

What you should know about
gastric acid



The innovative **Swiss** pharmaceutical company

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Introduction

Severe and burning pain in the oesophagus or in the stomach area is frequent and known to almost everybody. The pain appears primarily after food intake, during sleeping time, and in stress situations. General popular definitions like "heartburn" or "stomach ulcer" are pain symptoms whose causes and treatment possibilities shall be explained more precisely in this booklet.

In principle, oesophagus and stomach-related pain is often the result of a disturbed gastric acid household. Mostly, it appears only sporadically and is, as a rule, harmless.

However, as soon as the oesophagus- and stomach-related pain appears regularly or if it is felt to be disturbing, a doctor should definitely be visited for a detailed examination.

Oesophagus- and stomach-related pain can occur due to sub-optimal daily habits (diet, stress etc.). In these cases, the pain is easily treatable by adjustments to the individual life-style.

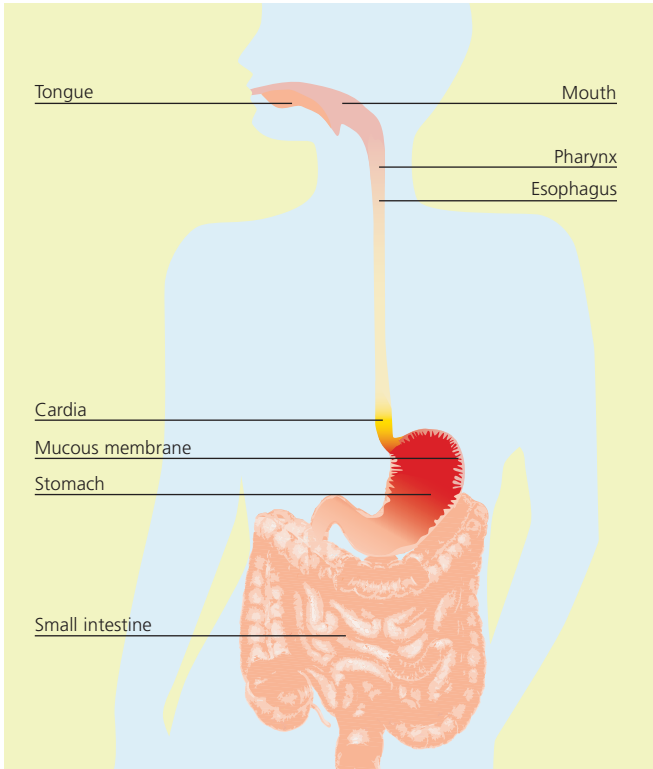
However, the possibility also exists that the pain is caused by bacterial infections or other inflammatory events. If this is the case, your doctor will provide you with a suitable therapy and will relieve the pain with the right medicine.

In either case, oesophagus- and stomach-related pain has to be taken seriously. In order that permanent damage can be prevented, your doctor will diagnose the cause of your pain and start the correct treatment.

As a help for orientation, in this booklet you will find a summary of causes and treatment possibilities in the case of oesophagus- and stomach-related pain.

Digestive tract

The following organs of the digestive tract are concerned with oesophagus- and stomach-related pain:



During food intake, the nutritional mash is channelled by the oesophagus into the stomach. Once it arrives in the stomach, it is mixed with gastric acid and other substances and digested further. In the duodenum, the beginning of the small intestine, the recovery of the nutritional elements (resorption) starts. The aggressive gastric acid (hydrochloric acid!) is a central component of digestion. It is produced by the mucous membrane which protects and lines the inner side of your stomach.

However, the gastric acid is also the main cause for oesophagus- and stomach-related pain. It can irritate the oesophagus (heartburn) or injure the stomach or the duodenum at mucosa-eroded places (stomach and duodenal ulcer).

Acid-related stomach disorders

As mentioned, gastric acid is the main cause for oesophagus- and stomach-related pain. Causes and localization of the pain are, however, very different. Most frequent are reflux disorders and stomach ulcers. These and rarer illnesses of the oesophageal and digestive system are described here.

Reflux disorders

Everybody knows an occasional burning sensation in the stomach (heartburn). After a heavy meal with a high fat content or after generous alcohol consumption, heartburn can appear without warning. Bending over or in a horizontal position can intensify the sensation. Heartburn is caused by a backflow of gastric acid into the oesophagus. It manifests itself as burning ascending pain behind the breastbone.

