Diabetes epidemics- classification and prevalence

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- **Diabetes mellitus is a chronic metabolic disease characterized by the presence of hyperglycemia due to defective insulin production and secretion, defective insulin action or both.**
- **High blood glucose leads to typical symptoms : weight loss, polyuria, increased thirst, weakness.**

Classification of diabetes

- **According to the American Diabetes Association there are four main types of diabetes mellitus :**

•type 1,

•type 2,

•gestational diabetes mellitus and

•other specific types.

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Zdrowe odżywianie zaczyna się od śniadania

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CHROŃMY NASZĄ PRZYSZŁOŚĆ

www.diabetyk.org.pl

International Diabetes Federation

Abbott Diabetes Care

Światowy Dzień Walki z Cukrzycą

14 listopada

ADC_plakat_PSD_11_2014

Type 1 diabetes mellitus

- Type 1 diabetes (T1D), named immune-mediated diabetes, account for 5-10% of all diabetic cases,

- more common in the younger persons, results from an immune-mediated depletion of pancreatic beta-cells with very sudden onset, esp. in infants and children, that causes lifelong dependence on exogenous insulin.

- According to recent ADA position statement (2014) the majority of individuals with T1D are adults.

Type 1 DM

- Traditionally diagnosed based on clinical symptoms suggestive of insulin deficiency polyuria, increased thirst, tiredness, constant hunger, sudden decrease of weight, slow-healing wounds, recurrent infections, blurred vision and hyperglycemia resistant to oral hypoglycemic agents.

- Severe insulinopenia predisposes patients with T1D to diabetic ketoacidosis which may be the first manifestation of the disease.

Type 1 DM

- **Characteristic of T1D are 5 different pancreatic autoantibodies :**
- **- anti-glutamic acid decarboxylase antibodies (GADA or**
- **GAD65),**
- **- islet cell antibodies (ICA),**
- **- insulin autoantibodies (IAA),**
- **- protein tyrosine phoshphatases Ab (IA-2A and IA-2β)**
- **- zinc transporter protein (ZnT8) Ab.**

Type 1 DM

- **In 85-90% of individuals one or more type of these Ab are present at diagnosis of fasting hyperglycemia.**
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- **T1D has multiple genetic predispositions , is related to not yet defined environmental factors.**

Individuals with T1D are prone to other disorders of autoimmune background.

Type 2 diabetes

- **Individuals with type 2 diabetes are characterized by a spectrum of disturbances from**

„predominantly insulin resistance with relative insulin deficiency to

predominantly an insulin secretory defect with insulin resistance”.

Type 2 diabetes

Important risk factors are associated with the development of T2D : obesity, poor diet, low physical activity, advancing age, family history of diabetes, ethnicity, prior high blood glucose in pregnancy, dyslipidemia and hypertension

Type 2 diabetes

- Most cases with T2D have insulin resistance (with hypertriglyceridemia and low HDL-C) and concurrent insulin deficiency and glucagon excess.
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•T2D can go undiagnosed for years. Affected by T2D are unaware of the long-term damage being caused by the disease.

•As a result up to 25% of patients with T2D have already developed one or more microvascular complications by the time of diagnosis.

• T2D accounts for approx. 90-95% of all diabetic cases.

Type 2 diabetes

- **There are more than 60 distinct genetic disorders associated with glucose intolerance or diabetes but substantial complex genetic factors which contribute to risk of T2D are not defined yet.**
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- **Routine genetic testing in T2D is not recommended.**

T2D vs T1D- complications

- **T2D is by nature a cardiovascular condition.**

Macrovascular complications are much more common in the T2D (ischemic heart disease and stroke, Diabet Care 2013), no difference in retinopathy or nephropathy between T2D and T1D.

- **Death also more common in patients with T2D and occurrs after shorter disease duration.**

Gestational diabetes mellitus

- Gestational diabetes (GDM) occurs around the 24th wk of pregnancy when women without diabetes develop IR and subsequent hyperglycemia or glucose intolerance.
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- Serious risks to the mothers and their infants (macrosomia, neonatal hypoglycemia, increased risk of perinatal mortality) and increase the risk for developing T2D 5-10 years later.

