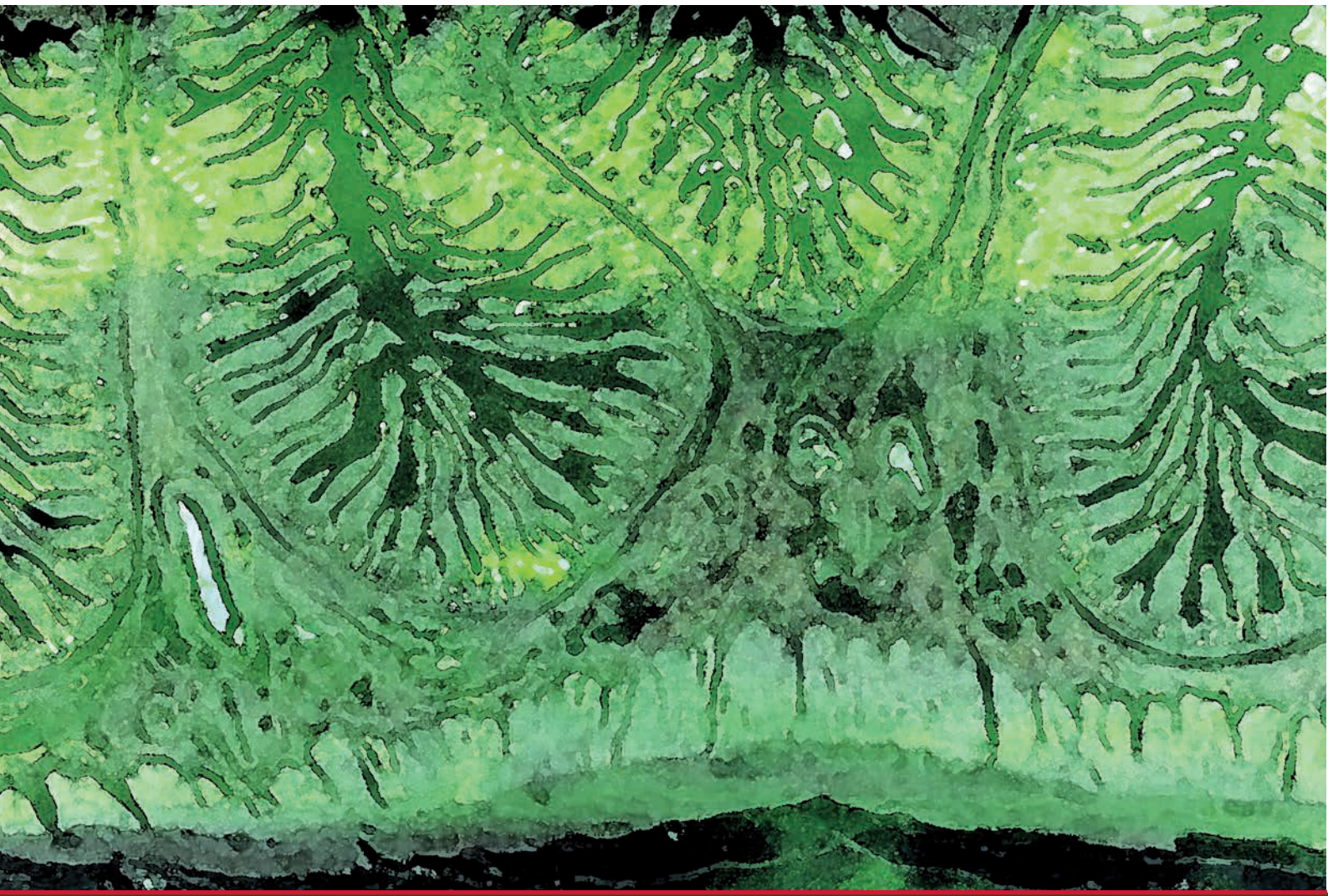
bio|vis' DIAGNOSTIK

„Leaky gut“

Increased intestinal permeability - causes and consequences



Healthy or ill?
This decision is often made in the intestines.

