Ulcerative colitis and Crohn's disease

An overview of the diseases and their treatment

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Preface

Every chronic disease represents a difficult challenge – for the patient, their family and for the physicians managing their care. This is particularly true when the causes of the disease are only partially understood and when the disease is so rare that the typical family doctor may have only seen a few cases in his primary care practice. In Germany, the inflammatory bowel diseases (IBD) affect about one in every 200 to 400 persons. A person confronted with the diagnosis “inflammatory bowel disease” usually first feels significant insecurity: Many troubling questions may come to their mind: What does it really mean to have a chronic disease? What disease course am I facing? How will it affect my life? And, what effect will it have on my future? Surveys of patients with IBD find that the majority feel that they do not have sufficient information regarding their disease. While no brochure can replace open discussions with a physician, every additional source of information can be useful. It may be of particular help in assisting the patient in converting his uncertainties and anxiety into concrete questions that can then be discussed with his physician.

The present brochure is intended to be just such a source of information. We particularly hope to cover questions, which, in our experience, are often raised by patients. If you find certain questions unanswered after reading this booklet, please let us know. Your opinions are important to us and will help us to improve this brochure in future editions.

March 2011 H. Herfarth, J. Schölmerich, G. Rogler

The names: Ulcerative colitis – Crohn's disease

You or a member of your family has been confronted with the diagnosis "inflammatory bowel disease" or IBD. In most cases, this means either ulcerative colitis or Crohn's disease. At first, these names seem strange and you probably wonder what they can mean. Both refer to chronic inflammation of the mucosal lining of the intestine or bowel, though each has quite specific characteristics.

What do the names mean?

The use of different names is based on the fact that the disease is often named according to the portion of the bowel it affects and which becomes inflamed. The chart on page 11 shows the digestive tract and gives the names of the various segments.

Dr. Burrill B. Crohn

The **small bowel** is normally 3–5 m in length, while the **large bowel or colon** is about 1.5 m long. We distinguish between two main forms of IBD. The first is **ulcerative colitis**, an inflammation ("-itis") affecting only the colon and associated with the formation of **ulcers**. In some cases, only the rectum is involved, and we speak of ulcerative **proctitis** (Greek: proctos = rectum).

The second main type of IBD is **Crohn's disease**. Named for its discoverer, the American gastroenterologist **Burrill B. Crohn**, it can affect any portion of the digestive tract, from the mouth to the anus. Depending on the exact segments affected, we can speak of Crohn's ileitis, ileocolitis, colitis or enteritis.

The digestive tract

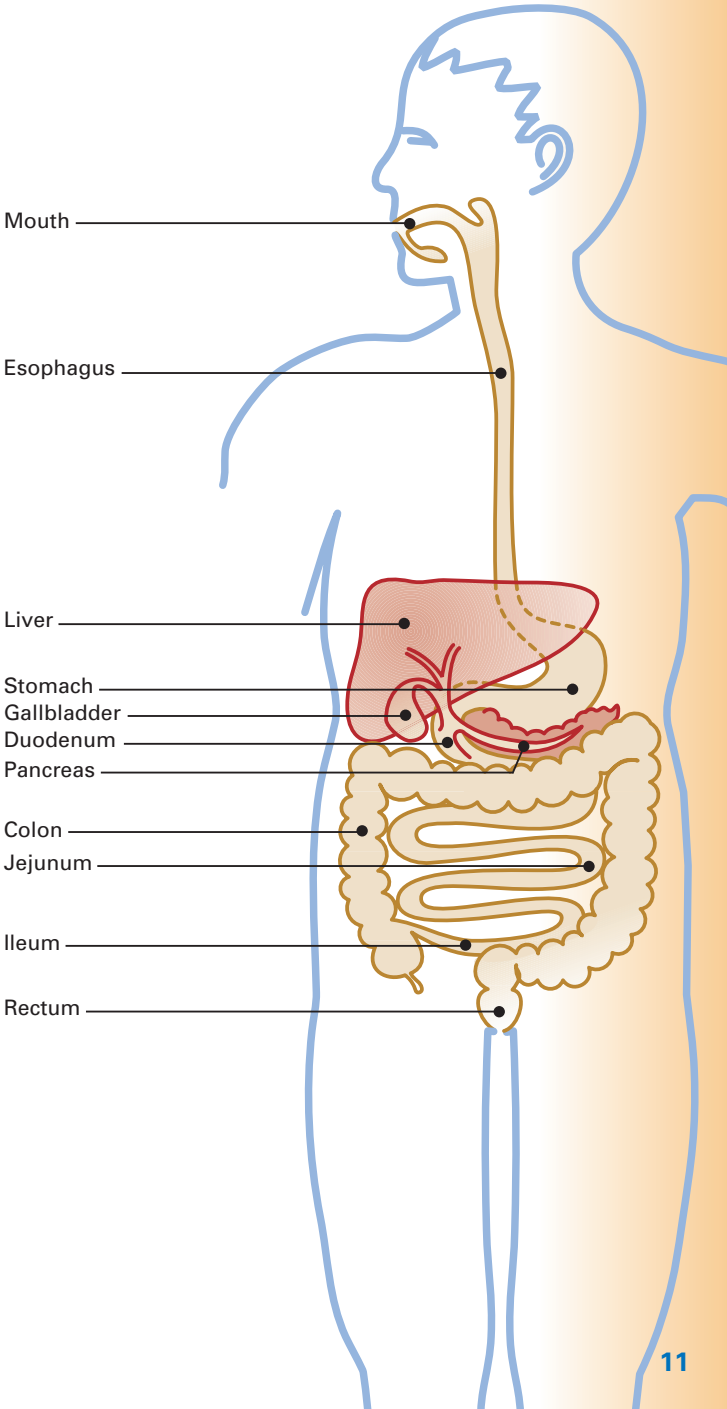
What you should know about the normal digestive tract

The **digestive tract** begins in the mouth. Here, the food is chewed and mixed with saliva, lubricating and partially digesting it. Once swallowed, the food passes into the esophagus, a muscular tube, whose walls move in wave-like patterns propelling the food downward into the stomach. In the stomach, the food is mixed with gastric juices, which consist of acid, mucus and various enzymes, which begin the breakdown of proteins. In the duodenum, the food is further mixed with secretions from the pancreas, which contain other digestive enzymes, and with bile. Bile is produced in the liver and contains bile acids, which also help in digestion. These functions are rarely compromised in **ulcerative colitis**, and if this is the case, it is usually due to an associated disorder of the biliary tract. They are sometimes affected in **Crohn's disease**.

In the **upper segment of the small bowel**, also known as the **jejunum**, fats, fat-soluble vitamins (A, D, E and K), protein breakdown products, sugars and some trace elements are absorbed. Vitamin B_{12} and bile acids, however, are absorbed in the **ileum**, **the lower part of the small bowel**. This latter process is often compromised in patients with **Crohn's disease**, though disturbances of the upper small bowel are less frequent. The insufficient absorption and resulting loss of bile acids in the ileum, however, may adversely affect the digestion and absorption of fats and fat-soluble vitamins in the upper small bowel.

The **colon's main role** is the absorption of water and minerals, which results in thickening and solidifying the fecal matter. After advancing to the **final segments of the colon (the sigmoid colon and rectum)**, the stool is formed and held back by the action of the **bowel outlet or anus** until a voluntary bowel movement occurs. These functions may be affected in both ulcerative colitis and Crohn's disease. The result may be a tendency to unintended passage of gas or stool (incontinence).

The human digestive tract ▷


Mouth
Esophagus
Liver
Stomach
Gallbladder
Duodenum
Pancreas
Colon
Jejunum
Ileum
Rectum

Symptoms

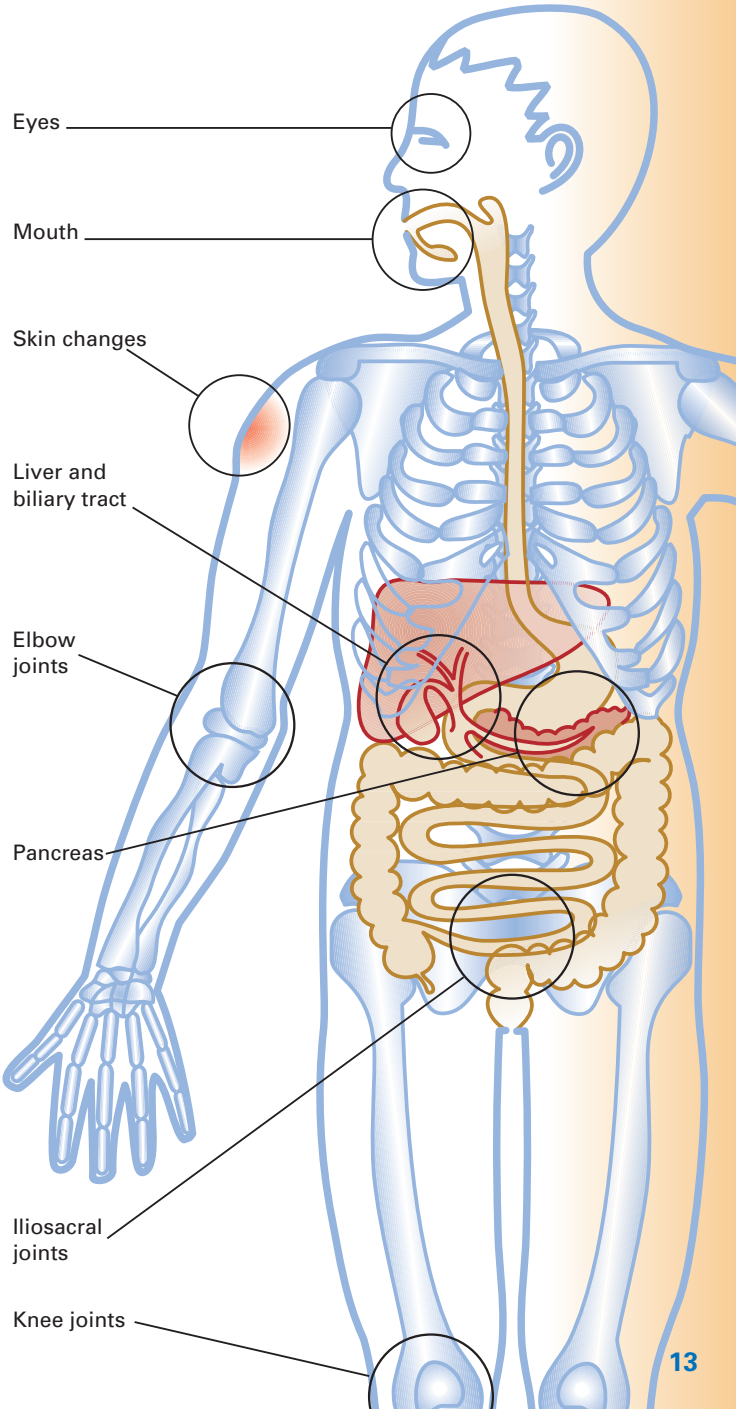
What are the symptoms of ulcerative colitis or Crohn's disease?

Both ulcerative colitis and Crohn's disease are characterized by an inflammation of the mucosal lining of the intestine. Thus, some symptoms are common to both diseases. However, here are fundamental differences due to the fact that the extent and location of the inflamed bowel segments differ between ulcerative colitis and Crohn's disease.