- In 50-60% of cases, glucose metabolism returns to normal after delivery.

Gestational diabetes mellitus

- **The risk to babies is more severe for those whose mother**
- **had T1D or T2D before pregnancy, a condition named**

  diabetes in pregnancy,

  which is substantially distinct from GDM.

- **GDM accounts for up to 4% of diabetic cases.**

Other specific types of diabetes

- **Include genetic defects of pancreatic β-cell function, endocrinopathies, drug induced and infection related.**

- **Maturity onset diabetes of the young (MODY) - genetic background with mutations in HNF-1A- (MODY 3), HNF-4B (MODY 1) or glucokinase genes (MODY 2)**

- **as well as transient or permanent neonatal diabetes diagnosed in infants before 6 months of life. In the latter the diagnosis of genetic mutations may be valuable.**

Other specific types of diabetes

- **Other genetic defects may lead to disturbed insulin action. Diabetes may also occur due to point mutations in mitochondrial DNA.**

Other specific types of diabetes

- **Pancreatitis, trauma, infection or cancer that can damage the pancreas can also cause diabetes.**

- **Endocrinopathies (Cushing syndrome, acromegaly, phaeochromocytoma, glucagonoma, hyperthyroidism),**
- **pharmacotherapy (nicotinic acid, glucocorticoids, thyroid hormones, tiazides)**

- **or toxic chemicals and infections (Rubella, cytomegalovirus).**

Uncommon forms of immune-mediated diabetes

- **Presence of anti-insulin receptor antibodies which block insulin binding to the cell receptors or act as insulin agonists.**
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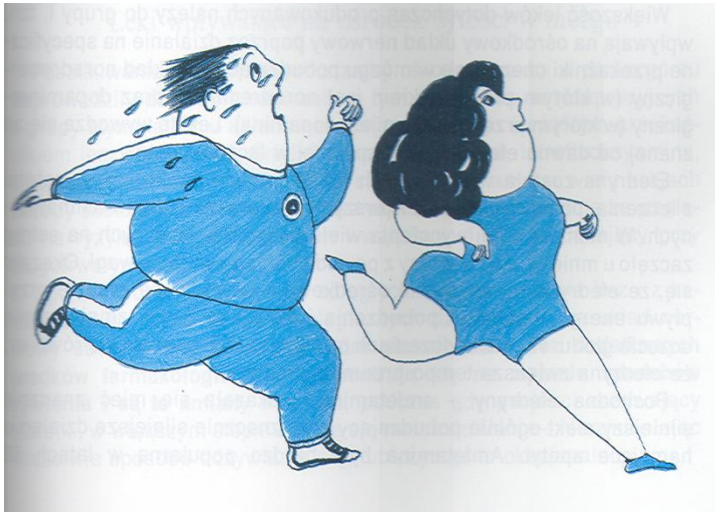
- **These antibodies occur in individuals with other autoimmune diseases.**

Prediabetes

- **The term used to describe people with impaired fasting glucose (IFG) or impaired glucose tolerance (IGT).**
- **Subjects with IGT are at increased risk of developing T2D but <u>evidence supports the effectiveness of lifestyle changes to prevent diabetes.</u>**



Prevalence of diabetes

•Diabetes, is one of the fastest-growing health problem in the world, reaching epidemic proportion in some regions, as a consequence of life-style, lack of exercise, unhealthy diet, obesity and overweight.

• The estimated health costs are enormous reaching in 2013 almost 11% of the total worldwide health budget.

• The global prevalence of diabetes in adult population (20-79 years old) in 2013 is estimated as 8.3%
•(382 million people).

