

World
Demographic
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University of St.Gallen

The WDA – HSG Letters

on Demographic Issues

Innovative approaches to managing the diabetes epidemic

*Summary of a Special Session with
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Michaela Diamant, VU University Medical Center, The Netherlands
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No. 2007/3

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Innovative approaches to managing the diabetes epidemic *

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* Based on a special session at the 2nd World Ageing & Generations Congress 2006, University of St. Gallen, Switzerland. The session was organized by Merck & Co., Inc., Whitehouse Station, New Jersey, USA. Outside of North America, the company operates in most countries under the name Merck Sharp & Dohme (MSD).

Innovative approaches to managing the diabetes epidemic

Diabetes prevalence is reaching epidemic proportions, as population ageing continues and the rates of obesity and other risk factors increase. The impact of the disease and its complications on public health and national budgets is growing into a formidable health challenge for the new century.

Diabetes is a complex disease whose human costs are destructive for both individuals and families. Current treatments can control the disease only within limits; eventually those with diabetes can develop such complications as heart disease, blindness, nerve disorders, vascular disease, and kidney damage.

Addressing the challenges of diabetes will require innovations in prevention and management. These include more effective health promotion policies, new and more effective treatments, and patient-centered approaches that promote more effective self-management. Governments must enlist the support of patients and all stakeholders to implement these new strategies successfully.

The health and economic burden of diabetes

*Bengt Jönsson**

Professor of Health Economics, Stockholm School of Economics, Sweden

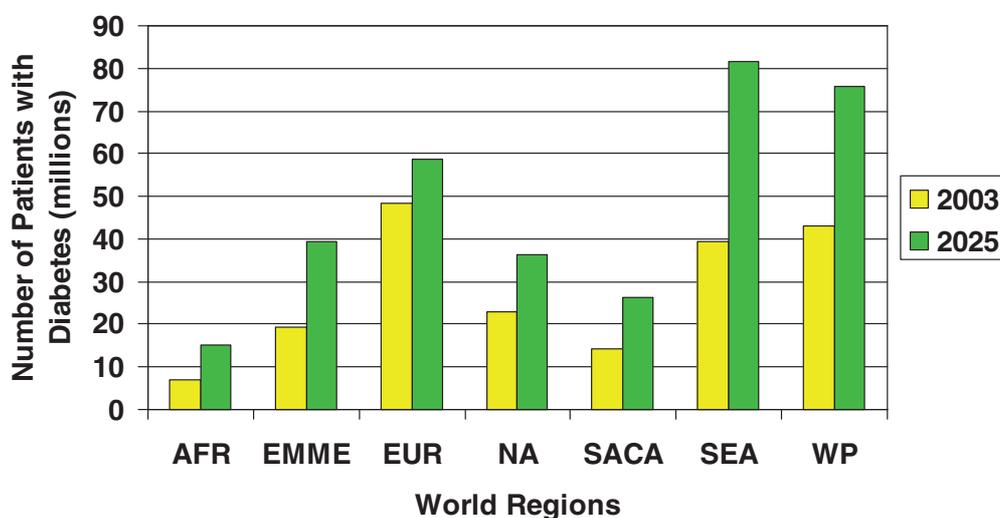
The incidence of type 2 diabetes is on the rise, with devastating consequences for individuals, families, and national health budgets. The disease currently affects approximately 200 million people worldwide. As population ageing continues and the prevalence of obesity and other risk factors increases, the disease is reaching epidemic proportions. Global prevalence is expected to increase from 5.1% in 2003 to 6.3% in 2025 – a more than 20% increase, with 10% higher incidence in females than males, and a greater prevalence among the elderly.¹ In Europe and globally, there are concerns about rising rates of diabetes in children, the elderly and in migrant populations. While prevalence is currently highest in North America and Europe, over the next two decades the projected increase in patients is by far the greatest in the emerging countries of South and East Asia and the Western Pacific region. The rising incidence in India in particular has come to international attention of late.²

* Session Chair

¹ International Diabetes Federation (2003). The global burden of diabetes, Diabetes Atlas, 2nd edition.

² International Herald Tribune (Asia). 2006. India increasingly crippled by "the sugar disease", Sept. 14.

