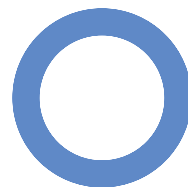


the diabetes epidemic and its impact on Europe



TODAY, WE CAN CHANGE TOMORROW
EUROPEAN DIABETES LEADERSHIP FORUM
COPENHAGEN 2012

JÖRG FREITAG
Jörg has type 2 diabetes





EXECUTIVE SUMMARY

Much progress has been made in recent years, but there is still room for improvement in tackling the growing diabetes challenge in Europe. Successfully controlling type 2 diabetes will significantly contribute in the prevention of other chronic diseases, due to their shared risk factors, underlying determinants and opportunities for intervention.

Most healthcare systems today are organised to treat the acute symptoms of disease and manage conditions separately. We are less advanced when it comes to integrated prevention efforts, early detection, care and treatment for chronic non-communicable diseases. An integrated patient-centred approach will capitalise on common treatment needs and thus have a greater impact. This book sets out a number of key steps, which could help tackle the epidemic development of type 2 diabetes while having a potentially far-reaching impact on the overall development of chronic diseases.

Prevention

- Type 2 diabetes shares several modifiable risk factors with other chronic diseases, and targeting these risk factors through general health promotion, awareness and direct intervention can prevent or delay the onset of diabetes*

Early detection

- Early detection and treatment can improve the outlook for people with type 2 diabetes and other chronic diseases, since timely control decreases the risk of complications

Improved management

- People with well-controlled diabetes achieve better outcomes. A patient-centred approach to care involving monitoring, and collecting of outcomes data can help keep people with chronic diseases healthier

Through all of the phases of prevention, early detection and improved management, a coordinated approach involving public and private partners is needed.

'The diabetes epidemic and its impact on Europe' begins with a discussion on chronic diseases and the value of prevention, and outlines the startling extent of diabetes in Europe. Following this, the benefits of early detection and the need for education and data collection are introduced. The book then stresses the importance of women and children's health and showcases good practice examples. As the case for urgent action has been made, potential next steps are then defined. Finally, the complications and burden of diabetes are highlighted.



ANDREAS ECK
Andreas has type 2 diabetes

*The document predominantly focuses on type 2 diabetes, unless otherwise stated.

European Diabetes Leadership Forum*

Across Europe, and within the institutions of the European Union (EU), declarations have been made that reflect the growing awareness of the challenge of diabetes and other chronic diseases. The need to act to address the substantial and growing human and societal burdens of these diseases has moved significantly up the political agenda. Under the auspices of the Danish presidency of the Council of the EU and the Danish Ministry of Health, political and healthcare leaders from across Europe will come together at the European Diabetes Leadership Forum taking place in Copenhagen on 25–26 April 2012 to discuss what more needs to be done to tackle chronic diseases.

The European Diabetes Leadership Forum is hosted by the Organisation for Economic Co-operation and Development (OECD) and the Danish Diabetes Association. Novo Nordisk is proud to support the conference. Novo Nordisk has also supported the development of this book.

As effective interventions exist for the prevention and control of chronic diseases such as diabetes, the evidence investigated and summarised in this book aims to provide payers, policymakers, patient associations, the expert community, and other stakeholders at the European and national level with a clear demonstration of the challenges presented by diabetes and possible solutions.

The book's development would not have been possible without the support from and contributions of its editors: Prof Bertrand Cariou, Dr David Eddy, Prof Janusz Gumprecht, Dr Richard Kahn, Dr Antonio Nicolucci, Prof Peter Schwarz, Dr Ulf Smith, Prof Nick Wareham and Dr Daniel Witte. All editors chose to donate their time and resources without compensation to increase awareness of diabetes. Although the editors have made every reasonable attempt to achieve complete accuracy of the content in this book, they assume no responsibility for errors or omissions. Furthermore, their personal involvement does not mean that the book reflects the opinions and beliefs of their institutions.

It is hoped that this book will contribute to the development of sustainable improvements in diabetes prevention and detection, and the provision of affordable, effective care throughout Europe.

ALEXANDRA COSTA
Alexandra has type 1 diabetes



*The data presented in this book are, in general, based on Europe, defined as: Albania, Austria, Belgium, Bosnia-Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, the former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, the Republic of Ireland, Italy, Kosovo, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Montenegro, the Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the UK.

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ROGÉRIO SILVA
Rogério has type 2 diabetes



AN INTEGRATED APPROACH TO CHRONIC DISEASES

Using an integrated approach to treating and managing diabetes, and other chronic diseases, allows for a greater impact.

The burden of chronic diseases

Chronic diseases are one of the greatest challenges for Europe. The most common of these diseases are cardiovascular disease (heart disease and stroke), cancer, respiratory disease and diabetes¹, and together they account for a substantial proportion of total mortality

and disability in Europe. Indeed, the vast majority of deaths and disease burden* in Europe are due to non-communicable diseases³.



An integrated approach to chronic disease management

An integrated approach is necessary with chronic diseases because many people have more than one of these diseases. In Europe, 35% of men aged over 60 years have two or more chronic diseases⁴.

People with multiple chronic conditions will require multiple ongoing interactions with the healthcare system. Healthcare systems have traditionally been organised around managing each condition separately. However, an integrated patient-centred approach will

capitalise on common treatment needs and thus have a greater impact.

In the case of type 2 diabetes treatment, research has shown the benefits of an integrated approach. Intensifying treatment to include tight control of multiple diabetes risk factors such as high blood glucose, blood pressure and cholesterol have been found to significantly reduce the risk of death from cardiovascular causes and the development of end-stage renal disease⁵.

*The burden of disease measures the impact of a disease or health condition. The World Health Organization measures the burden of disease in a combined mortality and morbidity measure called disability-adjusted life years (DALYs). This measure combines years of life lost due to premature mortality and years of life lost due to disability².

Diabetes as a model for other chronic diseases

A more holistic approach recommended to prevent and manage diabetes is highly transferable to other chronic diseases, and diabetes can be taken as a model for more general principles of care.

An example of this transferability is seen in two recent political declarations:

1. The declaration of the high-level meeting of the United Nations (UN) General Assembly on the Prevention and Control of Non-communicable Diseases (NCDs)⁶, and
2. The European Parliament Resolution on Addressing the EU Diabetes Epidemic.

These resolutions underline the importance of prevention, early detection and effective treatment, which are the cornerstones of diabetes action plans and form the basis of any effective diabetes care framework.



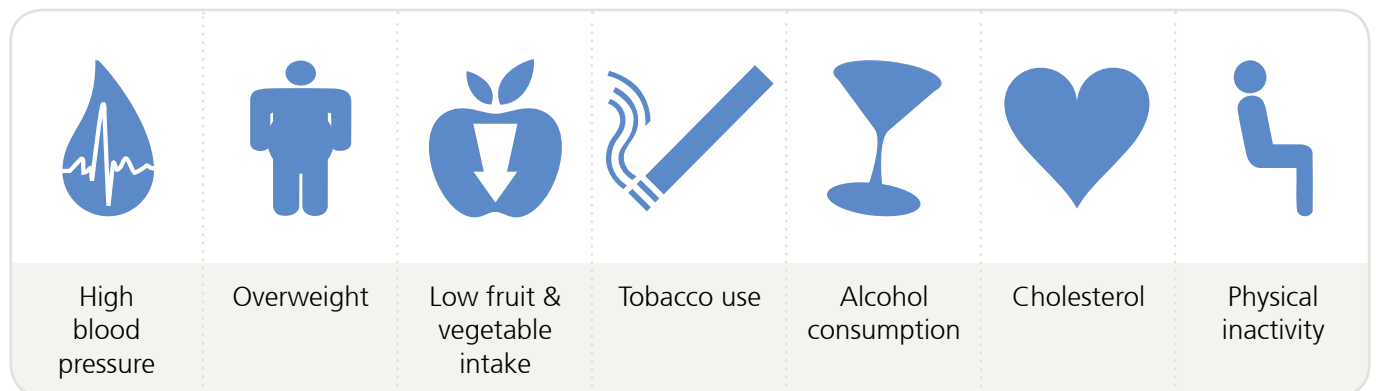
PREVENTION PROVIDES THE GREATEST POTENTIAL FOR GAIN

Diabetes and other chronic diseases, especially for people at high risk, can be delayed or even avoided by prevention programmes.

Common risk factors

The chronic disease burden in Europe is largely caused by shared modifiable risk factors, including diet, physical activity, alcohol and tobacco⁷. Based on these common risk factors, a common approach could reap significant rewards. A community-based prevention programme – for example, one that encourages a healthy diet –

could not only have the benefit of reducing the rise in diabetes, but also of reducing the risk of other chronic diseases. Furthermore, in Europe, multiple risk factors are often present within the same individual, commonly in socially disadvantaged groups⁴.



