

MALABSORPTION: AN OVERVIEW



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REFERENCES
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Malabsorption is a clinical term referring to impaired absorption of nutrients.¹ It can lead to symptoms such as bloating and diarrhoea, as well as potentially more serious complications associated with nutrient deficiencies. It is, therefore, crucial that we are aware of what conditions may lead to malabsorption, so we can detect and treat it appropriately.

In normal circumstances, the gastrointestinal tract (GIT) is involved in the absorption of both macronutrients (protein, carbohydrates and fats) and micronutrients (vitamins and minerals). However, malabsorption occurs when nutrients from food cannot be absorbed properly at any point of absorption. This may be due to a variety of causes (see Table 1). As a result, malabsorption may lead to undesirable consequences such as nutrient deficiencies, and the complications associated with these may arise over time.¹

PATHOPHYSIOLOGY OF MALABSORPTION

The main purpose of the GIT is to digest and absorb nutrients. This is a complex process requiring an interaction between motor, secretory, digestive and absorptive function.² The digestion and absorption of food can be divided into three phases.

- 1 Luminal phase – dietary fats, proteins, and carbohydrates are hydrolysed and solubilised by digestive enzymes and bile salts are combined with fat to enhance their solubilisation. In more simple terms, nutrients are broken down and micronutrients are released from the food we eat.

Table 1: Causes of malabsorption⁵

Mechanism of malabsorption	Conditions
Impaired mixing	Partial/total gastrectomy Gastric bypass surgery
Impaired lipolysis	Chronic pancreatitis Pancreatic cancer Congenital pancreatic insufficiency Gastrinoma
Impaired micelle formation	Liver disease Bacterial overgrowth Crohn's disease Gastrinoma
Impaired mucosal absorption	Lactase deficiency Coeliac disease Tropical sprue AIDS Whipple's disease Radiation enteritis Short bowel syndrome Mastocytosis
Impaired nutrient delivery	Lymphoma Tuberculosis Severe congestive heart failure
Unknown	Hypothyroidism Adrenal insufficiency Hyperthyroidism Carcinoid syndrome

CONDITIONS & DISORDERS

Table 2: Diseases and conditions that may lead to malabsorption and how to treat them dietetically.⁹

Disease/condition	Treatment
Coeliac disease	Gluten-free diet +/- vitamin and mineral supplementation, eg, calcium, iron. Secondary lactose intolerance may occur and can be addressed with a temporary exclusion diet.
Lactose intolerance	Lactose exclusion diet with appropriate dairy replacements, eg, lactose-free baby formulas in infants, suitable dairy alternatives and weaning advice for young babies. Appropriate calorie and calcium intake should be monitored across the lifespan.
Pancreatic insufficiency eg, in Cystic fibrosis (CF) or pancreatic cancer	Protease and/or lipase replacement therapy. Advice and guidance regarding their use and dietary considerations should be provided. High calorie supplements may be required. In CF patients fat soluble vitamins are routinely prescribed. Enteral nutritional support is sometimes required.
Inflammatory bowel disease eg, Crohn's disease, ulcerative colitis or pouchitis	Elemental feeds or liquid diets may be used to promote bowel rest and remission, administered orally or via enteral feeds. Vitamin and mineral supplementation may be necessary, eg, regular vitamin B12 injections and iron supplementation. Corticosteroids and/or anti-inflammatory agents, such as mesalamine. Immunosuppressants, eg, azathioprine and Infliximab. Probiotics may be considered but there is limited evidence for their use. However, they may be useful in the management of pouchitis and ulcerative colitis.
Short gut syndrome	If there has been extensive intestinal disease or resection, parenteral nutrition may be necessary. High calorie supplements may be useful for some patients along with vitamin and mineral supplements, eg, fat soluble vitamins, electrolytes, B12 and iron. Antibiotics may be prescribed for bacterial overgrowth.
Liver disease¹¹ eg, biliary atresia	Medium-chain triglycerides (MCT) based feeds and oil are used in patients experiencing poor weight gain as a consequence of fat malabsorption. MCTs are more easily absorbed and don't require the body's usual process for fat metabolism, eg, micelle formation is not required for absorption and they are transported via the portal route rather than via the lymphatic system. Fat-soluble vitamin supplements are required for patients with fat malabsorption. Oral and/or enteral nutritional support may be required.
Chylothorax¹²	60-70% of fat flows through the lymphatic system after digestion in the intestinal lumen. In chylothorax a fistula between the thoracic lymph duct and the plural cavity means that chyle is transferred in to the plural cavity rather than to body's cells. Minimal long-chain triglycerides (LCT) feeds and/or diet with MCT are given. High calorie juice based supplements are used in older children and adults.

