dnagut

Welcome

Sample Report

to your personalised DNA Gut report

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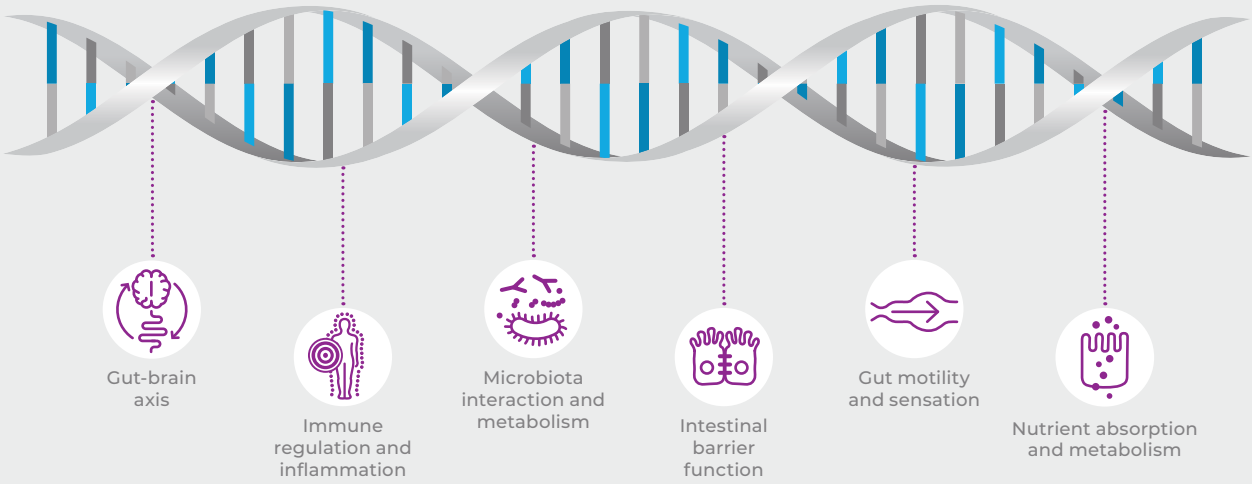
Referring practitioner: Private		

DNA Gut is designed to identify human genetic variation that predispose individuals to gut microbial alterations, gut barrier dysfunction and intestinal dysbiosis which can have negative consequences for human health. It offers personalised diet, lifestyle and nutraceutical interventions to support relevant pathways and help you achieve and maintain a healthy and resilient gastrointestinal tract.



Genetics and personalised medicine

Genes are segments of DNA that contain the instructions your body needs to make each of the many thousands of proteins required for life. Each gene is comprised of thousands of combinations of "letters" (called bases) which make up your genetic code. The code gives the instructions to make the proteins required for proper development and function.

Genetic variations (small differences in our DNA) can affect the expression of a gene, thereby affecting metabolic processes that are important for maintaining cellular health and how we respond to environmental interventions such as diet, lifestyle, supplements, and medication. Knowledge of these genetic variations offers unparalleled insight into your biological systems, allowing your healthcare practitioner to recommend precise interventions aimed at helping you reach your goals and achieve optimal health.

NORMAL GENE
Genotype resulting in typical response to environmental exposures influencing gut health

VARIANT GENE
Genotype resulting in altered response to exposures influencing gut health and need for personalisation

Personalised medicine and gut health

The human gastrointestinal tract is a complex and dynamic environment that supports a diverse community of microbes, including bacteria, viruses, and fungi, collectively referred to as the gut microbiota. This microbiome significantly contributes to the functioning of your metabolic processes through various mechanisms and is a key player in the development, maturation, and regulation of your immune system. The environmental exposures an individual experiences throughout their life, as well as their underlying genetic makeup, is responsible for shaping the intricate gut microbiome, determining the composition, diversity, and function of the microbial community. When this delicate balance within the microbiome is disrupted (dysbiosis), as a result of environmental insults together with your own genetic variants, it can contribute to the development and progression of a wide range of diseases.

This report tests for genetic variations associated with changes in key biological pathways known to predispose individuals to gut-related disorders. Weaknesses in these pathways, together with environmental factors, can increase risk for the development of gastrointestinal disorders. This report provides valuable insights into the relationship between the human genome, environmental exposures and the impact on gut health and the microbiome, highlighting individual priority areas that should be considered for optimising and managing a healthy gastrointestinal tract, thereby supporting overall health. This can be achieved through the implementation of a personalised diet, lifestyle and nutraceutical interventions.

Understanding gut health

The gut microbiome, influenced by both genetics and the environment, is vital for maintaining health. When this balance is disrupted (dysbiosis), it can increase disease risk. Understanding these interactions enables personalised disease prevention by:

- **Identifying individual risk** based on genetic and environmental factors
- **Tailoring interventions** such as diet, lifestyle, and microbiome-targeted therapies to a person's unique genetic makeup.

