

Nutritional management of Crohn's disease [Extract]

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Introduction

Crohn's disease (CD) is a chronic, relapsing, inflammatory disease, associated with malnutrition in 20–85% of patients [[Goh and O'Morain, 2003](#)], particularly, but not confined to, those with small bowel disease. Nutritional deficiencies result from reduced oral intake, malabsorption, medication side effects and systemic inflammation due to active disease.... Nutritional care and therapy forms an integral part of the management of patients with Crohn's disease (CD).

Role of diet and Crohn's development

There have been several attempts to use epidemiological data to link dietary factors to onset of CD. *A meta-analysis suggested a positive association between high intake of fat, polyunsaturated fatty acids, ω6 fatty acids and meat with risk of developing CD, while higher fruit and fibre intakes appeared to be protective* [[Hou et al. 2011](#)]. However, data are very heterogeneous with predominantly retrospective dietary histories, so it is difficult to clarify the strength of any association.

A variety of dietary modifications and measures have been evaluated in maintaining CD remission. For example, *fish oils*, which are a major source of ω3 fatty acids, have been shown to have specific anti-inflammatory properties in a variety of diseases [[Wall et al. 2010](#)]. However, a Cochrane review of six trials failed to demonstrate a clear clinical benefit of using fish oils in CD maintenance [[Turner, 2009](#)]. Though pooled results from all studies favoured the use of ω3 fatty acids (RR 0.77, 95% CI 0.61–0.98, p = 0.03), a combination of all studies showed statistically significant heterogeneity.

Dietary modifications, including elimination–reintroduction diets and a low fermentable, oligosaccharides, disaccharides, monosaccharides and polyols (FODMAP) diet may improve symptoms but there are currently

no data to suggest that these approaches have any role in the induction or maintenance of remission.

FODMAP diets have been shown to be efficacious in patients with irritable bowel syndrome [[Staudacher et al. 2011](#)], and it is likely that they also reduce functional symptoms in patients with CD, possibly by reducing the osmotic load and bacterial fermentation associated with the food delivered [[Gibson and Shepherd, 2010](#)], rather than having a primary anti-inflammatory effect.

Nutrient deficiency

Micronutrients refer to trace minerals and vitamins required in minute quantities, as opposed to macronutrients, required in larger amounts (fats, carbohydrates, proteins, calcium, phosphate and magnesium etc).

Consequences of micronutrient deficiencies range from overt clinical syndromes, including anaemia (due to deficiencies in *iron, B12 and folate*), osteomalacia (*vitamin D*), peripheral neuropathy (*vitamin E*), night blindness (*vitamin A*), beriberi (*thiamine*) and stomatitis or glossitis (*vitamin B groups*). In many cases, however, patients with micronutrient deficiencies present with nonspecific symptoms such as fatigue and depression.

Iron deficiency anaemia is the most common 'extra-intestinal' manifestation of inflammatory bowel disease (IBD), with prevalence rates ranging from 36% to 88% [[Gisbert and Gomollon, 2008](#); [Gerasimidis, 2011](#)]..... Indeed, when choosing the dose of oral *iron* to administer, it is important to recognize that a maximum amount of 10–20 mg can be absorbed from the gastrointestinal tract (proximal small bowel) [[Rimon et al. 2005](#)]. Vitamin B12 deficiency occurs in approximately one-fifth of patients with CD [[Yakut et al. 2010](#); [Headstrom et al. 2008](#)], although this will clearly be higher in patients with loss of absorptive terminal ileal surface due to disease activity or after surgical resection.....

Low serum and red cell folate levels have been reported in up to 28% of patients, particularly in those with active disease [[Elsbourg and Larsen, 1979](#); [Hoffbrand et al. 1968](#)], though more recent studies using modern laboratory techniques put this much lower at 4.3% [[Oldenburg et al. 2000](#)]..... Observational studies suggest that folate supplementation may be associated with reduced colorectal neoplasia in IBD [[Lashner et al.](#)

[1997](#)], and the recently published British Society of Gastro-enterology guidelines [[Cairns et al. 2010](#)] note that folate supplementation may be beneficial, especially in patients who may have folate deficiency due to sulphasalazine therapy.....