Projected increase in number of patients with diabetes around the world by 2025



AFR: Africa

EUR: Europe

SACA: South & Central Americas

WP: Western Pacific

EMME: Eastern Mediterranean and Middle East

NA: North Americas

SEA: South-East Asia

*Adopted from Diabetes Atlas, 2nd Edition, International Diabetes Federation, 2003

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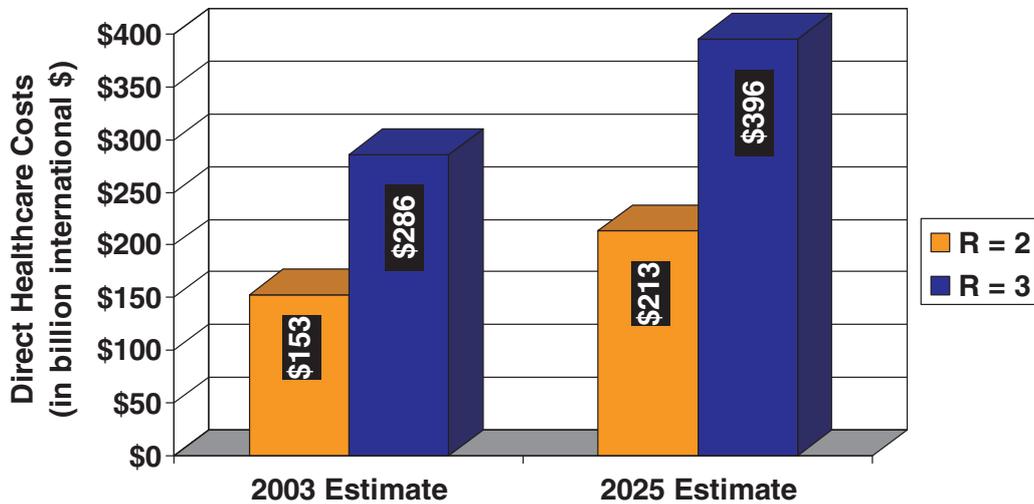
At a time when current demographic trends make it necessary for governments to help citizens to stay healthy and productive longer, the diabetes epidemic threatens to create the opposite effect. Eventually those with the disease can develop complications ranging from heart disease to blindness, nerve disorder, vascular disease and kidney damage. As the prevalence of diabetes continues to rise, the incidence of such complications will rise concomitantly, leading potentially to excess deaths and disability, and reduced quality of life for millions. In the US, diabetes is the fifth leading cause of death and the eleventh cause of disability-adjusted life year loss in males.³ Global estimates of excess mortality are 1 million in developed countries and 1.9 million in developing countries.⁴ The potential economic impact of the disease and its complications on national health budgets is a formidable challenge for the new century. Globally, direct healthcare costs associated with diabetes range from \$153 to \$286 billion international dollars, and could reach as high as \$400 billion by 2025. Healthcare costs associated with diabetes are 2-3 times higher than total healthcare costs for matched non-diabetic populations.⁵

³ Roglic G et al (2005). The burden of mortality attributable to diabetes. *Diabetes Care*, 28: 2130-2135; also McKenna et al (2005). Assessing the burden of disease in the United States using disability-adjusted life years. *Am J Prev Med*, 28, 5: 415-423., and Roglic G et al (2005). The burden of mortality attributable to diabetes. *Diabetes Care*, 28: 2130-2135.

⁴ American Diabetes Association (2003). Economic costs of diabetes in the US in 2002. *Diabetes Care*, 26: 917-932.

⁵ International Diabetes Federation (2003). The global burden of diabetes, *Diabetes Atlas*, 2nd edition, 175-192.

Estimated worldwide increase in direct healthcare costs associated with diabetes by 2025



