DigestaVite Plus

herbs and nutrition for digestive health

"There is a lot of truth in the naturopathic belief that all diseases start in the gut. Homoeostasis depends on the dynamic balance between gut microflora, the mucosal barrier and the immune system"

Herbs and Nutrients for a Healthy Gut

The gut is constantly confronted with a large array of antigens and the mucosal immune system has to prevent dissemination and proliferation of potentially harmful agents, while sparing the vital structures of the intestine from immune-mediated destruction.1 The terms 'microflora' and 'microbiota' refer to the community of living micro-organisms in an individual. Gut bacteria include native species acquired at birth and soon after, and transient bacteria which are continuously being ingested from the environment. Acid, bile and pancreatic secretions kill most ingested microbes, therefore very low numbers of bacteria exist in the stomach and small intestine compared to the large intestine. An adult individual may have 500 different species of bacteria, with 30-40 comprising up to 99 per cent of the total population. The dominant genera are the Bacteroides and Bifidobacterium. Data even suggest that each individual harbours unique strains.2

Primary Functions of the Microflora

Microflora have three primary functions, metabolic, protective and trophic.2

1. Metabolic

The microflora is involved with the fermentation of non-digestible dietary substrates and endogenous mucus. Fermentation of carbohydrates is a major source of energy in the colon for bacterial growth, production of short chain fatty acids and the active absorption of calcium, magnesium and iron. Metabolic functions also include the production of vitamins K, B12, biotin, folic acid and pantothenate (B5), and synthesis of amino acids from ammonia and urea. At the same time, potentially toxic compounds including ammonia, amines, phenols, thiols and indols may be produced by the microflora.

2. Protective

The protective functions of the microflora include the barrier effect that prevents invasion by pathogens. The resident bacteria known as commensal bacteria, secrete antimicrobial substances including bacteriocins, which inhibit the growth of other bacteria. The bacteria must also compete for food.

3. Trophic

Gut bacteria control the proliferation and differentiation of the epithelial cells lining the gut wall. Bacteria also play an essential role in the development of the immune system. Comparison of animals bred under germ-free conditions to normal animals suggests that the microflora is involved with metabolic, anatomical and physiological functions. Organ weights

(heart, lung and liver), cardiac output, intestinal wall thickness, intestinal motor activity, serum gamma-globulin levels and lymph nodes have been shown to be reduced or atrophic in germ-free animals.

The Gut and the Immune System

Homoeostasis depends on the dynamic balance between the microflora, the mucosal barrier and the immune system. In response to invading bacteria, signals converge to activate NF-Kappa B and other factors, which start the transcription responsible for the synthesis of pro-inflammatory proteins. Then epithelial cells are stimulated to secrete mediators including chemo-attractants for neutrophils and pro-inflammatory cytokines, enzymes for the production of nitric oxide, prostaglandins and leukotrienes. In other words, the epithelial cells generate a full immunological and inflammatory response. Acquired immune responses develop in the gut-associated lymphoid tissues (GALT) located in the Peyer's patches, lymphoid follicles, lamina propira and surface epithelium. GALT is associated with the production and activation of T and B lymphocytes, including sIgA and sIgG antibodies. About 70 per cent of all the lymphocytes of the animal body are concentrated in the GALT. According to the hygiene hypothesis, the increasing incidence of allergy in western countries may to some extent be explained by the reduced microbial load in early infancy.2

CLINICAL INFORMATION

Dysbiosis and Associated Diseases

Dysbiosis is defined as excess bacterial colonisation of the gut leading to disease and is associated with:

Antibiotic-associated diarrhoea due to excess

- Clostridium difficile
- Irritable bowel syndrome (IBS)
- Mucosal barrier dysfunction (leaky gut) associated with sensitivities, allergies and infections
- Inflammatory bowel disease (IBD) including ulcerative colitis and Crohn's disease

The Intestinal Barrier

The intestinal barrier comprises a monolayer of epithelial cells and displays a number of specialised protective adaptations. These include the formation of tight junctions that seal the intestinal lumen, a special coating of the surface and the secretion of mucins, and antimicrobial agents. All of these prevent access by micro-organisms to the intestinal mucosa. Goblet cells secrete mucus (mucin glycoproteins) that forms a viscous, gel-like film at the epithelial surface. The mucus adds to the physical barrier and prevents firm adhesion of bacteria to the epithelial cells. Paneth cells at the base of the crypt in the small intestine secrete microbicidal defensins and other antibacterial products. Paneth cells are also found in the colon during chronic inflammatory conditions. The tight junctions only permit a very small number of bacteria to penetrate the intestinal epithelium. Occasionally, commensal flora and luminal antigens can breach the epithelial barrier and invade the mucosa. However, the innate and adaptive immune components described above are normally capable of preventing excessive inflammatory reactions. Significant defects in the epithelial barrier however, are associated with the development of allergies, IBD and autoimmune diseases.2

Inflammatory Bowel Disease (IBD)