Intestinal Permeability

Many diseases can be traced back to

increased intestinal permeability.

Not only intestinal disorders but also allergies or autoimmune diseases like **diabetes type 1, multiple sclerosis, rheumatoid arthritis** and others may be the consequences!

Healthy or ill?
This decision is often made in the intestines.

"Death sits in the intestines!" This is how Hippocrates if often cited. Fact is that this harsh statement is now also supported by modern medicine: More and more frequently there is evidence that many diseases start in intestines, which are not functioning properly. It is remarkable that these diseases do not necessarily have to be located in the intestines, but may occur in many other organs.

Erkrankungen, die ihren Ursprung im Darm haben können:

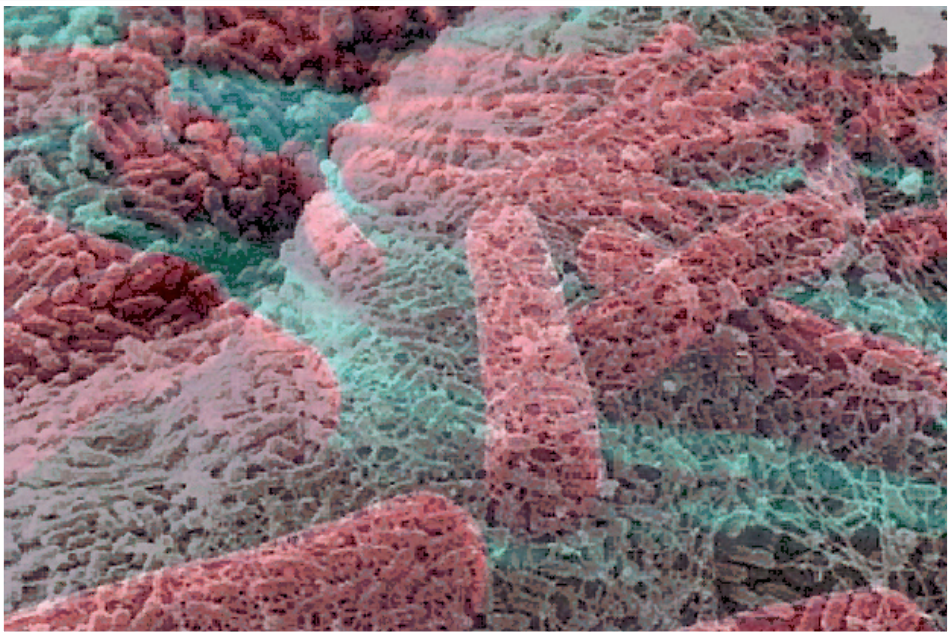
- ACUTE AND CHRONIC INFLAMMATIONS OF THE INTESTINES
- INDIGESTION
- ALLERGIES
- FOOD INTOLERANCES
- MIGRAINE
- DIABETES TYPE 1
- MULTIPLE SCLEROSIS
- RHEUMATOID ARTHRITIS
- PSYCHIC DISEASES
- AND MANY OTHERS

The intestines have many responsibilities within the body. Firstly of course the controlled and highly selective substance consumption, which – among others – ensures the body's nutrient supply. A further very important intestinal function is an effective infection defence – as contact between body and environment is most intense at the intestinal mucosa. And not at last – the intestines are a major part of the immune system.

