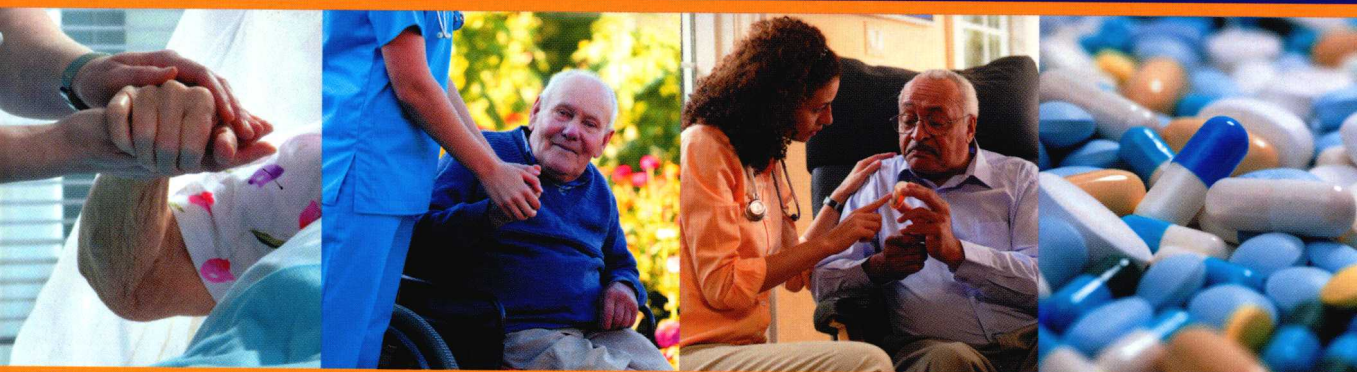


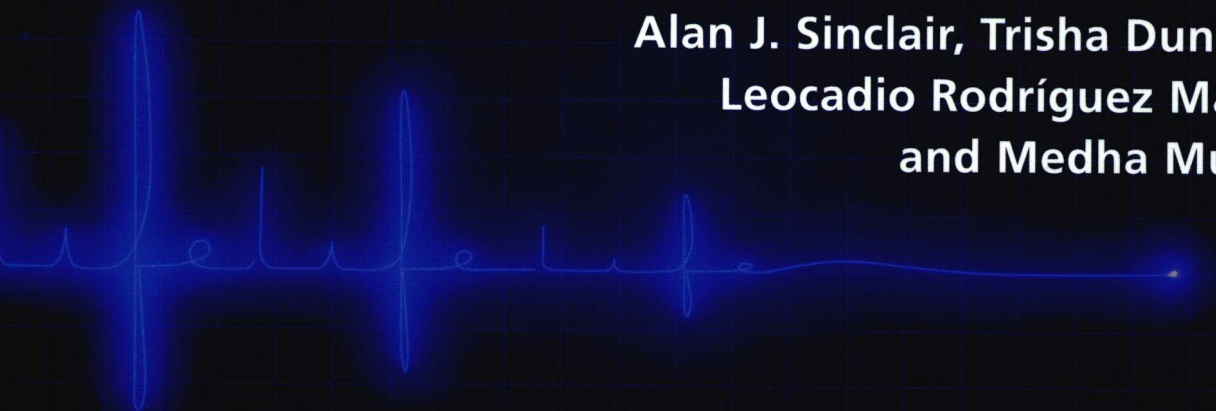
DIABETES IN OLD AGE

FOURTH EDITION



Edited by

Alan J. Sinclair, Trisha Dunning,
Leocadio Rodríguez Mañas,
and Medha Munshi



WILEY Blackwell

Diabetes in Old Age

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Diabetes in Old Age

Preface

Diabetes in Old Age, 4th Edition

The primary purpose of this book is to promote high-quality diabetes care for all older people irrespective of their health or social care setting. This brings with it the equally important need to ensure their wellbeing, quality of life, and an acceptable level of physical and cognitive functioning.

Older people also have a fundamental right to expect this care to be delivered in a compassionate and effective way using, where possible, all modern treatments and technology. With this view in mind, we decided at an early stage of the preparation of this book that individual contributions should be provided by active investigators in the field, many of whom are leading international authorities, rather than by armchair physicians and clinicians. Our expert contributors come from the USA, Europe, Australia, Canada, India, Mexico, and South America.

We have also tried to establish a balance between diabetes care in community settings and care in hospital

or care homes. All these aspects and more are covered. We have included a “Key messages” section in each chapter and have limited the number of references cited where possible in an attempt to cite more recent work.

This book has been written to appeal to general physicians, diabetologists, geriatricians, hospital-based and community nurses, diabetes specialist nurses, social care staff, commissioners of health and social services, policy makers, and other allied professional staff and stakeholders.

