

# Carbohydrate digestion

**Carbohydrates** are taken in food mainly as **polysaccharides, disaccharides and monosaccharides**.

The main polysaccharide is **vegetable starch**, composed of amylopectin and amylose. Glucose molecules are arranged in it in straight or slightly branched chains and are bound by 1,4  $\alpha$ -glycosidic bonds. The polysaccharide **of animal origin is glycogen**, which is made up of glucose molecules with branched chains connected by 1,6  $\alpha$ -glycosidic bonds. Disaccharides include **sucrose** (beet sugar) and **lactose** (milk sugar). Monosaccharides include **glucose** and **fructose**.

**Cellulose, hemicellulose and pectin** belong to indigestible plant polysaccharides, so they have no nutritional value for humans, but are **part of fiber** in food. Fiber is indigestible for humans, but it is digestible by colon bacteria, it also lowers cholesterol and is important in the prevention of colon cancer. It is important in the regulation of intestinal functions.

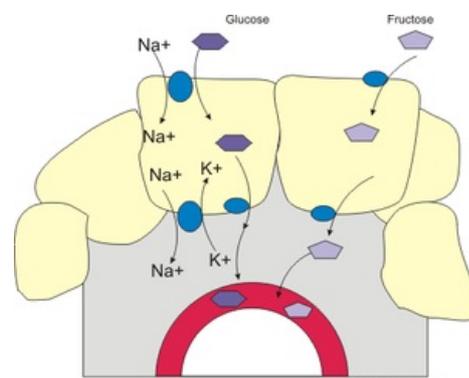
Starch digestion **begins in the mouth** by the action of the salivary gland enzyme - **ptyalin**. Its activity is attenuated in the acidic stomach contents and then continues in the duodenum by the action of pancreatic  $\alpha$ -amylase. Alkaline pancreatic juice neutralizes the acidic chyme entering the duodenum from the stomach and thus enables the action of pancreatic amylase, which completes the breakdown of starch and glycogen into simpler carbohydrates (maltose, maltotriose and oligosaccharides, primarily  $\alpha$ -dextrin).<sup>[1]</sup>

The actual resorption of carbohydrates takes place only at the level of monosaccharides, the enzymes of the brush border of the enterocyte membrane must complete the cleavage of the resulting oligosaccharides.

## Carbohydrate absorption

The end products of digestion are simple sugars - **glucose, galactose and fructose**. The resulting monosaccharides are subsequently **transported to the enterocytes**. Glucose and galactose use secondary active transport with  $\text{Na}^+$  ions using the transporter SGLT-1 and 2, fructose passes into the enterocyte facilitated diffusion using the transporter GLUT- 5.<sup>[1]</sup>

Glucose passes from the enterocyte by facilitated diffusion using the transporter GLUT-2 further into the veins collecting into the vein portae, fructose is mostly converted to glucose via fructose-6-phosphate and glucose-6-phosphate, a smaller part it also enters the blood via the GLUT-2 transporter.<sup>[1]</sup>



Absorption of carbohydrates

## Links

### Related articles

- Polysaccharides
- Pancreatic Hormones
- Disorders of lysosome metabolism/Treatment

### Literature

- KITTNAR, Otomar. *Lékařská fyziologie*. 1. edition. Grada, 2011. ISBN 978-80-247-3068-4.
- SILBERNAGL, Stefan – DESPOPOULOS, Agamemnon. *Atlas fyziologie člověka*. 6. edition. Grada, 2011. ISBN 978-80-247-0630-6.
- GANONG, William F. *Přehled lékařské fyziologie*. 20. edition. Galén, 2005. 890 pp. ISBN 80-7262-311-7.

### References

1. GANONG, William F. *Přehled lékařské fyziologie*. 20. edition. Galén, 2005. 890 pp. ISBN 80-7262-311-7.