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MALABSORPTION: AN OVERVIEW

Malabsorption is a clinical term to describe any defects occurring during the digestion of food and the absorption of nutrients. Depending on the cause, the digestion or absorption of single or multiple nutrients can be affected.

In lactose intolerance and the digestion of a single nutrient, lactose, is affected. However, for example, in coeliac disease, the digestion and absorption of several nutrients are affected.

There are a wide range of symptoms related to malabsorption, with abdominal discomfort, bloating, flatulence, diarrhoea and weight loss being commonly reported by patients. Nutritional intervention is

often required to manage malabsorption, including the use of exclusion diets, nutritional support and use of specialist nutritional products and/or supplements. In some cases, pharmaceutical intervention is also required. The intervention will depend on the definitive cause of the malabsorption.

Common causes of malabsorption are listed in Table 1.

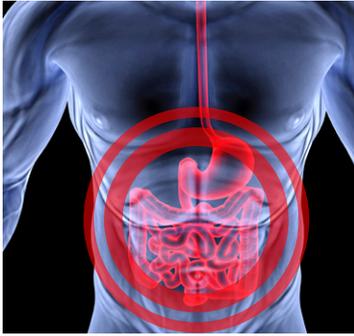
Table 1: Causes of malabsorption (adapted from Ruiz Jr AR)¹² (continued overleaf)

Dysmotility, e.g. inadequate gastric mixing, rapid emptying, or both	Gastrectomy Gastrojejunostomy Gastroparesis Vagotomy
Digestive enzyme or bile deficiencies	Biliary obstruction and cholestasis Cirrhosis Chronic pancreatitis Cholestyramine-induced bile acid loss Cystic fibrosis Lactase deficiency Pancreatic cancer Pancreatic resection Sucrase-isomaltase deficiency
Abnormal intestinal environment	Abnormal motility secondary to diabetes, scleroderma, hypothyroidism, or hyperthyroidism Bacterial overgrowth Diverticulitis Zollinger-Ellison syndrome (lowered duodenal pH)



It's the little things...





There are various stages of malabsorption depending on which point it occurs in the normal process of digestion and absorption within the gastrointestinal tract.

Table 1: Causes of malabsorption (*continued*)

Acutely abnormal epithelium	Acute intestinal infections Alcohol Antibiotic therapy, e.g. neomycin
Chronically abnormal epithelium	Amyloidosis Coeliac disease Crohn's disease Ischemia Radiation enteritis Tropical sprue Whipple disease
Short bowel syndrome	Intestinal resection, e.g. for Crohn's disease, NEC in neonates Jejunioileal bypass for obesity
Impaired transport of nutrients during the postabsorptive stage	Abetalipoproteinemia or Bassen-Kornzweig syndrome (rare autosomal recessive disorder that interferes with the normal absorption of fat and fat-soluble vitamins) Addison's disease Blocked lacteals due to lymphoma or TB Intrinsic factor deficiency found in pernicious anaemia Lymphangiectasia Chylothorax

It is important to understand the mechanism of malabsorption in order to realise the impact it may have on the health of the patient. There are various stages of malabsorption depending on which point it occurs in the normal process of digestion and absorption within the gastrointestinal tract. In the normal digestion and absorption process there are 3 stages¹:
Luminal - where digestive enzymes and bile break down dietary fats, proteins and carbohydrates;
Mucosal - where the brush border membrane,

found within the epithelial cells of the intestine, transport digested matter to the body's cells from the intestinal lumen;

Postabsorptive - here nutrients are transported around the body to its cells via the circulatory and lymphatic systems.

Disruption of the digestive or absorption process and/or capability during any of these stages leads to malabsorption. If the intestine's ability to absorb certain nutrients is disrupted an osmotic load leads to presenting symptoms.