- **The region with the higher prevalence of 11% is North America and the Caribbean**
- **followed by the Middle East and North Africa with the prevalence of 9.2%**
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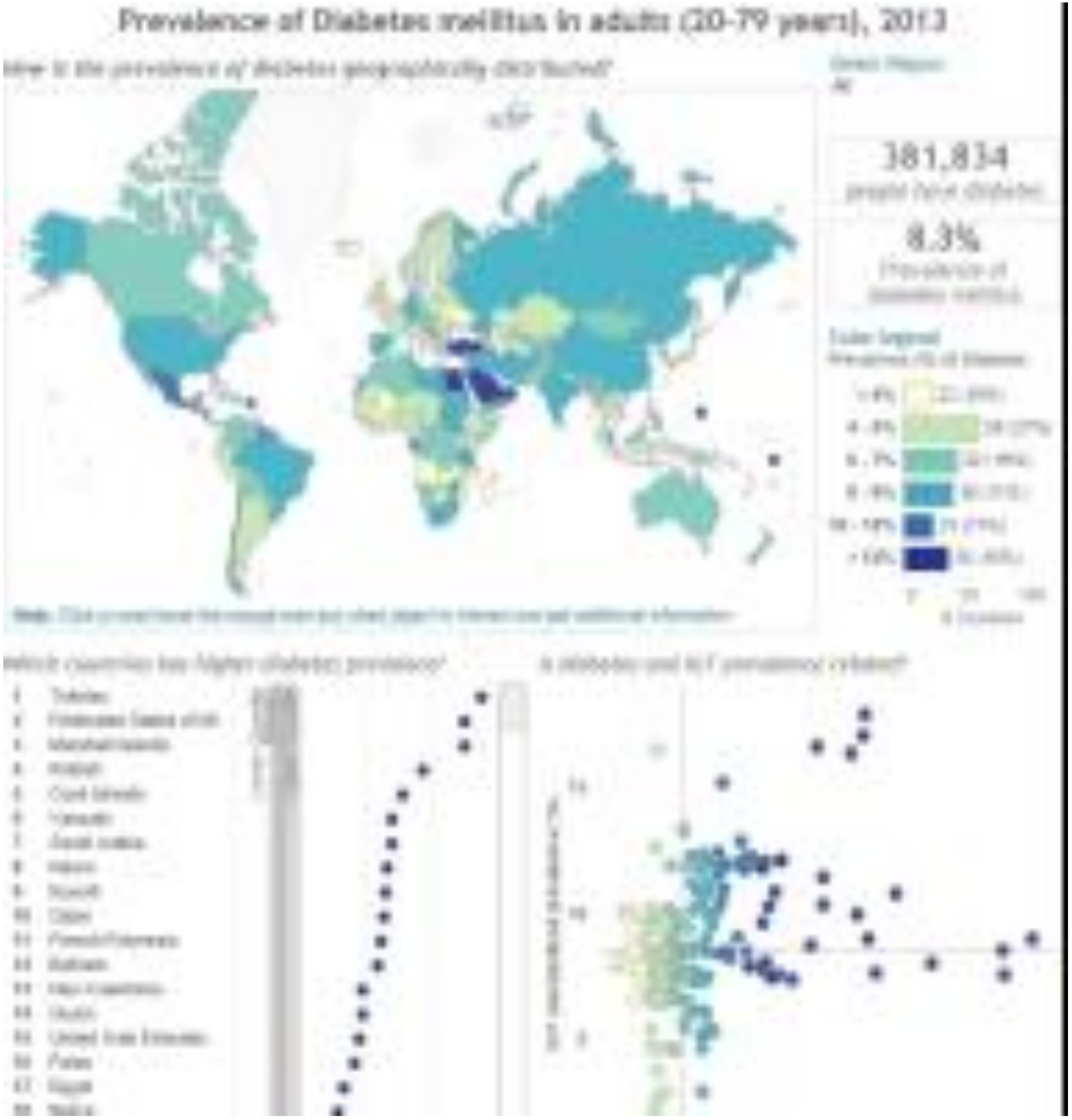
- **and Western Pacific regions with 8.6% that is close to the world prevalence.**


Prevalence of Diabetes mellitus in adults (20-79 years), 2013
381,834
8.3%

Countries with estimated prevalence of diabetes over 30%

- **Tokelau** — **37,5%**
- **Federated States of Micronesia** — **35 %**
- **Marshall Islands** — **34,9%**

7 countries with the prevalence over 20%:
Saudi Arabia (23.9%),
Kuwait (23.1%),
Qatar (22.9%)

Of the total 219 countries 16%, located mainly in Western Pacific, Middle East and North Africa, have very high prevalence of diabetes >12% .