Frequent heartburn can be an illness. In this case, one speaks of gastroesophageal reflux disease (GERD). Reflux disorders are to be found within 3–4% of the population and are mostly generated by a mechanical disturbance of the oesophagus-stomach intersection (cardia).

Reflux disorders are – besides the unpleasant pain – also problematic because the repeated acidic burning of the oesophagus permanently damages the oesophageal mucous membrane (oesophagitis). Consequently, an increasing risk arises that the damaged tissue will transform into a tumour-like structure (Barrett's oesophagus).

In any case, with repeatedly recurring heartburn, it is worthwhile consulting your general practitioner. He will clarify the causes of pain and – if necessary – collaborate with a specialist. It is possible that the causes of pain are examined using methods such as gastroscopy (heartburn optical visualization of the inner side of oesophagus and stomach) and x-ray techniques.

Finally, your doctor will administer a suitable diet and prescribe a proper therapy so that the heartburn will stop affecting your quality of life.



Gastric and duodenal ulcers

Gastric and duodenal ulcers are injuries of the stomach and duodenal lining (mucosa). Mostly, they present themselves in the form of severe pain. Other symptoms can be an iron deficiency, lack of appetite, stomach bleeding, or vomiting. The symptoms are caused by an acidic irritation of the stomach nerves. Stomach ulcers are relatively frequent and affect approximately 1 in 50 adults.

Different factors can cause the emergence of a gastric ulcer. Besides other causes, two main factors are considered to be primarily important:

1. A stomach infection with the bacterium *helicobacter pylori* (90% of the stomach ulcer patients)
2. Regular therapy with anti-inflammatory painkillers (like aspirin). This class of painkillers can damage the stomach lining

In the case of a stomach ulcer being suspected, your doctor can use different diagnostic methods. After a thorough examination, he will decide which therapy to apply.

Generally, stomach ulcers are treated with specific drugs and in an out-patient setting, i.e. bed rest is not required.

In the case of a *helicobacter* infection, stomach ulcers are usually treated with a combination of three medicines (2 different antibiotics plus a proton-pump-inhibitor – see table “Comparison of different medications...”). As a rule, the therapy is successfully finished after a few weeks.

If the suspicion of a stomach ulcer centres on anti-inflammatory painkillers, then these are discontinued if possible. During the cure of that kind of stomach ulcer, the use of proton-pump-inhibitors is also indicated.

In any event, it is important to see your doctor in the case of strong stomach-related pain. These days, most stomach ulcers can be cured quickly and efficiently.

Other painful diseases of the digestive tract

Gastrinoma/Zollinger-Ellinson-Syndrome

A gastrinoma is a tumour-like disturbance of the hormone system. The disorder results in an overproduction of the hormone gastrin in the stomach. The overproduction of gastrin results in an excessive production of gastric acid. A permanent excess of available gastric acid can lead to stomach ulcers, stomach bleeding, stomach perforations, reflux disorders, inflammation of the oesophagus, and to diarrhoea.

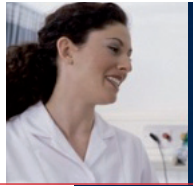
First-line therapy includes a surgical removal of the tumour-like structure. However, sometimes gastric acid control by proton-pump-inhibitors is successful, too.

Gastritis

The inflammation of the stomach mucosa is described as gastritis. Gastritis can have numerous causes and therefore does not represent any clear syndrome. Besides the already mentioned infection by *helicobacter pylori* and the use of anti-inflammatory painkillers, alcohol, cancer medicines and radiotherapy can also cause gastritis. In addition, other bacterial infections (e.g. tuberculosis, syphilis) or rare illnesses like Crohn's disease can cause the condition.

Depending on the cause of the gastritis, your doctor will select the right therapy.





Functional dyspepsia

The functional dyspepsia syndrome is a condition which is difficult to diagnose correctly. By definition, the classic symptoms, such as flatulence, satiety, feeling of premature repletion, lack of appetite, nausea and vomiting as well as pain in the upper part of the stomach have to be present longer than four weeks.

The causes of the disease are not really clear either. In addition to incompatible food intake and to the infection with *helicobacter pylori*, experts are discussing the relevance of gastric acid, a restricted peristalsis (motility of the gut), a changed visceral sensibility, and the influence of emotional factors. According to current knowledge, the peristalsis theory and the increased visceral sensibility phenomenon are probably seen as the most critical underlying factors for the disease.

In the case of a therapeutic approach, mainly non-medicinal methods are important. Therapeutic approaches focus on optimized diet behaviour as well as on improved life-style situations (sports, profession, family, nicotine, alcohol).