Primary prevention of chronic diseases

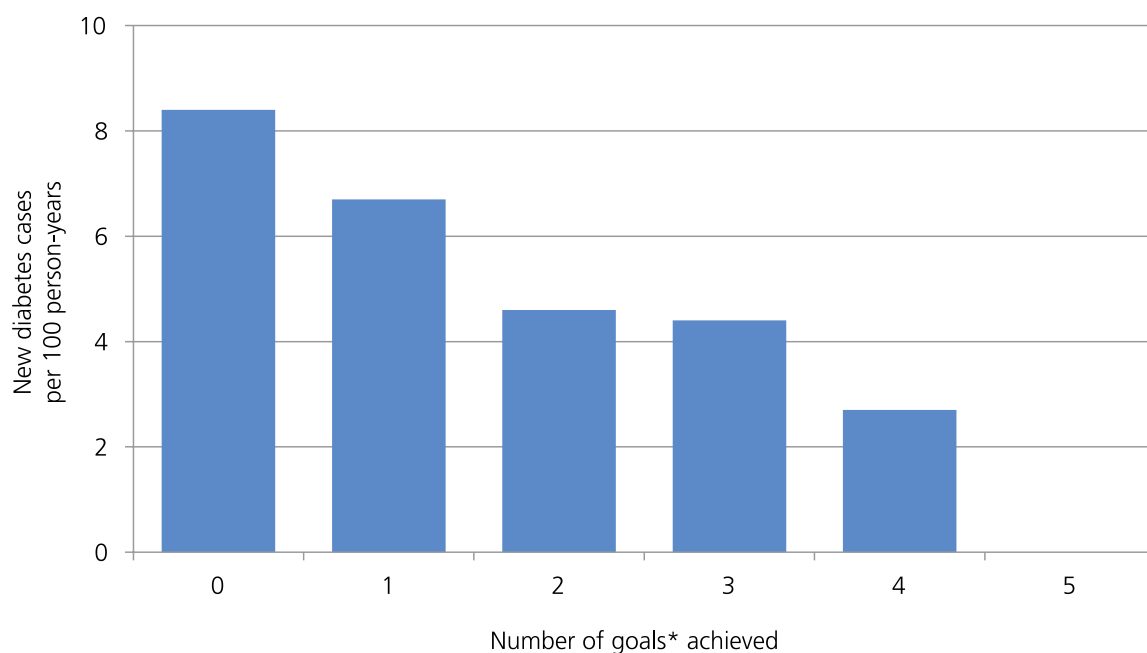
Prevention programmes must be recognised as a cornerstone in a global response to the chronic disease burden⁸. By encouraging and facilitating a healthier lifestyle with a balanced diet, moderate exercise, and an avoidance of tobacco and alcohol, primary prevention aims to prevent people from developing chronic diseases. Evidence from large trials in Finland, as well as ‘real-world’ prevention programmes in many European countries, has identified that lifestyle interventions can

prevent or delay the onset of type 2 diabetes in people at high risk⁹. Specifically, the risk of developing type 2 diabetes can be reduced over a 3-5 year period for people with impaired glucose tolerance by intensive lifestyle modification programmes (58%)^{10,11} and pharmacological intervention (31%)¹¹.

The key to successful prevention is lifestyle changes, such as weight reduction, increased physical activity, and dietary modifications to increase dietary fibre and reduce total and saturated fat intake. The more goals* (ie healthy behaviours) achieved, the lower the incidence

of type 2 diabetes (Figure 1)^{9,12}. This has clear benefits for the individual and society, as preventing or delaying the onset of diabetes will reduce the occurrence of costly and irreversible diabetes-related complications.

Figure 1: Achieving all five of the lifestyle goals* prevented diabetes onset for at least 7 years in the Finnish Diabetes Prevention Study^{9,12}



*Specific goals included: 1) no more than 30% of daily energy from fat, 2) No more than 10% of energy from saturated fat, 3) at least 15 g/1000 kcal of fibre, 4) at least 30 min/day of moderate physical activity and 5) at least 5% weight reduction.

The complex nature of chronic diseases, including diabetes, requires a sustainable and comprehensive approach to prevention. Ideally, prevention programmes should combine broad population-based primary prevention while simultaneously targeting disadvantaged groups and people at high risk of developing a chronic disease^{4,13}.

Health promotion and the prevention of chronic diseases often receive a small share of the healthcare budget – the focus is often on care for people who have already developed a disease^{4,14}. However, a comprehensive approach that focuses on health promotion, disease prevention and disease management is needed⁴. Health promotion can include many activities, including advocacy (through national associations), community support (through education and urban design), fiscal

and legislative changes (through environmental and infrastructure regulation), engagement of the private sector (through workplace programmes and responsible product and marketing practices) and media support (through mass media communication)¹³. An environment which promotes physical activity and healthy diets will support prevention of those at high risk from developing type 2 diabetes, while also aiding people at low risk from becoming high risk¹⁵.

As a 'health in all policies' approach is needed¹⁶, it is necessary to collaborate to ensure the success of health promotion and disease prevention interventions; healthcare professionals, payers, education providers, the food industry, the media, urban planners, politicians and non-governmental organisations must join forces to utilise prevention efforts^{13,14}. Furthermore, alignment of

all national policies including agriculture, trade, industry and transport is needed to promote improved diets and increased physical activity¹.

Primary prevention is often cost-effective

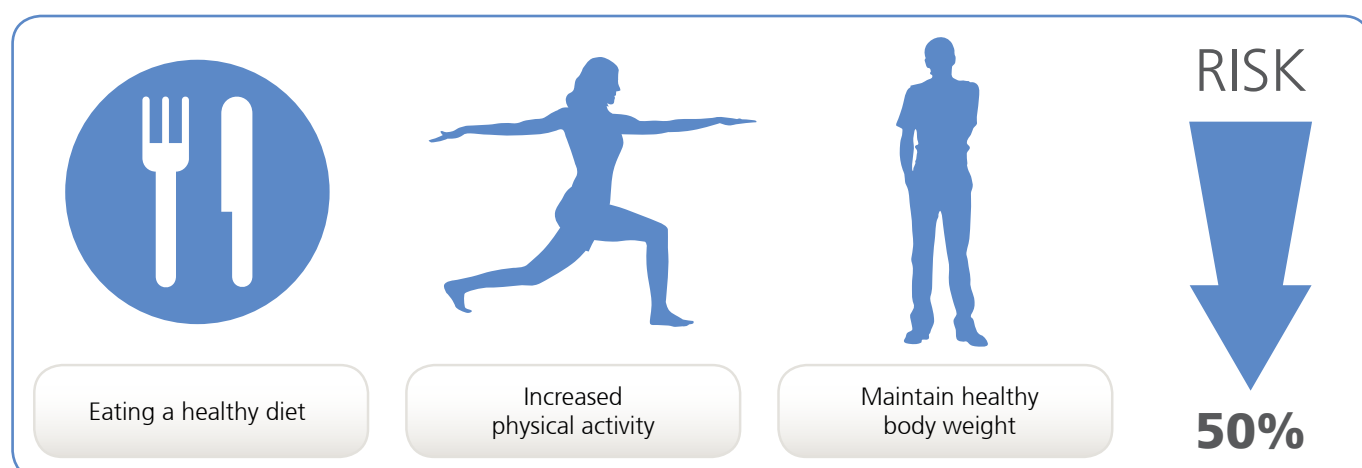
Prevention programmes improve health in the long term but can involve costs in the short term. Furthermore, in the case of chronic diseases, the health benefits – and cost savings – are only realised many years after having implemented such prevention programmes. Health budgets are often allocated to activities that provide tangible benefits in the short term – even if the benefit to society in the medium to long term is smaller, compared with investing in prevention programmes¹⁴.

However, ‘best buys’ in terms of prevention exist. These interventions have a significant public health impact, and are highly cost-effective, inexpensive and feasible to implement. Such interventions in terms of lifestyle include promotion of public awareness about diet and physical activity through mass media, reduced salt in food and replacement of trans-fats⁷.

By encouraging reduced consumption of tobacco, alcohol and unhealthy food, improving awareness of healthy lifestyles and using financial incentives, prevention programmes can effectively tackle the leading causes of NCDs and their underlying risk factors¹⁴.

Conclusions

- Type 2 diabetes and other chronic diseases are linked by common modifiable risk factors – and common opportunities for intervention
- Primary prevention of type 2 diabetes and other chronic diseases is possible
- ‘Best buys’ in prevention exist that are cost-effective, feasible and relatively inexpensive to implement especially compared to the costs of hospitalisation for the complications of diabetes



PETER ROT
Peter has type 2 diabetes

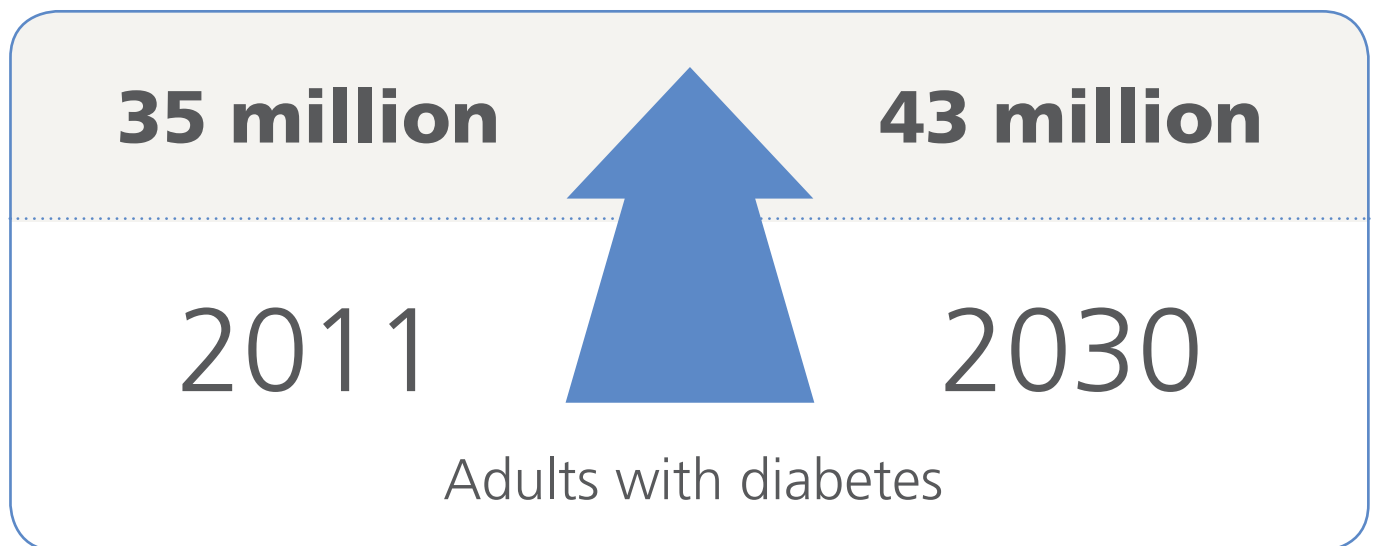


DIABETES IN EUROPE

The International Diabetes Federation (IDF) estimated that, in Europe*:

- 35 million adults had diabetes (both type 1 and type 2) in 2011. This is projected to increase by 23%, to 43 million in 2030¹⁷, which is the lowest increase of any region in the world
- 89 billion euros** were spent on treating and managing diabetes and its related complications in 2011¹⁷. However, the true cost of diabetes also includes indirect costs, such as productivity losses, which can dramatically increase the costs associated with diabetes

The IDF estimates suggest trouble ahead for Europe. Delays in diagnosis and treatment deficiencies ultimately make diabetes-related complications more likely and will inevitably increase healthcare costs in the future. Chronic diseases like diabetes can reduce a household's income, which can lead to poverty, poor educational performance and, in the wider economy, can have a negative effect on gross domestic product (GDP)^{18,19}.