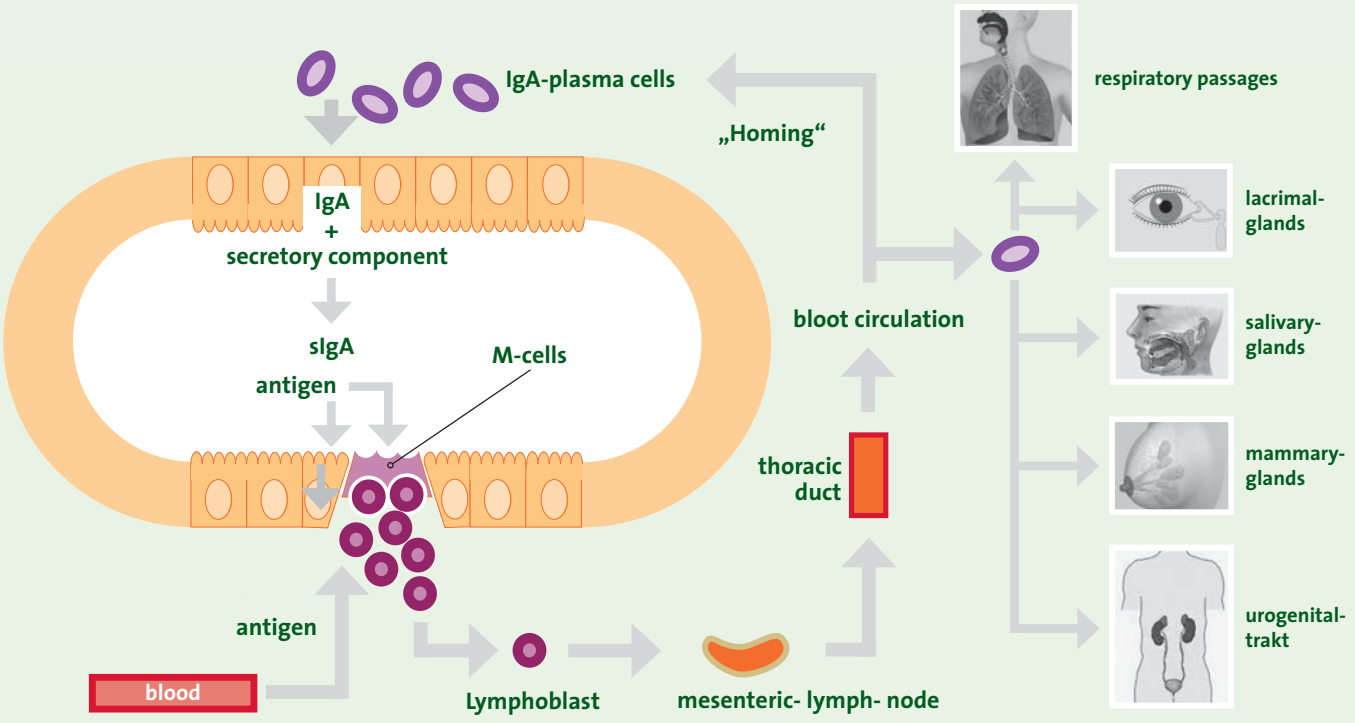
To be able to carry out all its tasks correctly the intestines absolutely need:

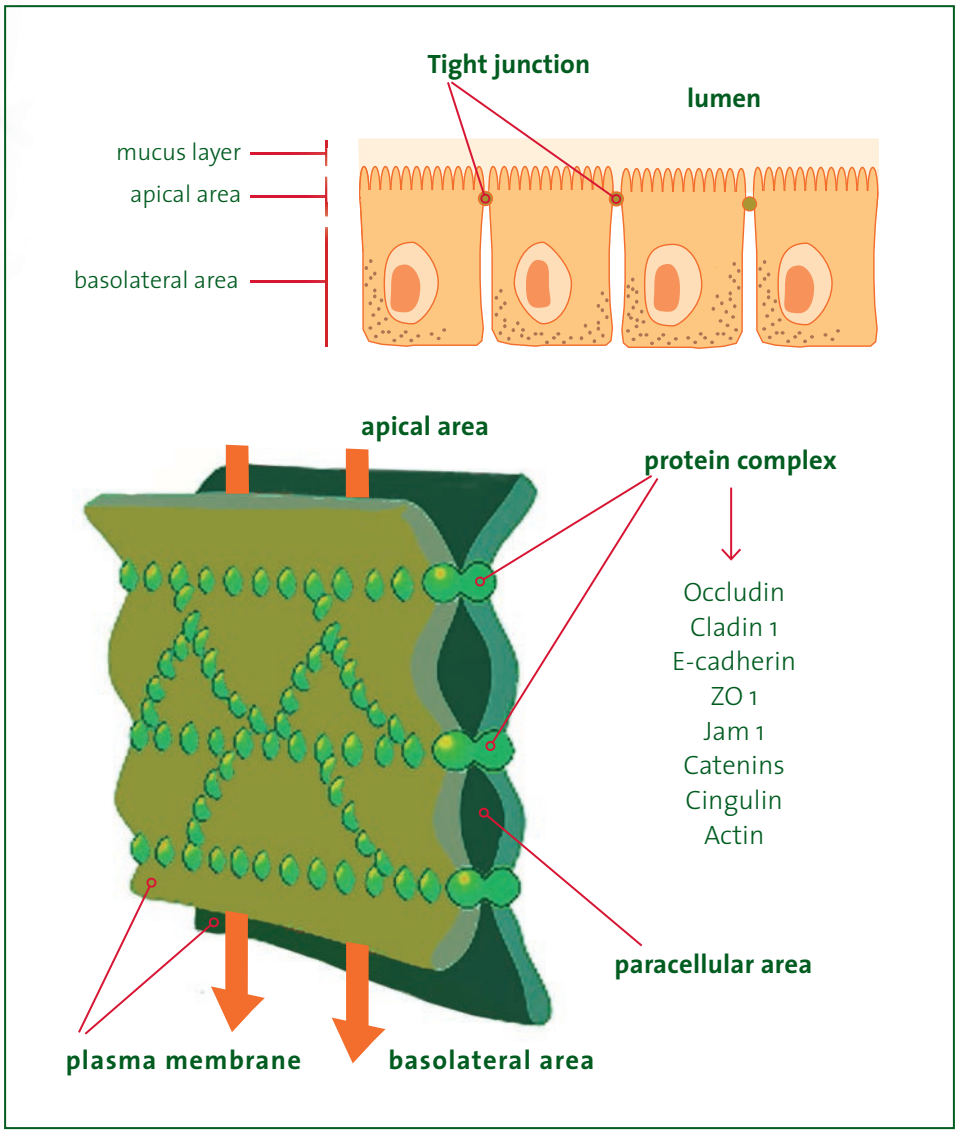
- **an intact bacterial population (intestinal micro-flora)**
- **sufficient production of mucosa mucus and**
- **secretory immunoglobulin A (sIgA) as well as**
- **an undamaged intestinal epithelia cell layer**

The intestinal micro-flora is an important instrument for fending endogenous infections. With the aid of an intense population of the mucosa with "healthy" germs it is hard for pathogenic microorganisms to settle on the intestinal mucosa and thereby reduce their infectivity. Furthermore the intestinal bacteria fight with potential aggressors for nutrients, which prevents the latter to increase and spread out. These effects of healthy intestinal bacteria population are called colonization resistance.



The mucus produced by the mucosa is on one hand important for the transport of the food in the intestines. It protects the mucosa, is important for its integrity and is therefore the basis for the maintenance of the normal permeability. On the other hand it supports the correct texture of the bolus to provide for regular substance absorption. In addition the sIgA is passed to and distributed in intestines with the mucus. The production of mucosa mucus and sIgA is therefore directly associated. The sIgA has the important job to link antigens of all types – for example bacteria, viruses, large macro molecules etc. – in the intestinal lumen. Thereby it reduces stress on the mucosa. At the same time it keeps the antigen inside the intestines, does not let them get in contact with the mucosa and leads them to secretion. This way the sIgA effectively controls the antigen pollution of the body and thereby the infection frequency. It is also an important instrument of the immune system.