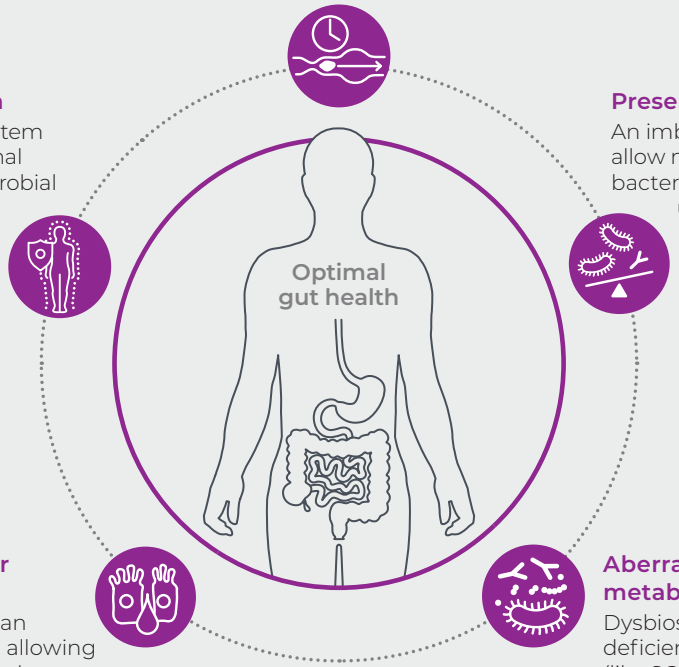
DNA GUT PROVIDES INSIGHTS INTO KEY BIOLOGICAL PATHWAYS TO OPTIMISE HEALTH AND DECREASE RISK FOR GUT-RELATED DISORDERS THROUGH PERSONALISED SUPPORT

Homeostasis in the gut microbiome can be disrupted by:

Gut transit time and motility
Dysfunctional gut motility and transit time can disrupt the microbiome, leading to inflammation and poor nutrient absorption, contributing to conditions like IBS.

Altered immune function
A dysfunctional immune system can create an altered intestinal environment that drives microbial imbalances, contributing to gut dysbiosis, which in turn further contributes to immune disorders.

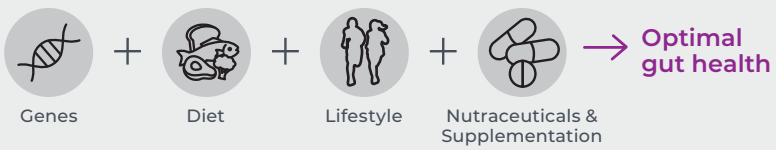
Presence of pathobionts
An imbalanced microbiome can allow normally harmless resident bacteria to become pathogenic under certain conditions, contributing to disease.



Compromised gut barrier integrity ("leaky gut")
An unhealthy microbiome can weaken the intestinal lining, allowing harmful substances to enter the bloodstream and trigger systemic inflammation.

Aberrant microbial metabolite production
Dysbiosis can result in either a deficiency of beneficial metabolites (like SCFAs) or an overproduction of harmful ones, impacting various bodily functions.

To achieve and maintain a healthy and resilient gut:
identify and implement a personalised approach