It's also possible that the doctor will try a drug therapy. In a first attempt, he will probably apply a therapy using medicines which support the peristalsis (prokinetics). As a second step, he will also eventually consider the inhibition of gastric acid by proton-pump-inhibitors.

Acid-related stomach pain: non-drug-based therapies

In the context of pain which is caused by gastric acid, several simple measures can achieve alleviation:

■ **Diet**

Control your eating behaviours. Do not eat heavy meals with a high fat content and reduce your consumption of chocolate and coffee. Ensure that your menu plan includes plenty of fruit, vegetables and whole-foods and drink enough water.

■ **Smoking and alcohol**

Nicotine and alcohol are known for their negative influence on the gastric acid household. Therefore, stop smoking and enjoy alcohol only on special occasions.

■ **Exercise**

Get regular, outdoor exercise. In addition to the good physical feeling, the exercise positively influences your digestive tract and also "ventilates" your mind.

■ **Stress**

Avoid all forms of professional and private stress. It often helps to plan all activities well and to set aside ample time for following the plan. Also include breaks and recovery time in your plans. Enjoy the active as well as the non-active phases. Check yourself regularly to see whether your plan and your stress management are working sufficiently.



Acid-related stomach pain: drug-based therapies



If you suffer from acid-related stomach pain, there are primarily three different substance classes at your disposal for a medicinal therapy. The three classes are explained briefly on this page and the following pages.

Antacids

Antacids are buffering substances which counteract the gastric acid while neutralizing it. In the case of mild complaints such as occasional heartburn, they work purely symptomatically. This means that they neutralize the gastric acid quickly (within minutes) and at short notice (within 20–40 minutes); however, they do not cure the underlying disturbance of the abnormal acid production. They do not have any healing influence on a stomach ulcer nor on an organically-based reflux disorder, either.

Generally, antacids are well tolerated. On rare occasions, they can interact with other medication (e.g. antibiotics). Furthermore, antacids can induce complications in the case of patients with restricted kidney function.

H₂-Receptor-Antagonistes (H₂RAs)

H₂RAs are substances which bind reversibly to histamine receptors in the stomach and indirectly inhibit gastric acid synthesis – primarily during the night. The binding prevents histamine (an important biological messenger substance) from having access to its receptor. The histamine block inhibits a complex cellular cascade, with the result that the proton secretion which produces gastric acid does not take place. H₂RAs are used to treat reflux disorders, stomach ulcers, or also gastrinomas.

The H₂RAs act relatively quickly: within 2–3 hours. The active period of this substance class is several hours long. The production of gastric acid during mealtimes is inhibited by approx. 50%.

In principle, H₂RAs are well tolerated. Nevertheless, it can occasionally happen that unwanted side effects such as headaches, dizziness, tiredness, diarrhoea, constipation and nausea occur. Additionally, H₂RAs have the potential to interact with other medicine.

Proton-pump-inhibitors (PPIs)

Introduction

In addition to antacids and H₂RAs, PPIs belong to the third and most modern substance class which is used to treat gastric acid disorders. Nowadays, PPIs represent – due to their convincing effectiveness – the therapy standard in the management of reflux disorders and stomach ulcers.

Definition

PPIs are drugs which directly inhibit the synthesis of gastric acid specifically and permanently.

PPIs belong to the group of the benzimidazole derivatives.
Frequently used substances are:

- Omeprazole
- Esomeprazole
- Lansoprazole
- Pantoprazole
- Rabeprazole

Although belonging to the same chemical substance group, those substances have different pharmacological qualities.

Use

PPIs are used to treat various illnesses of the digestive tract, with the aim to counteract the abnormal production of the aggressive gastric acid:

- Reflux disorders
- Gastric and duodenal ulcers
- Gastritis (inflammation of the gastric lining)
- "Stomach protection" while using anti-inflammatory painkillers

During the use of PPIs, both the basal as well as the stimulated gastric acid production is restricted. The "basal" production corresponds to a steady normal acid production. During food intake, more gastric acid is needed, i.e. the acid production is "stimulated".



Mode of application

PPI tablets or capsules are taken orally once daily. In the small intestine, the PPIs are reabsorbed into the blood stream. From the blood, the substances reach the parietal cells (gastric acid producing cells) found in the gastric lining. There, the PPIs irreversibly bind to and permanently inactivate the proton pump (molecule which “pumps” protons into the stomach).