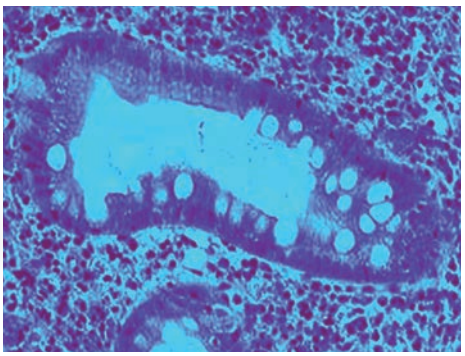


The controlled (nutrient) substance passage from the intestinal lumen into the circulatory system takes place at the **intestinal epithelia layer**. For one thing this is carried out **by the cells** themselves (**trans-cellular**) and for another thing **between the cells** (**para-cellular**). The trans-cellular transport takes place without further interference of the cells via simple diffusion, via specialized receptors or by enclosing the substances by invaginating the cell membrane (endocytosis). The para-cellular passage through the single ephitelia layer on the other hand happens at so-called "tight-junctions". These are parts of a protein net, which envelop the cells and seal its gaps more or less. At certain positions – just at those "tight-junctions" the net allows a controlled passage of fluid and dissolved or colloid substances.

If one or even several of the above mentioned pre-conditions for a healthy intestinal system are missing, health problems will soon arise. If the intestinal microflora is not in good shape pathogens can for example spread better and cause infections. If sIgA is not available in sufficient amounts, the antigen load for the "downstream" parts of the immune system in the body increases. It becomes obvious also by the patient's increased susceptibility to infections. If the epithelia layer and its tight-junctions are not "leak-proof" too high amounts of undesired substances can pass into the body. At first the complaints arising from such dysplasia may only be located in the intestines, on long-term, however, they will spread to other organs of the body.

Intestinal Permeability and Its Significance

A well functioning intestinal absorbing capacity is essential for nourishment of the body and therefore of vital importance. On the other hand the intestinal mucosa has to protect the body from pathogenic bacteria, pollutants etc. Therefore controlled permeability of the intestines is of major importance for a person's health. If the intestinal permeability is increased, higher amounts of substances pass into the circulatory system. These increased amounts of pathogenic substances have negative effects on the body. The logical consequence is a massive reaction of the immune system against these substances: First of all the intestinal mucosa is infected and on a longer term this leads to damages of the intestinal mucosa. The permeability of the intestines increases further and a vicious circle is initiated.



In addition there are other immunological reactions: If the immune system for example fights against actually harmless food components, which pass into the body in higher amounts because of the "leaky gut". This might lead to food allergies or intolerances. And the complaints will spread. Patients with a "leaky gut" can - in the long run - produce antibodies, which link with the body's own organ surfaces and suddenly the body starts fighting itself. In plain English this means: A "leaky gut" may cause auto-immune diseases. Especially for diabetes type 1, multiple sclerosis and rheumatoid polyarthritis one has found concrete proof for such combinations in the body. But also for many other diseases one can assume that an abnormally increased intestinal permeability can be a (contributory) cause.

The Causes of Increased Intestinal Permeability

What brings about the "leaky gut", which has so far reaching consequences? First of all it is intestinal diseases, which have an effect on the permeability of the intestines. Crohn's disease and ulcerative colitis, which both come along with inflammations of the intestines, always bring about an increased permeability of the intestines. This also becomes obvious by the fact, that a respective therapy improves the conditions of the patients in most cases.
This is also similar in case of intolerances of all types. Celiac disease, lactose, fructose and other intolerances alter the intestinal permeability in the long run. Also the exocrine pancreas insufficiency (lack of enzymes for food decomposition) damages the intestinal mucosa and abnormally increases its permeability.

Infections and miscolonizations, as well as toxin and radical pollution may alter the intestines in this manner. And last but not least also psychic and physical stress affects the intestinal permeability. Caused by to many stress hormones and neurotransmitters (CRH and noradrenalin) the intestinal mucosa "bulges" (oedema formation) and this leads to an increased intestinal permeability.