Beside the **general manifestations of the disease**, such as fatigue, tiredness, loss of appetite and sometimes fever, the **specific symptoms** are related directly to the bowel.

These include **irregular bowel movements** containing mucus and/or blood, severe **diarrhea**, **abdominal pain**, which is sometimes focused on a certain spot, but often affects the entire abdomen, and which can be crampy or persistent. Many patients experience **nausea** and may vomit. The inflammation may also result in loss of blood through the bowel. This loss, which may take the form of so-called "occult", or hidden, bleeding can be detected only with special tests and may lead to **anemia**. Whenever there is loss of blood, iron is also lost: In this case, the bone marrow lacks the iron necessary to form new blood cells. This is known as **iron-deficiency anemia**.

Involvement of other organs in inflammatory bowel diseases (extraintestinal manifestations) ▷


Eyes
Mouth
Skin changes
Liver and biliary tract
Elbow joints
Pancreas
Iliosacral joints
Knee joints

In both, ulcerative colitis and Crohn's disease, **symptoms** may occur not only in the bowel but also at **other sites in the organism**. More than 25% of patients experience pain or even inflammation (arthritis) in the larger and smaller joints of the arms and legs, as well as in the **joints** of the spine and pelvis. As in other types of arthritis, this joint inflammation results in swelling, pain and restrictions in motion. The **skin** in patients with IBD may also react in the form of painful purplish-red areas of thickening, most commonly occurring on the arms and legs (erythema nodosum).

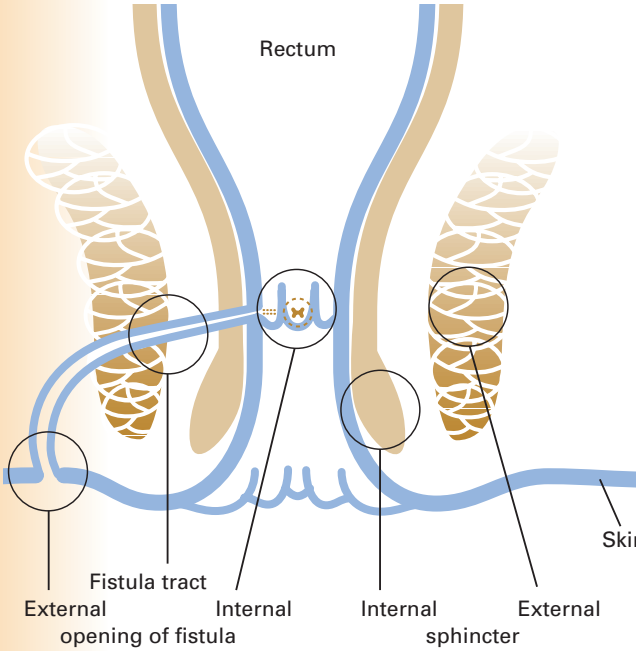
Somewhat less frequent is inflammation affecting the **eyes**, particularly the iris and conjunctiva. In both, **ulcerative colitis** and **Crohn's disease**, there may be rather uncharacteristic associated inflammation of the **liver**. In very rare cases, the **bile ducts** can undergo inflammation with extensive scar tissue formation resulting in jaundice and digestive disturbances. Other rare complications include inflammation of the **pericardium** (the sac surrounding the heart) and **pancreas**, as well as venous thromboses (blood clots).

Ulcerative colitis, which affects only the colon, is typically characterized in its acute phase by diarrhea mixed with mucus and/or blood. The severity of the **diarrhea** depends on the inflammatory activity and the extent of the bowel inflammation. Diarrhea may be very severe in cases in which the entire colon is affected. However, if only the final portions of the colon (the sigmoid or rectum) are affected, as in ulcerative proctitis, the stool may be more solid but traces of blood can be detected.

Crohn's disease may affect both the small bowel and colon. In its initial phase, it may cause few or no symptoms at all and, particularly in cases in which the colon is only partially affected or completely spared, there may

be no diarrhea. In many cases, there may be **abdominal pain**, which sometimes can be confused with appendicitis. Crohn's disease is associated with nutritional deficiencies in its early stages, resulting in significant weight loss. In some patients, the disease manifests with **inflammation in the region of the anus**, resulting in the formation of fistulae and abscesses. A fistula is a tube-like tract lined with inflammatory cells. It may connect two hollow organs or open into the outer skin or the anal mucosal membrane (see illustration on page 16). Fistulae are found in up to 30% in patients with Crohn's disease during the disease course and may also recur or even persist.

Weeping, purulent fistulae in the region of the anus, particularly if they recur, should always suggest the need for more extensive examination of the bowel. Whenever a patient reports the occurrence of several of the above described symptoms, the physician will consider the possibility of IBD.



Perianal fistulae in Crohn's disease (schematic illustration)

Methods of examination

What will the physician do to determine the type and extent of a patient's disease?

He will inform you, the patient, that **"diagnostic procedures"** are now necessary, that you should undergo certain types of examinations.

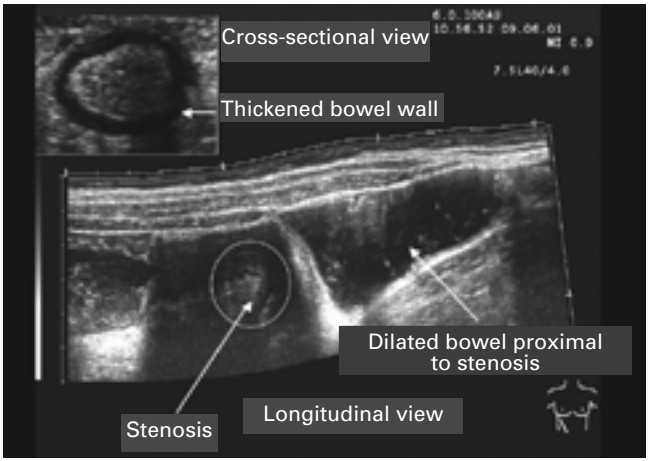
As a first step, he will conduct a **physical examination** of your entire body, particularly the abdomen and also the rectum. He will gather information by palpating the outer surface of the body, by listening with the stethoscope and by tapping over hollow organs. This will help discover whether the skin, mucous membranes, eyes or joints show signs of disease. When examining the abdomen, it may be possible to determine the exact site of pain and the physician will be able to learn much about the condition of the liver and the activity of the bowel. In examining the anus, he will be able to recognize inflammation or fistulae and, by gently examining the rectum with his finger, possibly find traces of blood.

The physician will then obtain blood and urine samples in order to perform certain **laboratory tests**, including unspecific "inflammation indicators" such as the erythrocyte sedimentation rate (time required for settling of suspended red blood cells) and the C-reactive protein (CRP), the number of white and red blood cells and platelets (the "blood count"), the protein content of the blood (protein electrophoresis) and other special laboratory tests such as iron, electrolytes, vitamins (particularly vitamin B_{12}), folic acid and trace elements, such as zinc. Together, these tests help determine whether general signs of inflammation, absorption disorders (reduced

or inadequate uptake of nutrients from the bowel) or bleeding are present. The urine tests help evaluate for problems of the kidneys and the urinary tract. In recent years two new markers, which can be found in the feces, have been evaluated. These markers are **calprotectin** and **lactoferrin**, which are proteins normally found in white blood cells (so-called neutrophils). Normally, under normal conditions no neutrophils are present in the gut wall and subsequently the levels of calprotectin and lactoferrin are very low in the feces. When an inflammation of the gut wall occurs, as it is the case in ulcerative colitis and Crohn's disease, these inflammation cells migrate into the gut wall. There they die and become part of the pus that is frequently observed during bowel movements in inflammatory bowel diseases, especially in ulcerative colitis. With some exceptions calprotectin and lactoferrin are excellent parameters to evaluate the degree of gut inflammation without any apparative examination such as colonoscopy or radiological techniques. They are also useful to distinguish inflammatory bowel disease from non-inflammatory **functional diseases** such as **irritable bowel syndrome**.

If the results of these tests confirm the suspicion of an inflammatory bowel disease, **further examinations** will be necessary to determine the type of the individual patient's disease as well as its location and extent in the gastrointestinal tract.

The simplest and least invasive of all these methods is the **ultrasound examination of the abdomen**, also known as sonography. In most cases, ultrasound sensitively detects changes in the abdomen, such as widening of the bowel and thickening of its wall, changes in the liver, gallbladder and kidney stones, abscesses and any condition hindering the outflow of



Ultrasound image: *longitudinal (lengthwise) slice through a section of the bowel that is ballooned with fluid held back by an area of narrowing (stenosis). In this slice, you see the stenosis as a thin, irregular black band (arrow). This black band is actually the remaining open interior of the bowel. The cross-sectional slice shows that the intestinal wall is thickened in the area of the stenosis (8–10 mm, compared with a normal wall thickness of 1.5–3 mm measured by ultrasound). (The figures have been made available by Prof. Dr. K. Schlottmann, Innere Medizin I, Katharinen-Hospital Unna, Germany).*

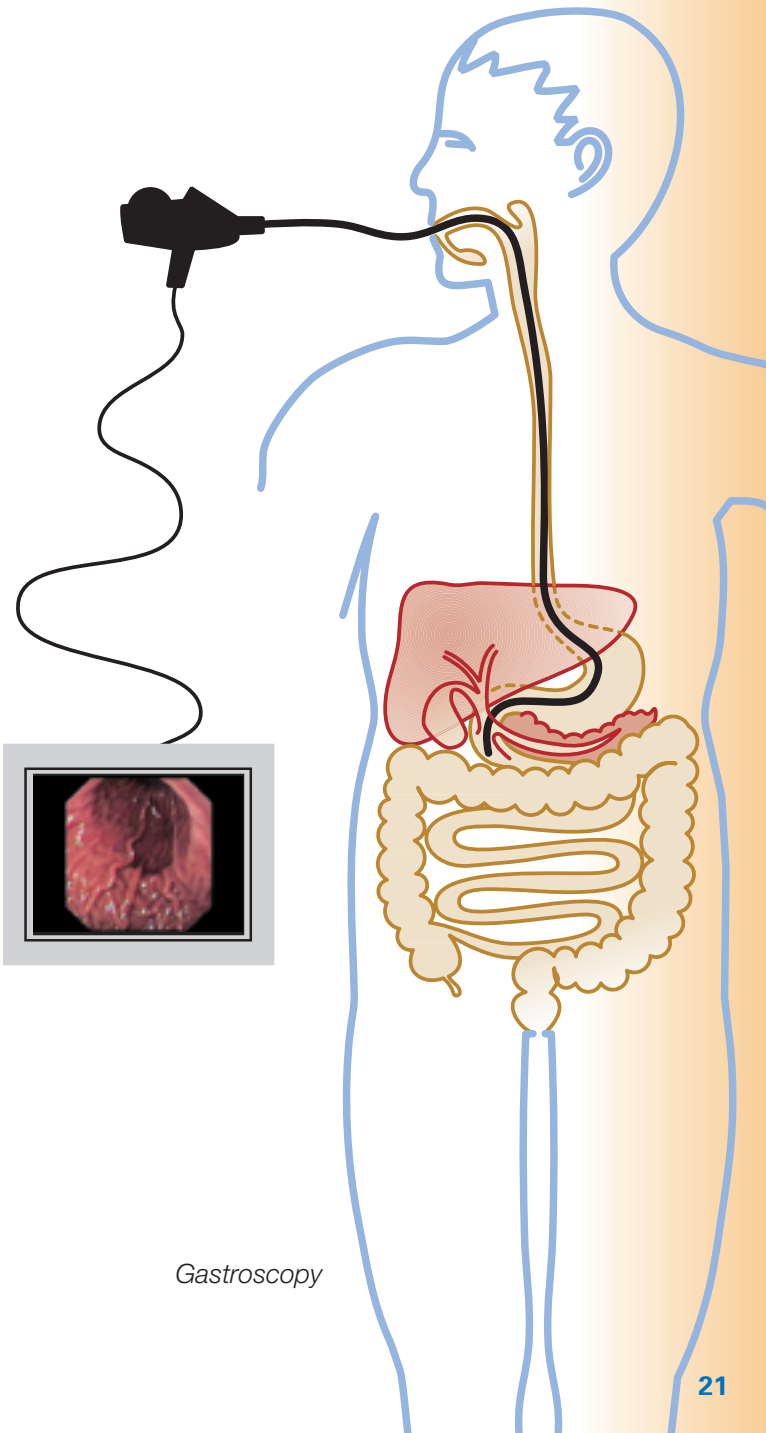
urine from the kidneys. Ultrasound is completely harmless and can be safely repeated as often as necessary. Thus, any suspicious findings can be re-examined and monitored.