Efficacy

PPI tablets are taken daily in the morning and are preferably not chewed. Depending on the disorder, a treatment cycle with PPIs usually lasts about 2–4 weeks. In general, the relief of the painful symptoms occurs within the same time frame.

PPIs act quickly and for about 24 hours. It is known that these drugs reduce the stomach acid production by 70–80% within the first 24 hours. PPIs reduce the stomach acid production both during day and night-time.

Tolerability

On rare occasions, PPIs can cause unwanted side effects. If unwanted side effects should appear, they are mostly of moderate nature.

Some of the rare unwanted side effects are:

- Stomach/intestine complaints
(diarrhoea, stomach ache, feeling of fullness, constipation)
- Dizziness
- Headache

Interactions with other medication

PPIs can influence the effect of other medicines you are taking alongside them.

If you have specific questions concerning a PPI therapy, please consult your doctor. He will provide advice and will choose the right therapy for you.

Comparison of different medications which counter

	Antacids
Use	<ul style="list-style-type: none">– Heartburn– Stomach pain– Digestive troubles
Mode of action	<ul style="list-style-type: none">– Neutralisation of the gastric acid by chemical buffer substances– Do not heal, act only on symptoms
Efficacy	<ul style="list-style-type: none">– Fast action (within minutes)– It is possible that repeated intake is necessary within a day
Duration of efficacy	<ul style="list-style-type: none">– 20–40 minutes
Tolerability	<ul style="list-style-type: none">– Well tolerated
Interactions with other medication	<ul style="list-style-type: none">– Can alter the efficacy of other drugs (e.g. tetracycline, an antibiotic)

act stomach acid production



H₂RAs	PPIs	
<ul style="list-style-type: none">– Overproduction of gastric acid– Reflux disorders– Gastrinoma– Stomach ulcers	<ul style="list-style-type: none">– Reflux disorders– Gastric and duodenal-ulcers– Inflammation of gastric lining– “Stomach protection” in case of simultaneous therapy with anti-inflammatory painkillers	
<ul style="list-style-type: none">– Reversible binding to histamine-receptors type 2 of the parietal cell– Indirect inhibition of gastric acid production	<ul style="list-style-type: none">– Irreversible binding and inactivation of the H⁺/K⁺-ATPase– Direct Inhibition of the gastric acid production	
<ul style="list-style-type: none">– Relatively fast action (within 2–3 hours)– Have to be taken 2–3 times per day– Maximal inhibition of acid production at night	<ul style="list-style-type: none">– Active within the first 24 hours– Intake once daily– Maximal inhibition of acid production both night and day	
<ul style="list-style-type: none">– Several hours	<ul style="list-style-type: none">– 24 hours	
<ul style="list-style-type: none">– Occasionally: Headache, dizziness, nausea, obstipation	<ul style="list-style-type: none">– Rare: Disorders of the digestive tract, dizziness, headache	
<ul style="list-style-type: none">– Relevant interactions with several drugs possible	<ul style="list-style-type: none">– Minor interactions with several drugs possible	

When to see your physician?

If you suffer from one of the following stomach problems, you should visit your doctor – even in the case of doubt:

- Frequent heartburn
- Obscure stomach pain
- Bleeding
- Black stool
- Repeated vomiting
- Unnatural feeling of fullness
- Groundless lack of appetite

Your doctor will definitively clarify the underlying cause of your ailment and provide you with the correct therapy.





How to get the right medication?

Only your doctor decide which therapy is the right one for your painful stomach illness.

If you should have questions regarding the dosage, a possible therapy stop, etc., again your doctor is the most reliable person to turn to.

If you need medical advice, it is preferable – for the sake of your health – to ask your doctor too many than not enough questions.

Message to take home

Heartburn and stomach pain are very painful events. In most cases, the major cause is aggressive gastric acid. If the painful symptoms occur often, the possibility of a serious illness (e. g. stomach ulcer) exists.

For the treatment of stomach pains and disorders caused by gastric acid, different drug classes – besides non-medicinal solutions – are at your disposal.

Antacids help to treat mild and occasional gastric acid problems. In the case of more serious gastric acid disturbances, H₂-Receptor Antagonists are used. However, today, H₂-Receptor Antagonists have been almost completely replaced by proton-pump-inhibitors. Proton-pump-inhibitors are modern, very effective and well tolerated inhibitors of gastric acid production.

To enable your stomach pains to be diagnosed and treated correctly, a visit to your doctor's surgery is mandatory.

Do not hesitate to arrange an appointment in case of heartburn or stomach pain.

Your doctor:

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