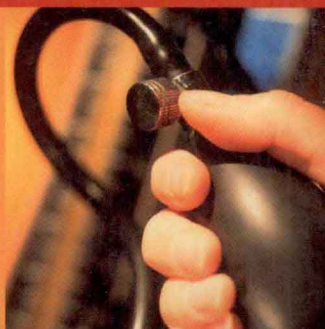

Diabetes

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Kenneth M. Shaw and Michael H. Cummings

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John Wiley & Sons, Ltd

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West Sussex PO19 8SQ, England

Telephone (+44) 1243 779777

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Other Wiley Editorial Offices

John Wiley & Sons Inc., 111 River Street, Hoboken, NJ 07030, USA

Jossey-Bass, 989 Market Street, San Francisco, CA 94103-1741, USA

Wiley-VCH Verlag GmbH, Boschstr. 12, D-69469 Weinheim, Germany

John Wiley & Sons Australia Ltd, 42 McDougall Street, Milton, Queensland 4064, Australia

John Wiley & Sons (Asia) Pte Ltd, 2 Clementi Loop #02-01, Jin Xing Distripark, Singapore 129809

John Wiley & Sons Canada Ltd, 22 Worcester Road, Etobicoke, Ontario, Canada M9W 1L1

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Library of Congress Cataloging-in-Publication Data

Diabetes : chronic complications / editors, Kenneth M. Shaw and Michael H. Cummings. – 2nd ed.
p.; cm.
Rev. ed. of: Diabetic complications / edited by K.M. Shaw. c1996.
Includes bibliographical references and index.
ISBN-13 978-0-470-86579-8
ISBN-10 0-470-86579-2
1. Diabetes–Complications. I. Shaw, K. (Kenneth) II. Cummings, Michael H.
III. Diabetic Complications.
[DNLM: 1. Diabetes Complications. WK 835 D5343 2005]
RC660.D5636 2005
616. 4′62–dc22 2005019919

British Library Cataloguing in Publication Data

A catalogue record for this book is available from the British Library
ISBN 0 470 86579 2

Typeset in 10.5/13pt Times by Thomson Press (India) Limited, New Delhi
Printed and bound in Great Britain by Antony Rowe, Chippenham, Wilts
This book is printed on acid-free paper responsibly manufactured from sustainable forestry
in which at least two trees are planted for each one used for paper production.

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Preface to *Diabetic Complications*

We appear to be on the threshold of witnessing a substantial reduction in the long-term complications of diabetes. Modern treatment regimens, better monitoring of control and the huge impact of improved education all combine to offer the prospect of real progress towards prevention of complications and lessening of progression in those in whom complications may be present. The Diabetes Control and Complications Trial (DCCT) has provided eveidence that such can be achieved, while the St Vincent Declaration initiative has set the standards to enable these benefits to become reality. Such is the encouraging future expectation that the logistics of delivering the necessary diabetes care to achieve the potential immense health gain are still daunting. Much more diabetes care is being undertaken in general practice as structured mini-clinics are established, while hospital diabetes centres have never been busier as more specialized complex cases are referred. Never has organized multiprofessional teamwork across all sectors of health care been needed more. Whether the patient is managed at a hospital centre, in a community mini-clinic or on a shared-care basis, the importance of identifying those patients at risk of complications and the detection of developing complications at an early stage is now beyond dispute.

The contributors to this book have extensive experience in diabetes, either as specialists specifically in diabetes or as experts in other fields to whom complications of diabetes are referred. Each contribution seeks to outline the nature of diabetes complications, how susceptibility and risk can be identified, the importance of screening during the early stages and the way appropriate investigation and management should be undertaken.

It is hoped that those of all disciplines involved in the day-to-day care and education of diabetes, either in the community or in the specialist centre, will find both interest and practical help from the content of this book. The St Vincent's objective of reducing and even eliminating complications of diabetes is now a real and achievable goal.

K.M. Shaw
Portsmouth, February 1996

Foreword to *Diabetic Complications*

Nearly three-quarters of a century has passed since the discovery of insulin, and while there is scarcely anyone who can now recall diabetes treatment before 1922, there are many whose memories extend over 60 years or more to the early exhilarating era of insulin treatment. Some recall their physicians of the time, notably perhaps Dr. R. D. Lawrence of King's College Hospital, that flamboyant, yet astute and most caring of physicians. Yet those with long memories and long lives have survived a life of diabetes, happily spared the development of diabetic complications. The absence of complications may have been due in part to good management, but a genetic influence is probably as important.

The euphoria of the 1920s was followed by recognition of most of the disorders due to diabetic complications in the following decades. Yet by mid-century physicians could only observe the outcome with little change of having any influence on the natural progression of the disease. Nephropathy and retinopathy frequently led to renal failure and blindness, while the consequences of neuropathy and vascular disease resulted in catastrophic foot disease and amputations.