In determining the **extent of the digestive tract** affected by any IBD, it is crucial to determine the exact site(s) of inflammation. A number of methods are available, including **endoscopy** and **radiography**.

Endoscopy uses a camera to directly see the inner surface of hollow organs. Entering through the mouth, it is possible to examine the esophagus, stomach and duodenum. Entering through the anus, the physician can check the rectum, the entire length of the colon and usually the last few centimeters of the small bowel, also known as the terminal ileum. New endoscopes (double-balloon enteroscopy) can also visualize large parts of the small bowel if necessary. The endoscopy of the small bowel is restricted to rare special situations. The endoscope is a flexible, tube-like instrument with a diameter of 9–12 mm. These high-precision instruments contain a camera integrated into their tip connected to an outer processor. A fiber-optic cable transmits light into the organ being examined. The endoscope has also a separate channel through which a thin instrument can be introduced. This instrument, known as a biopsy forceps, can be used to obtain tissue samples from the intestine for further examinations.

Endoscopy permits the examiner to look directly at the inner lining (mucous membrane) of the digestive tract. Normal tissue can usually be easily distinguished from inflamed areas. In addition, tissue samples can be taken from affected areas and examined using microscopic methods, also known as histological examination. This direct examination under the microscope of samples of mucous membrane permits determination of whether inflammation is present, how severe it is, and what type of inflammation it is. Thus, it can establish the diagnosis of IBD and usually (≥ 90%) can differentiate between **ulcerative colitis** and **Crohn's disease**.

The endoscopic examination of the stomach is also known as **gastroscopy** (see illustration on page 21). For gastroscopy, the endoscope is introduced through the mouth and advanced through the esophagus into



Gastroscopy

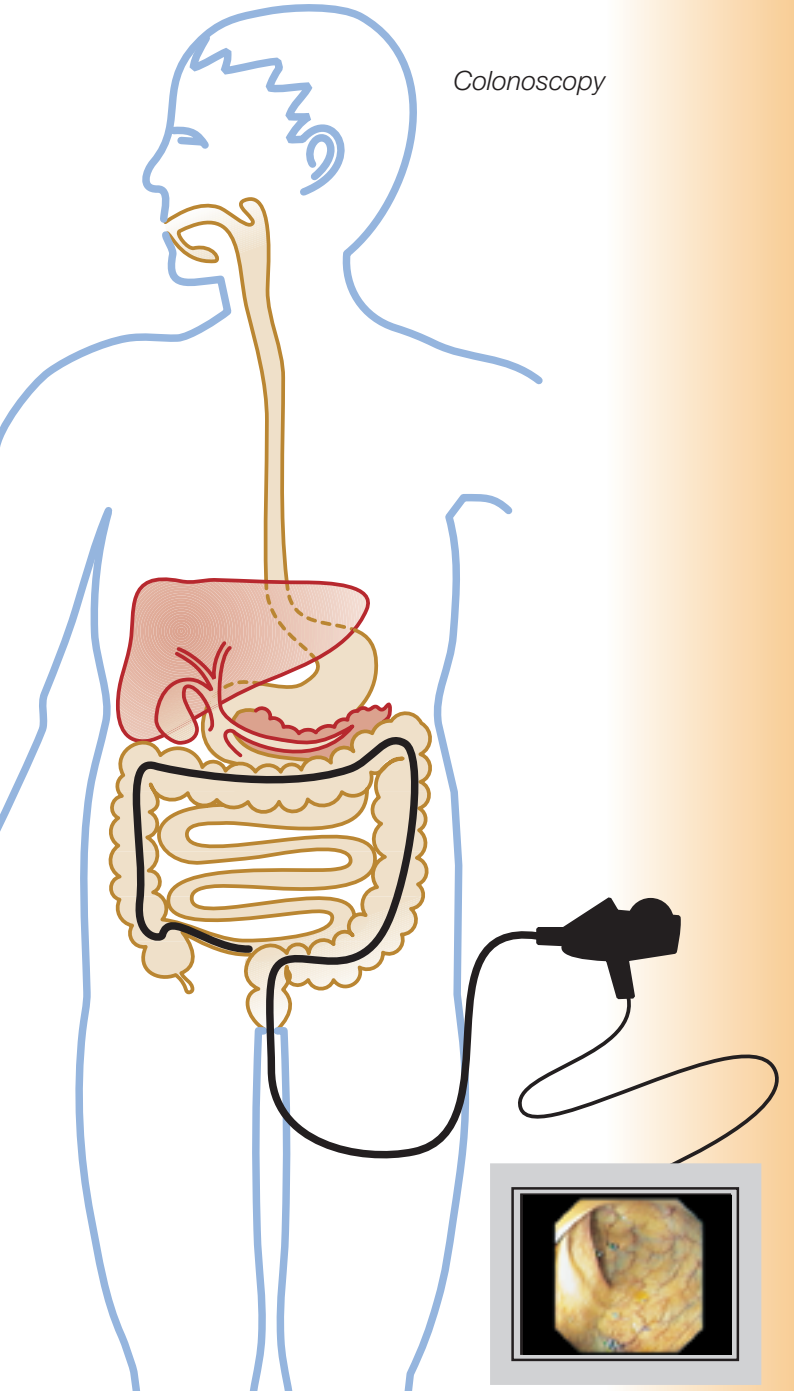
the stomach and duodenum. This examination must be done in a fasting state to prevent that food content of the stomach will interfere with inspection of the mucous membrane of the stomach. The examination is generally painless and in most cases a medication is given that allows the patient to sleep during the procedure.

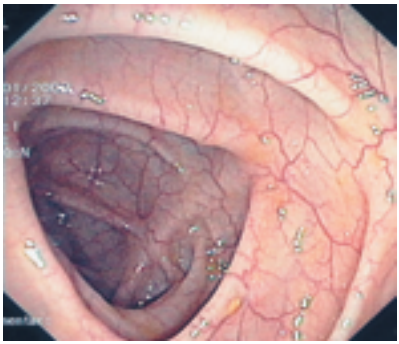
For **colonoscopy** (see illustrations on pages 23 and 24) the endoscope is introduced through the anus and advanced up the entire length of the colon to the entrance of the small bowel. Once the junction between the small bowel and colon (the ileocecal valve) is passed, the terminal portion of the small bowel can also be inspected. Colonoscopy requires more intensive preparation. Patients are not permitted to consume any solid food for 24 hours prior to the examination. On the day before the examination, the patient may eat breakfast but for lunch, only clear broth is allowed. In the afternoon, the patient must also consume a suitable irrigating solution (2–5 liters) in order to cleanse the bowel. Various solutions are available with different tastes. After this, only mineral water or tea is allowed.

Colonoscopy may be painful, particularly when there are inflammation-related adhesions in the abdomen. Patients may be given injections that help relax them and relieve pain, making the examination tolerable.

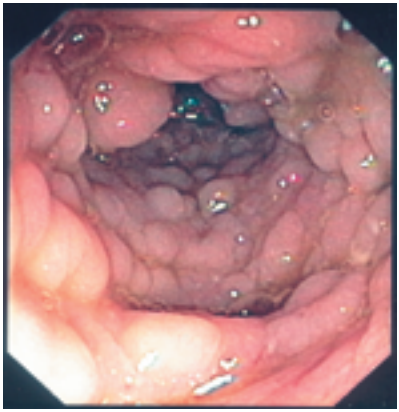
Proctoscopy is the simplest and least invasive endoscopic method. It involves examination of the distal rectum and covers the last 5–10 cm above the anus. More commonly, patients undergo **sigmoidoscopy**, a procedure permitting inspection of the distal 30–40 cm of the colon. Prior to both procedures, the bowel is cleansed with an enema. Then, the examiner inserts either a short, stiff tube (rectoscope) or a short flexible endoscope (sigmoidoscope). Both procedures offer the

Colonoscopy

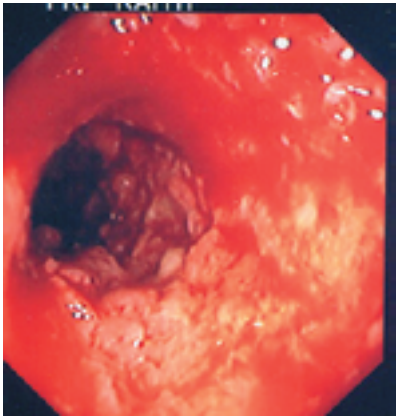




Colon –
normal findings



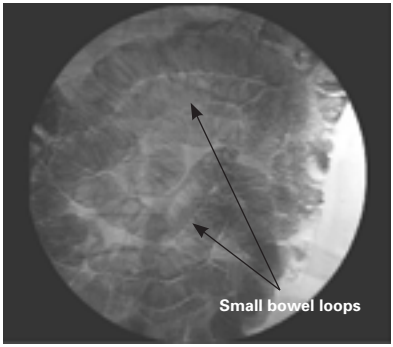
Crohn's disease –
chronic inflammation
with pseudopolyps



Ulcerative colitis –
severe inflammation

capability of obtaining tissue samples (biopsies). Both methods are sufficient for evaluation and follow up of inflammation in the area of the rectum.

Radiological examinations represent another option for examining the digestive tract. One method makes use of a solution (contrast medium) that is not penetrated by x-rays to show the contours of the esophagus, stomach, small bowel or colon. In cases of IBD, examination of the small bowel is particularly important. In such cases, the small bowel can be examined using a special method developed by and named for the radiologist Sellink. In this method, a tube is passed through the stomach into the duodenum (see illustration on page 25). This permits direct application of a diluted contrast medium in the small bowel. The segments of the small bowel between the duodenum and colon, which are not accessible to endoscopy, can be examined using this method. However, with the introduction of CT and MRI technologies, which are both much more comfortable for the patient, a “Sellink-small bowel follow through” is no longer routinely performed.