This edition gains from the inclusion as new editors three highly distinguished clinical scientists, Trisha Dunning, Medha Munshi, and Leocadio Rodriguez Manas, who have worked tirelessly with Alan J. Sinclair to produce this book.

Finally, we wish to acknowledge the administrative support of Caroline Sinclair.

Alan J. Sinclair, Medha Munshi, Leocadio Rodriguez
Manas, and Trisha Dunning

Foreword

The cognoscenti, the small cadre of experts on diabetes in older people, will skip this foreword and dive right into the individual chapters. There they will find many treasures related to clinical science and clinical care, as well as historical vignettes and current controversies related to diabetes in aging patients.

You, by reading this foreword in a book on diabetes in old age, are marking yourselves as non-expert but you are clearly ahead of your medical colleagues. You are recognizing that the excellent textbooks on diabetes and excellent textbooks on geriatric medicine, though they cover medical care of the older patient, typically fall short in dealing with the older patient with diabetes.

These textbooks mirror the state of affairs in medical care today. When I was a young physician, I was impressed that excellent internists provided excellent care for their patients, including very good diabetes management. My impression now is that very good internists continue to provide very good care, except for diabetes where the care often is only mediocre. Many endocrinologists, formerly excellent in diabetes, are also falling further and further back from the cutting edge of diabetes care. This is especially sad because we now know more than ever the importance of good management and have better tools with which to approach the desired goals. The gap between “excellent” and “actual” widens as the patient’s age increases.

In this essay, I plan to inspire you, to help guide you into a highly satisfying professional path, a path that will please you, as well as enhance your value to your patients and to your medical community. The rest of this book is filled with instructional material that you will find very useful. My goal is to provide an overarching view from the top of the mountain.

Nourishing the soul

Champions seek new challenges, set new goals. For mountain climbers and cellists, surgeons and swimmers, dancers and authors, striving for excellence channels

energies and rejuvenates the self. The physician who adopts the mindset of a champion helps his or her patients, helps other health care professionals with their patients and nourishes his or her own soul. At this time in medicine, when physician burnout is epidemic, nourishment for the soul can be life-saving. In the USA, where the pension systems are in disarray and large debts have been piled up to pay for schooling, physicians will be working many years past the hallowed 65. The best preparation for the long journey is passion in one’s professional pursuit. As an internist, or endocrinologist, or geriatrician, join me in exploring the attractions of becoming skilled in the care of diabetes of the old.

When I entered the profession fifty years ago, antibiotics were routing many infectious diseases. The ancient aphorism “If you know syphilis, you know all of medicine” was being re-modelled; syphilis was replaced by diabetes.

I propose a new model: “If you know diabetes in old age, you know all of medicine”.

The challenge for the profession

Increasingly, medicine in general is benefiting from the introduction of protocols and algorithms. While improving care, these also shrink the intellectual distance between the physician, the physician’s assistant and the nurse. I am guessing that a 37-year-old professor of computer science with type 1 diabetes can probably manage well with a little help from a diabetes educator and an occasional visit to a physician. Recall the World War II pharmacist’s mate who in the pre-antibiotic area successfully removed an inflamed appendix from a crew member of his submarine submerged beneath the waters of the Pacific.

Advancing age brings growing complexity. Elderly patients with diabetes need continuous input from skilled physicians. For these physicians, protocols and algorithms are the starting point but the real plan needs

multiple modifications, surveillance, balancing of competing priorities, and skilled navigation of poorly charted waters. It demands professional skills at their best.

Interpreting data

Multi-centre trials, the foundation of therapeutics today, are typically performed on younger patients. With the basic and clinical science in the background, the data from widely heralded multi-centre trials (with patients who are typically younger and less complicated) provide a basis but not a recipe for care of the elderly patient. Advanced age and other exclusionary criteria, including medications, make extrapolations to older people more tenuous. The loud “microphones” supported by pharmaceutical company coffers often fill the air with information that is misleading for older patients.

Laboratory standards are based on younger populations. Data in the elderly are much sparser. Even when the mean and median for a lab test remain unchanged, the splay typically increases so that higher and lower values that are “normal” for an older patient are easily labelled as pathological.

New medications are largely tested on younger, less complicated patients. Data among older patients are sparse. Many side effects of drugs emerge gradually in the years after their introduction. The catalogue of side effects among older complex patients emerge more slowly. The sparseness of data dictates that new drugs should be avoided in older patients, except on the very rare occasion when the new drug is a very substantial advance and other drugs cannot meet the need.

Adverse drug interactions between two drugs are identified slowly. Many remain undetected. Typical elderly patients take many medications, exponentially increasing the likelihood of adverse drug interactions and, equally, making their detection most difficult.

