

BACKGROUND PAPER

What is diabetes?

Diabetes is a serious and rapidly escalating global health problem.

In Australia, it has reached epidemic proportions, affecting almost one million people and costing the nation well over \$3 billion each year.

Diabetes is a major cause of heart disease, kidney failure, blindness, amputations and birth defects. It can shorten a sufferer's life expectancy by as much as 15 years. About 25% of our hospital beds are occupied by people with diabetes. The disease is the major cause of limb amputations and the growing number of older people going blind.

Worldwide, the number of people with diabetes is estimated at 200 million. More than 5% of the global adult population has diabetes and another 8% have impaired glucose tolerance, a condition which typically precedes diabetes. In some countries, diabetes is one of the leading causes of death.

A year-long investigation conducted recently by the New York Times identified diabetes as the largest health crisis facing New York and the only major disease that is escalating.

Despite intensive research, medical scientists have so far been unable to find the cause of the two major forms of diabetes, type 1 and 2 (see below). Nor have they yet found a cure for type 1 diabetes or a safe mean of preventing it. However, there is now evidence that weight reduction and exercise can reduce the burden of type 2 diabetes by about 50%. There are also pharmacological agents that also can prevent progression to type 2 diabetes in people at high risk.

Regrettably, many of the world's governments and public health planners are still largely unaware of how widespread the disease is and the speed at which it is escalating out of control.

Three major types

Diabetes is caused by a defect in insulin secretion, insulin action, or both. This means that the body has little or no ability to move glucose out of the blood and into the cells for use as fuel. There are three common types of diabetes:

- **Type 1:** usually occurs in people under 30 whose bodies stop producing insulin. This form of diabetes accounts for about 10% of all cases of diabetes. Type 1 diabetes is not currently preventable. To sustain life, people with type 1 diabetes are treated with daily insulin injections and urged to eat healthier meals and remain or become physically active.
- **Type 2:** About 90% of people with diabetes have a preventable form of the disease known as type 2 diabetes. The disease is caused either by the body producing less insulin than is required or its failure to respond properly to the insulin it is producing. Type 2 diabetes frequently runs in families and is usually lifestyle-related. It typically occurs in people who are overweight or obese. Although it commonly occurs in people over 30, it is becoming increasingly common in young adults and even teenagers.
- **Gestational Diabetes Mellitus (GDM):** this is a temporary form of diabetes that occurs during pregnancy when various hormones prevent the body's naturally-produced insulin from working properly. Although usually treated with healthy diets, insulin injections may be required. Healthy eating and physical activity help women who have had GDM from contracting type 2 diabetes in later life. Without these strategies, over 50% will develop type 2 diabetes over the next 10 years.

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The AusDiab Study (Stage 1)

Stage 1 of the Australian Diabetes Obesity and Lifestyle Study (AusDiab) involved 11,247 people across Australia and was conducted by the Melbourne-based International Diabetes Institute in 1999-2000. Its purpose was to provide the nation with a snapshot of the population's health and measure the prevalence of diabetes in the Australian community. The results showed a population in poor health:

- Almost 1 in every 4 Australians over 25 had diabetes or impaired glucose metabolism, a condition which increases the immediate risk of heart disease and typically leads to diabetes in later life
- The number of adults with diabetes had trebled since 1981
- Approximately 60% of the adult population was overweight or obese
- More than 50% had high cholesterol levels
- 50% did not exercise enough and
- 1 person in every six participated in no physical activity at all.

The AusDiab Study (Stage 2)

Stage 2 of the AusDiab study was conducted in 2004-2005 and involved revisiting more than 6,000 of the people who had been involved in the Stage 1 study five years earlier. By taking a series of blood samples and body measurements, we monitored any improvements or declines in each participant's health. This enabled us to estimate the number of people who developed diabetes in the five years between Stage 1 and Stage 2, and identify those at greatest risk of developing diabetes and its complications in the future. In those who had diabetes five years previously, we were able to monitor improvements brought about by dietary and/or lifestyle changes, and chart the progress of their disease.

The AusDiab Study (Stage 3)

Our Stage 1 and Stage 2 findings provide compelling reasons why our research should be repeated every decade or so. We have therefore begun planning a Stage 3 study in 2009-2010, ie 10 years after Stage 1 and five years after Stage 2. Stage 3 would involve following up those who participated in Stages 1 and 2, and surveying a new representative sample of the Australian population. Armed with the results, we could then compare and quantify any improvement or decline in the nation's health. This information would be vitally important to government, particularly in the

areas of healthcare planning and formulating healthcare budgets. Such information would indicate how many new cases of diabetes will occur in any given period and how much care (doctors, hospitals, specialist clinics etc) will be required.

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The International Diabetes Institute

Established in 1985, the International Diabetes Institute is Australia's largest diabetes centre.