- **North Africa and 3 other African countries have high diabetes prevalence >10%, however this is the region with the lower estimated prevalence (4.9%).**
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- **Mali, a small Middle-West African country with a population of 15 mln, has the lowest prevalence of diabetes of 1.6%.**

- **Geographic distribution of the prevalence of diabetes mellitus is very heterogeneous.**

Prevalence of diabetes in Europe

- **8.5% prevalence, similar to the global.**

- **Turkey in upper extreme with 14.9%,**
- **Montenegro with 10.1%,**
- **Serbia 9.9% and Bosnia Hercegovina with 9.7%**

- **The lowest prevalence of diabetes in Europe :**
- **Norway, Sweden, United Kingdom (4-5%)**
- **Croatia, Finland, France, Greece (5-6%),**
- **Poland 6,7%**

- **According to newly released data from the UK National Diabetes Audit (July 2014)**
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- **each day 738 people are being diagnosed with type 2 diabetes, among them 30 people with T1DM.**

- **The North America and Caribbean region not only show the highest average prevalence of diabetes but also the highest prevalence of impaired glucose tolerance (IGT) with a median of 12%.**
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- **Globally, countries with high prevalence of diabetes tend to have higher IGT prevalence.**

Trends

- **The new estimates show an increasing trend towards younger generations developing diabetes and**
- **~50% increase in its prevalence within next generation.**
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- **The burden of diabetes is reflected in the growing number of premature deaths due to diabetes. In 2013 almost 50% of all deaths due to diabetes were noted in people under the age of 60.**

- **The greatest unfavourable changes are expected in the developing countries due to increasing life expectancy and rapid life style changes.**

Trends in the prevalence of type 2 and type 1 diabetes in the United States.

- **The prevalence of diabetes in the US has increased substantially over the last two decades, paralleling an increase in the prevalence of obesity.**
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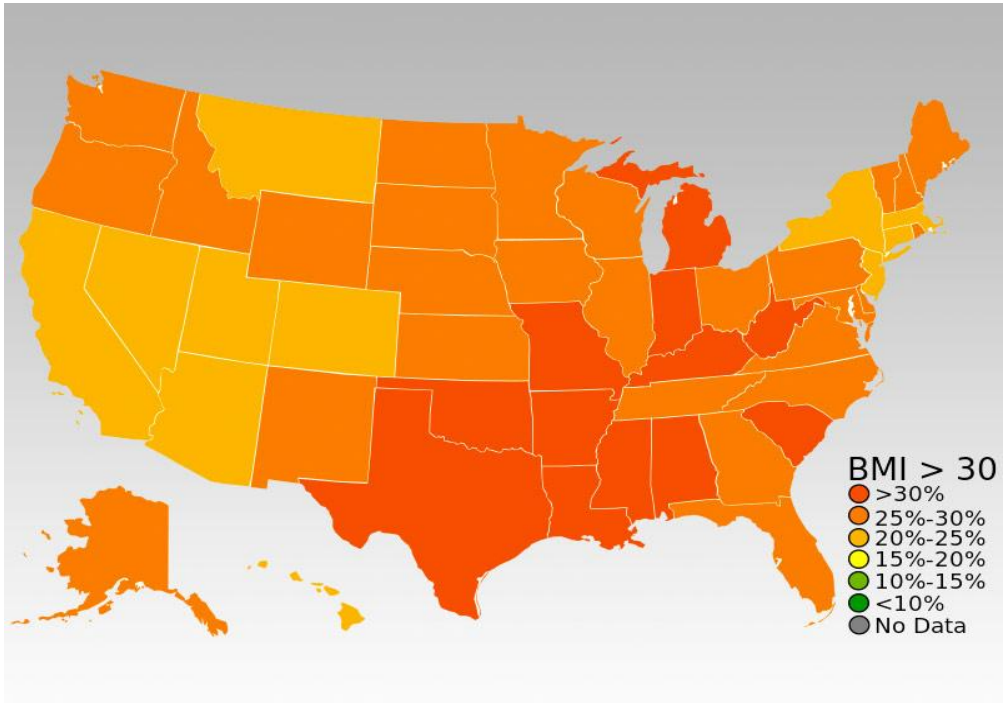

Trends in the prevalence of type 2 and type 1 diabetes in the United States.