Result summary

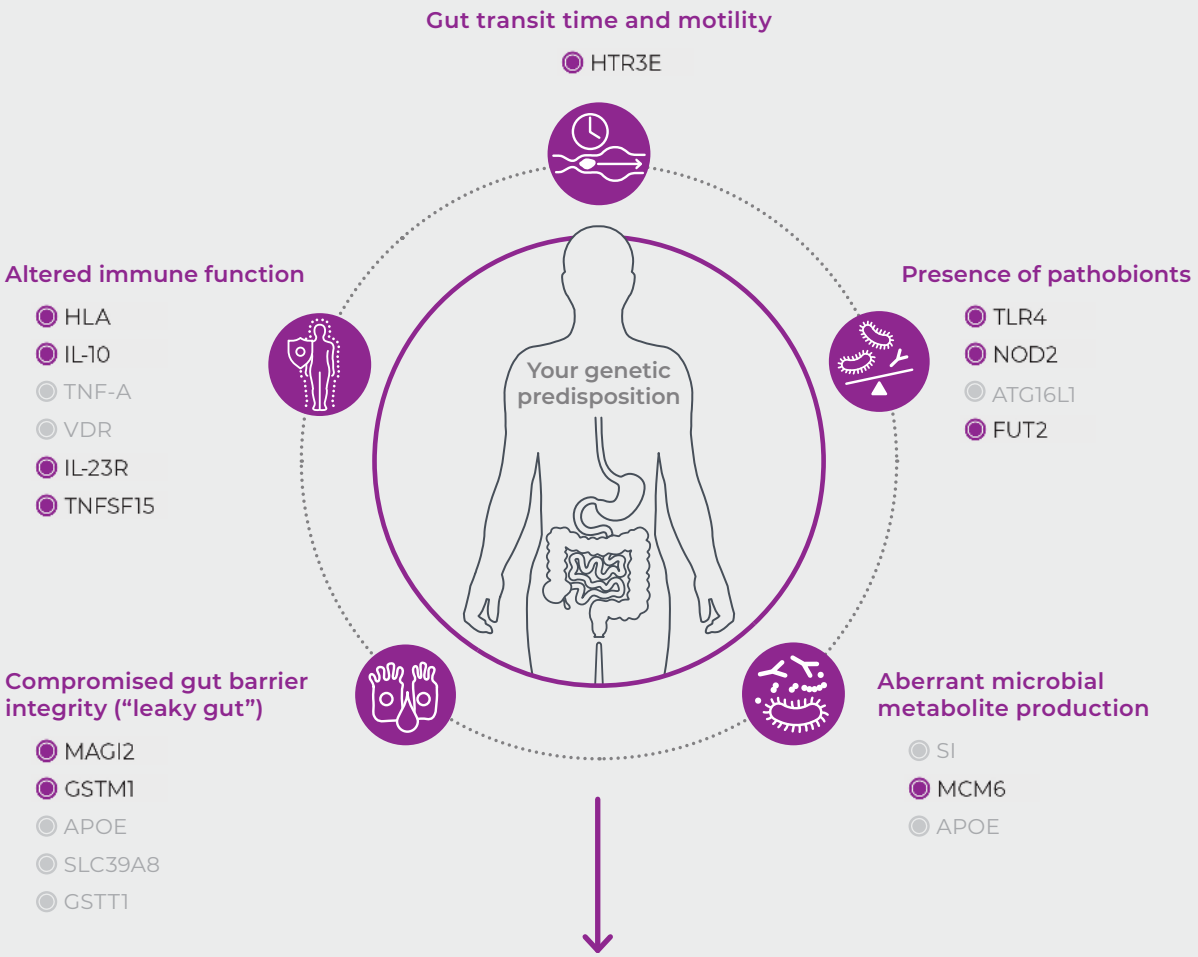
Each biological area, influencing gut-related disorders, has been allocated a priority rating of low, moderate, or high priority, for you to understand where your focus areas should be. Based on the genes tested, a low priority biological area means that there is no need for increased support compared to standard health recommendations. A moderate or high priority biological area means that the particular area will require increased support with regards to appropriate diet, lifestyle, nutraceuticals and supplementation to off-set the imbalances in that pathway caused by the genetic variants you carry, and further functional testing may be required. Detailed information on each biological area is provided in the body of this report.

BIOLOGICAL AREA	PRIORITY
Gut-brain axis	LOW
Blood group antigen secretor	HIGH (non-secretor)
Bacterial sensing and autophagy	MODERATE
Tight junction	MODERATE
Vitamin D	LOW
Inflammation	MODERATE
Oxidative stress	LOW
Detoxification	HIGH
Serotonergic pathway	HIGH
Gluten Intolerance	LOW
Starch degradation	LOW
Lactose intolerance	MODERATE

Summary of genetic predisposition to gut-related health disorders

The risk genes that may adversely affect the five pillars of gut health and require extra support are highlighted in purple below. The greyed-out results indicate a normal or typical outcome.

RISK FOR GUT-RELATED HEALTH DISORDERS

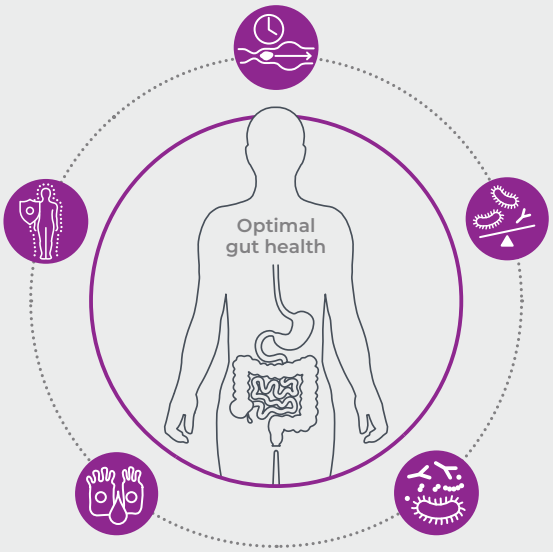


Your potential areas of risk

Infection refers to increased susceptibility to *H. pylori* pathogenicity and/or gastroenteritis.

Summary of recommendations

Based on your genetic risks affecting the five pillars of gut health, we've outlined key summary recommendations to help you optimise and maintain a healthy, resilient gut. These include personalised guidance on diet, lifestyle, and nutraceuticals.



