

Diabetes Mellitus

Diabetes mellitus (DM) is a chronic metabolic disease with high morbidity and mortality. The main and most common manifestation of Diabetes mellitus is hyperglycemia resulting from an absolute or relative lack of insulin. In the last decade, a significant and sustained increase was recorded, and there is also talk of an epidemic or pandemic of diabetes. The cause of this phenomenon lies in the lifestyle of the population of economically developed countries (excessive energy intake, reduced physical activity).

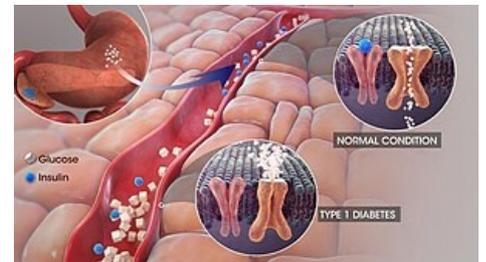
DM, HTN:



More than 9% of people with diabetes (990,000) are currently registered in the Czech Republic. Another 5% of the population is thought to remain undiagnosed. Type 2 DM is most common (93% of cases), type 1 DM accounts for about 5%, and other types are rather rare.^[1]

Classification of diabetes mellitus:

- Type 1 Diabetes mellitus
 - autoimmune
 - type LADA (develops at a later age, is often confused with type 2 DM)
 - idiopathic
- Type 2 Diabetes mellitus
 - with a predominant **insulin secretion disorder**.
 - with a predominant **insulin action disorder**.
- Other specific types of diabetes mellitus
 - pancreaticobiliary Diabetes Mellitus (chronic pancreatitis, resection, trauma, cystic fibrosis, hemochromatosis),
 - Diabetes Mellitus in endocrinopathies (acromegaly, glucagonoma, pheochromocytoma, hypercortisolism, hyperthyroidism, etc.),
 - Diabetes Mellitus induced by drugs and chemicals (glucocorticoids, nicotinic acid, thyroid hormones),
 - monogenic conditional forms (MODY = Maturity Onset Diabetes of the Young)
- Gestational diabetes mellitus
 - appears in early pregnancy and disappears spontaneously during six weeks after childbirth
 - a two-phase screening is performed (1st phase: fasting blood glucose -> 2nd phase: oGTT = oral glucose tolerance test)



type 1 DM

Prediabetes

- Increased fasting glucose (IFG - impaired fasting glucose).
- Impaired glucose tolerance (IGT - impaired glucose tolerance).

Patogenesis

Disruption of glucose metabolism occurs:

- Impaired insulin production or secretion (insulin deficiency),
- impaired insulin action (insulin resistance),
- possibly a combination of both mechanisms.

Insufficient insulin function causes disruption of the transport of glucose from the blood into the cell, which leads to hyperglycemia and at the same time a lack of glucose intracellularly. Inadequate utilization of glucose leads to a change in the mechanisms for ATP gain. There is stimulation of gluconeogenesis and glycolysis, lipolytic splitting of triacylglycerols into fatty acids and glycerol increases in adipocytes. The breakdown of fatty acids by β -oxidation produces excess acetyl-CoA, from which ketone bodies (acetoacetate, 3-hydroxybutyrate and acetone) are formed in the liver. Acetoacetate can serve as an energy source for muscle and brain activity instead of glucose.

If the formation of ketone bodies exceeds their utilization by peripheral tissues, **ketoacidosis** develops. Since ketone bodies are water-soluble and excreted in the urine, **ketonuria** occurs. When the threshold plasma concentration of glucose (10-12 mmol/l)^[2] is exceeded, the transport capacity of the proximal tubule is disrupted, and glucose thus enters the final urine. Glucose and ketone bodies are **osmotically active**, so they drag a larger amount of water with them into the urine, which is the basis of **polyuria**.

Clinical manifestations of diabetes mellitus

From the above, the characteristic symptoms of DM such as thirst and polydipsia, osmotic polyuria, non-constant loss of appetite and weight loss caused by fluid loss, reduced food intake and negative energy balance due to large losses of glucose in the urine follow.

Psychological aspects of treatment

Due to the need for comprehensive treatment of the disease, cooperation between doctor and patient is important. A patient with diabetes may experience problems related to the newly established diagnosis, necessary measures or related secondary complications that may lead to the emergence of diabetic distress. It is advisable for the doctor to also focus on the psychological aspects of this disease.

Complications

- Acute complications
 - hypoglycemia,
 - diabetic hyperosmolar hyperglycemic coma,
 - diabetic ketoacidosis,
 - ketoacidotic coma,
 - lactic acidosis,
 - lactic acidosis coma.
- Late complications
 - Diabetic kidney disease,
 - diabetic retinopathy,
 - diabetic neuropathy,
 - diabetic foot syndrome,
 - atherosclerosis.

History of diabetes treatment

One of the most important events that went down in the history of diabetes treatment belongs to the year 1921, when the doctor Frederick Grant Banting and his assistant, a medical student, Charles Herbert Best, discovered a substance in the pancreas of animals, after which the blood sugar level of dogs dropped. They called this substance insulin. Later, they repeated the experiment on a thirteen-year-old diabetic boy, Leonard Thompson, who thus became the first successfully treated diabetic in the world and survived another 13 years.

Links

Related articles

- Gestational diabetes mellitus
- Type 2 diabetes mellitus
- Type 2 diabetes (pediatrics)
- diabetic ketoacidosis
- Metabolic syndrome
-

External links

- Subtypy diabetu LADA a MODY Medicína pro praxi 2016 (<https://www.medicinapropraxi.cz/pdfs/med/2016/01/05.pdf>)
- Úvod do diabetu po lopatě (<https://www.youtube.com/watch?v=61l5kUNGL1E>) - video na youtube.com
- Jednoduchá prezentace o metabolismu živin 3 LF UK, asi 2011 (https://www.lf3.cuni.cz/3LF-365-version1-pato_fyziologie_metabolismus_nutrice.pdf)

Source

1. ČEŠKA, Richard, et al. *Interna*. 3. vydání. Praha : Triton, 2020. 970 s. ISBN 978-80-7553-780-5.

2. ČEŠKA, Richard, et al. *Interna*. 3. vydání. Praha : Triton, 2020. 970 s. ISBN 978-80-7553-780-5.