Depression

Advancing age as well as medications and multiple medical conditions are associated with depression. The link between diabetes and depression has received a lot of attention recently. Growing evidence that depression impacts negatively on physical health mandates that depression, so common in older people, be detected and treated energetically.

In dealing with depression, especially in the older patient, recall:

- I** Depression without sadness is easy to miss.
- II** Screening instruments are helpful.
- III** Personalized rationalizations of the healthcare professional (“If I were 82 and living alone, I would also feel that way ...”) can obscure the correct diagnosis and management.
- IV** Drugs as well as endocrine diseases and other disorders are common aetiologies of depression that is reversible.
- V** When medication and psychotherapy fail, ECT (electroconvulsive therapy), is an excellent therapeutic choice to consider.
- VI** With ageing, suicide rates rise sharply, especially among white males. Living alone and having firearms in the home each add to the risk.

Demographics and disease

The population is being enriched progressively with patients who are over 65. They are living longer. The so-called old-old are a rapidly growing group. Objective data to guide the physician require ever longer lines of extrapolation, demanding more of the physician’s judgment. The incidence and prevalence of diabetes increase with age. Ageing brings out diabetes; diabetes accelerates biological ageing and onset of other pathology. These processes corrode cognition.

Ageing in our Society: The universal reverence, or at least respect, for the elderly that held sway worldwide since the beginning of human memory, has been replaced in the industrialized world of today with a wide range of negative attitudes, mostly undeserved. In their care for the elderly, physicians and their teammates in care will be energized by recalling the widely appreciated positive features of a majority of the elderly:

- I** Every older patient can be improved in some way by an encounter with a professional.
- II** Typically, older people are appreciative of the care and express their appreciation.
- III** Their expectations for improvement are realistically tempered.
- IV** They are individually “more unique”.

“More unique” is a phrase that will galvanize to action legions of amateur grammarians all over the English-speaking world. They will reflexly remind me that unique indicates one-of-a-kind and therefore no

comparator is permitted. Biology and I will prove them wrong. Let's start with a fertilized egg that is just dividing to generate a pair of monozygotic twins. They are not identical and progressively diverge, distancing one biological self from the other. All humans do the same. The extremely similar looking zygotes, and highly similar looking newborns progressively diverge, biologically, sociologically and medically, to the delight and amazement of the skilled physician and other health care providers. Like snowflakes, Rembrandt paintings, precious gemstones, and leaves from a single tree, blessedly, there are no sames among older patients with diabetes.

Valediction

With a little luck, it is likely that you, in your lifetime, will never lack for food for your body. Much more at

risk, and therefore more to be guarded, is the supply of nourishment for your professional soul.

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SECTION A

Pathophysiology, screening and diagnosis

CHAPTER 1

Pathophysiology of diabetes in older people

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KEY MESSAGES

- Lifestyle factors play a major role in diabetes in the elderly.
- Diabetes in the elderly is metabolically distinct.
- Elderly patients with diabetes have an increase incidence of severe or fatal hypoglycemia.

1.1 Introduction

Numerous studies have been conducted to investigate the pathogenesis of type 2 diabetes [1]. Unfortunately, elderly patients were systematically excluded from these protocols. We have more recently started to study, in a systematic fashion, the pathophysiological alterations that occur in elderly patients with diabetes. These studies, the details of which will be reviewed in the following sections, suggest that there are many ways in which diabetes in the elderly is unique. Some of the factors that contribute to the high prevalence of diabetes in the elderly are shown schematically in Figure 1.1.

1.1.1 Genetic factors

There are several lines of evidence which suggest that there is a strong genetic component to diabetes in the elderly, although the specific genes responsible have yet to be defined [2]. If you have a family history of type 2 diabetes, you are much more likely to develop the disease as you age [3]. Diabetes is much more common in the elderly in certain ethnic groups [4], while the likelihood that an elderly identical twin will develop diabetes if their sibling is affected is over 80%. Even in elderly identical twins discordant for type 2 diabetes, the unaffected siblings clearly have evidence of abnormal glucose metabolism [5].