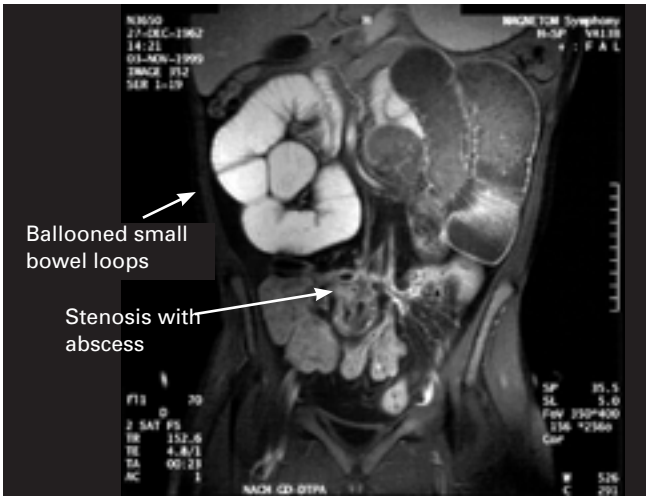


Normal view of the small bowel using the radiologic method developed by Sellink

Newer and better possibilities have become available for imaging the small bowel using **magnetic resonance imaging (MRI)**. MRI generates "slices" of selected regions of the human body (see illustration on page 27). Unlike the Sellink procedure, MRI does not involve any radiation. Various techniques have been developed to optimize imaging of the small bowel with MRI. Depending on the technique used, it may be in some cases necessary to insert a tube into the duodenum. However, in general it is sufficient to simply drink fluids (for example water), which act as contrast media in the small bowel. The quality of MRI has dramatically improved in recent years. If available it is the examination of choice for the evaluation of the small bowel. In Germany and many European countries MRI is available for patients with IBD, however, this is not the case in some other countries such as the United States, where mainly computed tomography (CT) is performed.

As mentioned above, another method for imaging the abdomen is **computed tomography (CT)**. As in MRI, CT generates slices of selected regions of the body. Unlike MRI, CT requires the use of radiation. CT is particularly useful in the search for abscesses (encapsulated collections of pus), which are frequently encountered in IBD.

Two new endoscopic techniques include **capsule endoscopy** and **double-balloon endoscopy**. Capsule endoscopy makes it possible for the first time to examine the small bowel in its entirety. Unfortunately, capsule endoscopy, while permitting us to inspect the small bowel, lacks the capacity for tissue biopsy. The method is also not suitable for the examination of the stomach or colon. For patients with Crohn's disease, capsule endoscopy is associated with a certain risk that the endoscopy capsule may be retained in an area



Significant ballooning of the bowel caused by retained contrast medium (pineapple juice) before a stenosis as shown using MRI (MRI-enteroclysma). An abscess has formed adjacent to the stenosis.

of stenotic bowel. In the worst case, this can result in acute intestinal obstruction, requiring immediate surgery. At present, capsule endoscopy has not become an established option in the diagnosis of inflammatory bowel diseases and should only be used in special situations.

The second new endoscopic technique is **double-balloon endoscopy**, which uses a specially designed endoscope permitting examination of significantly longer stretches of the small bowel than has been possible using conventional endoscopes. Unlike capsule endoscopy, double-balloon endoscopy has the capacity to obtain tissue specimens from the small bowel, as well as to stop bleeding and remove polyps. It is also possible to dilate short narrowed areas of the bowel (stenoses) that otherwise may require surgery.

You may now be asking yourself whether all of these examinations must be performed. You can relax. The more extensive array of methods is normally required only to confirm the initial diagnosis of a disease and to determine its extent and severity.

More importantly the choice of the radiological and endoscopic method depends on individual factors, particularly the patient's current physical condition. Endoscopy and radiological methods can be used to complement each other. Usually, endoscopy is used to examine the more easily accessible segments of the digestive tract to obtain tissue samples (biopsy) from suspicious areas for microscopic evaluation. In order to properly evaluate the small bowel, as well as in cases in which the presence of fistulae or severe narrowing (stenosis) in the colon are suspected, it will not be possible to avoid radiologic examinations. The exact analysis of fistulae and/or abscesses can often be done using a special ultrasound examination of the rectum **(endosonography)** or with MRI.

In endosonography, an ultrasound transducer head is introduced through the rectum as in proctoscopy or sigmoidoscopy. This permits ultrasound examination of underlying tissue and determination of possible fistula formation.

How does the physician monitor the course of inflammatory bowel diseases?

It is important for you, the patient, to understand that, while both **ulcerative colitis** and **Crohn's disease** are chronic diseases of the bowel that can become and remain inactive, careful medical attention is crucial for monitoring and controlling your disease. This means

regular visits to the physician: at least twice a year is recommended, even when you are free of symptoms. If, however, drugs are required to control your disease, **follow-up examinations** should be done at least every three months. Beside a physical examination including palpation of the abdomen and examination of the bowel, patients undergo blood tests that help identify signs of inflammation or nutritional deficiencies. At least once a year, the physician will order an ultrasound examination of the abdomen. If there is no evidence of inflammation, the more complex examination methods can usually be avoided.

During an acute disease episode or flare-up, patients do not necessarily have to re-undergo the entire battery of tests. In those cases in which symptoms are significantly different than in earlier disease phases, however, it may be helpful to re-assess the extent of the disease, since changes may occur, possibly necessitating a modification in treatment strategy. In **ulcerative colitis**, this is particularly important in cases in which the initial extent of the disease did not involve the entire colon. In **Crohn's disease**, significant changes in symptoms usually necessitate re-examining both the small bowel and colon in order to exclude the presence of fistulae, stenoses or other complications. If there are no changes and the disease remains inactive, these invasive methods are not necessary. Patients who have suffered from ulcerative colitis for a long period of time (more than 8–10 years) should undergo regular colonoscopy (once a year is initially recommended) in order to exclude the development of malignant tumors in the bowel. This is particularly important in extensive colitis.

Causes

What causes inflammatory bowel diseases?

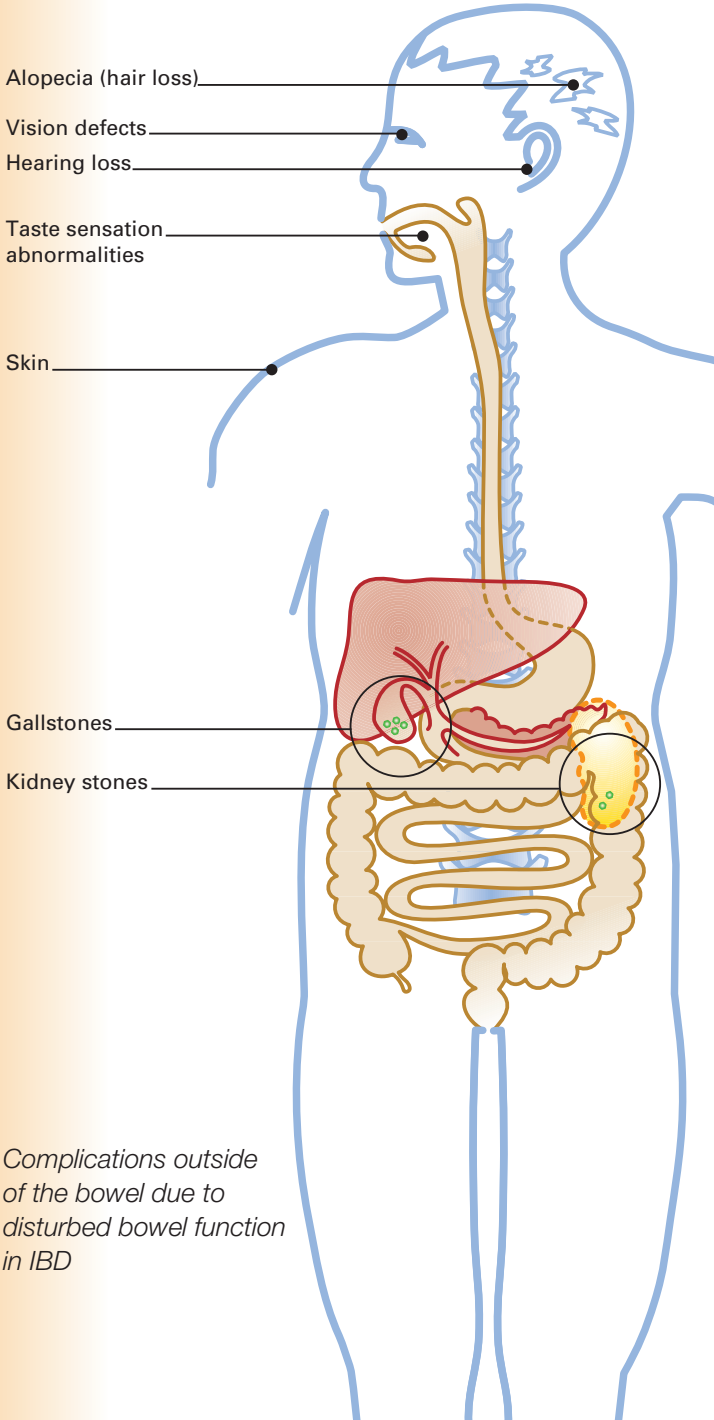
Despite numerous studies, the actual cause of the inflammatory bowel diseases remains elusive. It is likely, however, that these chronically recurring episodes of inflammation in the human bowel are related to a complex interaction between various environmental factors and a hereditary predisposition for these diseases.
In recent years, research has identified various sites (genes) within the human genome that may be associated with these diseases. To date, changes in more than 70 genes have been discovered that play a greater or lesser role in the development of Crohn‘s disease. The most important of these genetic changes in patients with Crohn‘s disease was identified by scientists in 2001. They showed that changes (mutations) in the so-called NOD2 gene significantly increase the risk of developing Crohn‘s disease. Such changes appear to be at least partially responsible in about 20–30% of all Crohn’s patients for the occurrence of this disease. On the other hand, it is clear that this hereditary predisposition alone cannot lead to the outbreak of disease: This requires the presence of further, as yet unidentified factors. Changes in the NOD2 gene are found in about 4–10% of individuals, who do not develop this disease. This means that genetic predisposition requires the action of other, still unknown factors in order for an affected individual to actually develop the disease. These factors may include viruses or bacteria, changes in nutritional behavior or the consumption of certain preservatives or other food additives, as well as disturbances of the body’s own immune defense system or the intestinal barrier. To date, no definitive evidence has been found to prove a connection between these factors and the development of

inflammatory bowel disease. It is, however, very probable that environmental factors play a role. Crohn's disease, for example, is much more common in Western industrial nations than in other regions of the world. On the other hand, it is very unlikely that IBD is due to an underlying infectious disease – hence, infecting other persons with the disease is not possible.

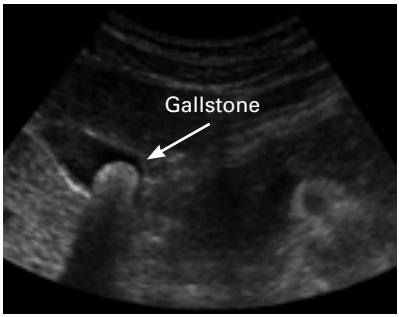
The role of psychological factors remains controversial. While psychic stress may, under certain circumstances, provoke an acute flare-up of an existing disease, it is not the underlying cause of inflammatory bowel disease.

We also do not know the exact reason why many patients with IBD also suffer from **inflammatory changes in other organs**, such as the joints, skin or eyes. One explanation is an overreaction on the part of the body's immune defenses to either invading microbes or even the body's own tissues. This, however, has not yet been proven.