Gut transit time and motility

- Low FODMAP diet. Include ginger (gingerols & shogaols), peppermint (menthol), capsaicin (chilli peppers), quinine
- Panax ginseng, Ligusticum striatum, galanolactone, cannabinoids
- Manage stress, regular physical activity
- Nuts, bananas, tomatoes, plums

Compromised gut barrier integrity ("leaky gut")

- Plant-based (organic), fibre rich, nuts/seeds, fatty fish, cruciferous vegetables, gluten free
- L-glutamine, MSM, butyrate, berberine, quercetin, liquorice extract, Zn, sulforaphane, TUDCA, medicinal mushrooms, probiotics: *Lactobacillus rhamnosus, plantarum, acidophilus, Bifidobacterium longum*
- Manage stress & weight, daily moderate intensity exercise
- Toxins, processed & inflammatory foods, food intolerances, alcohol, artificial sweeteners, fructose-corn syrup, industrial food additives

Presence of pathobionts

- Anti-inflammatory diet, with prebiotic fibres (beta-glucan, inulin, FOS, acacia fibre) alium vegetables, chicory, & asparagus. Vitamin B12 (eggs, meat), fermented & probiotic-rich foods
- Vitamin B12 & D, boswellia serrata, glutamine, zinc, omega 3 fatty acids, berberine, saccharomyces, Human Milk Oligosaccharides (HMOs) e.g. 2'-fucosyllactose, & probiotics: spore-forming, *bifidobacterium infantis* & *lactobacillus crispatus*
- Manage stress, sunlight exposure, moderate intensity exercise
- Trans fats, sugar & lectin-rich foods

Altered immune function

- Anti-inflammatory high in fibre & fermented foods
- Vitamin D, zinc, magnesium, omega 3 FAs, ginger extract, curcumin, medicinal mushrooms, probiotics: *Lactobacillus rhamnosus GG, plantarum, Reuteri, Paracasei & Bifidobacterium animalis, longum ES1*
- Manage stress & fat percentage, regular moderate intensity exercise, gluten-free personal-care products
- Gluten, environmental procarcinogens, processed foods, salt

Aberrant microbial metabolite production

- Anti-inflammatory, lactose-free/fermented foods, limiting dairy to 1 cup/day
- Probiotic: *Lactobacillus acidophilus DDS-1 / reuteri*, lactase
- Manage stress
- Dairy & lactose-rich foods

Standard guidelines | Diet | Nutraceuticals | Lifestyle | Avoid

Genotype results table

○ No Impact ● Low Impact ●● Moderate Impact ●●● High Impact ✓ Beneficial Impact

BIOLOGICAL AREA	GENE NAME	GENE VARIATION	RESULT	GENE IMPACT
Gut-brain axis	APOE	E2/E3/E4	E2/E3	✓
Blood group antigen secretor	FUT2	G>A (Trp154Ter)	AA	●●● non-secretor
Bacterial sensing and autophagy	NOD2	C>T (R702W)	CT	●●
	TLR4	A>G (D299G)	GG	●●●
	ATG16L1	A>G (T300A)	AA	○
Tight junction	MAGI2	A>G	AG	●●
Vitamin D	VDR	TaqI T>C	TT	○
	VDR	FokI T>C	TC	●
	VDR	ApaI G>T	GG	○
Inflammation	IL-10	-1082 A>G	AG	✓
	IL-10	-819 T>C	CC	●●
	IL-23R	G>A (R381Q)	GG	●
	TNFA	-308 G>A	GG	○
	TNFSF15	A>G	AG	●●
Oxidative stress	SLC39A8	G>A (Ala391Thr)	GG	○
Detoxification	GSTM1	Insertion/Deletion	Deletion	●●●
	GSTT1	Insertion/Deletion	Insertion	○
Serotonergic pathway	HT3E	*76 G>A	AA	●●●
Gluten Intolerance	HLA	DQ2/DQ8	DQ2.2	●
Starch degradation	SI	G>T (Val15Phe)	GG	○
Lactose intolerance	LCT (MCM6)	C>T	TC	●

Your results and recommendations

Gut-brain axis

The gut-brain axis describes the bidirectional communication between the gastrointestinal (GI) tract and the central nervous system (CNS). This intricate network is crucial for maintaining overall physiological balance. The gut and brain constantly exchange signals, impacting each other's function. The gut microbiota plays a significant role by producing neuroactive substances that can influence mood, behaviour, and cognitive functions. Disruptions in the gut-brain axis, as a result of environmental and host genetic factors, have been implicated in various conditions including neurodegenerative disorders.