Diabetes in Europe: A diverse picture

Although rates of premature death from cardiovascular disease have decreased in western Europe, they vary greatly within the region, and the highest rates are found in eastern Europe⁴. Furthermore, there is a 20-year difference in healthy life expectancy across Europe⁴, highlighting that European countries are at very different

stages in terms of responding to the challenge of chronic diseases⁴. Despite having the benefit of some of the most developed healthcare systems in the world, there are currently large variations in availability and measurement of data on diabetes prevalence and costs in many parts of Europe.

*Europe defined as: Albania, Austria, Belgium, Bosnia-Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, the former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, the Republic of Ireland, Italy, Kosovo, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Montenegro, the Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the UK.

**Based on the exchange rate at 13:30 UTC on 5 April 2011.

- IDF estimates of the number of people with diabetes and the levels of current healthcare spending attributable to diabetes vary from country to country in Europe. For example¹⁷:
 - The estimated diabetes prevalence varies across Europe vary from 2.8% in Albania to 9.8% in Portugal
 - Estimated healthcare spending due to diabetes ranges from 312 euros per person in the Republic of Macedonia** to 6,896 euros per person in Norway**

The large differences in prevalence and costs associated with diabetes are due to a number of factors, including differences between countries in terms of healthcare systems, treatment and management costs, technology and lifestyles.

Diabetes in Denmark

It is estimated that, in 2010, 5.2% of the adult population in Denmark (286,534 people) had been diagnosed with diabetes²⁰. The prevalence is estimated to increase to 600,000 people by 2025²¹. Furthermore, the IDF estimated that, in 2011, healthcare expenditure on diabetes in Denmark was 5,180 euros per person**, which is more than double the regional average¹⁷.



CAROL KING
Carol has type 2 diabetes

**Based on the exchange rate at 13:30 UTC on 5 April 2011.

HOW CAN WE CHANGE THE FUTURE FOR DIABETES IN EUROPE?

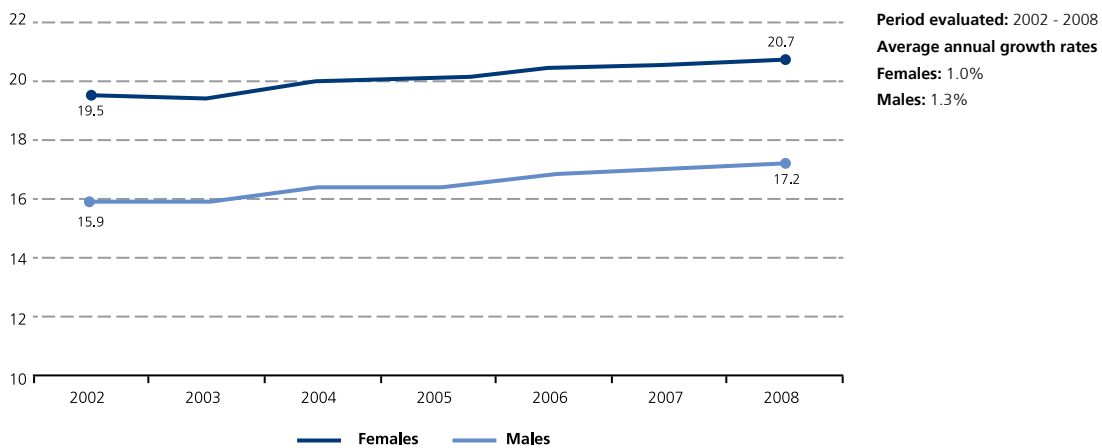
Some risk factors for type 2 diabetes cannot be changed, such as age and ethnicity. However, there are risk factors, such as weight, unhealthy diet and physical activity that can be changed.

Demographics

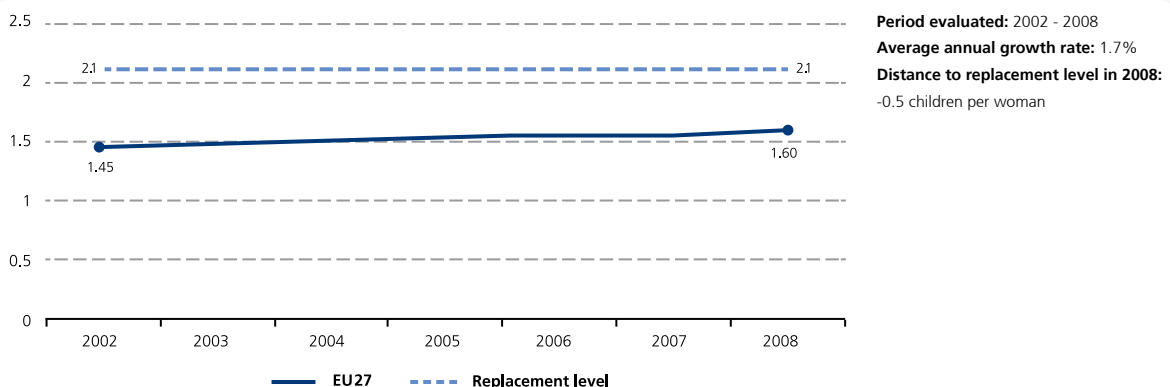
During the last 50 years, economic, technological and medical improvements have increased life expectancy in Europe (Figures 2a)²². In addition, even though the

fertility rate increased between 2002 and 2007, it remains below the level needed to maintain the current population (Figures 2b)²².

Figure 2*: a) Increase in life expectancy at age 65, by gender, in the EU27²²



b) Total fertility rate in the EU27²²



²²EU27 denotes the 27 member states of the EU. It includes: Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, the Republic of Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the United Kingdom.

As age is a marked risk factor for developing type 2 diabetes, societies with an ageing population could experience an increase in the number of people with type 2 diabetes. This would impose a great challenge to society, potentially slowing economic growth¹⁶.

Co-morbidities also increase with age and, as the number of people in western Europe aged over 64 years have more than doubled, and the number of people aged over 80 have quadrupled, in the last 60 years¹⁴, there will be more people with multiple chronic diseases. For example, in Denmark, an estimated 40% of the population already live with at least one long-term condition⁴.

Without changes in immigration patterns and a rise in the retirement age, the labour force will gradually become smaller compared with the rest of the population. It has been estimated that the ratio of elderly, economically inactive people (> 65 years) to people of working age in the EU will double between 2005 and 2050⁴. The quality of healthcare could, therefore, suffer as fewer people must cover the increasing costs of healthcare. Governments must utilise the time prior to any financial problems caused by ageing populations to prepare for these demographic changes²².

The role of ethnicity is also noteworthy, as prevalence of diabetes differs by ethnic group: for example, type 2 diabetes is up to six times more common in people of South Asian descent and up to three times more common among those of African and African-Caribbean origin⁴. There are also ethnic differences in the nature of diabetes, including risk factors and outcomes²³.

Physical activity and diet

Lifestyles, including diet and exercise, are not only based on individual choices. Choices are often influenced by environmental factors, including social structures, cultural and political conditions, and physical and economic environments¹⁴. Globalisation and urbanisation are two environmental factors that have a large influence on personal behaviour⁴ and are leading to obesogenic environments*. Globalisation has increased the availability and consumption of inexpensive fast foods high in fat, salt and calories while also reducing the reliance on local markets⁴. Similarly, urbanisation has increased the levels of motorised transport, urban spread, and reduced opportunities for daily physical activity within home, work and school settings⁴. These factors encourage sedentary lifestyles and can make it difficult for people with diabetes to adhere to treatment²⁴.

There are some differences between European countries, with more people having sedentary lifestyles in Mediterranean countries, such as Portugal (88%) and, in general, fewer in the Scandinavian countries, such as Sweden (43%)²⁵. Physical activity varies between countries and individuals, due to sex, culture and age²⁶, and guidelines need to account for these differences¹⁴.

In Europe, the average fat intake in adults is above the recommended level in almost all countries²⁷. A high intake of saturated fat is seen in Austria and Belgium, for example, where 16–18% of energy consumed is through saturated fat. In contrast, people in Portugal and Italy, who consume a more Mediterranean-style diet, consume 10% of their energy through saturated fat²⁷.

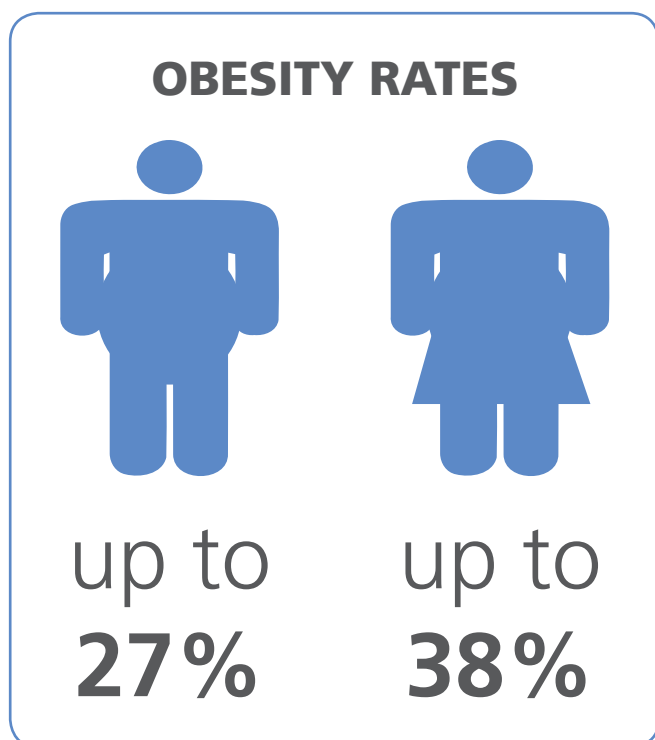
Lack of physical exercise, inappropriate nutrition and obesity increase the risk of developing type 2 diabetes¹⁶. Although diet can often vary according to culture, food availability and personal preferences, a high intake of vegetables and fruits and a limited intake of highly processed foods (for example, processed meat, sweetened beverages and confectionery) should be guiding principles²⁸.