1.1.2 Age-related changes in carbohydrate metabolism

The progressive alterations in glucose metabolism that occur with age explain why genetically susceptible older individuals may not develop diabetes until late in life. Pathogenic mechanisms which contribute to the glucose intolerance of aging include alterations in glucose-induced insulin release and resistance to insulin-mediated glucose disposal [6]. Early investigations suggested that glucose-induced insulin release was normal in the elderly. However, more recent studies enrolling large numbers of carefully characterized healthy young and old subjects have demonstrated definable alterations in glucose-induced insulin release in the aged [6, 7]. Part of the reason for the decrease in insulin secretion is an impairment in islet mass and reduced β -cell proliferation [8]. In addition, the magnitude of the decrement in insulin secretion is more apparent in response to oral than to intravenous glucose [6]. This may be due, in part, to a decreased β -cell response to the incretin hormones (see below). As with many hormones, insulin is secreted in a pulsatile fashion. Normal aging is associated with subtle alterations in pulsatile insulin release, which further contribute to age-related changes in glucose metabolism [9]. Elevated levels of proinsulin, which suggest disordered insulin processing, predict the subsequent

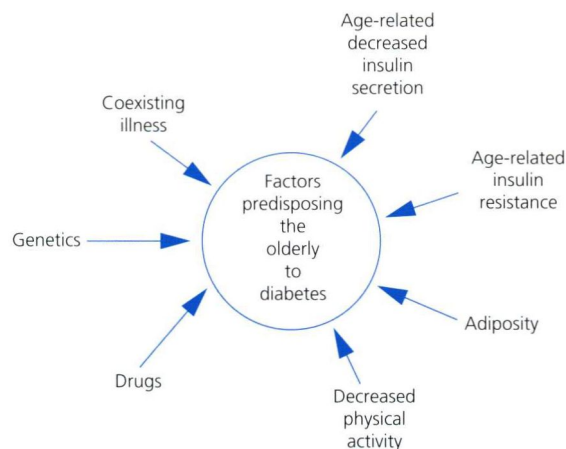


Figure 1.1 Factors that contribute to the high prevalence of diabetes in the elderly. Reproduced with permission from Halter, J.B., Carbohydrate metabolism, in: E.J. Masoro (ed.), *Handbook of Physiology, Volume on Aging*. New York, Oxford University Press Inc., 1995, p. 119.

development of type 2 diabetes in elderly subjects [10]. Thus, it is clear that alterations in glucose-induced insulin release are an important component of the changes in carbohydrate metabolism with aging. However, the most important pathogenic mechanism underlying the glucose intolerance of aging is resistance to insulin-mediated glucose disposal [2, 6, 11]. Debate persists as to whether the insulin resistance of the elderly is intrinsic to the aging process itself, or is the result of lifestyle factors commonly associated with aging. The consensus of opinion is that the aging process itself is the most important cause of insulin resistance, although lifestyle changes are clearly an important contributing factor. The molecular and cellular changes contributing to insulin resistance are detailed below.

1.1.3 Lifestyle and environmental factors

Despite the strong genetic component, it is abundantly clear that various environmental and lifestyle factors can increase or decrease the likelihood that a genetically susceptible individual will develop the disease in old age. Many older people have coexisting illnesses and take multiple drugs (e.g., thiazide diuretics, antipsychotic drugs), which can allow a latent abnormality in glucose metabolism to develop into full-blown diabetes [12, 13]. Obesity, especially with a central distribution of body fat, and a reduction in physical activity as well

as functional decline occur progressively with aging, and these factors are associated with abnormal carbohydrate metabolism and diabetes in the elderly [2, 13–21].

The above information suggests that lifestyle modifications may be of value in the prevention of type 2 diabetes in the elderly, even in patients with a strong family history of the disease. Indeed, the Diabetes Prevention Program found that a combined lifestyle intervention consisting of weight loss and increased physical activity was effective in reducing the incidence of diabetes in elderly patients with impaired glucose tolerance [22].

1.2 Diet and diabetes in the elderly

Diabetes is more likely to develop in older patients who have a diet that is high in saturated fats and simple sugars, and low in complex carbohydrates [14, 23–25]. Moderate alcohol consumption may protect against diabetes in elderly women [26]. It has been suggested that deficiencies of trace elements or vitamins may contribute to the development or progression of diabetes in younger subjects, and it is increasingly recognized that the same may be true in the elderly [13, 23]. Elderly patients with diabetes have exaggerated free radical production, and administration of the antioxidant vitamins C and E to these patients improves both insulin action and metabolic control [27, 28]. Some epidemiologic studies have shown an association between low levels of vitamin D and diabetes in the elderly [29–32] but others have not [33]. To date, there have been no trials to test the hypothesis that treatment with vitamin D in elderly patients predisposed to diabetes will prevent its development. There is a correlation between increased intake of vitamin K and a reduced incidence of diabetes in the elderly [34]. Many elderly patients with diabetes are deficient in magnesium and zinc, and supplements of zinc and magnesium can improve glucose metabolism [35–37]. Increased dietary iron may be associated with an increased risk of diabetes in aged individuals [38]. Although chromium deficiency has been shown to cause abnormalities in glucose metabolism in animals and younger patients, there is no evidence to date that chromium supplements will improve glucose tolerance in the elderly. There is also no evidence that selenium deficiency is associated with an increased risk of diabetes in the elderly [39]. Persistent organic pollutants