On the other hand, the causes of many other **complications** of these bowel diseases are known. For example, the reduced absorption of vitamins and some trace elements (minerals) in patients with IBD is responsible for symptoms such as night blindness, deafness, changes in taste sensation, vulnerability to infection, hair loss, infertility (in men), growth retardation (in children) and certain skin changes frequently seen in these patients. Anemia may be caused by iron deficiency, by loss of blood from the bowel or by vitamin B_{12} malabsorption. A reduced uptake of bile acids in the small bowel and an increased absorption of bilirubin in the colon is responsible for the increased risk of gallbladder stones, while kidney stones may result from the increased loss of water.



Complications outside of the bowel due to disturbed bowel function in IBD



Gallstone in the gallbladder in a patient with Crohn's disease (ultrasound image)

In both main types of IBD, serious **complications** such as acute ballooning of the bowel ("toxic megacolon") or perforation, the formation of a hole in the wall of the bowel, may occur in a few patients. Peritonitis, the inflammation of the membranous lining of the abdomen, and intestinal obstruction or paralysis (ileus) may result. These are life-threatening conditions requiring immediate hospital admission and often emergency surgery. Extensive intestinal hemorrhage occurs most often in patients with ulcerative colitis. Stenoses caused by inflammation or scar tissue formation and fistulae between the bowel loops and other organs are direct consequences of Crohn's disease.

Treatment

As the name “chronic inflammatory bowel diseases” implies, both ulcerative colitis and Crohn’s disease are chronic disorders. This means that the patient will continue to have them for the rest of his or her life. The progression of the disease, however, can differ significantly from patient to patient. While some individuals experience very mild disease with infrequent flare-ups, others will suffer from much more severe disease with frequent hospitalizations. Unfortunately, it is currently impossible to exactly predict the future disease course of an individual patient with a new diagnosis of Crohn’s disease or ulcerative colitis. A few risk factors for patients with Crohn’s disease are known (e.g. onset of disease at a young age, fistulizing disease) and should be taken into account in treatment considerations. Of note, large studies have shown that approximately half of all patients with ulcerative colitis or Crohn’s disease tend to exhibit a mild clinical course and do not require even one course of treatment with cortisone preparations.

What treatment methods are available?

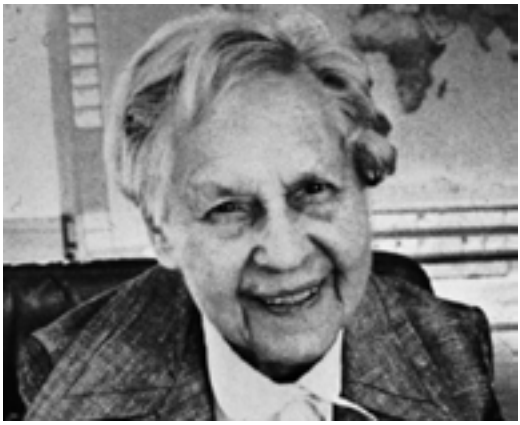
Treatment options fall into four main groups and include drugs, surgery, diet and supportive measures. One very important supportive measure is for the patient affected with Crohn’s disease to quit smoking. Compared to smokers, patients who quit smoking have a 60% lower chance of experience disease recurrence within a two-year period.

The treatment of ulcerative colitis

The primary goal of treatment is to improve patients' symptoms (diarrhea, pain, blood loss) and, once this is successful, to prevent recurrence.

The usual first step is the use of drugs. The choice of therapy depends on the severity of patients' symptoms. In cases with mild to moderately severe inflammation, **5-aminosalicylic** acid is often prescribed. In patients in whom the joints are also affected, **sulfasalazine** can be tried. This drug, discovered in 1942 by the Swedish physician Nanna Svartz, was the standard treatment for ulcerative colitis prior to the introduction of 5-aminosalicylic acid.

5-aminosalicylic acid, also known as mesalazine, is a specially manufactured agent designed to be released in the lower third of the small bowel and throughout the colon. In those cases in which ulcerative colitis affects only the rectum or left side of the colon (up to 80% of patients), the disease may also respond to suppositories,



Dr. Nanna Svartz

enemas or rectal foams that contain either 5-aminosalicylic acid or **cortisone preparations**. Enemas or foam containing the locally acting cortisone derivative budesonide are also effective and are associated with a significantly lower occurrence of side effects in the body. Patients in whom therapy results in resolution of complaints (remission) are usually started on 5-aminosalicylic acid in order to maintain their status of disease remission.

In severe cases, the administration of cortisone preparations either as pills or injections is usually effective. If cortisone in the form of tablets or enemas does not lead to an improvement in a patient's symptoms, the physician may recommend medications that reduce the body's immune reactions. These drugs are frequently effective because, as we noted above, inflammatory bowel diseases represent a disorder in which the body's immune system has been misdirected against its own tissues.

If this type of treatment is selected, the first drugs tried are usually **azathioprine** or **6-mercaptopurine**. Their maximum effect, however, becomes apparent at least after 8–12 weeks of therapy. Unfortunately, not all patients respond to these drugs and about 10 in 100 patients experience significant side effects, including acute hepatitis, acute pancreatitis or a disorder of blood cell formation. Hence, patients must undergo regular (weekly, then biweekly) laboratory tests of liver and pancreatic function and complete blood counts. If these tests remain normal for three months, the test frequency can be reduced to every two to three months but have to be continued as long as azathioprine or 6-mercaptopurine is administered.

If azathioprine or 6-mercaptopurine successfully prevent disease recurrence, they should be taken for at least four to five years. The length of azathioprine or 6-mercaptopurine therapy depends on the disease course and previous disease complications of the individual patient and may be as well much longer.

If an ulcerative colitis flare is very severe and cortisone therapy does not result in any improvement, patients should be hospitalized. In such cases, **cyclosporine, tacrolimus or infliximab** can be administered intravenously. Cyclosporine was originally developed for use in patients with kidney transplants to suppress the body's rejection of the transplanted organ. Instead of cyclosporine a similar substance called tacrolimus also has been successfully used in ulcerative colitis therapy. The anti-TNF-antibody infliximab can be used in patients with severe ulcerative colitis. Infliximab is given as an infusion in the beginning after two and six weeks after the first dose and then usually every eight weeks.

If cyclosporine, tacrolimus or infliximab prove ineffective, the last option is the surgical removal of the colon (colectomy).

A very important point in the therapy of ulcerative colitis is that the **choice** between the various preparations and the **method of administration** depends on the **extent** and **activity** of the disease. This fact explains the importance of a complete examination before treatment and in cases in which the pattern of symptoms has changed.

In determining the best treatment strategy, the physician will take into consideration the severity of the flare-up and the extent of inflammation. In any case, the **drugs** must be taken **long-term**, that is, even after symptoms

have resolved. Long-term administration of 5-aminosalicylic acid preparations has been shown to effectively prevent a new flare-up of the disease. As with all medications, **undesired side effects** may occur. These include headache, stomach complaints, nausea, anemia and hair loss. These side effects, however, are rare and resolve once administration of the drug has been stopped. The detailed description of these side effects on the package insert should not cause you to stop taking the drug out of fear. Instead, you should always consult your physician who will use appropriate methods to determine whether, in your case, the administration of the drug should be stopped or the dosage changed. Complications are more frequently due to patients' discontinuing their medication without consulting their physician than to side effects of the drug themselves. This is also true for patients who are, for the moment, free of complaints.

Recent studies have shown that disease recurrence in ulcerative colitis can also be effectively blocked by the administration of so-called **probiotics**. Probiotics influence the bowel's bacterial flora and include such agents as Escherichia coli Nissle and various lactobacilli. They appear to be as effective as 5-aminosalicylic acid. This method is particularly attractive in patients who do not tolerate 5-aminosalicylic acid. The efficacy of this method, however, has not been substantiated in the treatment of Crohn's disease or of the acute disease phase of ulcerative colitis.

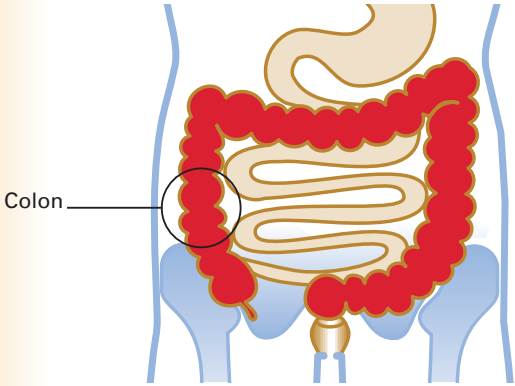
Beside the testing of new drugs, several new and interesting therapy concepts exist that are currently being investigated in clinical studies. Examples are the treatment with lecithin (phosphatidylcholine) or with eggs of the pig worm Trichuris suis. As with all new therapeutic

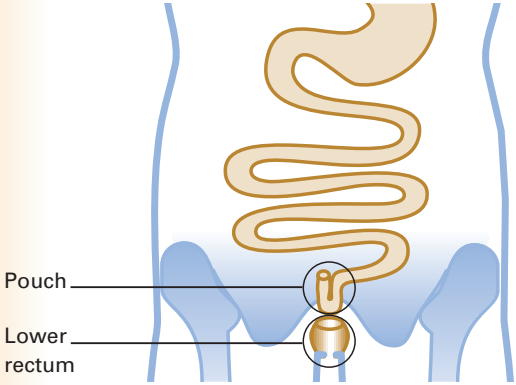
methods, studies must comprehensively investigate both their effects (here, the success of therapy) and possible side effects.

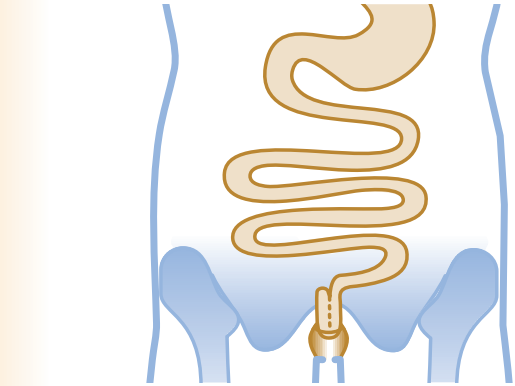
Because of the success associated with drug treatment, surgery is rarely necessary. Life-threatening complications (see page 33), severe complaints persisting despite adequate drug treatment and serious drug-induced side effects are indications for surgery.

The **surgical removal of the entire colon** cures ulcerative colitis. In many cases, it may be possible to remove the colon without the need for a permanent "ileostomy" or artificial bowel outlet in the abdominal wall. This usually involves surgical creation of a "pouch" out of loops of small bowel that acts as a reservoir and substitute for the rectum (see illustration on page 40). In most cases, this results in almost normal stool consistency and a bowel movement frequency of about five to eight times per day.

Patients with ulcerative colitis do not require a **special diet**. It is advisable, however, to avoid foods such as cabbage, onions or high-fat items that may cause complaints even in healthy persons. In our experience, it is usually best for each patient to test his or her own individual tolerance to different foods. Nutritional deficiencies occur very rarely in patients with ulcerative colitis. These may manifest themselves as edema (swelling due to accumulation of water in various tissues caused by protein deficiency) or anemia (due to blood loss or iron deficiency) occurring most often in instances of prolonged disease flare-ups. They respond to substitution of the appropriate substances.