In the last 25 years there has been a dramatic change. The benefits of tight metabolic control have been demonstrated in numerous studies, most recently and most conclusively in the Diabetes Control arid Complications Trial (DCCT) in the USA. It is now possible to reduce the incidence of complications by 35–70 per cent, or when they occur to retard their progression. This magnificent study gives enormous encouragement to both patients and their physicians and nurses by demonstrating that their efforts are really worthwhile. It gives renewed impetus to the search for achieving better diabetes control without developing the devastating consequences of hypoglycaemia.

Extraordinary developments have also evolved in treating the consequences of diabetic complications when they do occur. In Germany, photocoagulation was used empirically to prevent the evolution of retinopathy and was subsequently shown to prevent blindness. The evolution of nephropathy can be substantially reduced by hypotensive treatment, and the potential specific advantage of angiotensin-converting enzyme inhibitors has been demonstrated. Dialysis and transplantation are now available to most diabetic patients who need renal support treatment, although even a decade ago, many centres considered that diabetic

patients did not qualify for these treatments. The availability especially of continuous ambulatory peritoneal dialysis (CAPD) has transformed the availability of renal support even in elderly patients who can achieve a very acceptable quality of life. Treatment of the diabetic foot has been revolutionized: primary prevention of foot ulcers by education, chiropody and advice on footwear represents probably the best and most cost-effective prevention measure in the care of diabetic patients. The establishment of specialized foot clinics leads to rapid treatment of threatening lesions, and the amputation rate can thereby be halved. Angioplasty and vascular surgery have advanced to the point where they make an important contribution to limb salvage.

Proper care in the 1990s must therefore include the facilities for identification of all patients with diabetes – hence the need for diabetes registers – and regular review for early detection of complications, which will enable physicians to take the steps needed to abort the disease. These requirements place a huge demand on society in terms of health resources, but the demands of our patients are now heard, and governments have acknowledged the need to reduce complications following wide acceptance of the St Vincent declarations. So it is the organization of diabetes care which must change to accommodate these developments. The introduction of the diabetes specialist nurse is probably the most important innovation is diabetes care, and his/her expertise now enables delivery of care on a community basis, linked of course to the strength of diabetes expertise and research at the hospital-based diabetes departments. These new arrangements must be made to achieve high standards, and there should be a new era of optimism which might lead to a reduction of the tragedies of diabetes, just as improved standards reduced foetal mortality from over 30 per cent in the 1940s to between 1 and 2 per cent in the 1990s.

This book addresses these topical issues in a comprehensive approach, and describes in detail methods for early detection of diabetes complications by the extended team ranging from the community base to the hospital. Specialist nurses are responsible for one of the chapters, giving an indication of their key role not just in the care of patients, but also in the organization of screening and education programmes, now crucial to the provision of high-quality diabetes care.

There can be few fields in medicine in which such important advances have been made in little more than two decades. As the British Diabetic Association, which has done so much to advance understanding of the disease and help public understanding of its needs, celebrates its 60th birthday, both those with diabetes and those who care for them should have a renewed optimism for the future. The advances stem, of course, from the events in 1922 when the earliest patients were treated with C insulin, and Elizabeth Hughes wrote to her mother that 'Dr Banting considers my progress simply miraculous'. The advances continue to this day.

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Preface to the Current Edition

The exponential rise in the global prevalence of diabetes, particularly type 2, but also type 1 at young age, will almost certainly be associated with an inevitable and parallel increase in the long-term complications that associate with diabetes. Both metabolic susceptibility and complication predisposition are subject to genetic determination, but the expression of such is significantly influenced by environmental factors. The substantial rise in numbers with diabetes would indicate that adverse lifestyle factors continue largely unabated and, despite advances in understanding and therapy, consequent complications are set to continue, albeit with changing patterns.

The long-term complications of diabetes are well known and such is the diversity of effect that new areas of adverse consequence continue to be identified, such as non-alcoholic fatty liver disease, increased risk of colorectal cancer with insulin-resistance and psychological disturbance such as depression. Furthermore, diabetes is a great magnifier and so often physical ailments are worsened by diabetes if not directly caused by it.

Yet, an increasing evidence base provides encouragement that the development of diabetic complications can at least be ameliorated if not prevented. DCCT for type 1 and UK PDS for type 2 diabetes have shown that for microangiopathy a reduction in complication rate can be achieved and furthermore the benefit continues even when intensive management is lessened. On the other hand, for large vessel disease, although the relationship of hyperglycaemia to causation is established, so far the benefits of improved glycaemic control are uncertain. In this context, other vascular risk factors are seemingly more important.