- **The prevalence of confirmed diabetes in US increased from 6.2% in 1988 to 9.9% in 2010,**

  simultaneously from 1994 to 2005 prevalence of undiagnosed diabetes (defined by HbA1c or IFG) decreased from 16% to 11%.

Trends

- **The prevalence of type 2 diabetes in all major racial/ethnic groups of US teenagers has enormously increased by 35% over an 8-year period.**

- **The greatest change in T2D were found in Hispanic children. This trend in T2D reflects the current obesity epidemic.**

Trends

- **The global prevalence of T1D is not known but in the US reaches approx. 9% (up to 3,3 mlns in youths aged 0-19 years).**
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- **The prevalence of pediatric type 1 diabetes in US increased by 30% from 2001 to 2009 and this was mostly seen in white youth.**
- **The potential causes may be „lack of certain viral or bacterial triggers at an early age, changes in early diet that might negatively affect the developing gut microenvironment, and increased rates of obesity in the general population”**

Trends

- The incidence of T1DM varies considerably among countries:
- East Asia and American Indians have the lowest incidence rates compared to Finland with the highest incidence rate (8-fold higher).
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- Worldwide prevalence of T1D increases due to the rising number of new-onset cases of T1D diagnosed in adults, including those diagnosed with LADA (latent autoimmune diabetes of adults), as well as to longer lifetime of subjects with childhood-onset diabetes as a consequence of better care.

Trends in Europe

- Recent study from Sweden showed that the incidence of type 1 diabetes among 0-34 years old was two to three times higher than previously reported.

- Contrary to this, new findings from Finland, which has the highest incidence of T1D in the world, suggest that it appears to be levelling off.
- Since 2006 the overall incidence rate of T1D which was before 3.6% per year has not increased.

- Interestingly, among the factors which might be behind these changes increased vitamin-D consumption is mentioned and the possibility that the T1D onset may have shifted to an older age group.

Trends in incidence of diabetes in pregnancy

- **The incidence of diabetes in pregnancy (pre-GDM) and GDM is the rapidly-growing concern.**
- **Large population-based study (Ontario, Canada) compared trends in rates of diabetes in pregnancy over the past 14 years.**
- **Age-adjusted rate doubled from 1996 to 2010**
- **for GDM 2.7 ↗ 5.6%, $p<0.001$**
- **and for pre-GDM 0.7 ↗ 1.5%, $p<0.001$.**
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Trends in incidence of diabetes in pregnancy

- **The rise of diabetes in pregnancy has also been found in German and UK studies. Presented data indicated that in pregnant women >30 years of age almost 10% had diabetes with the prevalence of GDM of 7.4% and pre-GDM of 1.9%.**

- **In the United States the prevalence of GDM seems to be even higher, up to 9.2%.**

Hidden diabetes

- Recent Danish data have shown that increasing severity of heart failure in Danish patients with a mean age of about 75 yrs was associated with an increasing risk of T2D.
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- During a 10-year follow-up, patients with the most severe HF were 3-times more likely to develop diabetes than patients with the least severe HF.

T2D is also a common comorbidity in patients with an AMI and sometimes this hospitalization represents the first opportunity to recognize the disease.

Conclusions

- **The enormous increase in the prevalence of diabetes worldwide should shift the focus from improving treatment to much better diabetes prevention strategies in the next decades and reducing the human and health care costs associated with this condition.**

Conclusions

- **More efforts should be put on screening and earlier diagnosis of diabetes to limit high risk for heart attack, stroke, blindness, kidney disease and amputation.**

- Thank you for attention