Colon


Pouch
Lower
rectum



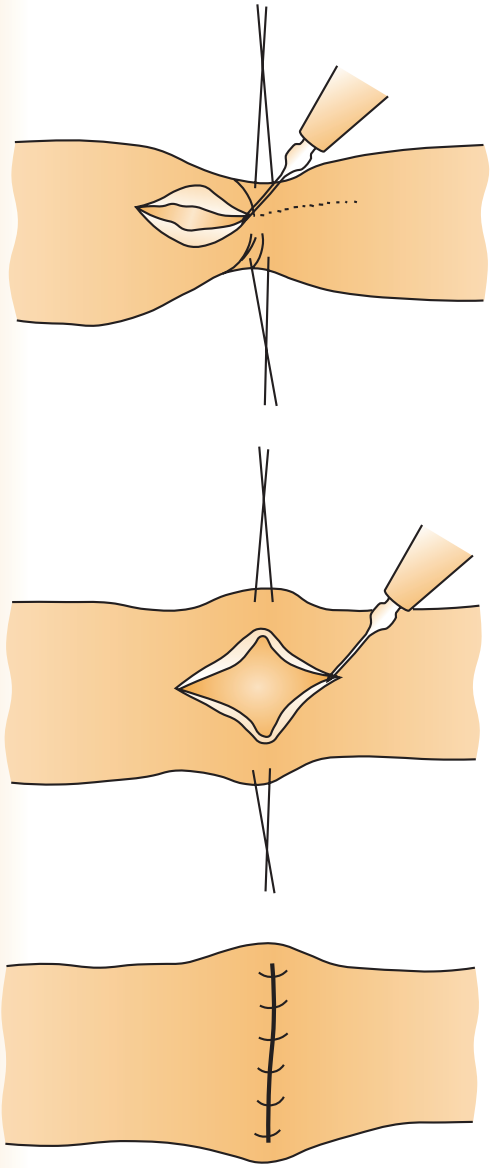
Disease manifestations outside of the bowel (joints, skin, eyes) can also be successfully treated with medication, usually with preparations containing cortisone. Surgical or dietary measures are usually less effective. Changes occurring in the biliary tract are often treated with ursodeoxycholic acid (UDCA), a bile acid. UDCA does not "cure" these conditions but may significantly slow their progression. Every case of abnormal "liver enzymes" requires careful study and appropriate treatment.

The treatment of Crohn's disease

The treatment of Crohn's disease is based on the same principles as that of ulcerative colitis. However, because of the more divergent pattern of disease, symptoms and complications it is more challenging to establish the **optimum treatment** for each individual patient.

Acute flare-ups are usually treated with **cortisone preparations**. There are preparations containing **budesonide** introduced for the treatment of Crohn's disease (especially the last part of the small bowel, terminal ileum). Their efficacy is similar to that of cortisone and its derivatives. Because their effects are limited to the bowel and the overwhelming proportion of the drug is de-activated in the liver prior to reaching the general circulation, these agents are associated with a significantly lower rate of side effects than standard cortisone preparations.

◁ *In the pouch operation, the whole colon is removed with the exception of a small section of the lower rectum. A pouch is then created out of a part of the small bowel (terminal ileum) and sutured to the remaining portion of the rectum.*



The technique of stricturoplasty. A longitudinal (length-wise) incision is made in the area of stenosis and then the bowel is closed in a cross-wise fashion.

Especially in children an acute flare of Crohn's disease can also be treated with dietary measures. Patients can convert their dietary intake to the so-called **"astronaut diet" or "elemental diet"**, consisting of substances wholly digested and absorbed in the upper gastrointestinal tract. Nourishment can also be administered through **infusions** of nutrient solutions directly into the blood stream. Dietary measures are usually associated with lower chances of success.

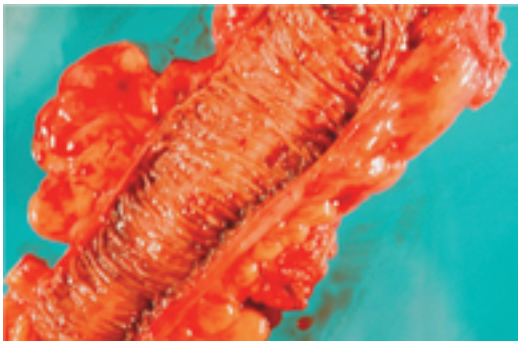
In cases in which the inflammation is restricted to the small bowel, cortisone or **budesonide** preparations are normally used first. If the colon is affected, **5-amino-salicylic acid** may also be tried.

If patients do not respond to either of these therapies, drugs that suppress the **immune system** (**azathioprine, 6-mercaptopurine or methotrexate**) may be added. All of these drugs may be associated with side effects, such as itching sensations in the arms and legs, hair loss, anemia, increased risk of colds and flu-like symptoms. Should these or other side effects occur, it is important to consult your physician, who will advise you on the proper course of action. In any case, you should not stop taking your medication or change its dose without asking your doctor.

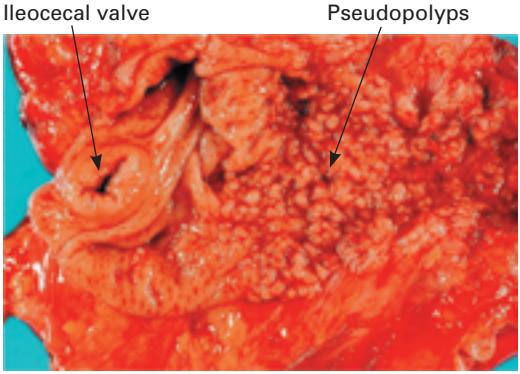
In most cases, these drugs successfully treat **acute flare-ups** of Crohn's disease. The same is true for manifestations of the disease occurring outside of the digestive tract. The use of 5-aminosalicylic acid preparations or azathioprine or 6-mercaptopurine has been shown to reduce the recurrence of the disease after surgery. Newer treatment methods, such as **inhibition of tumor necrosis factor** (TNF), a messenger substance in the body (e.g. infliximab), have been introduced into the treatment of Crohn's disease with great success.

The benefit/risk ratio certainly is of the "benefit-site" if patients have frequent disease flare-ups despite conventional therapy or have complicated disease courses. An early treatment with TNF-inhibitors may also be beneficial in patients at high risk for a complicated and severe disease course. These are patients in whom Crohn's disease started at young age, or who have a perianal disease or complications (such as abscesses) right at the onset of disease. If one or several of these "risk factors" for a severe disease course are present in a Crohn's disease patient, an early use of TNF-inhibitors (infliximab, adalimumab or other anti-TNF-agents) is justified.

If these methods prove unsuccessful, or if complications such as intestinal obstruction or repeated stenoses occur, **surgery** may provide long-term relief. When surgery is recommended, emphasis is placed on techniques that preserve as much bowel as possible. Short areas of narrowing (stenoses or strictures) can be relieved using a technique called stricturoplasty (see figure on page 42). This involves placing a longitudinal (lengthwise) incision into the area of stenosis and then closing the bowel in a cross-wise fashion. This relieves the narrowing and normal passage of stool is again possible. The main advantage of this method is that no bowel must be sacrificed. Stricturoplasty can be performed on several segments of stenosed bowel during a single operation. Surgery must also be considered for the treatment of fistulae. Abscesses are usually treated by means of a **drainage** placed through the skin under ultrasound or computed tomographic guidance. Surgery, however, is usually required after the acute symptoms have subsided to treat the underlying cause, which may be a fistula or stenosis of the bowel. Following successful surgery, it is advisable to undergo regular follow-up



Normal colon



Severe inflammatory changes in the colon with pseudopolyps

conducted by experienced internists and surgeons working together. This permits early recognition and treatment of any complications that may arise.

Unlike **ulcerative colitis**, **Crohn's disease** is associated with a number of different **nutritional deficiencies**, including vitamins, trace elements, minerals and protein. This requires appropriate substitution (vitamins, calcium, iron, potassium, zinc). Your doctor will use regular blood tests to identify the exact nutrients that require substitution. One very common deficiency is that of **vitamin B_{12} in patients with Crohn's disease**, who underwent surgical resection of the last part of the small bowel (terminal ileum). Since vitamin B_{12} is absorbed in the ileum the life-long administration of the vitamin by injection every three months may often be necessary to prevent a deficiency of vitamin B_{12} and the resulting anemia.

Diet

Several clinical trials in the past failed to demonstrate a significant benefit of dietary interventions (except the above described "astronaut diet" or "elemental diet" in children). Therefore, currently there is no general recommendation for a specific diet for patients with ulcerative colitis or Crohn's disease. But patients individually should determine for themselves, which foods they tolerate and which foods cause them problems.
A balanced diet providing the necessary nutrients, vitamins and minerals should be the goal.

To date, no special diet or nutritional form has been proven to either accelerate induction of remission or prevent recurrence.

Psychotherapy

Different researchers have expressed different opinions on the need for and expected success of **psychotherapeutic treatment**. On the one hand, it is certain that inflammatory bowel diseases cannot be cured by psychotherapy. Whether such therapy can help prevent a flare-up in patients with psychic stress is not known. It is probable, however, that a behavioral therapy that helps patients better cope with the problems of their disease and of daily life could be useful. In any case, such a treatment should only be conducted in cooperation with your physician.

Special problems

What kinds of special problems may occur?

Now that we have discussed the issues of the development, diagnosis, treatment and follow-up in cases of inflammatory bowel disease, we will turn to a few special problems that must be confronted by patients living with these diseases.

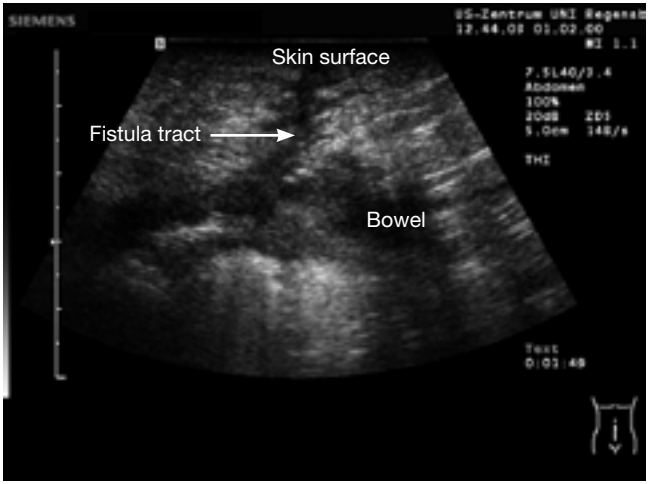
Course of the disease

Probably the most important question you will wish to discuss with your physician deals with the future course of your disease: How will it progress and what problems will confront you in the future? When discussing your **prognosis** (that is, the probable future course of your disease), your physician will explain that, in individual cases of inflammatory bowel disease, reliable predictions are often possible only after fairly extensive periods of observation. We know today that patients' life expectancies are not reduced in either ulcerative colitis or Crohn's disease, provided they are correctly diagnosed and appropriately treated. Ulcerative colitis and Crohn's disease are **chronic diseases** that will affect your life for years to come. Both diseases tend toward an episodic **pattern of activity**, alternating between symptom-free and active disease states. Early diagnosis and appropriate treatment can usually suppress the inflammatory activity and lead to re-establishment of an inactive disease phase. Complications are more likely in patients in whom the inflammation has become chronic and has led to progressing changes in the bowel. The most effective way of reducing the risk of complications is **regular follow-up by your physician** who can recognize inflammatory

flare-ups early and institute appropriate treatment. Flare-ups and associated complications can severely reduce your quality of life and overall happiness. Thus, minor side effects of special drug therapy can be tolerated with this larger goal in mind.