APOE E2/E3/E4

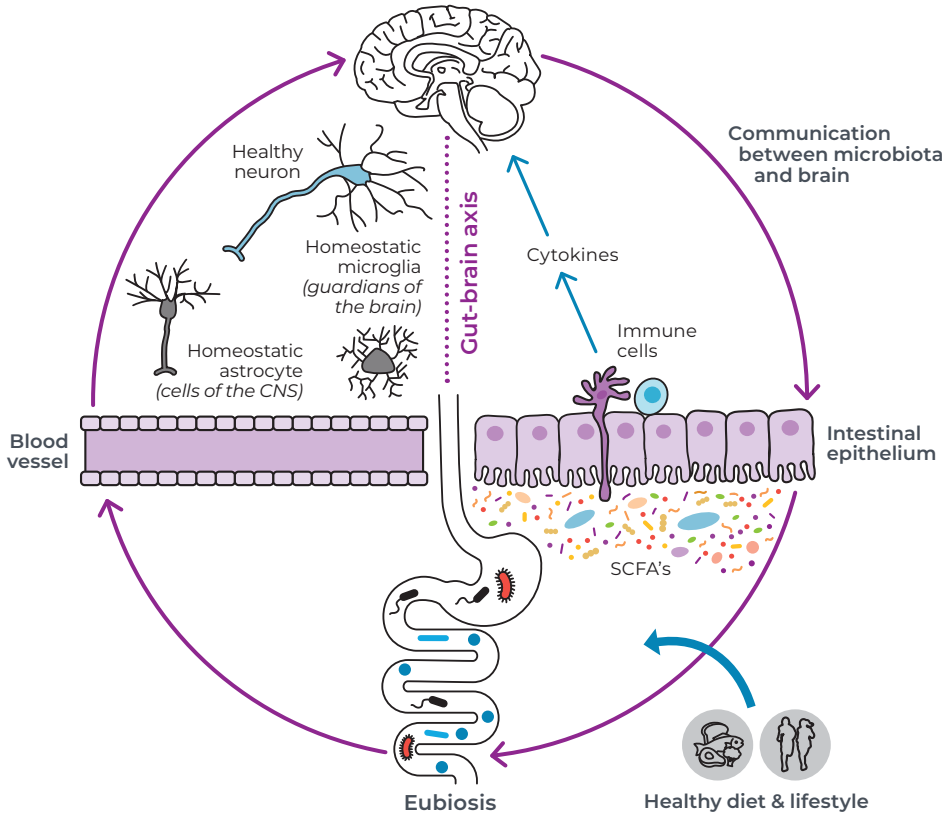
Apolipoprotein E (APOE), known for lipid transport, also interacts with the gut-brain axis. Two SNPs result in three allelic isoforms; ε2, ε3, and ε4, affecting the protein conformation. These isoforms appear to influence the composition and function of the gut microbiome. This interaction, in turn, can impact neuroinflammation, amyloid and tau pathology, blood-brain barrier integrity, and ultimately, the risk of cognitive decline.

Result: E2/E3

The E2/E3 genotype carriers exhibit a higher abundance of bacterial families involved in fibre degradation and SCFAs production. This is associated with protection against neuroinflammation and cognitive decline.

Your gut-brain axis results

Healthy gut-brain axis



Priority level: Low

Recommendations:

While you do not carry sufficient genetic risk variants to make this a moderate or high priority focus area, it is still important to manage your weight, and follow a healthy diet and lifestyle that supports good gut health.

Potential areas of risk

Cognitive decline

Aberrant microbial metabolite production

Compromised gut barrier integrity

Blood group antigen secretor

A blood group antigen secretor refers to an individual who has the ability, genetically, to secrete ABO blood group antigens (A, B, and H) in a water-soluble form into saliva and other body fluids like sweat, digestive secretions, breast milk, and tears. The ABO blood group antigens are typically found on the surface of many cell types, including epithelial intestinal cells. They serve as a point of attachment for viruses and bacteria, making secretors susceptible to various infectious diseases. Secretor status is inherited separately from the ABO blood group (A, B, AB, O) and an individual can be any ABO blood type and either a secretor or non-secretor.

FUT G>A (Trp154Ter)

Result: AA

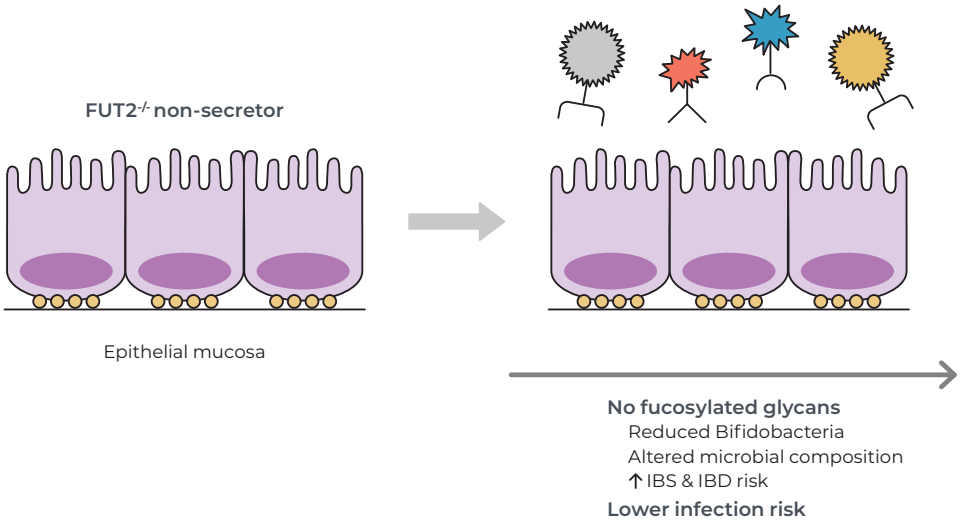
non-secretor

The galactoside 2-alpha-L-fucosyl-transferase 2 (FUT2) enzyme is essential for the secretion of the ABO blood group antigens. A common FUT2 polymorphism, G428A (Trp154Ter), results in decreased enzyme activity leading to a non-secretor status. Individuals who have two copies of the non-secretor A allele are unable to secrete blood group antigens or express them on the mucosal surfaces. This can impact how susceptible they are to infectious diseases. FUT2 influences gut health by affecting the intestinal microbiota composition, and this polymorphism can disrupt microbial adhesion and glycan utilisation, resulting in dysbiosis.