IBD mainly consists of two clinical entities: ulcerative colitis where only the mucosa of the large intestine is affected, and Crohn's disease which can occur anywhere in the GIT. It is generally accepted that several environmental, microbial, immunological, genetic and lifestyle factors play a role in the initiation of the disease. However, it seems likely that atypical immune reactions to viral or bacterial infections, or dietary antigens are a major factor.1

Allergic Diseases

Despite the evolution of the selectively permeable epithelial barrier in the intestine, up to two per cent of ingested food antigens are absorbed by the follicle-associated epithelium M cells overlying the Peyer's patches and by the intestinal epithelial cells. These antigens however infrequently induce clinical symptoms. The healthy mucosal immune system generally suppresses the reaction to harmless foreign antigens from food protein and commensal bacteria. Food allergy may result from a failure in oral tolerance of dietary antigens while they are being ingested. Typically this will be to food proteins that are resistant to digestion. An altered barrier function of the gut epithelium, including a developmental immaturity of

components of the gut barrier (enzymatic activity and sIgA) in early animal life, may be responsible for the observed increase in allergies.1

Herbs and Nutrients for the Digestive System

Glutamine

Glutamine is an important intermediate in a large number of metabolic pathways.3 It represents metabolic fuel for the cells of the GIT.4 All proliferating cells, mainly those of the immune system, solely depend on the availability of glutamine as an energy source.3 Glutamine is also a precursor for glutathione synthesis5 and is a vital nutrient used in severe acute diabetes mellitus, sepsis and trauma. Recent studies indicate that glutamine is an essential dietary component for the maintenance of gut metabolism, structure and function, particularly during critical illness when the gut mucosal barrier may become compromised.6 Glutamine has been shown to exert beneficial effects on the mucosa by stimulating the proliferation of the crypt cells.7

It also modifies the endogenous inflammatory responses by decreasing the release of pro-inflammatory cytokines (IL-8, TNF-a) by polymorphonuclear leukocytes, while increasing the anti-inflammatory IL-10.3,8 In patients with IBD and neoplastic disease, glutamine has been shown to maintain intestinal permeability and villous height.9,10

Slippery Elm (Ulmus rubra)

Slippery Elm inner bark is demulcent, emollient, mildly astringent and nutritive. It is used in traditional medicine for the treatment of inflammation and ulceration of the GIT, diarrhoea, convalescence, coughs and sore throat.11,12 Slippery Elm contains a unique combination of soluble and insoluble fibre making it an ideal herb for maintaining GIT health. The term 'mucilage' is used to refer to these compounds like gums, that form gelatinous solutions when mixed with water, and is therefore a water-soluble fibre. Slippery Elm is invaluable as a prebiotic as part of a bowel flora protocol to manage dysbiosis.

Inulin and Acacia Gum

Inulin is a term applied to a blend of fructose polymers, which are found as storage carbohydrates in plants. Inulin and oligofructose are present in a number of vegetables and plants including wheat, onion, bananas, garlic and chicory. Oligofructose is a subgroup of inulin. Inulin and oligofructose are not digested in the upper GIT and therefore have a reduced caloric value. They do not lead to a rise in serum glucose or stimulate insulin secretion.13 Inulin and oligofructose influence intestinal function by increasing stool frequency and weight, as well as decreasing faecal pH, which has been linked to suppression of the production of putrefactive substances in the colon. Additionally, they reportedly decreased serum triglycerides and blood cholesterol levels in hypercholesterolaemic patients.13 Inulin and oligofructose are also prebiotics14 because they are non-digestible food ingredients that selectively stimulate growth and/or activity of a number of potentially health-stimulating intestinal bacteria. Inulin stimulates the growth of intestinal bifidobacteria, allowing them to out compete potential detrimental organisms. Bifidobacteria inhibits the growth of harmful bacteria, stimulates components of the immune system and aids the absorption of calcium, magnesium, iron and zinc, and the synthesis of B vitamins.13 Acacia gum is a soluble dietary fibre, consisting mostly of arabic acid which becomes arabinose, galactose and arabinosic acids upon digestion. Acacia gum also acts as a demulcent.15

Greenfoods and Cruciferous Vegetables

These functional foods contain high concentrations of whole food nutrients including vitamins, minerals, gamma-linoleic acid, selenium and amino acids.16,17

Spinach and green leafy vegetables provide high levels of carotenoids such as lutein, as well as minerals including calcium, magnesium and iron, which are released from the food matrix by the action of digestive enzymes.17

Beetroot contains vitamins A, B, C, carotenoids, minerals and fibre, and also facilitates digestion.18
Parsley contains apigenin and other flavonoids with anti-inflammatory and antioxidant activities.19,20

Flavonoids may also stimulate phase 2 detoxification enzyme activity by promoting the excretion of potentially toxic or carcinogenic chemicals.21

Broccoli is a good source of selenium,22 has antioxidant activity and stimulates both phase 1 and phase 2 enzymes in the liver.23

