

**Lifestyle chemistry keeps you slim**

Diet pill orlistat promotes obsession with slenderness

The new diet pill orlistat heightens the pressure to stay slim,

because where there’s a *pill* there’s a way!

A young student became an easy prey for this false conclusion. She wanted to achieve a slim waist quickly by taking the drug; even though it is only available by prescription, she got it via an internet pharmacy and took it without medical supervision. She suffered from various gastrointestinal problems, such as flatulence, which appear especially when one does not adhere to the low-fat diet while taking orlistat.

The effect of orlistat

Orlistat is a substance that is structurally very similar to fat. By ingestion of orlistat, 25-35% of dietary fats are excreted undigested. Only 65-75% of the fats are split by the enzyme lipase and reabsorbed. The active agent orlistat stays as it is and is excreted the usual way.

Conclusion

Only somebody who is suffering from obesity should be prescribed orlistat. It is not a slimming agent!

The German Nutrition Society (DGE) says: “Who thinks that taking the drug will help to lose and keep one’s weight is mistaken. Overweight can only be dropped if one changes his eating behaviour and increases activity.”

orlistat – Orlistat (Diätpille)

slenderness – Schlankheit

(to) become an easy prey – zum Opfer fallen

available by prescription – verschreibungspflichtig

gastrointestinal – Magen-Darm

flatulence – Blähungen

ingestion – Aufnahme

(to) excrete – ausscheiden

active agent – Wirkstoff

obesity – Fettleibigkeit, Adipositas

Tasks:

1. In groups of three, draw a sketch of dietary fat digestion in the presence of orlistat. Label your sketch with appropriate terms that you know from enzymatic reactions.
2. Orlistat’s effect on fat digestion can be attributed to one of two different inhibition types. Carefully read the information texts about allosteric and competitive inhibition and give reasons for matching one of the types to orlistat reactions. Discuss with your group members.
3. Imagine you are on a pharmacy congress and have to present the new product “orlistat”. Design a poster for the congress and include the information from the previous exercises on orlistat. Everyone in your group should be able to present how orlistat is working in human bodies!

Information texts:

Enzyme inhibition means that enzymes are not able to function properly. The inhibition is caused by inhibitors.

**Inhibition type 1 (allosteric inhibition)**

The inhibitor is structurally completely different from the substrate and is not similar to the substrate. The enzyme has two centres: the active centre and a second binding site, which is spatially built different than the catalytic centre. It is therefore called the “other centre” (*dt.* allosterisches Zentrum). Certain substances (so-called **inhibitors**) can stick to the **allosteric** centre and by that cause a change in the three-dimensional structure of the catalytic centre. The bonding of a substrate is therefore more difficult or not possible at all. Since the inhibitor molecules do not interfere with the substrate for a binding site, an increase of substrate molecules will not help to reverse the inhibition.

(It can also be the case that a non-competitive molecule increases the turnover rate of the substrate. These molecules then function as activator molecules.)

**Inhibition type 2 (competitive inhibition)**

Substances that are very similar to the substrate of a particular enzyme can bind to the active centre without being processed (**enzyme-inhibitor-complex**). If there are more inhibitor molecules than the actual substrate, the reaction comes to a halt because mainly inhibitors are bound to the enzymes. If, however, the substrate concentration is high enough, the inhibitor molecules are repressed (“pushed away”) by the substrate and the substrate can be processed. This kind of inhibition, where substrate and inhibitor compete for the active centre, is called **competitive** inhibition.

In certain metabolic processes, the product of a reaction is an inhibitor at the same time, since its structure does not chance too much during the enzymatic reaction. The reaction is thereby regulated via **negative feedback**: the more product, the less active enzyme molecules and the less products. This mechanism ensures that the product is only synthesised as long as the organism needs it, which ultimately safes unnecessary resource and energy efforts.

inhibitor – Hemmstoff

spatially – räumlich

(to) repress – verdrängen

(to) compete for sth. – konkurrieren (um)

negative feedback – negative Rückkopplung

(to) synthesise – produzieren, synthetisieren