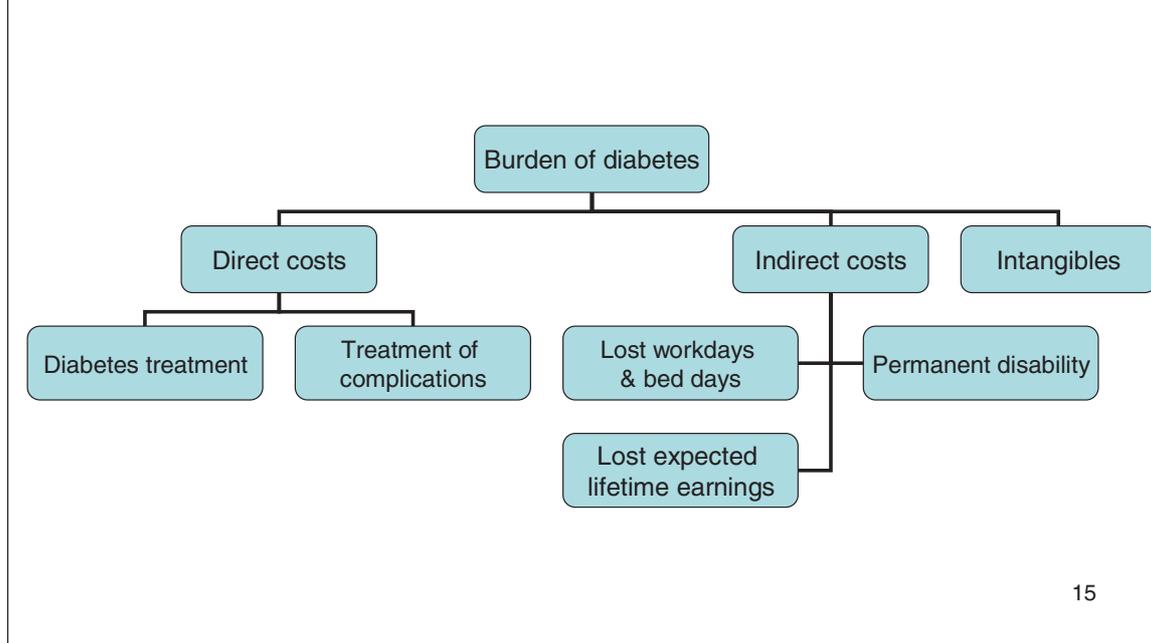
R indicates ratio of the cost of care for people with diabetes to cost of care for people without diabetes
Source: Diabetes Atlas, 2nd edition, International Diabetes Federation, 2003

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The costs of diabetes include not only direct costs of treating the disease and its complications, but also indirect costs such as lost work days, both for patients themselves and the family members who care for them, loss of expected lifetime earnings and permanent disability. Indirect costs associated with diabetes may constitute 25%-62% of total costs associated with the disease.⁶

⁶ Ettaro et al (2004). Cost-of-illness studies in diabetes mellitus. *Pharmacoeconomics*, 22, 3: 149-164, and International Diabetes Federation (2003). The global burden of diabetes, *Diabetes Atlas*, 2nd edition, 175-192.

Components of economic burden of diabetes



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Of the direct costs associated with diabetes, the vast majority of resources go toward treating complications, rather than managing the disease itself. The Cost of Diabetes in Europe-2 (CODE-2) study showed that complications can increase the average medical costs of the disease by between 1.7 and 3.5 times, and average hospital costs by between 2.1 and 5.5 times.⁷ In many countries, institutional care accounts for a much larger proportion of direct costs than do medications.⁸

⁷ Jonsson B. Revealing the cost of Type II diabetes in Europe. *Diabetologica*, 2002, 45: S5-S12.

Williams R, Van Gaal L, Lucioni C. Assessing the Impact of Complications on the Costs of Type II Diabetes. *Diabetologica*, 2002, 45:S13-S17

⁸ Jonsson B. Revealing the cost of Type II diabetes in Europe. *Diabetologica*, 2002, 45: S5-S12.

Costs of complications reported by the Cost of Diabetes in Europe-2 (CODE-2) study (in 2002 US dollars)

	Prevalence	Impact on average cost	Impact on hospitalization cost	Avg. direct medical cost
No complications	28%	-	-	\$ 1,514
Only microvascular complication	19%	1.7	2.1	\$ 2,578
Only macrovascular complication	9.6%	2.0	3.1	\$ 3,167
Microvascular & macrovascular complications	24%	3.5	5.5	\$ 5,257

Used a July, 2002 conversion rate of 1.006 to convert estimates in Euro to US dollars
Source: Jonsson et al, 2002; Williams et al; 2002

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Primary prevention techniques -- such as promoting lifestyle changes (diet and exercise) -- and secondary prevention strategies that improve management of diabetes and prevent complications are the two most important points in reducing the health and economic burden of the disease. In struggling to address these challenges, governments need to take long-term perspectives on the costs and benefits of various policies and interventions.

Type 2 diabetes as a progressive disease: why are new therapies still needed?