The astringent tannins in **Green Tea** (Camellia sinensis) can produce antidiarrhoeal effects and the polyphenols may increase the level of Lactobacillus and Bifidobacter.24 Catechins and theanine in Green Tea have anti-inflammatory effects and increase fat metabolism, resting energy expenditure and cellular thermogenisis.25,26

Grape Seed (Vitis vinifera) proanthocyanidins and flavonoids exhibit significant antioxidant effects, providing protection against reactive oxygen species, free radical-induced lipid peroxidation and DNA damage.27,28

Chlorella contains substantial amounts of lipids, including fatty acids, particularly polyunsaturated fatty acids, protein, chlorophyll, carotenoids, vitamins, including vitamin B12 and vitamin K, minerals, and unique pigments.29 Chlorella is used to boost the immune system and detoxification, and has anti-inflammatory, antioxidant and cholesterol-lowering effects.29 Chlorella is a chelator, and has been shown to increase the faecal and urinary excretion of cadmium associated with 'itai-itai' disease (caused by cadmium poisoning).30 More recent studies have shown that chlorella protects against cadmium-induced oxidative damage.31 In a clinical study, 23 pregnant Japanese women who took chlorella supplements during pregnancy had approximately 30 per cent lower dioxin total toxic equivalents in their breast milk compared with controls ($p = 0.0113$).32 A recent study suggests that the nutritious algae Chlorella might be helpful in the treatment of fibromyalgia. In this double-blind, placebo-controlled trial 37 people with fibromyalgia were given either placebo or chlorella supplements at a dose of 10 g daily. At the end of three months, individuals were switched to the opposite group, and then treated for an additional three months. The results showed significant improvements in symptoms when participants used chlorella as compared to placebo.33

Spirulina contains high levels of B vitamins, betacarotene, other carotenoids and minerals, including calcium, iron, magnesium, manganese, potassium and zinc. It is also a source of gamma-linolenic acid (GLA).34

Milk Thistle (Silybum marianum) and Ginger (Zingiber officinale)

Milk Thistle is a liver tonic with anti-inflammatory, antioxidant and hepatoprotective activities. The active constituent Silymarin has a glutathione-sparing effect by maintaining the levels of this important antioxidant in the liver and inhibiting lipid peroxidation. Silymarin is a potent inhibitor of tumour necrosis factor (TNF).

Ginger contains the active constituents, ginerol, gingerdione and shogaol which have a variety of pharmacological properties including anti-inflammatory, warming, digestive and antiemetic actions.

B-Group Vitamins

Bowel dysbiosis can cause a deficiency in biotin. Biotin containing enzymes are involved in fatty acid synthesis, gluconeogenesis and metabolism of certain amino acids and cholesterol.35 Thiamine (B1), Nicotinamide (B3), Pantothenate (B5) and Pyridoxine (B6) are essential for a range of enzymes responsible for the production of energy from food. Riboflavine (B2) is a cofactor of flavocoenzymes critical for the metabolism of carbohydrates, fats and proteins. In conjunction with the cytochrome P-450 pathway, flavocoenzymes also participate in the metabolism of drugs and toxins. Cyanocobalamin (B12) is required by the biochemical reactions involved in the production of energy from fats and proteins. Vitamin B12 and folate are required for the function of the folate-dependent enzyme, methionine synthase. This enzyme is required for the synthesis of methionine from homocysteine.36

Cholecalciferol, Betacarotene, Vitamins C and E

Vitamin D regulates cellular differentiation of intestinal cells and maintains optimum serum calcium and phosphorus concentrations by enhancing the efficiency of the small intestine to absorb these minerals from the diet.37 Betacarotene plays a central role in epithelial cell integrity and immune competence. It facilities the synthesis of cell proteins and membranes and helps maintain the barrier function of the GIT.38 Vitamins C and E are antioxidants involved in the activation of the immune system and prevention of inflammation.

Minerals

Magnesium is involved in neuromuscular transmission and activity, smooth muscle relaxation, production of gastric HCl, as a laxative and an enzyme cofactor. Calcium is essential for muscle contraction, neuromuscular transmission and skeletal system maintenance and has a protective effect on bowel epithelium.39 Zinc plays a part in the maintenance of normal intestinal permeability. It inhibits stress-induced release of vasoactive agents from gastric mast cells, maintaining the defence against mucosal inflammation and degradation. Zinc is a cofactor in multiple enzyme systems, immunity and in wound healing.38

Synergistic Combination DigestaVite Plus

The above herbs, green vegetables, superfoods and multi-nutrients in combination make a potent formulation, DigestaVitePlus, for improving digestion, gut repair and liver detoxification by:

- Aiding healthy digestion and liver function
- Assisting with mucous membrane support and nutrient absorption
- Acting as a liver tonic and trophorestorative
- Providing vitamin and mineral supplementation to support metabolism, digestion and liver detoxification.

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