CAUSES OF A "LEAKY GUT" MAY BE:

- INFLAMMABLE INTESTINAL DISEASES (ULCERATIVE COLITIS, CROHN'S DISEASE)
- CELIAC DISEASE (WORLDWIDE INCIDENCE RATE BASED ON CLINICAL SYMPTOMS: 1:3300; ACCORDING TO LABORATORY SCREENING: 1:270 INHABITANTS)
- INTOLERANDCES /FOOD INTOLERANCES (LACTOSE INTOLERANCE: INCIDENCE RATE IN EUROPE 2-65% OF THE INHABITANTS SHOWIN A NORTH-SOUTH INCREASE, I.E. FRECTOSE MALABSORPTION: INCIDENCE RATE UP TO 1/3 OF THE INHABITANTS.)
- EXOCRINE PANCREAS INSUFFICIENCY
- LACK OF SECRETORY IGA
- PSYCHIC AND PHYSICAL STRESS
- INFECTIONS AND MALCOLONIZATION (PARASITES, BACTERIAL, VIRUSSES, YEASTS)
- ALCOHOL
- MEDICATION (I.E. NSAR)
- HEAVY METALS
- RADICAL POLUTION (OXIDATIVE STRESS)

„Leaky gut“
- biovis Diagnostics

“Leaky gut” can be diagnosed with the aid of serum, urine and stool tests. The following tests are part of the testing range:

Zonulin, **Sample Material: Stool, Serum**

Zonulin is a protein which substantially participates in the regulation of the permeability of the intestinal epithelia layer’s tight junctions. If it is increased, it will lead to a “leaky gut”. Patients with active celiac disease, for example, show increased values of this protein. During the development of celiac disease, but also in case of diabetes type 1, multiple sclerosis and rheumatoid polyarthritis increased zonulin levels indicate the participation of permeable intestines.

Alpha-1-anti-trypsin, **Sample Material: Stool**

Alpha-1-anti-trypsin shows an inflammation of the intestinal mucosa, but it often is also a safe indicator of increased intestinal permeability.

Secretory IgA, **Sample Material: Stool**

sIgA might be reduced or altogether absent in case of an immune defect. There are also low values for celiac disease patients. If an immune deficiency has not been safely diagnosed, sIgA always is always a signal for intestines not functioning normally and increased mucosa permeability.

Histamine, **Sample Material: Serum**

The histamine tests show if there are food intolerances, pseudo-allergies or parasitic infections. The histamine excretion in stool is also increased under stress.

Lactulose-Mannitol-Test,

Sample Material: 24-hour urine collection

Those two sugars, which can not be decomposed for humans, are dissolved in water, drunk and later on their contents are measured in the collected urine. Lactulose passes into the body via the para-cellular path, mannitol mainly via the trans-cellular path. Para-cellular passage is amplified in case of pathologically increased intestinal permeability; the trans-cellular transport on the other hand is reduced. The quotient of the urine contents of both substances provides a safe index, if and to what extent the intestinal permeability is disordered.

Calprotectin, Sample Material: Stool

This calcium binding protein is an indicator of an invasive mucosa infection.

biovis recommends as basic diagnostics in case of suspected "leaky gut":

- **zonulin**
- **alpha-1-anti-trypsin**
- **sIgA**
- **histamine**

For further verification a

Lactulose-Mannitol-Test may be carried out.

biovis will gladly advise you which tests are important and recommendable for your special situation.
Please call us!

Tel.: +49(0)64 31. 2 12 48-0

Fax: +49(0)64 31. 2 12 48-66

info@biovis.de

biovis'
Diagnostik MVZ GmbH

Justus-Staudt-Straße 2
65555 Limburg
Tel.: +49/64 31/2 12 48-0
Fax: +49/64 31/2 12 48-66
info@biovis.de
www.biovis.de