- Mucosal phase – nutrients are absorbed at the brush-border membrane of the intestinal epithelial cells. Digested products are then transported from the lumen into the cells where they are needed.
- Postabsorptive phase – reassembled lipids and other nutrients are transported throughout the body via portal circulation and the lymphatic system. These will either be used or stored for future use.¹

If there are disturbances to any of these stages, malabsorption may arise. This may be due to pathological interference with the normal physiological sequence of digestion, absorption,

and transport of nutrients.¹ Disturbances may include disease of the mucosa, conditions leading to acquired damage of the mucosa, congenital defects in the intestinal membrane transport systems, impaired absorption of specific nutrients, impaired GI motility, disrupted bacterial flora, infection, or compromised blood flow or compromised lymphatics.³ The aetiology of such disturbances will determine the type and severity of symptoms and if the situation is acute or chronic.

WHAT CAUSES MALABSORPTION?

Certain disorders, infections and surgeries can cause malabsorption. Table 1 outlines the mechanism of malabsorption and which

conditions may cause this. It is worth noting that impairment may be a single nutrient or several depending on the cause. This is known as specific or global malabsorption. Malabsorptive disorders, such as coeliac disease, impair the absorption of most nutrients, vitamins and trace minerals (global malabsorption), whereas other disorders, such as pernicious anaemia, only affect one nutrient (partial malabsorption).⁴

WHAT ARE THE SYMPTOMS?

Symptoms of malabsorption arise when unabsorbed nutrients pass through the digestive tract⁶ and will vary depending on the cause, severity, condition and how long a patient has had the disorder causing malabsorption. The most common symptoms of malabsorption are chronic diarrhoea, weight loss and anaemia.⁷ Other symptoms may also include the following:

- Abdominal distension/pain
- Increased gas
- Fatigue
- Impaired growth in children
- Greasy stools
- Steatorrhea (blood in the stool)
- Other symptoms related to micronutrient deficiency (eg, bone pain following calcium/vitamin D deficiency)

DIAGNOSIS OF MALABSORPTION SYNDROME⁷

Malabsorption is usually apparent following a detailed patient history. It should always be suspected in patients with chronic diarrhoea, weight loss and anaemia. In some cases, the underlying cause may be obvious, and appropriate testing should be carried out to provide a diagnosis and subsequent treatment. For example, in a patient who reports symptoms of chronic diarrhoea and dermatitis herpetiformis worsened by a gluten-containing diet, coeliac disease should be suspected, and appropriate testing should be carried out by relevant members of the medical team. However, in cases where there is no obvious cause, blood tests can be used as a screening tool as results may suggest a diagnosis and direct further information.

Other methods of testing may include the following:⁸

- Stool tests – too much fat in the stool may indicate fat malabsorption.

- Breath tests – these can be used to test hydrogen levels. High levels of hydrogen may suggest lactose intolerance. This is because if lactose isn't being absorbed, it enters the colon and bacteria in the colon break down lactose and produce hydrogen gas. The excess hydrogen is absorbed into the bloodstream and taken to the lungs to be exhaled.
- Other tests such as endoscopies, contrast x-rays, or CT scans can be carried out, eg, a CT scan may be used to look at the walls of the small intestine. If this is thickened, it may be a sign of Crohn's disease.

TREATMENT

Treatment options are variable as it completely depends on the cause of malabsorption. The underlying disease should be treated and dietary advice to resolve symptoms should be provided. It goes without saying that malabsorption caused by lactose intolerance will be treated very differently to malabsorption caused by coeliac disease. Table 2 provides examples of diseases or conditions and dietetic treatment options in malabsorption.

EPIDEMIOLOGY

Malabsorption is affecting millions of people worldwide,³ but estimating malabsorption is very difficult, as multiple causes obscure the prevalence and incidence of cases. However, the epidemiology of subgroups can be estimated. For example, for individuals with chronic pancreatitis, incidence of malabsorption is 85% in those with severe disease and 30% in those with mild disease.¹⁰

CONCLUSION

Malabsorption can have a huge impact on a patient's quality of life. It is therefore crucial to treat all conditions that may lead to malabsorption seriously and treat symptoms as soon as possible. This will reduce side effects and long-term complications experienced by the patient and lead to better overall health, whilst providing patient-centred care. Furthermore, investigating possible food intolerances and associated malabsorption issues may lead to reduced costs in interventions due to use of dietary therapy instead of potentially unnecessary and costly drug treatments.