Malabsorption rather than dietary insufficiency is the likely main underlying mechanism leading to fat-soluble vitamin deficiencies [[Kuwabara et al. 2009](#)] which, in turn, can be associated with metabolic bone disorders [[Kuwabara et al. 2009](#)]. Vitamin D deficiency can, of course, result in osteomalacia.... Vitamin deficiencies, including *vitamin K*, are associated with reduced bone density.... Depletion of vitamin A stores can occur in patients with CD in the absence of any clinical manifestations of this vitamin deficiency, such as night blindness [[Bousvaros et al. 1998](#)].... However, deficiency of vitamin E leading to peripheral neuropathy is a rare clinical occurrence [[Bousvaros et al. 1998](#)]. Factors that compromise *protein energy* nutrition in CD include poor oral intake, malabsorption from active disease or following surgery, hypercatabolism due to active inflammation, and side effects from different treatment strategies.

Nutrition support

Oral nutritional supplementation

For patients with CD who are malnourished, or at risk of malnutrition, oral nutritional supplements (ONS) can be well tolerated, allowing individuals to meet their nutritional requirements with resultant improvements in anthropometry [[Harries et al. 1983](#)]. European Society for Clinical Nutrition and Metabolism (ESPEN) guidelines recommend up to 600 kcal/day in the form of ONS, suggesting this to be beneficial [[Lochs et al. 2006](#)].

Distinct from treatment of malnutrition is a role for nutrition as a primary therapy in CD. This was initially postulated in adults in 1973, when a small series of patients with CD treated with an elemental diet were demonstrated to have reduced Crohn's activity, in addition to improved nutrition [[Voitk et al. 1973](#)].

Elemental nutrition

Elemental feeds consist of nutrition in its simplest form, for example, single amino acids, as opposed to oligopeptide ‘semi-elemental’ or full protein polymeric feeds. Elemental feeds were originally designed by the National Aeronautics and Space Administration (NASA) as easily digestible, water-soluble foods that produced smaller faecal bulk when consumed in space [[Winitz et al. 1965](#)].

There is clear evidence that *elemental feeds* have a primary anti-inflammatory effect in CD, with evidence of improved intestinal permeability [[Teahon et al. 1991](#)], reduced inflammatory cytokine production [[Yamamoto et al. 2005](#); [Sanderson and Croft, 2005](#)] and mucosal healing [[Yamamoto et al. 2005](#)], although only when given exclusively [[Johnson, 2006](#)].

Enteral nutrition (EN)

If daily nutritional requirements are not adequately met by oral intake, alternative routes such as enteral tube feeding can be used in patients to achieve target intake. In a group of growth-retarded adolescents with CD, nocturnal tube feeding of 1–1.5 liters of non-elemental feed improved weight gain and growth [[Aiges et al. 1989](#)].

There is evidence to suggest that EN can induce and maintain remission in children and adults with CD [[Zachos et al. 2007](#)] but not with UC [[Lochs et al. 2006](#)]. Though corticosteroids are often used in adults to induce remission, it is important to recognize that these medications carry significant risks and do not necessarily lead to mucosal healing [[Rutgeerts, 2001](#)].

EN is often used as first-line therapy to induce remission in children [[Lochs et al. 2006](#)], not least because this approach is associated with growth and minimal side effects compared with steroids [[Belli et al. 1988](#)] and may be associated with mucosal healing [[Borrelli et al. 2006](#)], although this has not been confirmed [[Afzal, 2004](#)]. By contrast, EN may be underused as a primary therapeutic option in adults, partly due to compliance issues.

Conclusion

Nutritional deficiencies in patients with CD are common. Nutritional support should be provided...wherever possible.

It is important that use of malnutrition screening tools, such as MUST [[Elia, 2003](#)] is embedded into routine practice. In addition, there should be a low threshold to investigate for specific micronutrient deficiencies, particularly common abnormalities such as iron deficiency anaemia.

IBD standards state all patients should have access to dietitians, both for nutritional support and consideration of primary therapy [[IBD Standards Group, 2009](#)]. Although the first IBD audit demonstrated low rates of uptake, more recent data suggest this has improved, at least when considering availability of dietitians, which is reported to be in 97% of hospital sites taking part in the audit [[Royal College of Physicians, 2011](#)].

Read the review in full <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3625021/>