Oral Antidiabetics

Oral antidiabetics are a very wide group of medicine with different mechanisms of action that are used in therapy of type 2 diabetes. As you can read in the appropriate text, this form of diabetes is a complex metabolic disease. The principle is gradually increasing resistance of peripheral tissues to insulin, which is a hormone produced by the pancreas. Insulin is produced in sufficient amount (and in the beginning even in excessive), but it loses the ability to allow entry of sugar into the cells. This leads to increased blood sugar, which is generally the main sign of diabetes. After some time, the pancreatic cells forming the excessive amount of insulin get exhausted and insulin levels begin to decline. This leads to further deterioration of the condition.

Note: Type 1 diabetes is a completely different disease, where the own body's immune system destroys the insulin-producing cells, and this disrupts the insulin production. Logically, the lack of insulin leads to increased blood sugar level.

The therapy of type 2 diabetes should always include proper healthy lifestyle with plenty of physical exercise, weight reduction and healthy diet. This may be supported by oral antidiabetics and by insulin in more advanced stages of the disease. These treatment options can be naturally combined.

Oral antidiabetic agents are drugs with various effects that may improve the sensitivity of tissues to insulin, or they stimulate pancreatic cells to produce more insulin.

Biguanides

This traditional group of oral antidiabetics includes particularly a compound known as metformin. Metformin is the main preparation of treatment in people with type 2 diabetes and should be deployed as soon as possible after diagnosis of diabetes. It can be used in relatively high doses, up to about 2-3 thousand milligrams per day. Metformin may be used alone or combined with other oral antidiabetics, or with insulin. Metformin alone does not significantly increase the risk of hypoglycemia, which is a big difference compared to the sulfonylurea compounds. Good effect of metformin is reported particularly in obese patients.

Despite the metformin has a great effect, it can cause life-threatening lactic acidosis (severe acidification of the organism). Therefore, it should not be used in humans with acute or chronic renal failure and in chronic alcoholics. Quite controversial is the use of metformin in patients with heart failure. It was suggested to avoid it; nowadays it is recommended in lower dosage.
**Sulfonylurea medications**

This is a broad group of drugs that increase the production of insulin in the pancreas. These drugs include a variety of different active compounds and derived medicines. The most commonly used substances are **gliquidone, glipizide, gliclazide** and **glimepiride**.

The main disadvantage of this class of drugs is increased risk of **hypoglycemia**. The effect of these drugs can sometimes reduce blood sugar too excessively, especially in people with irregular food intake. Therefore, we should start the medication with low doses and increase them only cautiously. Another disadvantage may be increased stimulation of pancreas, which may accelerate its exhaustion with final decrease of insulin production. The majority of sulfonylurea preparations should not be used in patients with disrupted liver and renal functions.

Despite the above-mentioned disadvantages, sulfonylurea drugs are together with metformin the pillar of **type 2 diabetes** treatment.

**Glinides**

Glinides increase the release of insulin from pancreatic cells. They have a rapid onset of action and thus have a high risk of **hypoglycemia**, such as sulfonylurea medications.

**Inhibitors of intestinal glycosidases**

Basic active substance of this group is **acarbose**. Acarbose operates on an entirely different principle than the previous drugs. It blocks enzymatic cleavage of sugars in the intestine and so it decreases absorption into blood. Acarbose does not increase the risk of **hypoglycemia**. However, the effect of acarbose is not miraculous and it is rather a support therapy, which should be used with other oral antidiabetics.

**Thiazolidinediones**

This long name refers to a relatively new class of drugs, which includes for example **rosiglitazone**. Drugs in this group work in similar way to biguanides. They increase the sensitivity of tissues to insulin action. Relatively unpleasant disadvantage is a slow onset of their action, which may last for about 8 weeks after the start of their usage.

**Incretins**
Incretins are substances that occur in our body naturally. Their effects on carbohydrate metabolism and insulin are complex. They increase insulin secretion and its release from the pancreas after meals. In addition, they reduce appetite, accelerate gastric emptying, etc.

Medicaments of this group are synthetically produced and actually slightly improved analogues of those natural substances. These include for example compound exenatide, which is administered subcutaneously by injection. Special subtypes are so-called DPP-4 inhibitors. They are not incretins themselves, but their effect prevents degradation of the incretins in our body, thus enhancing their effects. Such incretin DPP-4 inhibitors are substances sitagliptin and vildagliptin.

**Drugs increasing sugar losses into the urine**

These very modern drugs are not used widely. They act on the kidneys and increase the loss of sugar into the urine, leading to lower blood sugar. It is an interesting idea, but it bears certain disadvantages. Glucose presence in urine may increase risk of urinary tract infections and there is also discussed slightly higher occurrence of urinary bladder cancer in patients receiving these medications.

**Short repetition of oral antidiabetics' mechanism of action**

Increasing the sensitivity of tissues to the action of insulin - biguanides, thiazolidinediones

Increasing the release of insulin from the pancreas - sulfonylureas, glinides

Blocking digestion and absorption of sugars in the intestine - acarbose

Complex effects on carbohydrate metabolism and insulin - incretins