IDK® Bile Acids

Assay for the *in-vitro* determination of bile acids in stool

- Several studies have documented bile acid malabsorption in up to 50 % of patients with chronic diarrhea (1; 2)
- Determination of bile acids in feces lays the grounds for a successful therapy

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Reveal the reason of chologenic diarrhea

with IDK® Bile Acids

Bile acids

Physiology

Bile acids are formed from cholesterol in the liver and secreted into the intestine. Because they differ in their hydroxylation and conjugation they exhibit various properties in the organism :

Classification	Nomenclature	Appearance	Function
Primary bile acids	Chenodeoxycholinic Acid (CDCA)	Synthesized in the liver, conjugation with Taurine and Glycine, storage in bile bladder, excretion into duodenum	These bile acids are present in the duodenum as ionized forms. Therefore, they are soluble in the digestive juice. In higher concentration they spontaneously form micelles, containing fatty acids and monoglycerides to make them available for digestion.
	Cholinic Acid (CA)		
Secondary bile acids	Deoxycholinic Acid (DCA)	Re-absorption into portal vein system and recycling in the liver	Enterophepatic circuit re-absorbs 95% of the bile acids in the terminal ileum via a Na+-dependent transport mechanism involving a variety of different regulators.
	Lithocholinic Acid (LCA)	Bacterial deconjugation in the colon and faecal excretion	Bile acids, which are not re-absorbed, are excreted with faeces after bacterial deconjugation in the colon.

Several studies have documented bile acid malabsorption in up to 50 % of patients with chronic diarrhea. In these patients the enterohepatic circulation of bile acids seems to be altered (1; 2). Chologenic diarrhea is the main symptom of the bile acid malabsorption syndrome.

If the hepatic de-novo synthesis of bile acids fails, a bile acid loss syndrome occurs, usually accompanied by steatorrhea and lithogenicity of the bile.

Pathophysiology and classification

Causes of chologenic diarrhea are clinical pictures which are caused by morphological changes in the organism. These include disease and resection of the ileus, such as Crohn`s disease or ileitis following radiotherapy and small bowel overgrowth syndrome, a situation where colon bacteria reach the ileum and metabolise the bile acids which hinders their re-absorption.

Besides that chologenic diarrhoea may occur without morphologic changes. This is reasoned by functional anomalies of the re-absorption in the enterohepatic circulation. The reasons are diverse and not fully understood. In literature the following causes are discussed *(1)*:

- genetic mutation in the Na+-dependent transport mechanism of the re-absorption
- accelerated transit in ileum and thus reduced re-absorption
- changes of enzymes, receptors and regulators for the re-absorption of bile acids
- anomalies in bile acid recycling

Chologenic diarrhea can arise as an adverse reaction of therapies e.g. Biguanid (Metformin) for the treatment of diabetes mellitus type 2 or polycystic ovarian syndrome.

Even in patients suffering from AIDS a chologenic diarrhoea may occur as a sign of infection or a side effect of a drug.

Diagnosing bile acid malabsorption syndrome – a comparison

Method	Advantages	Disadvantages
^{14}C glycocholate-assay		• Radiation exposure • Varying normal values • Does not differentiate BAM from small bowel overgrowth
^{75}SeHCAT	• Defined normal values	• Radiation exposure • Fasting sample • Nuclear Medicine Department only
HPLC-determination of bile acids in stool	• Detection of single bile acids	• Only in laboratories with specific equipment (HPLC, GC-MS) • Variable daily values (24h sample)
photometric determination of total free bile acids in stool ***IDK®* Bile Acids**	• Determination of total free bile acids • For routine use • No radiation exposition • Suitable for the differential diagnosis of chronic diarrhea • No additional patient appointment: → Patient takes stool sample → Practitioner sends sample to a laboratory to perform the test	

Modified according to *(1; 3)*:

➲ ***IDK®* Bile Acids: non-invasive assay for routine use in differential diagnosis of chronic diarrhea.**

Expert`s statements from literature

„Total direct costs for one irritable bowel syndrome patient per year amounted to 1548 DEM (791.48 €, comprising roughly 25 % for physician visits and tests, 50% for drugs and 25 % for hospitalization. Including indirect costs for sick leave, total costs were 1946 DEM (994.97 € per patient per year." (4)

„Therefore, from an epidemiological perspective and, because it can be specifically treated, patients presenting with irritable bowel syndrome with diarrhea (IBS-D) or chronic diarrhea should be screened for bile acid malabsorption. … measurement of fecal bile acid excretion should be done." (1)

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with IDK® Bile Acids

IDK® **Bile Acids**	
Test principle	photometric
Matrix	Stool
Sample volume	15 mg
Tests	96 Tests
Cat. No.	K 7878W

IDK® **Bile Acids** (DSX-Version)	
Test principle	photometric
Matrix	Stool
Sample volume	15 mg
Tests	96 Tests
Cat. No.	K 7878DX

K 7878DX is purpose-built for the ELISA workstation DSX (by Dynex).

IDK® **Bile Acids** (cuvette version)	
Test principle	photometric
Matrix	Stool
Sample volume	15 mg
Tests	40 Tests
Cat. No.	K 7878CV

also available:

IDK® Bile Acids (Serum)
Cat. No. K 7877W and K 7877CV (cuvette version)

Stool sample preparation system:
- filled with extraction buffer ***IDK Extract***® (Cat. No. K 6999)
- unfilled (Cat. No. K 6998SAS)

US: all products: Research Use Only. Not for use in diagnostic procedures.

Literature:

1. **Camilleri, Michael (2014)** Advances in understanding of bile acid diarrhea. *Expert Rev Gastroenterol Hepatol* 8(1):49-61
2. **Halilbasic E, Claudel T, Trauner M (2013)** Bile acid transporters and regulatory nuclear receptors in the liver and beyond. *J Hepatol* 58(1):155-68.
3. **Vijayvargiya P, Camilleri M, Shin A, Saenger A (2013)** Methods for Diagnosis of Bile Acid Malabsorption in Clinical Practice. Clinical Gastroenterology and Hepatology 11(10):1232-9
4. **Müller-Lissner SA, Pirk O (2002)** Irritable bowel syndrome in Germany. A cost of illness study. *Eur J Gastroenterol Hepatol* 14(12):1325-9