*Obesogenic environments: aspects of physical, social and economic environments that favour obesity³¹.

Obesity

Obesity is a risk factor for chronic diseases, including diabetes²⁹. Obesity, defined as a body mass index (BMI) in excess of 30 kg/m², and being overweight (>25 kg/m²), greatly increase the risk of developing type 2 diabetes. Being obese leads to more than a seven-fold increase in the risk of developing type 2 diabetes, while being overweight increases the risk nearly three-fold³⁰. Furthermore, people who are severely obese (>35 kg/m²) have a risk of developing type 2 diabetes up to 60 times greater than those with a normal weight³¹.

Obesity rates in Europe range from 10–27% in men and up to 38% in women³². In at least seven European countries, more than one in five adults are obese³². The increasing rates of overweight and obesity are quite recent, with the average BMI in England increasing by 1.5 units and the average BMI in France increasing by 1 unit over a 15-year period (early 1990s to the mid-2000s)¹⁴.



Waist circumference (WC) provides a measure of central obesity. Generally, a high disease risk (relative to normal weight and normal WC) is indicated by a WC >102 cm (men)/88 cm (women)³³. However, different cut-offs have been suggested for different ethnicities³³. WC compares closely with BMI, but WC is often seen as a better way of determining the risk of developing a chronic disease in clinical practice³⁴ and used in diabetes and cardiovascular risk scores.

Health inequalities

The increasing number of people with diabetes cannot be explained merely by demographic changes and lifestyle causes. In many countries in Europe, type 2 diabetes and other chronic diseases have a higher prevalence in lower educational groups³⁵ and are related to social deprivation associated with poverty.

Social determinants of health account for the economic and related social conditions people live in, which influence their health. Even in developed economies, such as many countries in Europe, differences in life expectancy can be linked to wealth as people who are less well-off develop more illnesses³⁶. In the United Kingdom (UK), for example, morbidity from diabetes-related complications is 3.5 times higher among the less well-off compared with the wealthiest⁴. Furthermore, when improvements to health occur, the benefits are often unevenly distributed within society and higher socioeconomic groups appear to benefit more⁴.

Healthcare policies need to incorporate wider health determinants like economic growth, income inequalities and poverty, as well as education, the working environment, unemployment and access to healthcare to create sustainable improvements in health. To reduce the disease burden from type 2 diabetes and other chronic diseases, integrated action on risk factors and their underlying determinants across sectors is necessary⁴.

Conclusions

- As the population in Europe is getting older and life expectancy is increasing, there will be more people with type 2 diabetes and other chronic diseases
- Modern obesogenic environments, with the combination of unhealthy diet and physical inactivity, have serious implications for type 2 diabetes and other chronic diseases
- There is an uneven distribution of chronic disease, with higher prevalence among poor, vulnerable and certain ethnic groups

WALTER HILBERATH
Walter has type 2 diabetes



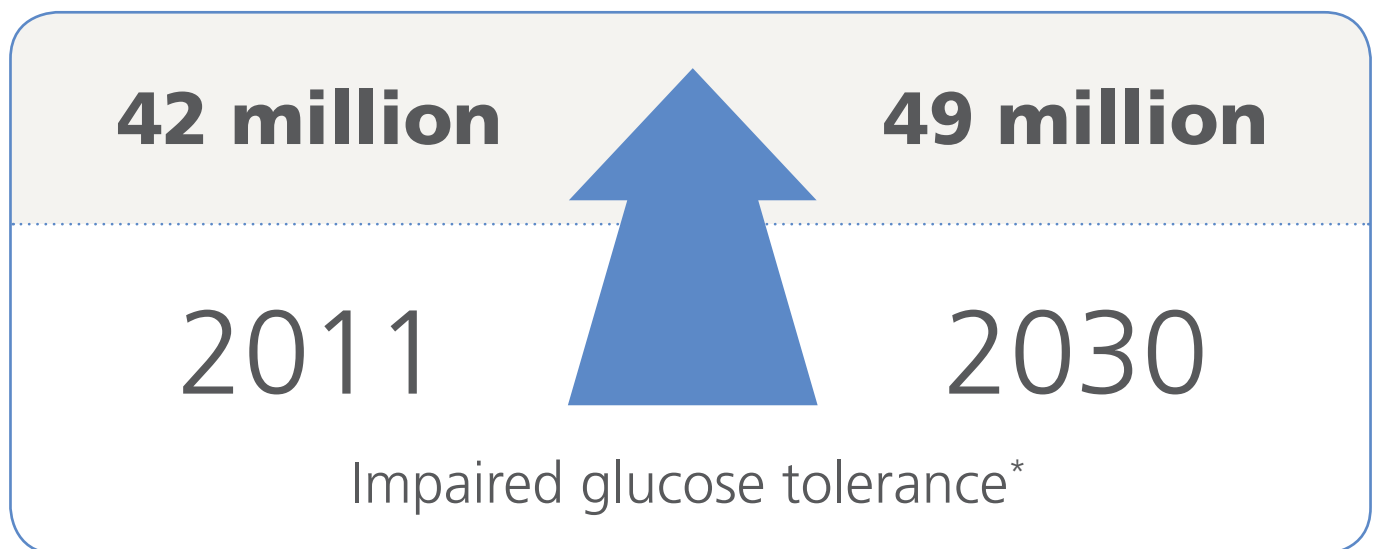
IMPROVING OUTCOMES BY EARLY DETECTION

Early detection and appropriate intervention presents an opportunity to improve outcomes for people with type 2 diabetes and other chronic diseases.

Is early detection of diabetes warranted?

In 2011, the IDF estimated that 42 million people in Europe had impaired glucose tolerance*, representing

9.5% of the total European population. This number is projected to increase by 15% to 49 million by 2030.



The purpose of early detection is to detect a disease with no apparent symptoms and improve the patient's outlook by initiating timely treatment. Health checks can identify people who are undiagnosed or at high risk of developing a disease, and allow for early detection, treatment and prevention. Criteria for identifying when health checks are effective measures to improve public health have been developed and require that:

1. The disease should constitute a public health issue of sufficient severity
2. The disease should be well understood and have early detectable phases during which symptoms are not apparent
3. Interventions in the early phase should be effective in preventing or delaying onset of the disease and its complications
4. A safe, reliable and accepted testing procedure exists

*A state of increased risk of developing type 2 diabetes.

Targeted, opportunistic case finding – based on national risk factors for type 2 diabetes and heart disease – where the population to be screened is selected by simple questionnaires, can meet these criteria^{16,37,38}.

Why detect early?

Diabetes-related complications can be potentially postponed or avoided through early detection¹⁶, assuming: 1) Appropriate treatment and management and 2) Appropriate preventive measures. Furthermore, it has been found that people who have a high cardiovascular risk should be treated with a multidrug regimen and counselling, which reduces the risk of developing heart attacks, strokes and kidney disease⁷. Early intervention can be effective and, even if the intervention is stopped after some years, the patient may benefit from fewer complications in the long term because of the early lifestyle changes and early intensive treatments³⁹.

Cost-effectiveness of early detection

Ideally, policy decisions should be made on the basis of strong, long-term clinical evidence⁴⁰. However, for early-detection and health-check programmes, this is unlikely to occur³⁸, due to time, cost and ethical considerations. In the absence of this information, modelling future outcomes becomes relevant⁴⁰. Recent modelled results of type 2 diabetes health-check programmes have indicated cost-effectiveness in given settings⁴¹. Other early detection interventions, including providing aspirin to people with a heart attack and controlling blood glucose levels in people with diabetes, have also been identified as cost-effective, often being inexpensive and feasible to implement⁷.

Conclusions

- Health checks allow for early detection of diabetes and other chronic diseases
- Early detection and intervention in people with diabetes, or other chronic diseases, can delay or prevent the onset of the disease and its complications
- Recent modelled results of type 2 diabetes health-check programmes have indicated cost-effectiveness in given settings

HOWARD FANCOURT
Howard has type 2 diabetes



PATIENT SELF-MANAGEMENT EDUCATION AND SUPPORT

Multi-disciplinary strategies that help motivate, educate and support people to manage their condition are an essential part of chronic care.

A large proportion of people with diabetes and other chronic conditions have difficulties following their prescribed treatment and as a result do not achieve optimal treatment outcomes^{24,42} – 50% of people with diabetes may have unsatisfactory blood glucose, cholesterol and blood pressure control⁴. Many factors play a role in influencing self-management in chronic illness and multi-disciplinary strategies are needed at national and local levels²⁴.

In diabetes, and other self-managed chronic conditions, it is the person with the condition and their family members, rather than the healthcare team, who are ultimately responsible for managing daily treatment. Lack of confidence in managing the disease and the effectiveness of treatment are some of the factors playing a key role in diabetes self-management⁴³. Other factors include the complexity and lack of understanding of treatments and dosing, especially for patients receiving multiple medications for different conditions²⁴. In type 2 diabetes, psychological barriers to initiation or intensification of treatment among patients and healthcare professionals also contribute to delays in initiating required medical therapy⁴⁴.