Non-secretors are characterised by an altered gut microbial composition, specifically reduced Bifidobacterial diversity, richness, and abundance, lacking species such as B. bifidum, B. adolescentis, B. catenulatum/pseudocatenulatum, and the Ruminococcus torques genus group. This has been linked to disorders like IBS and IBD. Conversely, they exhibit lower susceptibility to Rotavirus gastroenteritis and H. pylori pathogenicity. To support the growth of beneficial bacteria that are not reliant on FUT2-dependent fucosylated glycans, adopt an anti-inflammatory diet rich in diverse plant-based foods and a broad spectrum of prebiotic fibers like beta-glucan, inulin, and FOS, with acacia fiber specifically boosting Bifidobacteria. Consider supplementing with Bifidobacterium infantis and spore-forming probiotics, which can colonise more easily in the absence of fucosylated glycans. Address inflammation and immune dysregulation. Follow-up tests include evaluating ESR and hs-CRP levels and functional testing for calprotectin and eosinophil activation protein, as well as SIBO and markers of dysbiosis.

Your blood group antigen secretor results

Blood group antigen secretor status



Priority level: High

Recommendations:

Diet & lifestyle: Follow an anti-inflammatory diet rich in a variety of plant-based foods and prebiotic fibres e.g. beta-glucan, inulin, FOS, and acacia fibre to boost Bifidobacteria.

Neutraceuticals: Vitamin B12, *Bifidobacterium infantis* and spore-forming probiotics, Human Milk Oligosaccharides (HMOs) e.g. 2'-fucosyllactose.

Follow-up testing: ESR and hs-CRP levels, SIBO, GI Map: calprotectin and eosinophil activation protein, and markers of dysbiosis.

Potential areas of risk

Inflammatory bowel disease (IBD)

Irritable bowel syndrome (IBS)

Presence of pathobionts

Bacterial sensing and autophagy

Bacterial sensing involves key immune receptors recognising specific bacterial components to initiate host responses. This is essential for appropriate immune surveillance, maintaining gut barrier integrity, and shaping the composition of the gut microbiota. Aberrant sensing or signaling by key receptors, often due to genetic variations or environmental factors, can lead to dysbiosis and increased susceptibility to gut-related diseases like inflammatory bowel disease.

Autophagy, also described as “self-eating,” is a crucial intracellular process necessary for maintaining overall cellular homeostasis. It involves degrading and recycling damaged cellular components and helps eliminate pathogens. Impaired autophagy, as a result of genetic polymorphisms, may lead to disruptions in intestinal epithelial cell function, altered gut microbiota composition, and an increased susceptibility to inflammatory conditions of the gut, such as Crohn’s disease.

NOD2 C>T (R702W)

Result: CT

The NOD2 gene encodes an intracellular receptor present in intestinal epithelial cells. It plays a primary role in sensing peptidoglycans from bacterial cell walls. This binding elicits an immune response, crucial for maintaining gut homeostasis and regulating immune responses to bacteria. The R702W (Arg702Trp) genetic variant is particularly associated with Crohn’s disease, and can disrupt the delicate equilibrium between the host immune system and the gut microbiota, promoting an increased bacterial load that can contribute to inflammation and disease pathogenesis.

The CT genotype leads to reduced protection from pathogenic microbes, and increased risk for dysbiosis and ileal disease including Crohn's disease. Vitamin D directly boosts NOD2 production, improving bacterial sensing and immune responses, while Boswellia serrata modulates NOD2 inflammatory pathways. Incorporate strategies to reduce inflammation, support gut barrier function, and promote a healthy microbiome with a personalised anti-inflammatory diet, stress management and key nutrients including glutamine, zinc and omega 3 fatty acids. Bifidobacterium spp probiotics, Lactobacillus from kefir, and Saccharomyces species may show benefit. Evaluate ESR levels, and consider functional testing of calprotectin as well as markers of digestion, dysbiosis, metabolic imbalance and infection.

TLR4 A>G (D299G)

Result: GG

TLR4 encodes a transmembrane receptor that mainly recognises lipopolysaccharides (LPS) derived from Gram-negative bacteria. After LPS binding, several signaling pathways are activated, leading to the production of inflammatory cytokines. The D299G (Asp299Gly) genetic variant can cause dysregulation of TLR signalling which can lead to alterations in the normal microbial composition. This can contribute to inflammatory conditions such as Crohn's disease.

The GG genotype is linked to altered TLR4 signalling, microbial composition and immune response. Positive modulation of TLR4 can be achieved by following a Mediterranean style diet, limiting trans fats and sugar, increasing omega 3 fatty acids and consuming fermented foods. Stress management and regular, moderate intensity exercise is also recommended. Consider supplementation of berberine and specific probiotic strains; Lactobacillus crispatus, amylovorus and jensenii TL2937. Evaluate ESR levels and follow-up with functional testing of calprotectin, markers of digestion, dysbiosis, metabolic imbalance and infection, as well as an omega-3 index.

