

# Intermittent fasting in the prevention and treatment of diabetes

**Intermittent fasting** (IF) collectively refers to all diets in which the period of normal food intake is cyclically alternated with periods of voluntary fasting of varying lengths.

## Introduction

In the past, there have often been periods of food shortages of varying lengths, and therefore insufficient energy intake. In order to overcome these periods of starvation, genes have been selected in evolution that regulate metabolism towards the efficient use of energy from nutrients and **increase energy storage in fat stores** (the so-called **energy-saving genotype** hypothesis). Currently, when food shortages are no longer a threat and food intake is often abundant, this type of genotype is associated with an epidemic of a number of chronic metabolic diseases, such as obesity, metabolic syndrome or type 2 diabetes mellitus (DM2).

## Forms of regulated starvation

náhled|Tkáňově-specifický efekt přerušovaného hladovění

**Periods of starvation** in which no food is eaten were formerly a natural part of human development and are still an integral part of many religions and Eastern medical schools. In recent years, however, regulated starvation has begun to be discussed as a possible approach to **improving health and losing weight**. One of the possible forms of regulated starvation is the so-called **intermittent fasting (IF)**, in which various length periods of food intake and starvation alternate cyclically. In essence, it is not a diet, as it does not primarily regulate the quality of the food consumed or its quantity. Only the time schedule of food intake changes. There are a number of variants of IF; from simpler schemes, eg **12/12** (12 hours of starvation and 12 hours of food intake), through the more challenging ones, eg **16/8**, or **20/4** (16 or 20 hours of starvation and 8 or 4 hours of food intake), up to the most challenging schemes, in which periods of starvation last 24 hours or more.

## Benefits of IF

It is known from many studies that intermittent fasting yields much health benefits, especially in the area of metabolic functions and its regulation, even if the caloric intake per day remains unchanged. Intermittent fasting has been shown to **prolong life, improve overall health**, and is **effective in the prevention and treatment of a number of diseases**, including obesity, metabolic syndrome, neurodegenerative and cardiovascular diseases, cancer, or D2M (see below.).

## IF in the prevention and therapy of diabetes

### IF in the prevention and therapy of obesity and diabetes DM2

Intermittent starvation prevents the development of DM2 and aids with weight loss process by modulating obesity, which is one of the main risk factors for its development. Intermittent fasting leads to a **reduction in the size of adipocytes in both visceral and subcutaneous fat**. In mice, the IF process has also been reported to stimulate subcutaneous fat deposition instead of the abdominal region, which is very risky due to the development of dyslipidemia and increased cardiovascular risk.

At the same time, IF may lead to an **increase in peripheral insulin sensitivity** and a consequent increase in insulin-mediated glucose entry into cells, resulting in a decrease and **normalization of plasma glucose and insulin levels**. This has been significantly confirmed several times in studies involving animal models and in addition in several clinical studies.

### IF in the prevention of DM2 complications

IF **normalizes the blood lipid profile** (lowers total cholesterol, LDL-cholesterol, triacylglycerols and increases HDL-cholesterol) and after induction of cardiovascular stress during starvation there is no increase in plasma levels of stress markers (adrenocorticotrophic hormone, corticosterone). IF further **increases the level of adiponectin**, a hormone that increases peripheral insulin sensitivity and has a cardioprotective effect. In addition, IF may have an **anti-inflammatory effect** as it reduces sympathetic activity, which may have an immunomodulatory effect that prevents the secretion of pro-inflammatory molecules such as TNF, IL-6 and IL-18, or CRP, which may play a role in DM2 progression. Through these mechanisms, IF may reduce the likelihood of developing cardiovascular disease.

IF can also play a significant role in preventing the development of diabetes health complications, e.g. diabetic nephropathy, such as correcting the levels of several blood parameters that are associated with the development of diabetic nephropathy (urea nitrogen, albumin and creatinine). At the same time, a **decrease in blood pressure**

and an **increase in the level of Sir2 protein** have been observed, which positively affects tissue sensitivity to insulin, inhibits adipogenesis and is involved in the overall regulation of cellular metabolism. Minor degenerative changes and kidney tissue damage were also observed, probably due to reduced activation of apoptosis.

## Technological background of IF

The „Intermittent fasting (<https://play.google.com/store/apps/details?id=com.jamal.intermittentfasting&hl=cs>)“ mobile application from Dedi designed for the Android interface can help in adhering to the intermittent fasting method. This application offers a selection of different time schedules for intermittent fasting, monitors the fasting phase and the food intake phase. It enables the counting of calories of consumed meals, calculates the Body mass index and, based on the entered data on the amount of fat in the body, weight, etc., calculates the adequate energy daily intake.

## Conclusion

However, the issue and use of intermittent starvation in everyday practice is still viewed with contempt and many prejudices, especially due to the incompatibility of this form of eating with the general paradigm of the principles of proper eating. In general, the disadvantage of IF is that it **does not primarily control the quality and quantity of food consumed**. At the same time, it is known that some studies have not shown any positive effect on glucose, protein or lipid metabolism and therefore further studies are needed.

## Links

### Related articles

Diabetes mellitus

Insulin • Metabolic syndrome and insulin resistance

Obesity

Dyslipidemia

Diabetic nephropathy

### Used literature

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- DE AZEVEDO, Fernanda Reis, Dimas IKEOKA a Bruno CARAMELLI. Effects of intermittent fasting on metabolism in men. *Revista da Associação Médica Brasileira (English Edition)* [online]. 2013, 59(2), 167-173 [cit. 2016-12-11]. DOI: 10.1016/S2255-4823(13)70451-X. Dostupné z: <https://linkinghub.elsevier.com/retrieve/pii/S225548231370451X>. ISSN 22554823.
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