Diabetes treatment guidelines also highlight the central role of education and self-management issues for the management of diabetes⁴⁵. National policies and programmes for the prevention and management of chronic illnesses, such as diabetes, depend on an in-depth understanding of the social, psychological and behavioural aspects of the condition and its treatment.

The World Health Organisation's (WHO's) innovative framework for care of chronic conditions⁴⁶ calls for chronic care policies to focus efforts on the activated patient and enable effective roles for the family and the community in healthcare systems. The International Alliance of Patient Organisations' (IAPO's) declaration on patient-centred healthcare⁴⁷ highlights the need for involvement of patients in all phases of healthcare change.

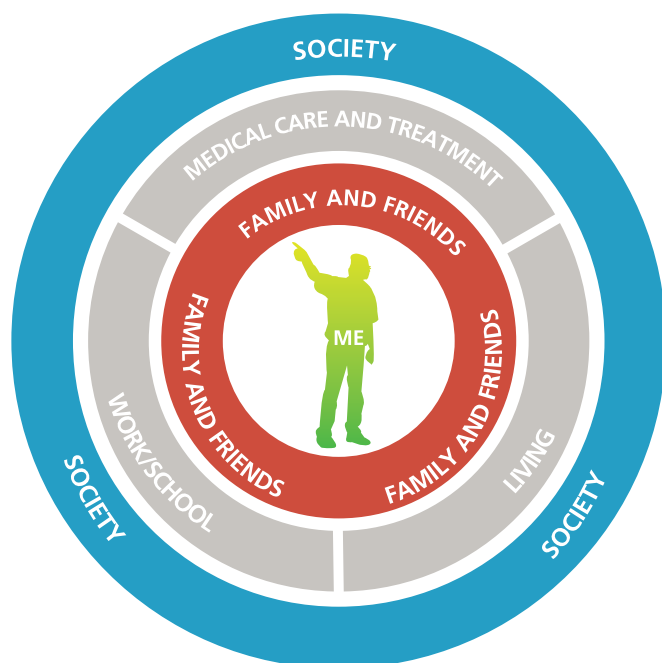
Better adherence to diabetes treatment is associated with better management and lower healthcare utilisation⁴⁸ and the evidence on the effectiveness of self-management support is growing^{49,50}. An area with a particularly strong evidence and guidance for action in Europe relates to the need for better access to quality-assured and evidence-based diabetes self-management education.

Figure 3 summarises the key areas that have been shown in large studies to influence a patient's ability to self-manage and achieve a good quality of life with diabetes. Future health policy frameworks should encourage better practices and evidence-based strategies for

addressing all of these dimensions in an evidence-based and cost-effective way.

There is a need to strengthen healthcare systems, to ensure patient-centred care across various levels of healthcare¹

Figure 3: Patient needs model



- **Me:** Being able to cope with my condition, and living a full, healthy and productive life.
- **Family and friends:** Emotional and practical support in all aspects of my condition
- **Community:**
 - Medical care and treatment:** Access to quality diagnosis, treatment, care and information
 - Work/school:** Obtaining support for, and understanding of, my condition
 - Living:** Having the same opportunities to enjoy life as everybody else
- **Society:** A healthcare system, government and public that are willing to listen, and to change, to be supportive of my condition

Conclusions

- The majority of people with diabetes do not achieve treatment targets suggested in clinical guidelines
- Health policies need to reflect the fact that people with diabetes and other chronic diseases rely on support not only from the healthcare system, but also from their family and the wider community
- Patient education can play a valuable role in helping people to better manage their diabetes

EFFECTIVELY MEASURING AND SHARING DATA CAN IMPROVE OUTCOMES

By measuring and sharing data – utilising the potential of health informatics – the lives of people with diabetes, and other chronic diseases can be improved.

Care for chronic diseases, including diabetes, cannot be improved until there is a solid understanding of the level of care today. Only when outcomes are consistently and continually measured and compared can strategies, treatment methods and healthcare systems be improved. Collection of indicators of healthcare and outcomes and analysis based on income level, age, sex and ethnicity is necessary to allow policymakers to adequately assess the effects of interventions and allocation of healthcare budgets and ensure progress towards equality^{4,16}.

Measuring and sharing quality-of-care data increase knowledge which can lead to improved care for people with chronic diseases such as diabetes. It can also contribute to better awareness and understanding of a disease and relevant treatment practices (Figure 4). There are many ways to measure quality of care of people with chronic diseases; for example, monitoring potentially preventable hospital admissions is a good indicator of the quality of diabetes primary care⁵¹.

Figure 4: The positive cycle of collecting, sharing and improving outcomes⁵²

Implement good practices to improve the quality of care



Collect quality-of-care data on a regional level

Compare the results and highlight good practices

Several countries in Europe collect data on diabetes, for example by having a national diabetes registry^{53,54}. A diabetes registry that captures information on quality of care offers great potential for continuous monitoring and improvement. However, collecting information on risk factors such as tobacco use, unhealthy diet, lack of physical activity and alcohol consumption is also necessary⁴.

The opportunity for comparing quality in the EU is limited since the type and scope of data collected in diabetes registries varies across countries, as does the possibility of linking to electronic patient records or medical claims databases to obtain a full picture of the quality of care.

The national healthcare registry in Denmark⁵⁵

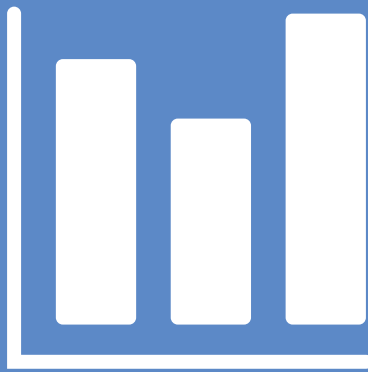
The Danish National Indicator Project was established in 1999 and aimed to develop and collect quality indicators for a range of chronic diseases, including diabetes. The indicators have been put to use both to inform quality of care and to track improvements at a national level, as well as a basis for reorganising and prioritising at regional or even hospital level. The quality monitoring was further improved in 2011, when it was agreed that general practitioners should use the digital platform DATAFANGST to track and report a range of quality indicators for people with chronic diseases.

There is currently no agreement on the quality indicators collected throughout Europe, which makes cross-country comparisons very difficult. To improve availability and comparability of diabetes quality-of-care data across the EU, there is a need to identify and introduce targets, develop transparent reporting systems and report on progress¹. This has been one of the purposes of the European Best Information through Regional Outcomes in Diabetes (EUBIROD) project⁵⁶. EUBIROD has worked towards compiling diabetes data available in EU countries, but continuous effort in this area is much needed.

This need is also highlighted in the recent European Parliament Resolution on Addressing the EU Diabetes Epidemic, which *“calls on the Commission to draw up common, standardised criteria and methods for data collection on diabetes, and, in collaboration with the Member States, to coordinate, collect, register, monitor and manage comprehensive epidemiological data on diabetes, and economic data on the direct and indirect costs of diabetes prevention and management.”*

This absence of complete data prevents understanding of the true burden of diabetes on individuals, healthcare systems and economies in Europe. It also prevents governments from assessing the impact and effectiveness of national diabetes policies and programmes⁵⁷.

By measuring and sharing data, the lives of people with diabetes, and other chronic diseases can be improved.



MARIA LUÍSA DE ARAÚJA
Maria has type 2 diabetes



WOMEN, DIABETES AND THE NEXT GENERATION

Gender influences the development of risk factors and diseases. Throughout a person's life course, gender affects health risks, access to and utilisation of healthcare.

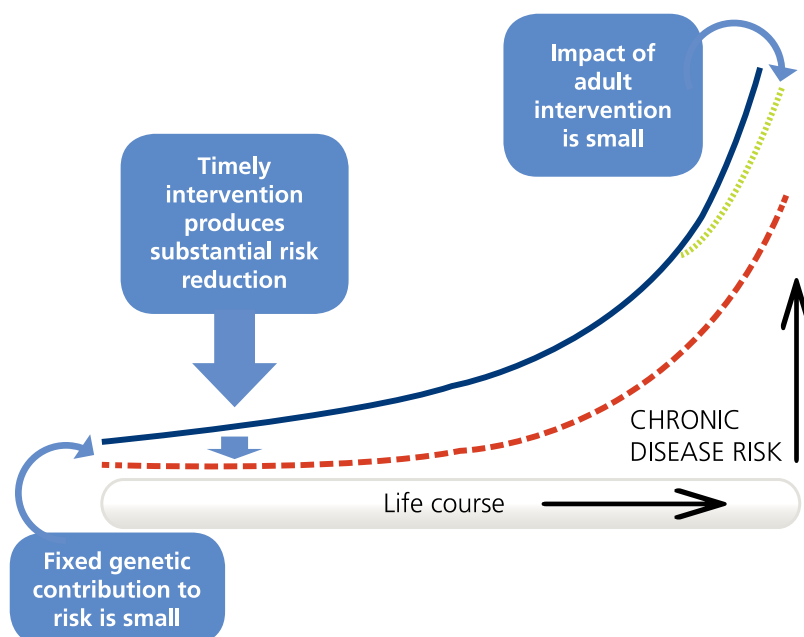
The medical problem

In women with diabetes, the risk of death from coronary heart disease is about 50% greater than in men⁵⁸. One potential reason for this is that pre-menopausal women with diabetes lose the natural protection against heart disease that non-diabetic women have⁵⁹. In addition, women with diabetes are almost twice as likely to have depression compared with men with diabetes⁶⁰. Women diagnosed with gestational diabetes (GDM) are at least seven times more likely to develop type 2 diabetes compared with women without GDM⁶¹. Furthermore, children of mothers with diabetes – either pre-existing, or gestational – are more likely to develop diabetes themselves in later life^{62,63}.