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Table 2: Common symptoms found in malabsorption

Symptom	Comment
Abdominal²⁻⁵	
Diarrhoea	Very common complaint. Frequent loose stools as a result of the osmotic load present within the intestine.
Steatorrhoea	A consequence of fat malabsorption. Patients experience pale, bulky, and offensive stools, which are difficult to flush away. Commonly observed in pancreatic insufficient cystic fibrosis patients when PERT (Pancreatic Enzyme Replacement Therapy) is not effectively managed or taken by the patient.
Flatulence and abdominal distention	Unabsorbed food is subject to bacterial fermentation. Gaseous products such as hydrogen and methane cause flatulence. Abdominal distention and cramps caused by excess wind within the intestine.
Other areas of the body	
Weight loss/faltering growth	Prevalence of weight loss may vary but can be significant. Some patients may have an increased calorie intake which may mask weight loss from malabsorption.
Anaemias	Iron deficiency anaemia often is a manifestation of coeliac disease ⁶ . Microcytic (iron deficiency) or macrocytic (vitamin B-12 deficiency) ¹ . Crohn's disease or ileal resection can cause megaloblastic anaemia due to vitamin B-12 deficiency.
Oedema	Peripheral oedema caused by hypoalbuminemia when there has been chronic protein malabsorption or from loss of protein into the intestinal lumen. Protein losses can be caused by extensive obstruction of the lymphatic system, seen in intestinal lymphangiectasia and HIV. Ascites can develop when there is severe protein losses.
Clotting disorders	Vitamin K malabsorption and subsequent hypoprothrombinemia can lead to complications in blood clotting.
Bone complications	Vitamin D deficiency may lead to osteopenia or osteomalacia. Easy fracture of bones and bone pain. Secondary hyperparathyroidism can be caused by the malabsorption of calcium.
Neurological presentations	Malabsorption of vitamins B5 (pantothenic acid) and D can cause generalised motor weakness. Peripheral neuropathy due to B1 (thiamine), B6 (pyridoxine) and B12 (cobalamin) malabsorption. Other complications can include night blindness (vitamin A), seizures (biotin). Loss of sensations such as vibration and position may be due to B12 (cobalamin) deficiency. B12 deficiency also causes breathlessness and fatigue. Hypocalcemia and hypomagnesemia, due to electrolyte malabsorption can lead to tetany.

DIAGNOSIS

There is a vast array of tests which are performed to diagnose malabsorption and its underlying causes. A good general overview can be found at: British Society of Gastroenterology: Tests for malabsorption.¹⁰

MANAGEMENT AND TREATMENT

When treating a patient who is experiencing

malabsorption, there are two approaches to consider:

- Treat the underlying disease, e.g. coeliac disease;
- Provide nutritional support to correct deficiencies, encourage adequate growth in children and prevent weight loss in adults.

Table 3: Examples of underlying diseases and treatment in malabsorption

Disease/condition	Treatment
Coeliac disease	Gluten-free diet +/- vitamin and mineral supplementation, e.g. 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, e.g. 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, e.g. 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. ¹³ In CF patients fat soluble vitamins are routinely prescribed. Enteral nutritional support is sometimes required.
Inflammatory bowel disease, e.g. 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, e.g. regular vitamin B12 injections and iron supplementation. Corticosteroids and/or anti-inflammatory agents, such as mesalamine. Immunosuppressants, e.g. 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. ¹⁴
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, e.g. fat soluble vitamins, electrolytes, B12, iron. Antibiotics may be prescribed for bacterial overgrowth.
Liver disease, e.g. biliary atresia ¹⁵	MCT (medium-chain triglycerides) 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, e.g. 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.
Chylothorax ¹⁶	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 pleural cavity rather than to body's cells. Minimal LCT feeds and/or diet with MCT are given. High calorie juice based supplements are used in older children and adults.

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Questions relating to: *Malabsorption: an overview*

Type your answers below and then **print for your records** or print and complete answers by hand.

Q.1	What is clinical malabsorption?
A	
Q.2	Describe the causes of malabsorption.
A	
Q.3	Explain the three stages of the absorption process.
A	
Q.4	Describe the common abdominal symptoms of malabsorption.
A	
Q.5	How does malabsorption cause oedema?
A	
Q.6	What are the neurological presentations of malabsorption?
A	
Q.7	Explain the treatment required for malabsorption in IBS.
A	
Q.8	What is chylothorax and how is it treated?
A	
Q.9	Describe the two main approaches to the dietetic management of malabsorption.
A	
Please type additional notes here . . .	