Fistulae

About one-third of all patients with Crohn's disease experience the development of fistulae. Fistulae represent a kind of short circuit connection between individual bowel loops or may form between the bowel and other organs, such as the urinary bladder, vagina or the skin. The most common site affected by fistula formation is the tissue surrounding the anus. In this area, the fistula forms a connection between the rectum and the skin surrounding the anus (see diagram on page 16). The development of fistulae is associated with certain com-



Ultrasound image showing a fistula tract linking the bowel with the skin

plications, including the formation of abscesses (encapsulated collections of pus). When the formation of fistulae is suspected, the physician will perform certain diagnostic procedures. Depending on location, these include radiologic examinations such as CT or MRI, **proctoscopy** and/or endosonography. The therapy of fistulae depends on their location and associated complications. Because of the associated inflammatory reaction, treatment may begin with the administration of antibiotics. In certain cases, however, it may be necessary to surgically remove the fistula or the bowel segment from which the fistula originates. This is often recommended in cases of fistulae that form between two bowel loops or when complicated by extensive abscess formation. In the longer term, most patients will ultimately require either surgical or medical (e.g. azathioprine or anti-TNF-antibodies) therapy to definitively close the fistulae. Unfortunately, patients with fistulizing disease have a high risk for recurrence of the fistula and to date, however, no totally satisfactory method for treating fistulae has been devised.

Osteoporosis

Over half of all patients with inflammatory bowel diseases suffer from reduced bone mineral content. While such bone loss can be mild or severe, both forms respond to drug treatment. Patients' bone density should be measured especially in cases of long-term administration of cortisone preparations. Bone density is measured using radiologic methods that expose the patient to relatively low doses of radiation. Therapy in mild forms of bone loss consists of the administration of vitamin D and calcium. More severe bone loss may require the use of

other drugs (bisphosphonates). These drugs directly inhibit bone destruction but are associated with a higher rate of side effects than vitamin D and calcium.

Inflammatory bowel diseases during childhood

It would appear that the frequency of **Crohn's disease** in children is increasing. Thus, children and adolescents should be just as carefully examined and treated as adults. An additional problem in these young patients is the fact that both the chronic bowel inflammation and, in some cases, the necessary drugs may result in disturbances of physical development. In such cases, as well as in patients who do not respond to drug treatment, surgery must be considered. This will at least temporarily remove the site of inflammation.

Children by nature are more greatly affected than are adults by psychic stress. They also suffer more profoundly under the effects of chronic diseases and therefore should be seen by a child psychiatrist as early as possible after first diagnosis. More so than with adults, it is advisable that the treatment of inflammatory bowel diseases in children should be conducted in cooperation between the child's family doctor and a specialized clinical center.

The risk of cancer

Cancer is associated with any chronic inflammation that persists for a long period of time. What does this mean, however, for patients with ulcerative colitis or Crohn's disease?

Studies have shown that there is an increased risk of cancer in patients with **ulcerative colitis** in whom the entire colon is affected and in whom the disease starts early and has persisted for more than 8–10 years. For this reason, all patients who have suffered from ulcerative colitis for longer than 8–10 years should undergo **endoscopic examination** (once a year is initially recommended, depending on the findings the time intervals can later on be stretched out to every two to three years). This is the only way to detect the early signs of malignant degeneration, such as mucous membrane dysplasia. If discovered in time, this abnormal tissue can be removed surgically, thus preventing the development of cancer. The risk of cancer is significantly lower in Crohn's disease. However, when only the colon is affected, colonoscopy should be performed every two years in patients whose disease has persisted more than 8–10 years.

Medication for pain (NSAIDs)

NSAIDs (non-steroidal anti-inflammatory drugs) are often prescribed for pain or fever and include e.g. ibuprofen, indomethacin, diclofenac and aspirin. NSAIDs are associated with a higher risk of a flare-up of inflammatory bowel diseases. Each patient should be aware of this risk. If NSAIDs are prescribed or bought over the counter (which is possible in some countries), the patient should discuss the risks and benefits of this drug class on an individual basis with the physician involved in their inflammatory bowel diseases care. Pain medications such as paracetamol (acetaminophen) or tramadol are considered safe in patients with inflammatory bowel diseases.

Psychic stress

The realization that you have been diagnosed with a chronic disease and will be confronted with it and its associated problems for many years to come naturally affects your personal sense of intactness and psychic constitution in a very profound way. What can you do in order to better cope with these problems?

Rule number one: You must confront your disease, then come to terms with it and accept it. You have the advantage of recognizing your disease, an advantage not shared by many other people. Coping with such a disease has its purpose and can be a source of enhanced self-confirmation and worth.

Rule number two: You must not let your illness control you. Those who lose courage suffer the most from their disease. You must actively confront your disease and live a normal life – despite and even because of your disease. All means of actively confronting your disease are open to you. First and foremost, of course, are rational medical treatment and drugs. However, **other alternatives** – again, after consultation with your doctor to prevent undesired consequences – are preferable to losing heart and doing nothing. Disease attacks the individual as a whole. All therapeutic measures must therefore also treat the person as a whole.

Self help groups

You are not alone in your disease. Coping with a chronic or other long-lasting illness can be made much easier by talking about it and its problems with others suffering from the same disease. Self help groups and associa-

tions have been formed in many towns and countries. The appendix offers more information on such groups in your country.

Disability and career

You are unable to work during the active phase of your disease. This is equally true for inflammatory bowel diseases as for any other disease and applies to every profession or line of work. Because of the typical chronic, episodic course of the disease, you must be prepared, whatever you work, for short, disease-related periods of disability. However, **job re-training** or giving up a career are only necessary in a few individual cases. Under certain circumstances, such as after major abdominal surgery, the presence of fistulae or in patients whose disease has not responded adequately to medical treatment, heavy physical work is not advisable. Such patients, however, can normally perform other jobs involving only light physical activity or that can be performed in seated position.

Adolescents, in whom there has been an increased occurrence of inflammatory bowel diseases in recent years, should particularly be encouraged to complete their **vocational or professional training**.

Recreation

Similar considerations apply to recreation as apply to work and career. All options remain open to you despite your disease. Only in phases of severe inflammation should certain restrictions be placed on your **physical activity**. With the exception of high-performance sports, physical activity in any form is fully recommended. This

is true even in patients undergoing long-term drug treatment. In fact, particularly in patients receiving cortisone preparations, regular exercise of the muscles, joints and bones is highly recommended and may help reduce or prevent some of the side effects of these drugs.

It is also normally possible to take **vacations in foreign countries**. The required vaccinations, however, should be given only after consultation with the physician treating your IBD, though, as a rule, there is no reason not to get them. One special factor is the long-term treatment of **Crohn's disease** with the antibiotic metronidazole. Patients receiving this drug should protect themselves from direct sunlight and avoid alcohol.

Sex and partnership

Here, too, no specific restrictions are required. Sexual activity will naturally be reduced during an acute disease flare-up. In females, the body's natural mechanism for conserving its energies and resources may result in interruption of menstruation.

The formation of fistulae in patients with **Crohn's disease** may, in certain cases, affect the internal and external genital organs, resulting in a mechanical restriction of sexual activity. Such fistulae require intensive medical attention and drug therapy. Thus, prompt consultation of a physician is advisable.

Reproduction and genetic factors

In our discussion of the causes of inflammatory bowel diseases, we noted that genetic predisposition probably

plays a role in both **ulcerative colitis** and **Crohn's disease**. Should this be considered a reason not to have children?

The probability of inheriting a predisposition to inflammatory bowel disease is low and there are no specific genetic tests necessary and advisable. Thus, the risk that children of persons with IBD will develop either **ulcerative colitis** or **Crohn's disease** is therefore not considered to be very high. This small risk should not deter persons affected by IBD from having children.

Pregnancy

This section is closely related to the last. Is it advisable for women with IBD to become pregnant and should these women attempt to carry pregnancies to term and deliver normally?

In answering these questions, it is important to state at the outset that pregnancy has not been shown to adversely affect the clinical course of either ulcerative colitis or Crohn's disease in any way. Thus, the decision to conceive can be supported in **patients who desire children**. It is, of course, important to plan the pregnancy, so that it does not occur during a period of more pronounced disease activity. During pregnancy, patients should be **carefully monitored** in cooperation between an internist and gynecologist. Should an acute disease flare-up occur during pregnancy, treatment with 5-aminosalicylic acid preparations, cortisone or anti-TNF-antibodies is possible. Careful administration of these drugs will control inflammatory activity without producing side effects in the embryo. Azathioprine or 6-mercaptopurine seem to be safe in pregnancy, but the risks and benefits of this therapy in the setting of a planned pregnancy

should be individually discussed with your treating physician. Patients undergoing long-term treatment with methotrexate have to use **contraception**. The two most effective methods of birth control, the pill and the intrauterine device (IUD), are both somewhat controversial in patients with IBD. The best form of contraception must be individually decided, if possible, by an internist and gynecologist working together.

"Ileostomy": the artificial bowel outlet

Newly developed surgical techniques make it possible in many cases of ulcerative colitis to remove the entire colon without permanent creation of an artificial bowel outlet, or "ileostomy" (see illustration on page 40). In fact, a permanent ileostomy is required only in very rare cases. The creation of a temporary ileostomy in patients with ulcerative colitis and Crohn's disease may, however, have a beneficial effect on the disease. The ileostomy is usually closed after four to six months. Modern ileostomy appliances make it possible to live a practically normal life, including sports and sexual activity, despite the artificial bowel outlet. Early retirement due to a permanent ileostomy is necessary only in the rarest of cases.

If, however, your disease and its treatment do require the placement of an artificial bowel outlet, you should contact and listen to the experiences of others who have been in your condition. Ileostomy patients have formed self help groups in many cities and countries. Once again, we refer you to the appendix for a list of groups and contact information.

What should you keep in mind, as a patient with inflammatory bowel disease?

1. Maintain regular medical follow-up even in phases when your illness is in remission. Patients with complications should seek rapid referral to a gastroenterological center in which internists and surgeons will cooperate in your care.

2. Inform yourself about possible dietary measures and consult a reputable dietician.

3. Never forget: The more you control your disease the less your disease will control you.

4. If your physician prescribes a long-term drug therapy regimen, you must comply with it as closely as possible. Medications should be discontinued or their dose changed only after consulting with the responsible physician. Ask your doctor about possible side effects and about how to recognize them.

5. Learn to recognize the signs of increased disease activity. In **ulcerative colitis**, these include changes in the stool up to and including bloody diarrhea, abdominal pain and general signs such as tiredness and fatigue. In **Crohn's disease** these include abdominal pain, weight loss, changes in stool (diarrhea or constipation) and general deterioration in physical performance. In both diseases, there may be symptoms outside the bowel, including pain in the joints, inflammation of the eyes, changes in the skin or mouth and back pain. You should inform your doctor immediately if these signs are recognized. These symptoms may not always be due to IBD, however.

Often, they may be due to dietary mistakes (for example, diarrhea following consumption of raw fruit) or bowel infections, which may occur as well in patients with IBD.