Michaela Diamant, MD

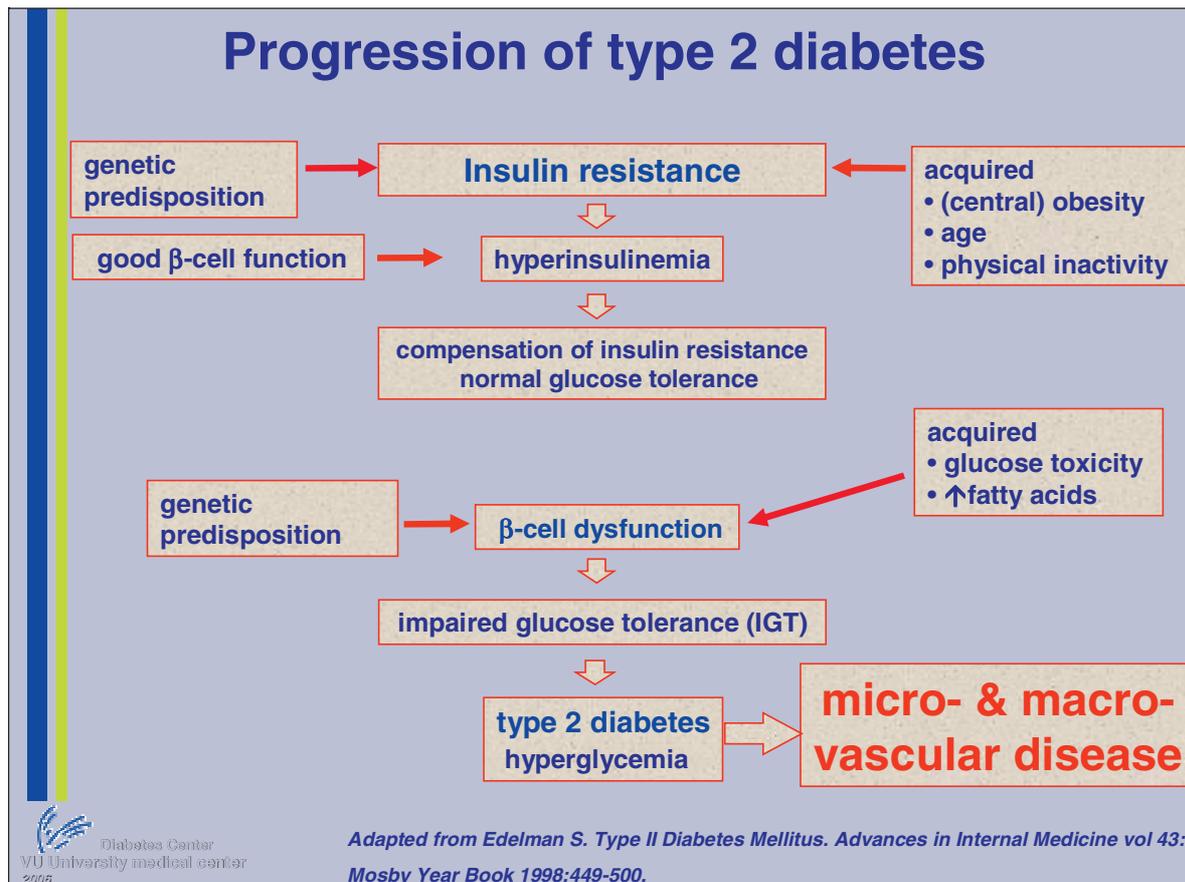
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Type 2 diabetes is a complex disease in which a number of mechanisms within the body fail to control blood sugar (glucose) levels. It is by far the most common form of diabetes mellitus and a significant concern to public health experts. Obesity is a key risk factor for the disease: the association is so strong that the term "dia-besity" has come into common use. Because obesity has increased dramatically in the global population, this has been a driving factor in the rapid worldwide increase in diabetes.