The foundations of health are laid in early life

In addition to the genes they pass on to their offspring and the direct biological influence imparted during pregnancy (through the uterine environment), women can also influence the next generation by feeding and caring for their children, and encouraging them to adopt a healthy lifestyle⁶⁴. Healthy habits, such as eating a balanced diet, exercising and not smoking, are learnt early in life, and are associated with parental examples⁴. The value of healthy pregnancy cannot be underestimated. Interventions that account for a life-course approach to chronic diseases highlight that chronic disease risks increase with age. (Figure 5).

Figure 5: Risk of non-communicable disease⁶⁵



The future

Numerous political initiatives have drawn attention to the health and social problems facing women – specifically women with diabetes, but their effects have been limited and greater collaborative efforts are needed. Gender-separated data are essential to reveal the true extent of the inequalities in access to, and quality of healthcare for, women⁶⁶. Education and information are vital to reducing the burden both on the individual and on society.

Children with type 2 diabetes: Tomorrow's challenge for Europe

In addition to having a higher risk of obesity in adulthood, overweight children may develop early signs of chronic diseases, such as raised blood pressure,

raised markers for cardiovascular risk, raised indicators of diabetes risk and early stages of fatty liver disease³¹. Estimates suggest that one in five children in Europe is overweight and that, each year, 400,000 children become overweight⁵⁷. Childhood obesity has been identified as a precursor for type 2 diabetes, and a study from the UK found a 2.5-fold increase in the number of children being diagnosed with type 2 diabetes in 2005, compared with 2003⁶⁷.

Changes in lifestyle, including an unhealthy diet and lack of physical exercise – of both the parent and the child – are thought to be one explanation for the rise in childhood obesity¹⁴. However, recent data reveal that childhood overweight and obesity rates are levelling in some countries, such as France, and there are even some early signs of a possible decline in some countries, such as England¹⁴.

1 in 5 children are overweight



Conclusions

- Cardiovascular mortality is much higher in women with diabetes compared with men
- Diabetes in pregnancy increases the risk of morbidity and mortality for both the mother and child
- There is an emergence of obesity and type 2 diabetes in childhood

SHARING EXPERIENCES

There are already many successful programmes in and around Europe that are tackling diabetes in innovative and effective ways. Sharing information and ideas about 'what works' is one of the most positive options for the future.

Health checks reveal undetected diabetes in Ireland⁶⁸

Vhi Healthcare, the largest health insurance company in Ireland, estimated that there are potentially 30,000 cases of undiagnosed diabetes and 146,000 cases of undiagnosed prediabetes in Ireland, together accounting for an alarming 11% of the population. A screening project found that 63% of the participants were either overweight or obese, 64% had elevated cholesterol and 25% had high blood pressure. These findings were significantly higher than anticipated.



Ireland
11%
undiagnosed

These estimates were made on the basis of a screening project in which over 11,500 people without a prior diagnosis, aged 45–75 years, were randomly chosen to attend a clinical evaluation and a fasting plasma glucose (FPG) test. The study found that a simple, combined Finnish Diabetes Risk Score and FPG score would identify 91% of undiagnosed people with diabetes and 74% of undiagnosed people with prediabetes.

The Vhi Healthcare screening project has been selected to be included in a prestigious EU research project examining how best to detect, intervene and treat type 2 diabetes and prediabetes.

Measuring and sharing quality of care data in Italy⁶⁹

The Italian Association of Diabetologists (AMD) realised the importance of measuring and sharing quality-of-care data to reduce the burden of diabetes. For this reason, in 2004 it began collecting diabetes quality indicators from all diabetes outpatient clinics. The initiative now involves 250 diabetes clinics throughout Italy, covering a total of over 400,000 people with type 1 or type 2 diabetes.

The quality-of-care data collected are compared with realistic gold standards established by identifying the best centres operating in the same healthcare system under similar conditions. This approach represents a key feature of the continuous quality-improvement effort implemented in Italy.



Italy
250
diabetes clinics

Results are then publicised through a specific publication (AMD Annals) and on a dedicated page of the AMD website, and discussed with investigators at an annual meeting. The project is conducted without allocation of extra resources or financial incentives, but through a physician-led effort made possible by the commitment of the specialists involved.

The participation of clinicians in the AMD Annals initiative has already proven effective in improving process and intermediate outcomes indicators.

Continuous improvement of a chronic disease care model in Israel⁷⁰

Since 1997, a diabetes programme has been in place in Israel run by one of the major health insurers, Clalit Health Services. It includes adaptation of clinical guidelines, continuous medical education, improved national electronic health records and software to support healthcare professionals making clinical decisions. The scheme provides a way of ensuring that patient information can be consistently accessed and tracked, and is incorporated in the electronic medical file of each patient, thus requiring minimal training to use. The system helps to facilitate preventive care, and faster and more accurate detection. It has also been found to increase the time that healthcare professionals can spend with patients, and reduces costs by reducing duplicate testing and unnecessary procedures. Currently, it covers 100% of the population of Clalit Health Services. In recent years, all of the other health maintenance organisations in Israel have adopted a similar solution to combat diabetes, and they all work together under the auspices of the Israeli Diabetes Barometer.



Israel CHS diabetes programme

Building primarily on the quality indicators in this diabetes programme, a National Programme for Quality Indicators for Health was established in 2004. To date, the programme has had positive results, with the proportion of people with diabetes receiving the necessary blood tests increasing four-fold. Furthermore, improvements in the proportion of people with diabetes adequately controlling their cholesterol and blood glucose levels have been observed: the proportion of people with diabetes in good control rose from 28% in 1999 to 53% in 2007.

Clalit is Israel's largest health maintenance organisation, covering about 70% of all people with diabetes in Israel. With government support, it initiated the registry in 1996, and now has an extensive collection of diabetes quality indicators. The registry has been accompanied

by a range of workshops and activities with the aim of improving diabetes care.

Improving glycaemic control in Poland

Currently, more than 2.5 million people (6.5% of the population) have diabetes in Poland. The large number of people with diabetes combined with poor glycaemic control leads to many instances of costly preventable complications.



Poland
2.5 million
suffer from diabetes

One indicator of diabetes control is the level of HbA1c* – a key tool used to monitor diabetes. According to international standards, HbA1c levels in people with diabetes should not exceed 7%. However, in Poland, 80% of people with diabetes do not meet that target, due to insufficient expertise of primary care doctors in intensifying diabetes treatment, and limited access to HbA1c testing.

In response to these needs, an educational programme was launched in 2007 that focused on training and education to improve glycaemic control. The programme involves the cooperation of primary care physicians and specialists who treat people with diabetes, and includes continual analysis of patient data. The aim of the programme is to improve the quality of life and treatment outcomes of people with diabetes. Thanks to a simple system, and the involvement of a group of doctors, the programme helps to monitor HbA1c levels and other parameters important for managing diabetes. The results are uploaded to a website (www.poprawakontroliglikemii.pl) to enable on-going data reviews.

By the end of 2011, 700 diabetes specialists and almost 3,300 general practitioners had joined the Improve Glycaemic Control Programme in Poland. In early 2010, the programme incorporated people with diabetes from 419 hospital wards and since then, more than 67,000 HbA1c tests have been conducted.

*HbA1c (glycated haemoglobin) measures the average blood glucose level over the last 3 months.

Structured diabetes self-management education in the UK⁷¹

A recent study involving 824 adult patients from 207 general practices in the UK found that people who received a group-based, patient-centred structured diabetes self-management education course had greater improvements in weight loss and smoking cessation compared with people who did not. The education programme, Diabetes Education and Self-Management for On-going and Newly Diagnosed (DESMOND), was carried out by the UK National Health Service.



UK **DESMOND** education programme

DESMOND is a structured patient education and management programme designed for newly diagnosed people with type 2 diabetes. It aims to support people in identifying health risks and developing personalised goals while also providing emotional and social support. This study also evaluated the cost-effectiveness of the DESMOND programme, and concluded that it is likely to be cost-effective compared with usual care for people with type 2 diabetes.

The programme fulfils the National Institute for Health and Clinical Excellence national guidelines and quality criteria for education, and is available through a quality-assured process on a national basis. The education model has been adapted in the Netherlands and, more recently, in Australia, and provides inspiration for potential wider European use.

The French diabetes management programme

The management of chronic diseases, especially diabetes mellitus, is a major priority for the French National Health Insurance (CNAMTS). The goal of the SOPHIA programme is to improve the health status and the quality of life of people with diabetes and to reduce healthcare expenditure by reducing complications and comorbidity frequency. To achieve this, SOPHIA provides a very broad programme of support, addressing

both type 1 and type 2 diabetes patients, building on the pivotal role of the general physician (GP) in the healthcare system and helping them to coordinate care for their patients.

The SOPHIA programme aims to provide personalised healthcare advice based on the risk status for each patient. This involves written documents, phone calls and web-based support on diabetes management including nutrition, physical activity, diabetic complications, self-blood glucose management, etc. Further information can be found on the website www.sophia-infoservice.fr.



France **SOPHIA** healthcare advice

The first pilot programme was launched in January 2008 in 10 departments with a target population of 140,000 people with diabetes and 6,000 GPs. In 2010, nine additional French departments joined SOPHIA, making an enlarged target population of 440,000 people with diabetes and 15,300 GPs. After 3 years, the pilot programme was evaluated, looking at implementation progress, measuring pilot efficiency and accessing cost.

In March 2011, 103,000 people with diabetes had subscribed to the programme and the nurses and health advisers recruited in the programme had performed 172,000 patient phone calls for health counselling. Compared to people with diabetes not enrolled in the programme, those involved in SOPHIA were younger and less advanced in the course of the disease. The first preliminary analysis showed encouraging results, with better detection of complications and potentially a slight improvement in glycaemic control. In light of these results, the French government has decided to extend the programme to the whole country.