ATG16L1 A>G (T300A)

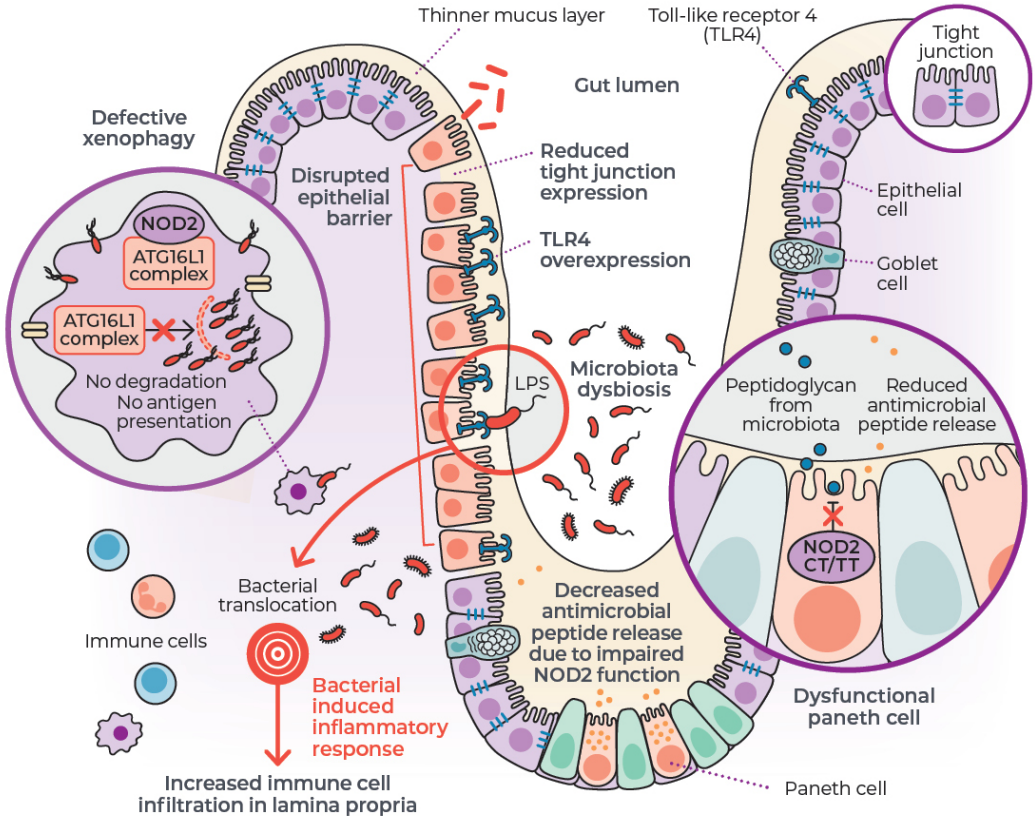
Result: AA

The ATG16L1 gene encodes the Autophagy-related 16-like 1 protein, a crucial component of the autophagy machinery. The T300A (Thr300Ala) genetic variant leads to impaired autophagy function in intestinal cells as a result of reduced levels of functional ATG16L1 protein. Impaired autophagy can lead to cellular stress which can trigger abnormal immune responses to the gut microbiota. This can lead to altered abundances of specific bacterial groups, potentially leading to dysbiosis and increase susceptibility to inflammatory conditions like Crohn's disease.

Individuals with the AA genotype typically produce sufficient ATG16L1, supporting robust autophagy which, alongside a healthy diet and lifestyle, contributes to a balanced immune response.

Your bacterial sensing and autophagy results

Inflamed gut



Priority level: Moderate

Recommendations:

Diet & lifestyle: Mediterranean-style diet, emphasising polyphenols (berries, vegetables), omega-3-rich and fermented foods. Limit trans fats and sugar. Incorporate intermittent fasting, regular moderate exercise, and stress management.

Neutraceuticals: Vitamin D and zinc, Urolithin A, Resveratrol, Curcumin, Sulforaphane, Boswellia serrata, Quercetin, Glutamine, and Marshmallow root to support autophagy, gut barrier function and immunity. Probiotics: *Lactobacillus crispatus, amylovorus* and *jensenii TL2937,* plus *Bifidobacterium spp.* and Saccharomyces species, are also recommended.

Follow-up testing: Hs-CRP and ESR levels, and omega-3 index. OAp, Organix or OMX profile, GI Map for calprotectin, digestion, dysbiosis, and infection.

Potential areas of risk

- Inflammatory bowel disease (IBD)
- Crohn's disease
- Presence of pathobionts

Tight junction

Tight junctions (TJs) are specialised protein complexes that form a tight seal between adjacent cells lining the intestine. They act as a crucial gatekeeper, controlling what passes between intestinal cells, and maintain the integrity of the gut barrier. They play a fundamental role in preventing the leakage of harmful bacteria, toxins, and antigens into the body, while allowing the selective passage of nutrients. Disruption of TJs can lead to a “leaky gut” which has been implicated in various gut-related and autoimmune disorders.