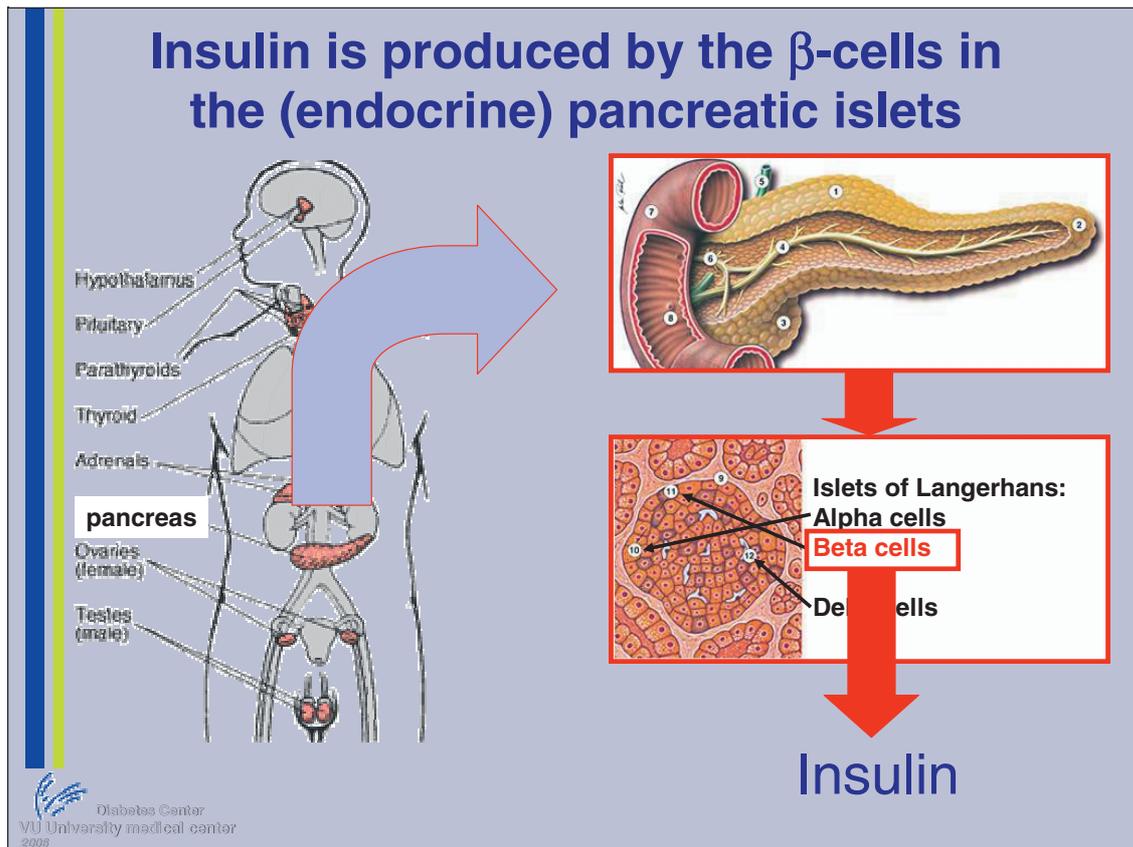
In addition to high blood sugar (glucose), type 2 diabetes is associated with a cluster of cardiovascular risk factors, including an unfavorable blood lipid pattern and high blood pressure, all of which can ultimately lead to cardiovascular complications as well as kidney damage, blindness and neuropathy. Due to the presence of these risk factors and complications, diabetes patients have a markedly decreased life expectancy. In fact, the survival curve of diabetes patients may be similar to

that of breast cancer. It is estimated that approximately 70-80% of diabetes patients die of cardiovascular disease.⁹



Type 2 diabetes is characterized by defects in insulin secretion and insulin action, resulting in high blood glucose. The body normally regulates blood sugar levels through the secretion of two hormones, insulin and glucagon, which are both produced by specialized cells in the pancreas. When blood sugar levels increase above normal range, pancreatic beta cells produce insulin, which facilitates the uptake of glucose and lipids into muscle and other tissues; when blood sugar levels are below normal range, other pancreatic cells stimulate glucagon production, which causes the liver to release glucose, raising blood sugar levels to normal. In patients without diabetes this process restores blood sugar levels to normal range. In patients with diabetes, the process is defective, due to insulin resistance in muscle and other tissues, and progressive dysfunction of the beta cells, which over time lose their ability to produce insulin. The reasons for this dysfunction are not yet known, although genetic predisposition seems one likely cause.

⁹ International Diabetes Federation. Diabetes e-Atlas. <http://www.eatlas.idf.org/Complications>.