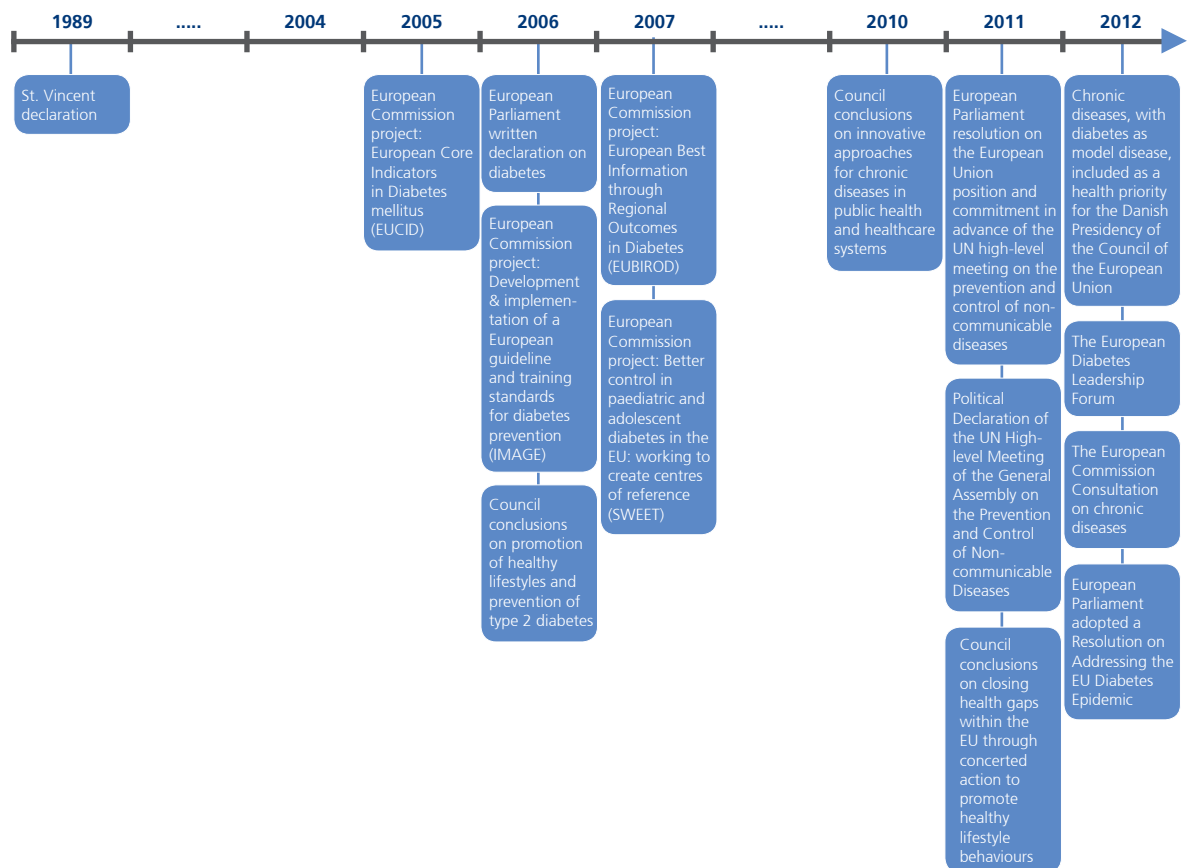
LENA LALLUKKA
Lena has type 2 diabetes



FROM POLICY TO ACTION

Since 1989, when the St. Vincent Declaration was adopted, and with mounting priority in subsequent years, diabetes has received growing attention as a policy priority. Even so, most nations have not taken dramatic or effective actions to curb the diabetes epidemic.

Figure 6: Timeline of European policy initiatives



The international will to address the threat of diabetes has been expressed in a number of major declarations and plans. Among the earliest is the 1989 St Vincent Declaration⁷², which was supported by the WHO's regional office for Europe (WHO/Europe) and committed to multiple initiatives to combat diabetes. The St.

Vincent Declaration was the first initiative to recognise the importance of national diabetes programmes (NDPs). Unfortunately however, many countries have not succeeded in introducing NDPs, which was a key element of the declaration.

Since 1989, there has been an increased political awareness of the importance of diabetes (Figure 6), including:

1. The European Parliament Written Declaration on Diabetes (January 2006)⁷³
2. The EU Council Conclusions on promotion of healthy lifestyles and prevention of type 2 diabetes (June 2006)⁷⁴
3. The UN Resolution on diabetes 61/225 (August 2009)⁷⁵

In December 2010, the EU Council adopted conclusions that called for the European Commission to initiate a reflection process involving both EU member states and civil society, aiming to identify options to optimise the response to the challenges of chronic diseases⁷⁶. This process is due to report in late 2012 or early 2013. Additionally, in September 2011, the European Parliament adopted a resolution that stressed the importance of prevention and control of NCDs⁷⁷.

In September 2011, heads of state and government leaders attended a UN high-level meeting in New York on NCDs, where delegates adopted a political declaration⁶ that calls for a united campaign by governments, the private sector and civil society to increase access to affordable, safe, effective and quality-assured medicines and technologies.

Finally, in March 2012 the European Parliament adopted a Resolution on Addressing the EU Diabetes Epidemic, which calls for a range of initiatives to improve prevention, detection and management of diabetes, including national diabetes programmes, and initiatives to secure better co-ordination of research into diabetes.

During the first quarter of 2012, Denmark holds the presidency of the Council of the EU. During the Danish EU presidency, key health priorities include chronic diseases, with diabetes as the model disease. This represents a unique opportunity for further collaboration between politicians, government officials, patient organisations and the private sector on the urgency of improving prevention, early detection and quality of care in Europe.

NINA OLDENBURG
Nina has type 1 diabetes



It is possible for all of the countries in Europe to effectively combat diabetes...

...we have the evidence and the tools to prevent, early detect and better manage diabetes

- Make healthy nutrition accessible for all and promote everyday physical activity throughout life
- Detect and treat diabetes and its complications early
- Make self-management education available to all people with diabetes
- Monitor, evaluate and communicate outcomes – not only nationally, but also regionally

...prevention, detection and management of diabetes also addresses other chronic diseases

ALEXANDRA GRÄBER-ROŠIN
Alexandra has type 1 diabetes



ABOUT DIABETES

Diabetes is defined by a failure of the pancreas to produce insulin or to produce and utilise sufficient insulin to keep blood glucose under control.

Insulin allows cells and tissues of the body to take up glucose and store it, thus reducing the levels of glucose in the bloodstream after a meal. A lack of insulin causes glucose in the blood to remain high and these high blood glucose levels are responsible for the damaging complications of diabetes.

Types of diabetes¹⁶

Type 1 diabetes is an autoimmune disease that destroys the insulin-producing cells of the pancreas and accounts for 3–5% of all diabetes cases globally. It commonly develops in children and the young, although it is possible to develop type 1 diabetes in adulthood. People with type 1 diabetes are dependent on insulin injections for survival.

Type 2 diabetes is due to a combination of insulin resistance and insulin deficiency. It is the most common type of diabetes, accounting for 95% or more of all diabetes cases globally. It most commonly occurs in middle-aged and older people but is increasingly affecting overweight children, adolescents and young adults.

GDM is glucose intolerance with onset or first recognition during pregnancy and affects at least one in 25 pregnancies globally. Undiagnosed or inadequately treated GDM can lead to larger than normal babies, higher rates of infant deaths, and foetal abnormalities. Women with GDM and the offspring of GDM pregnancies are also at increased risk of developing type 2 diabetes later in life.

Other types of diabetes exist, including latent autoimmune diabetes in adults (LADA). This is sometimes referred to as type 1.5 diabetes, as people present signs of both type 1 and type 2 diabetes.

Diabetes complications

Diabetes can lead to many serious complications, usually after a number of years, and particularly if diabetes is not detected early or well treated¹⁷.

- Cardiovascular disease (angina, heart attack, stroke, peripheral artery disease, and congestive heart failure) is the most common cause of death for people with diabetes¹⁷
- Kidney disease (nephropathy) in people with diabetes is among the leading causes of end stage renal disease requiring transplantation or dialysis¹⁷
- Eye disease (retinopathy) can cause impairment to sight or even blindness¹⁷
- Nerve damage (neuropathy) can lead to numbness, ulcers, infections and even amputations¹⁷

Due to these complications, people with diabetes have nearly a two-fold higher risk of premature death than people without diabetes⁷⁸.

A substantial burden of type 2 diabetes is derived from complications, specifically cardiovascular complications¹⁷. However, long-term intensified interventions aimed at multiple risk factors in people with type 2 diabetes and early-stage kidney disease (microalbuminuria) can reduce the risk of cardiovascular and microvascular events by around 50%⁵. Furthermore, a 1% decrease in HbA1c is associated with a 21% decrease in the risk of developing a complication⁷⁹. Intensive intervention combined with multiple drug combinations and behaviour modification can lead to sustained benefits in terms of vascular complications and mortality from any cause, including cardiovascular causes⁸⁰.

The UK Prospective Diabetes Study (UKPDS) found that tight blood pressure control in people with diabetes and high blood pressure (hypertension), reduces the risk of death and diabetes-related complications⁸¹. Furthermore, the UKPDS highlighted that any reduction in HbA1c reduces the risk of complications⁷⁹. However, the findings of the UKPDS contrast with recent trial data. The Action to Control Cardiovascular Risk in Diabetes (ACCORD) study⁸², found that intensive control, below international guidelines, was associated with an increase in all-cause and cardiovascular mortality. Furthermore, although both the Action in Diabetes and Vascular disease: Preterax and Diamicon-MR Controlled Evaluation (ADVANCE)⁸³ and the Veterans Affairs Diabetes Trial (VADT)⁸⁴ found no increase in mortality, they reported no beneficial effect of intensive glucose control. However, intensive glycaemic control was found to have positive effects on various microvascular outcomes in all recent trials.

A recent meta-analysis found that, overall, intensive compared with standard glycaemic control significantly reduces coronary events without an increased risk of mortality. However, the optimum mechanism, speed and ideal control vary among and within populations⁸⁵ and treatment needs to be individualised⁸⁶. Furthermore, long-term sustained benefits of intensive treatment with intensive glycaemic control have been identified in terms of microvascular outcomes⁸⁷.