IDI is a not for profit organisation whose goals are to find ways of curing or preventing diabetes, and provide care for those who have the disease.

During the last 20 years, IDI's internationally-acclaimed epidemiological, genetic, physical activity, basic and clinical research activities have been taking Australia and the world closer to understanding diabetes and its debilitating complications.

In addition to its medical research, IDI:

- treats more than 8,000 patients each year
- educates doctors, nurses and other health professionals about diabetes
- conducts education programs for the pharmaceutical industry
- advises Australian and foreign governments on the diabetes pandemic and its implications for health planners
- transfers its knowledge and intellectual property to industry, both in Australia and overseas, by providing consultancy services
- conducts diabetes awareness and education programs for the community at large and those at greater risk of developing the disease
- conducts and licenses physical activity (strength training) programs for older Australians
- publicly endorses healthy food products which meet its evidence-based food selection criteria, and
- advises local and international food manufacturers on developing healthier products.

IDI's battle against diabetes is being fought on several fronts. Detailed information about our medical research activities is contained in the attached annual research report.

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Professor Paul Zimmet AO MD PhD FRACP FRCP FTSE

Professor Zimmet has served as the International Diabetes Institute's Professor-Director since co-founding the organisation in 1985. He is also head of the World Health Organization's Collaborating Centre for the Epidemiology of Diabetes, Professor of Diabetes at Monash University and a Professor at Deakin University and the Graduate School of Public Health at the University of Pittsburgh in the United States. He is regarded as one of the world's leading diabetes researchers.

Professor Zimmet's current research includes the molecular mechanisms of type 2 diabetes, insulin resistance and obesity, and the effects that lifestyle changes have had on the development of diabetes, obesity, coronary heart disease and hypertension in developing countries in the Asia-Pacific region.

In 1993, he was made a Member in the Order of Australia (AM) for services to medicine and education, particularly in the field of diabetes. In 2001, he was further honoured as an Officer in the Order of Australia (AO) for distinguished services to medical research of national and international significance, particularly in the field of diabetes, as a leader of investigations into social, nutritional and lifestyle diseases, and to biotechnology development in Australia.

Professor Zimmet has served on the Australian Government's Strategic Taskforce on Diabetes, published more than 600 scientific papers, chapters and reviews in peer-reviewed journals and books, and was co-editor of the major and widely used "International Textbook of Diabetes Mellitus". He also co-edited "The Epidemiology of Diabetes".

In addition to his government honours, Professor Zimmet has received many awards, including the Kelly West Medal from the American Diabetes Association, The Lilly Award of the International Diabetes Federation, the Harold Rifkin Award of the American Diabetes Association, the Kellion Award of the Australian Diabetes Society, the 2004 Helmut Mehnert Award of the European Association for the Study of Diabetes and the Banting Award from Diabetes UK. He has also been a member of numerous WHO, international and national committees addressing the issue of chronic diseases and nutrition. Earlier this year, he was admitted as a Fellow of the Australian Academy of Technological Sciences and Engineering for his achievements in applying science and biotechnology to Australian life.

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Associate Professor Jonathan Shaw MD, MRCP, FRACP

Associate Professor Jonathan Shaw is IDI's Deputy Director and a Consultant Physician at the Institute. He is also Honorary Associate Professor at Monash University's Department of Epidemiology and Preventive Medicine, and an Honorary Senior Lecturer at Monash University's Department of Medicine.

Jonathan was born and educated in the UK and worked in various British hospitals after graduating from Leeds University. He worked as a Research Fellow in Clinical Diabetes at the Manchester Royal Infirmary between 1994 and 1997. Immediately after this, he worked as a Research Fellow in Diabetes at IDI between 1997 and 1999. His research interests are diabetes epidemiology, the metabolic syndrome, pre-diabetes and diabetic complications.

Jonathan has authored or co-authored approximately 100 papers in peer-reviewed journals, authored or co-authored chapters for 17 books on diabetes and has accepted numerous invitations to present lectures in Australia and overseas. He is also a member of the:

1. National Diabetes Register Committee (National Diabetes Strategy Group)
2. National Diabetes Data Working Group
3. American Diabetes Association Expert Committee on the diagnosis and classification of diabetes.
4. Steering committee of the DREAM trial, an international, multicentre trial investigating the use of ramipril and rosiglitazone in the prevention of type 2 diabetes.
5. Steering committee of the Workgroup on Outcomes of Hyperglycemia, an American Diabetes Association group looking at diabetes related outcomes, in relation to blood glucose.
6. International Diabetes Federation Task Force on Epidemiology.
7. World Health Organization Expert Committee on the diagnosis of diabetes.

With Professor Zimmet, Jonathan is also co-Chief Investigator in the AusDiab study.