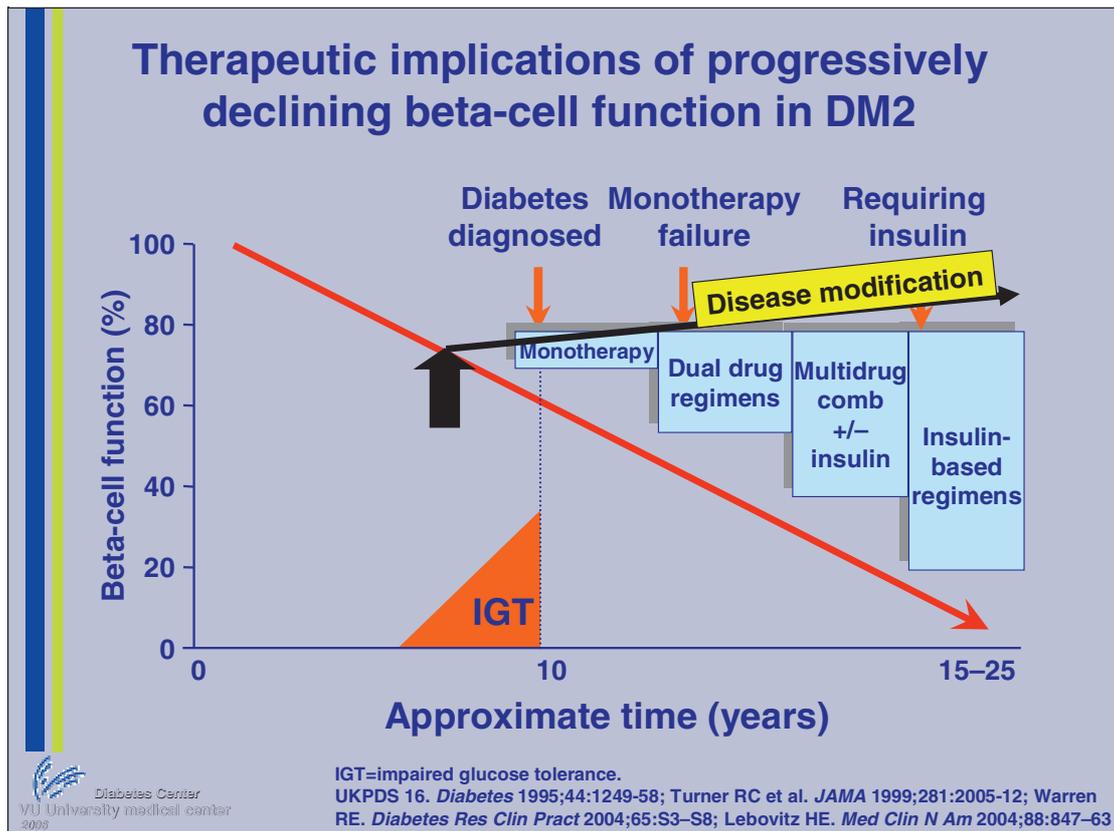


Type 2 diabetes is a progressive disease. In the pre-diabetic phase, which can last up to ten years, beta-cell function is gradually and progressively impaired; however, during this stage people generally do not recognize any symptoms. Once diagnosed, the disease continues to worsen, causing increasing damage to the organs.

Studies show that lifestyle changes in the pre-diabetic stage, including regular exercise and subtle dietary changes, resulting in moderate weight loss, can be effective in reducing patients' risks of actually progressing to diabetes. A recent Finnish diabetes study resulted in a 58% risk reduction for those who pursued a healthy lifestyle sustained over time.¹⁰

Traditionally, treatments employed have focused on managing blood glucose levels, thereby alleviating the associated symptoms, including thirst, frequent urination and blurred vision, and attempting to prevent long-term microvascular damage. However, the side effects associated with some available therapies, which include low blood sugar levels, weight gain, fluid retention and gastrointestinal complaints, negatively affect patients' quality of life. The most important limitation of these current therapies, however, is their lack of sustained effectiveness and their inability to change the natural course of the disease. Rather, due to progressive decline of the pancreatic beta-cell function, patients will require more drugs or combinations thereof (with the side-effects noted above) to maintain glycaemic control. All the while, the disease continues to progress.

¹⁰ Lindstrom et al. The Finnish Diabetes Prevention Study (DPS): Lifestyle intervention and 3-year results on diet and physical activity. *Diabetes Care* 26:3230-3236, 2003.