Finally, there is well-established evidence that, in individuals with diabetes, treatment for dyslipidaemia with statins and blood pressure with angiotensin-converting-enzyme (ACE) inhibitors is beneficial^{88,89}.

RONNI BIRCH
Ronni has type 2 diabetes



DIABETES AFFECTS EUROPE... AT EVERY LEVEL



...for the person with diabetes

Having diabetes is associated with a significantly higher risk of developing depression and other psychological problems compared with the general population^{90,91}. Depression not only causes suffering to the individual but can also adversely affect treatment adherence and is associated with poor medical outcomes and high healthcare costs⁹⁰⁻⁹².

The direct cost of medical treatment to manage diabetes varies within Europe, although nearly all countries have organised systems of medical care insurance and/or governmental provision of medical services¹⁷.

Diabetes can also negatively affect people's incomes and in the Republic of Ireland, for example men and women with diabetes were 66% and 42% less likely to work, respectively⁹³.



...for families and carers

Treatment for chronic diseases such as diabetes may not be accessible, available or affordable, and the burden of treatment and management costs can push families into poverty⁴. Furthermore, as older and socially disadvantaged groups often have multiple chronic diseases and risk factors, effective treatment often demands numerous medications^{4,24} and the elderly are the greatest consumers of prescription drugs²⁴. For this reason, adherence to long-term therapy can be a challenge²⁴. Stigma and discrimination also play a role, and certain chronic diseases such as diabetes can diminish employment opportunities¹⁶. This compounds the interrelationship between poverty and ill health⁴.

A diagnosis of diabetes imposes a life-long burden, not only on the individual but also on their family, due to the constant need for practical and emotional management of the disease. The social and emotional impact on a family dealing with diabetes is often greater than the direct costs of treatment and lost income. Diabetes has been shown to have a substantial negative impact on family relationships and social life, leading to a reduction in health-related quality of life⁹⁴. The availability of social support plays a crucial role in people with diabetes being able to adhere to treatment and manage their condition successfully²⁴.



...for employers and national economies

Dying young or living with long-term illness or disability has economic implications for families and society⁴ and the cost to employers and national economies is increasing¹⁶. Poor health of employees causes productivity losses due to lost working time through absenteeism, sub-optimal performance due to physical and psychological problems, sickness, early retirement and premature death⁹⁵.

Although, research on the economic impact of diabetes and other chronic diseases is still in its early stages, the morbidity and premature mortality rates attributable to chronic diseases highlight effective interventions for chronic disease that could bring significant health and economic gain to countries⁴.

EDITORIAL BOARD

Prof Bertrand Cariou

Prof. Bertrand Cariou is professor in endocrinology at Nantes University Hospital in France. His basic research focus includes the role of nuclear receptors (PPARs, FXR) in metabolic diseases including type 2 diabetes and non-alcoholic fatty liver disease/non-alcoholic steatohepatitis. He is the principal investigator of the clinical trial IT-DIAB, which aims to identify new biomarkers of type 2 diabetes risk in prediabetic patients. Furthermore, he received the Prix Apollinaire Bouchardat in 2009 for his research within diabetes.

Dr David Eddy

Dr David Eddy is the medical director and founder of Archimedes Inc. in San Francisco, CA, USA.. His research interests range from technical mathematical theories to broad health policy topics. Previously, he has been elected and appointed to the board of Consumers Union, the National Board of Mathematics, the WHO Panel of Experts, the Blue Cross/Blue Shield Medical Advisory Panel and the National Committee for Quality Assurance. Furthermore, he is a member of the Institute of Medicine/National Academy of Sciences.

Prof Janusz Gumprecht

Prof Janusz Gumprecht is a professor of medical sciences at the Medical University of Silesia in Poland. His main field of research activity includes pathogenesis and genetics of late diabetes-related complications, in particular diabetic nephropathy and pathogenesis of end-stage renal failure. He is also a member of the Polish Diabetes Association, European Renal Association - European Dialysis and Transplant Association (EDTA-ERA) and the European Association for the Study of Diabetes (EASD).

Dr Richard Kahn

Dr Richard Kahn is a professor of medicine at the University of North Carolina, USA and was previously chief scientific and medical officer of the American Diabetes Association (ADA). Prior to joining the ADA, Dr Kahn was chief of scientific affairs for the American Red Cross in St. Louis, Missouri and an associate professor of pathology at Washington University.

Dr Antonio Nicolucci

Dr Antonio Nicolucci is the chair of the Department of Clinical Pharmacology and Epidemiology at Consorzio Mario Negri Sud Centre for Biomedical and Pharmacological Research in Italy. His research interests

include epidemiologic methods and outcomes research in diabetes, the psychosocial impact of diabetes, and cardiovascular disease and its treatment. In his career, he has also held various roles in the Italian Diabetes Society and the Italian Association of Diabetologists.

Prof Peter Schwarz

Prof Peter Schwarz is head of the Division of Prevention and Care of Diabetes at the Department of Internal Medicine at the University of Dresden, Germany. His research focus includes care and prevention of diabetes, and the genetical and pathophysiological causes for diabetes. He is also a member of the scientific advisory board of the International Diabetes Association in the EU (IDF-EUROPE).

Prof Ulf Smith

Prof Ulf Smith was the former president of the EASD and is currently professor of medicine at the University of Gothenburg and director of the Lundberg Laboratory in Sweden. His research focuses on the role of the adipose tissue in eliciting insulin resistance, as well as the associated increase in cardiovascular morbidity and mortality. He has developed a broad methodological platform involving state-of-the-art technologies for phenotyping humans and experimental models involving transgenic animals or appropriate cell lines.

Prof Nick Wareham

Prof Nick Wareham is director of the MRC Epidemiology Unit and co-director of the Institute of Metabolic Science in Cambridge, UK. He is also a professor and an honorary consultant at Addenbrooke's Hospital in Cambridge, and is the clinical lead for the Eastern England Diabetes Local Research Network. His principal research interests are the aetiology and prevention of obesity and diabetes.

Dr Daniel Witte

Dr Daniel Witte is the research manager of the Epidemiology Research Group at Steno Diabetes Centre in Gentofte, Denmark. Furthermore, he established and manages the ADDITION-PRO study. In 2006 he was awarded the New Investigator Award by the Medical Research Council (UK). Furthermore, he is part of the steering committee of the European Diabetes Epidemiology Group (EDEG) and a key referee for Diabetologia. He also acts as a reviewer for Diabetes Care, Diabetic Medicine, BMC Medicine and Unity Health.

About the Organisation for Economic Co-operation and Development (OECD)

The OECD is an inter-governmental international organisation promoting policies to improve the economic and social well-being of people around the world. The OECD provides a forum in which governments can work together to share experiences and seek solutions to common challenges. The OECD brings together 34 member countries, including the world's most advanced economies from North and South America, Europe and the Asia-Pacific region, as well as emerging countries like Mexico, Chile and Turkey. The OECD works closely with emerging giants like China, India and Brazil and developing economies in Africa, Asia, Latin America and the Caribbean. The common thread of OECD work is a shared commitment to market economies backed by democratic institutions and focused on the wellbeing of all citizens.

Health is a major contributor to the productive capacity of OECD economies, so improving health system performance is a key concern for OECD countries. It is a major industry, too, accounting for 9.6% of GDP and considerably more in some countries. People are living longer and healthier lives, which raises expectations for more and better services. The ageing of populations and the cost of new technology also pose challenges for health systems. With health expenditure continuing to rise at a faster rate than GDP growth in most OECD countries, policy makers are interested to know how they can get the greatest health benefits from each dollar invested in health systems. The OECD helps policy makers make these difficult choices by providing evidence-based analysis and data that are essential for monitoring the performance of health systems in OECD countries.

The OECD works with other organisations such as the WHO and the EU to address the growing global pandemic of non-communicable diseases. Rising concerns about the expected growth in the burden of chronic diseases in OECD countries, particularly in relation to changing lifestyles, have raised questions as to what extent efforts should be made to prevent non-communicable diseases rather than to accept the consequences of treating and managing them.

About The Danish Diabetes Association

The Danish Diabetes Association has supported people with diabetes in Denmark since established in 1940. Currently, there are over 76,000 members and it constitutes one of the largest patient associations in Denmark. The Danish Diabetes Association is headed by Truels Schuelz, Chairman of the Board and Henrik Nedergaard, CEO. Since 1992, His Royal Highness, Prince Joachim has been protector of this organization.

The mission of the Danish Diabetes Association is to improve the quality of life for people with diabetes in Denmark. It aims to stand up for people with diabetes and provide expert advice and counselling on physical, social and psychological problems, encountered by people with diabetes and their family members.

Collecting and sharing information about diabetes has always been a major task of the Danish Diabetes Association and today they produce two magazines, one for people with diabetes and their family and another for healthcare professionals. The Danish Diabetes Association also produce booklets, patient care guidance, cookbooks and other publications that inform people about diabetes and contain well-grounded advice on healthy lifestyle, nutrition and exercise.

About Novo Nordisk

Novo Nordisk is a healthcare company and a world leader in diabetes care, focussed on changing diabetes. Changing Diabetes® is a commitment to answer the needs of people with diabetes in every decision and action. This means delivering targeted treatments based on a deep understanding of individual needs, and doing so with financial, social and environmental responsibility.

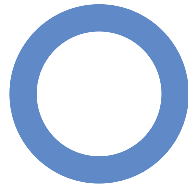
By leading through collaboration with individuals, organisations and governments to drive prevention and provide holistic support, we will break the curve of the diabetes pandemic and empower people to live fuller, healthier lives until a cure is found.

At Novo Nordisk, we are changing diabetes by delivering individualised treatments that secure better health outcomes. Our treatment solutions are the result of our listening to and learning from people with diabetes and those who support them. A firm belief in changing lives by addressing individual needs has led us to develop the broadest range of diabetes treatment options available for supporting individualised care and empowering active self-management.

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