6. Inform yourself about your disease and about your individual case. It may also be helpful to keep a diary or journal. In any long-term disease, it is probable that a number of physicians, independent of each other, will be involved in your care. Collect information on the examinations you have undergone as well as surgical reports. Important are the names and addresses of the physicians and/or associated hospitals, who examined you or performed operations or other procedures, as well as the date and measures undertaken. You yourself should know how extensive your inflammation is and what treatment methods have already been tried. Also note any side effects or intolerance to medications.

Glossary

Abscess	Encapsulated collection of pus occurring in areas of inflammation due to bacteria
Anemia	An abnormality of the blood caused by a deficiency of hemoglobin or in the number of red blood cells (erythrocytes)
Colon	The large bowel
Duodenum	First segment of the small bowel
Dysplasia	Abnormal development of tissue. Dysplasia may occur in different degrees of severity and may be considered a precursor of cancer of the bowel
Erythema nodosum	Violet-red thickening of the skin, usually on the arms or legs
Fistula	Abnormal, “short circuit” connection between two bowel segments, between the bowel and the bladder or vagina, or between the bowel and the skin occurring as a result of inflammation
IBD	Inflammatory bowel disease
IBS	Irritable bowel syndrome
Ileocecal valve	Valve-like structure forming the junction between the lower segment of the small bowel (ileum) and the colon
Ileum	Final segment of the small bowel

Ileus	Obstruction of the bowel caused by narrowing (stenosis) or paralysis
Immuno-suppression	Therapy aimed at inhibiting the body's immune system
-itis	Suffix denoting inflammation. For example, "colitis" means inflammation of the colon, "hepatitis" means inflammation of the liver
Jejunum	Middle segment of the small bowel
Osteoporosis	Loss of bone tissue or changes in the overall form of the bone resulting in reduced mechanical strength and a tendency to fracture
Perforation	Formation of a hole in the wall of a hollow organ, such as the bowel
Peritonitis	Inflammation of the membrane lining the inner surface of the abdomen
Pouch	Reservoir for stool that is surgically created from a bowel loop
Recurrence	Renewed manifestation of disease symptoms, such as an acute flare-up in IBD
Stenosis	Narrowing of the bowel often caused by inflammation. Over time, long-lasting inflammation can result in scar-tissue formation that makes the narrowing permanent
Stricture	Another name for stenosis. Strictures, however, represent narrowing of the bowel that has become permanent due to scar-tissue formation

Stricturoplasty	Surgical procedure to release strictures in the bowel without excision (removal) of the entire segment of narrowed, stenotic bowel
Subileus	Incomplete form of intestinal obstruction or ileus
Toxic megacolon	Complication occurring mostly in patients with ulcerative colitis and involving an acute dilation (ballooning) of the colon
Tumor necrosis factor (TNF)	Messenger substance in the human body that plays an important role in inflammatory processes
Ulcer	Hole or defect in the mucous membrane lining of an internal organ

Self help groups

Ulcerative colitis/Crohn's disease

Australia
Crohn's & Colitis Australia Head Office
Level 1, 462 Burwood Road
P.O. Box 2160
Hawthorn, VIC 3122
Tel.: +61 3 98151266
Fax: +61 3 98151299
E-Mail: info@crohnsandcolitis.com.au
Internet: http://www.acca.net.au

Austria
Österreichische Morbus Crohn/
Colitis ulcerosa Vereinigung – ÖMCCV –
Obere Augartenstr. 26–28
1020 Wien
Tel./Fax: +43 1 3330633
E-Mail: office@oemccv.at
Internet: http://www.oemccv.at

Belgium
Crohn en Colitis ulcerosa Vereniging (CCV) vzw
Groeneweg 151
3001 Heverlee
Tel.: +32 16 207312
Fax: +32 16 208732
E-Mail: secretariaat@ccv-vzw.be
Internet: http://www.ccv-vzw.be

Association Crohn-RCUH
Secrétariat administratif
Rue de la Forêt de Soignes 17
1410 Waterloo
Tel.: +32 2 3541285
Internet: http://www.mici.be

Canada
Crohn's & Colitis Foundation of Canada (CCFC)
National Office
600-60 St. Clair Avenue East
Toronto, ON, M4T 1N5
Tel.: +1 416 920-5035
Fax: +1 416 929-0364
E-Mail: ccfc@ccfc.ca
Internet: http://www.ccfc.ca

Czech Republic
CROCODILE (CROhn and COlitis DILEtants)
Pracoviště klinické farmakologie
Nemocnice České Budějovice a.s.
B. Němcové 54
370 87 České Budějovice
Tel./Fax: +420 387 874377
E-Mail: crocodile@zdravcentra.cz
http://nutraceutika.zdravcentra.cz

Denmark
Colitis-Crohn-Foreningen (CCF)
Klingenberg 15, 2.th
5000 Odense C
Tel.: +45 35354882
E-Mail: info@ccf.dk
Internet: http://www.ccf.dk

European Federation of Crohn's and Ulcerative Colitis Associations – EFCCA –
EFCCA
Rue Des Chartreux 33–35
1000 Brussels/Belgium
Tel./Fax: +32 2 5408434
http://www.efcca.org

Finland
Crohn ja Colitis ry (CCAFIN)
Kuninkaankatu 24 A 2. krs
33210 Tampere
Tel.: +358 3 2662600
Fax: +358 3 2662660
E-Mail: ccafin@crohnjacolitis.fi
Internet: http://www.crohnjacolitis.fi

France
Association François Aupetit (AFA)
La Maison des MICI
78, quai de Jemmapes
75010 Paris
Tel.: +33 1 43070049
Fax: +33 1 49283189
E-Mail: info-accueil@afa.asso.fr
Internet: http://www.afa.asso.fr

Germany
Deutsche Morbus Crohn/Colitis ulcerosa Vereinigung – DCCV – e.V.
Bundesgeschäftsstelle:
Inselstr. 1
10179 Berlin
Tel.: +49 30 2000392-0
Fax: +49 30 2000392-87
E-Mail: info@dccv.de
Internet: http://www.dccv.de

Great Britain
Crohn's and Colitis UK (NACC)
4 Beaumont House, Sutton Road
St. Albans, Herts AL1 5HH
Tel.: +44 1727 844296 or
+44 1727 830038
Fax: +44 1727 862550
E-Mail: info@crohnsandcolitis.org.uk
Internet: http://www.nacc.org.uk

Hungary
Magyarországi Crohn-Coliteses
Betegek Egyesülete (MCCBE)
Munkásotthon u. 41. VI/ 26
1043 Budapest
Tel./Fax: +36 27 393652
E-Mail: mccbe@mccbe.hu
Internet: http://www.mccbe.hu

Ireland
Irish Society for Colitis and Crohn's Disease (I.S.C.C.)
Carmichael Centre
North Brunswick Street
Dublin 7
Tel.: +353 1 8721416
Fax: +353 1 8735737
E-Mail: info@iscc.ie
Internet: http://www.iscc.ie

Italy
Associazione Nazionale
per le Malattie Infiammatorie Croniche
dell'Intestino (A.M.I.C.I. ONLUS)
Via A. Wildt, 19/4
20131 Milano
Tel.: +39 2 83413346
Fax: +39 2 89070513
Internet: http://www.amiciitalia.net

Luxembourg
Association Luxembourgeoise
de la Maladie de Crohn (ALMC)
P.O. Box 648
2016 Luxembourg
Tel.: +352 47 509828
Internet: http://www.afa.asso.fr

The Netherlands
Crohn en Colitis Ulcerosa Vereniging Nederland
(CCUVN)
Houttuinlaan 4b
3447 GM Woerden
Tel.: +31 348 420780
Fax: +31 348 480747
E-Mail: info@crohn-colitis.nl
Internet: http://www.crohn-colitis.nl

Norway
Landesforeningen mot Fordøyelsessykdommer (LMF)
Postboks 808 Sentrum
0104 Oslo
Tel.: +47 88005021
E-Mail: post@lmfnorge.no
Internet: http://www.lmfnorge.no

Portugal
Associação Portuguésa da Doença
Inflamatória do Intestino (APDI)
Avenida Rodrigues Vieira, nº 80 – sala A
Leça do Balio
4465-738 Matosinhos
Tel.: +351 22 2086350
E-Mail: geral@apdi.org.pt
Internet: http://www.apdi.org.pt

Slovakia
Slovak Crohn Club (SCC)
Jurigovo nám. 1
841 04 Bratislava
Tel.: +421 2 59327317
E-Mail: crohnclub@crohnclub.sk
Internet: http://www.crohnclub.sk

South Africa
South African Crohn's & Colitis Association
P.O. Box 798
2055 Fourways
Tel.: +27 11 4657449
E-Mail: mossy@cybertrade.co.za
Internet: http://web.uct.ac.za/depts/git/ibd/support.htm

Spain
Asociación de Enfermos de Crohn
y Colitis ulcerosa de España (ACCU)
C/ Enrique Trompeta 6, Bajo 1
28045 Madrid
Tel.: +34 91 5426326
Fax: +34 91 5475505
E-Mail: accuesp@accuesp.com
Internet: http://www.accuesp.com

Sweden
Mag- & Tarmförbundet
Gotlandsgatan 46
116 65 Stockholm
Tel.: +46 8 6424200
Fax: +46 8 6421100
E-Mail: rmt@magotarm.se
Internet: http://www.magotarm.se

Switzerland
Schweizerische Morbus Crohn/
Colitis ulcerosa Vereinigung (SMCCV)
5000 Aarau
Tel./Fax: +41 67 00487
E-Mail: welcome@smccv.ch
Internet: http://www.smccv.ch

USA
Crohn's & Colitis Foundation
of America (CCFA)
386 Park Avenue South, 17th Floor
New York, NY 10016
Tel.: +1 800 932-2423
+1 212 685-3440
Fax: +1 212 779-4098
E-Mail: info@ccfa.org
Internet: http://www.ccfa.or

Self help groups for patients with ileostomy

Austria
Österreichische ILCO
Obere Augartenstr. 26–28
1020 Wien
Tel./Fax: +43 1 3323863
E-Mail: stomaselbsthilfeilco@tele2.at
Internet: http://www.ilco.at

Germany
Deutsche ILCO e.V.
Thomas-Mann-Str. 40
53111 Bonn
Tel.: +49 228 338894-50
Fax: +49 228 338894-75
E-Mail: info@ilco.de
Internet: http://www.ilco.de

Great Britain
Ileostomy and Internal Pouch Support Group
Peverill House
1–5 Mill Road
Ballyclare, Co. Antrim BT39 9DR
Tel.: +44 28 93344043
Fax: +44 28 93324606
E-Mail: info@the-ia.org.uk
Internet: http://www.the-ia.org.uk

Switzerland
ilco-Schweiz
Sekretariat
Therese Schneeberger
Buchenweg 35
3054 Schüpfen
Tel.: +41 31 8792468
E-Mail: sekretariat@ilco.ch
Internet: http://www.ilco.ch

Note:
Despite checking the addresses with all due care and attention, we accept no liability for the content.

Further information for patients with inflammatory bowel disease:

- **Diet and Nutrition in Crohn's Disease and Ulcerative Colitis**
  Important Questions – Real Answers
  60 pages (S84UK)

- **Crohn's disease and its associated disorders**
  40 pages (S85UK)

- **Corticosteroid therapy in inflammatory bowel diseases**
  32 pages (Bu80UK)

- **Crohn's Disease, Ulcerative Colitis and Pregnancy**
  57 pages (S82UK)

These brochures can be ordered **free of charge** from Falk Foundation e.V. or the local Falk partner.

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