A different approach to therapy would be to target not just the symptoms, but also one of the causal factors of type 2 diabetes, e.g. defective insulin secretion by the pancreas. By preserving the function of the beta-cells, it may actually be possible to modify the course of the disease. Today, a new generation of anti-hyperglycaemic agents is being developed, with the potential to treat several otherwise unaddressed pathophysiological defects of diabetes. Using one of the body's own natural mechanisms for glucose regulation, they target hormones called incretins that are secreted in the gastro-intestinal tract in the presence of food. When blood sugar levels rise, the incretins glucagon-like peptide 1 (GLP-1) and glucose-dependent insulinotropic peptide (GIP) stimulate insulin production by pancreatic beta cells, while also inhibiting glucagon production. This "incretin effect" is typically diminished in patients with type 2 diabetes, due to the decreased secretion of GLP-1. Experimental studies indicate that incretins may also favourably affect beta-cell mass by inhibiting cell death and enhancing beta-cell replication.

In the body, GLP-1 and GIP are rapidly degraded by an enzyme called dipeptidyl peptidase 4 (DPP-4). The new treatments in development aim to improve the incretin effect in diabetes patients by slowing or preventing the degradation process. There are degradation-resistant compounds that mimic GLP-1 (exenatide, Lilly; liraglutide, Novo Nordisk), and DPP-4 inhibitors that prevent the breakdown of GLP-1 and GIP (sitagliptin, Merck/MSD; vildagliptin, Novartis). Both types of treatments have the potential to enhance the body's natural ability to produce insulin by, respectively, mimicking or enhancing incretin action. Although -- as with all new treatments -- there could be as yet unknown side effects, these have shown remarkable efficacy in experimental and clinical studies.

Together with lifestyle modifications, including diet and exercise, as well as effective self-management, these novel therapies, which focus on the pathogenic mechanisms of the disease rather than on symptoms, could potentially help patients with type 2 diabetes and their doctors to achieve better blood sugar control and delay or prevent the onset of diabetes-related complications.

Health promotion and prevention strategies for diabetes in the EU member states and the situation in Austria

Herta Marie Rack

Federal Ministry of Health and Women, Austria

Type 2 diabetes is one of the main health threats in Europe and its prevalence is increasing: the number of diabetic people in the adult population is predicted to double within 20-30 years. There are 300,000 diabetic people in Austria, with the annual cost of one patient being about 2800 euros. Diabetes and its complications can be prevented by lifestyle measures, including intensive nutritional and exercise programmes. Successful prevention can potentially both maintain health and save on budget; however, many people do not have access to professional care.

To promote action in preventing diabetes and its complications, a special EU-level conference was organized on February 15-16, 2006, by the Austrian Federal Ministry of Health and Women and the Austrian Health Institute with the support of the European Commission. Working groups were convened on preventing cardiovascular diseases in diabetes, reducing complications through disease management, early prevention, and social, societal and gender aspects of type 2 diabetes. The recommendations of the working groups are available in the conference report at www.diabetesconference.at.

The recommendations included the need for prevention strategies to include different approaches for the general population and for high risk individuals, and the need for early detection of undiagnosed type 2 diabetes. Particular attention should be paid to socially and economically disadvantaged groups, people with low levels of education, minorities, and women in their reproductive years. These programs should be multidisciplinary and multisectoral; that is, a wide range of actors should be enlisted to play a role in implementation. At the EU level, the report also called for the formation of a forum for the exchange and dissemination of best practices, an EU strategy and Council Recommendation, comparative data monitoring, investment in research, and national guidelines. At the national level the conference stressed the need for priority status for national diabetes plans, including patient education and empowerment. The recommendations of the "Vienna Declaration" have achieved broad support from stakeholders throughout the region.

In Austria, the government has launched a comprehensive national diabetes plan that involves patient management, data collection and epidemiology, prevention, care for special groups and research. An important result of this diabetes plan was the recommendation to implement a Disease Management Programme (DMP) for type 2 diabetes. The Federal Ministry of Health and Women established an interdisciplinary working group with the relevant partners in this field, to develop a strategy to implement a nationwide DMP for type 2 diabetes. This will involve developing Federal quality guidelines (structure-, process- and outcome quality) on the basis of the Federal Act on the Quality of Health Care. The DMP, which will begin as a pilot in one province and will then be rolled out to other provinces, also includes strategies aimed at sustainable improvement of education and empowerment of patients, improving access to care, data management, and economic/financing issues.

