

# Type 2 diabetes mellitus in childhood and adolescence

**Type 2 diabetes mellitus** is a chronic metabolic disease caused by insufficient effectiveness of insulin on tissues. The result is *hyperglycemia*, which leads to damage to organs and vascular supply (diabetic macro- and micropathy). Complications include *hypertension*, *dyslipidemia*, *nephropathy* and *hepatic steatosis*.

*More detailed information can be found on the pages Diabetes mellitus type 2 (endocrinology), Diabetes mellitus type 2 (biochemistry).*

## Pathogenesis

### Insulin resistance

**Insulin resistance** is the cause of type 2 diabetes mellitus. Insulin resistance is characterized by an insufficient response of muscle cells, adipose tissue and liver to insulin. As a result, blood glucose levels are elevated, which is offset by higher insulin production, which ensures that glucose enters the cells. The cause of type 2 DM due to insulin resistance is the failure of pancreatic beta cell function, which is unable to maintain increased insulin production. Researchers believe that *obesity* and *lack of physical activity* are the main risk factors for developing insulin resistance.

### Metabolic syndrome

Insulin resistance is closely linked to **metabolic syndrome**. Metabolic (Reaven's) syndrome has been described by the American endocrinologist Gerald Reaven. It was defined as a combination of impaired glucose tolerance, hyperinsulinemia, insulin resistance, arterial hypertension, hypertriglycerolemia and decreased HDL cholesterol levels. It is a group of risk factors that increase the likelihood of developing cardiovascular diseases, such as diabetes, ischemic heart disease or stroke.

## Representation among ethnic groups

In children, type 2 DM was first described in the 1990s in the United States. According to epidemiological studies, there are huge differences between diabetic children in the representation of type 2 DM. About 90% are in Hong Kong, over 50% in African Americans, and less than 1% of diabetic children in Scandinavia. In developed countries, the incidence is more common in the socially and economically weaker strata. In developing countries, on the other hand, a higher socio-economic status represents a higher prevalence of type 2 DM. In both cases, the cause is a lack of movement.

Girls are 1.7 times more likely to have DM2 than boys. The cause of this difference is not yet known. In adulthood, however, the gender difference in the prevalence of type 2 DM is negligible.

## Symptoms and differential diagnosis

The symptoms that lead to the diagnosis of type 2 DM are diverse. Accidental hyperglycaemia is a warning sign. Typical symptoms include **polyuria**, **polydipsia**, **weight loss**, and **diabetic ketoacidosis**, which was found in 25% of newly diagnosed adolescents with type 2 DM in the United States. About 15-30% of pediatric patients with type 2 DM have a positive family history of the disease.

In differential diagnosis, it is important to exclude type 1 DM and monogenic types of diabetes. About 10-20% of patients diagnosed with type 2 DM have antibodies specific for type 1 DM. These children have lower BMI, lower age, higher HbA1c, and lower stimulated C-peptide secretion.

## Treatment goals

The goals of type 2 DM treatment in children and adolescents are as follows:

- long-term blood glucose monitoring (glucose self-monitoring),
- introduction of regular physical activity (30-60 minutes a day),
- reduction of carbohydrate intake and reduction of total energy intake in the diet (detailed education of parents and the patient himself is important),
- comorbidity therapy (hypertension, dyslipidemia, nephropathy, hepatic steatosis),
- establishment of mental well-being (spa stays and camps for overweight children).

## Links

## Related Articles

- Diabetes mellitus
- Type 2 diabetes mellitus (endocrinology)
- Type 2 diabetes mellitus (biochemistry)
- Metabolic syndrome and insulin resistance
- Diabetes mellitus / PGS therapy (VPL)
- Insulin resistance

## External links

- <https://www.niddk.nih.gov/health-information/diabetes/overview/what-is-diabetes/prediabetes-insulin-resistance>
- <https://www.nhlbi.nih.gov/health-topics/metabolic-syndrome>
- <http://care.diabetesjournals.org/content/27/7/1798>

## References

- LEBL, Jan – AL TAJI, Eva. *Dětská endokrinologie a diabetologie*. 1. edition. 2016. ISBN 978-80-7492-271-8.