The pattern of diabetic complications is changing. In Western Europe advanced retinal disease and end stage renal failure are diminishing, whilst coronary heart disease has become the greatest clinical challenge. This change will have resulted from a number of advances in clinical management – better screening, better therapies and better monitoring – but there is still much more to be done to reduce the considerable burden of diabetic complications on the individual and society. Present therapeutic strategies are predominantly based on surrogate indicators of risk, and hence tend to be target-driven. Whether such intensified strategies will prove effective remains to be seen. Meanwhile, education and understanding promoting healthier lifestyles remain paramount.

Since the first edition of *Diabetes: Chronic Complications*, many advances have been made. Once more for this new edition we have drawn upon contributors with extensive experience in diabetes or specialist experience of issues related to diabetes. Again we have endeavoured to ensure that, along with an understanding of the nature of diabetic complications, a clear and practical guidance is provided on appropriate management. The evidence base for the reduction of diabetic complications is positive and encouraging, but the achievement of successful outcomes is still less easily implemented in this world of increasing diabetes. This second edition sets out to provide for all those involved in diabetes care a greater awareness of the problems encountered along with pragmatic advice on practice management.

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Diabetes

Chronic Complications

Contents

1

Diabetes and the Eye

Kevin Shotliff and **Grant Duncan**

1.1 Introduction

Since the invention of the direct ophthalmoscope by Helmholtz in 1851 and von Yaeger's first description of changes in the fundus of a person with diabetes 4 years later, there has been increasing interest in the retina as it contains the only part of the vasculature affected by diabetes that is easily visible. Interestingly, these first retinal changes described in 1855 were actually hypertensive, not diabetic.

Despite the target outlined in the St Vincent Declaration in 1989 to reduce blindness caused by diabetes by one-third within 5 years, and the advances made in laser therapy and vitreoretinal surgical techniques, diabetic retinopathy remains the commonest cause of blindness in the working-age population of the Western world. Furthermore, with predictions of a dramatic increase in the number of people diagnosed with diabetes, the detection and treatment of diabetic retinopathy continues to be a focal point for healthcare professionals. Indeed the recent National Service Framework for Diabetes (NSF) has prioritized diabetic retinopathy by setting specific targets associated with retinal screening and implementing the development of a National Screening Programme.

Visual loss from diabetic retinopathy has two main causes: maculopathy, described as disruption of the macular region of the retina, leading to impairment of central vision; and retinal ischaemia, resulting in proliferative diabetic retinopathy.

As well as the retina, other parts of the eye can also be affected in people with diabetes. Cataracts are more prevalent and are actually the most common eye abnormality seen in people with diabetes, occurring in up to 60 per cent of 30–54-year-olds. The link between diabetes and primary open angle glaucoma, however, continues to be disputed. Vitreous changes do occur in people with

Diabetes: Chronic Complications Edited by Kenneth M. Shaw and Michael H. Cummings

diabetes, such as asteroid hyalosis, seen in about 2 per cent of patients. These small spheres or star-shaped opacities in the vitreous appear to sparkle when illuminated and do not normally affect vision. Branch retinal vein occlusions and central retinal vein occlusions are associated with hypertension, hyperlipidaemia and obesity, and are often found in people with diabetes. Hypertensive retinopathy features several lesions in common with diabetic retinopathy, and care must be taken not to confuse the two conditions.

1.2 Epidemiology of Diabetic Retinopathy

Currently 2 per cent of the UK diabetic population is thought to be registered blind,[1] which means that a person with diabetes has a 10- to 20-fold increased risk of blindness. The prevalence of diabetic retinopathy depends on multiple factors and, like many microvascular complications, is more common in the ethnic minorities compared with Caucasians.

A prevalence of 25–30 per cent for a general diabetic population is often quoted. Every year about one in 90 North Americans with diabetes develops proliferative retinopathy and one in 80 develops macula oedema.

In type 1 patients:[2,3]

- <2 per cent have any lesions of diabetic retinopathy at diagnosis;
- 8 per cent have it by 5 years (2 per cent proliferative);
- 87–98 per cent have abnormalities 30 years later (30 per cent of these having had proliferative retinopathy).

In type 2 patients:[4,5]

- 20–37 per cent can be expected to have retinopathy at diagnosis;
- 15 years later, 85 per cent of those on insulin and 60 per cent of those on diet or oral agents will have abnormalities.

The 4-year incidence of proliferative retinopathy in a large North American epidemiological study was 10.5 per cent in type 1 patients, 7.4 per cent in older onset/type 2 patients taking insulin and 2.3 per cent in type 2 patients not on insulin.[2,3,5]

Currently in the UK, maculopathy is a more common and therefore more significant sight-threatening complication of diabetes. This is due to the much greater number of people with type 2 diabetes compared with type 1 and the fact that maculopathy tends to occur in older people. About 75 per cent of those with