The need for a patient-centred approach

Dr. Tony O'Sullivan, General Practitioner

President Elect, International Diabetes Federation European Region, Brussels and Chair, Diabetes Federation of Ireland

Active, informed patients have a key role to play in national diabetes strategies. Patients who feel empowered to be involved actively in their own healthcare, and who are able to make informed choices, are more likely to manage their disease more effectively. This is particularly important in diabetes, which requires day-to-day management outside the clinical setting.

Patient-centred care -- the sharing of disease management between the patient and his or her doctor - is fundamental to creating a sense of choice and empowerment in patients. In addition to doctors, nurses play an important role in promoting patient-centred care models in primary care settings, because they tend to focus on the broader circumstances of the patient. Patient education is also critical. The first reaction to diagnosis is fear; patients need to feel secure and need to be informed about the disease, and they have to be motivated to care for themselves. Timely access to good quality information about diabetes and its management is important to creating the sense of empowerment diabetes patients need to self-manage their disease effectively.

What is patient-centred care?

- *Patient-centred care is about sharing the management of an illness between patient and doctor; ... not new but increasingly evidence-based, especially for chronic problems such as diabetes*
- *Systematic reviews show that patient-centred care results in increased adherence to management protocols, reduced morbidity and improved quality of life for patients.*

MJA 2003; 179 (5): 253-256

To achieve patient-centered approaches to diabetes at all levels of society, healthcare actors and society have to cooperate – the physician with the patient, national level healthcare institutions with patient societies, and international bodies such as the EU, WHO and other UN organizations with the International Diabetes Federation. In Europe, the IDF's 60 national associations in 42 countries provide support, information and the education to the region's 50 million people with diabetes and

their families. They also do research, professional training, lobbying and public awareness activities (www.idf.org).

Adopting the patient-centered approach is also necessary because, after all, it's patients and the public who pay the bills for public health and health care. A balance of power must be achieved that incorporates patient and citizen involvement in health policy and healthcare decision making. Patients as a group are not a "black hole" of need and expense -- they are able to assess, prioritize, and contribute. Further, societal involvement is essential in difficult decisions, and healthcare decisions are among the most difficult. If we ask who is the real expert, the health professionals or the person with diabetes, the answer is that both are part of the system and the interaction between them is fundamental for improving the quality of care for people with chronic diseases such as diabetes.

In summary, governments must embrace the current trend toward patient empowerment, and acknowledge the role of patients as partners in fighting diabetes. Improving patients' ability to self-manage their disease can achieve better outcomes and quality of life for patients and their families.

<h2>Who's the expert?</h2> <p>Different agendas, equally relevant</p>	
HEALTH PROFESSIONALS	PEOPLE WITH DIABETES
More medical care	Quality of care
Medication	Psychological support
Specialisation	Access for all
Hierarchy	Integration
Health as freedom from disease	Holistic welfare, freedom from discrimination

Discussion

The subsequent audience discussion touched on the capacity of health systems to deal with the diabetes challenge and the reluctance of sick funds to pay for patient education, blood sugar monitoring or access to new drugs. This stands in contrast to the pledges of some countries to deal proactively with the problem. Ms. Rack responded by saying that in Austria at least, better consistency of care across regions is needed. Others raised questions about the fundamental design of health systems -- national diabetes plans can't really make a difference if the system is broken in the first place. Part of the solution lies in revising health systems so that they can better address patient and public health needs.

Access to new technologies was also addressed. Dr. Diamant commented that health authorities often look only at costs, but they don't look closely enough at what new treatments mean for patients. Dr. O'Sullivan added that well-informed patients are less demanding of resources than poorly-informed patients, so investing in patient information should improve the ability of governments to provide access to new treatments.

Dr. Diamant remarked that it is often difficult to motivate patients to sustain therapies. Both doctors and patients have to realize better how devastating diabetes is as a disease. Investing in prevention and screening is incredibly important; if we don't measure the extent of the problem, we won't be moved to do something about it. A patient representative agreed, and stressed that we must be more fearless in informing people of risks.

In summing up, Prof. Jönsson called for the use of innovative policies in addressing the diabetes epidemic: new investments in prevention and research, using available therapies in the most efficient way possible, adopting new technologies based on a thorough understanding of the disease, rethinking healthcare organization and financing, and empowering patients to enable them to self-manage their diabetes more effectively. The starting point is a better understanding of the problem by all stakeholders.

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