MAGI2 A>G

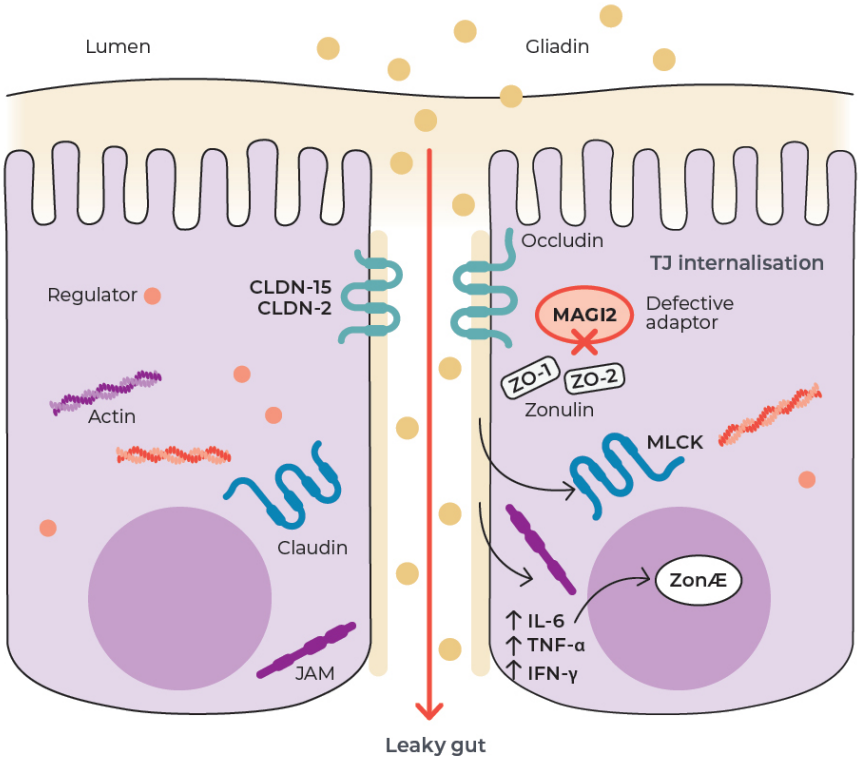
MAGI2 encodes a scaffolding protein involved in cell-cell communication and adhesion. The A>G genetic variant is associated with altered regulation of MAGI2 expression thereby impacting tight junction integrity and increasing intestinal permeability. This variant has been associated with an increased risk of inflammatory conditions such as IBD and coeliac disease.

Result: AG

The AG genotype can lead to a compromised gut barrier, especially with repeated exposure to triggers such as gluten and pathogens. To support cell membrane integrity, ensure sufficient good quality protein and fat (omega 3 fatty acids, extra virgin olive oil, and grass-fed butter in moderation). Phosphatidylserine, glutamine, quercetin, berberine, kaempfero, licorice extract, Lion's Mane, and probiotics (Lactobacillus rhamnosus GG, Bifidobacterium longum, Lactobacillus plantarum) have been shown to help with tight junction integrity and barrier function. Consider a gluten-free diet, limit foods high in fructose-corn syrup and industrial food additives, and avoid alcohol. Gain further insights with follow-up functional testing of zonulin, gut inflammation biomarkers, presence of pathogenic bacteria from stool tests, hs-CRP and a liver function panel.

Your tight junction results

Leaky gut



Priority level: Moderate

Recommendations:

Diet & lifestyle: Prioritise good quality fats and protein and avoid alcohol, food intolerances and sensitivities. Limit fructose-corn syrup and industrial food additives. Consider a gluten free diet.

Neutraceuticals: Phosphatidylserine, glutamine, quercetin, berberine, kaempfero, liquorice extract, Lion's Mane, and probiotics (*Lactobacillus rhamnosus GG, plantarum, Bifidobacterium longum*).

Follow-up testing: Hs-CRP, liver panel, GI Map + zonulin

Potential areas of risk

Increased intestinal permeability

Coeliac disease/ gluten sensitivity

Vitamin D

Vitamin D exerts its effects by binding to the Vitamin D Receptor (VDR), which is expressed in various cells throughout the body, including intestinal epithelial cells, immune cells within the gut, and also in the brain. In the gut, Vitamin D is crucial for maintaining a healthy environment, playing key roles from strengthening the gut barrier and regulating the immune system to preventing excessive inflammation and positively influencing the diversity and composition of the gut microbiome. Low vitamin D levels are linked to an increased risk and severity of gut disorders such as inflammatory bowel diseases. Beyond the gut, Vitamin D's presence in the brain and its binding to neuronal VDRs suggest a role in brain health, with deficiencies increasingly associated with mood disorders.

VDR

The VDR gene can significantly impact gut-related health outcomes by altering the body's response to vitamin D. The Taq1, Fok1 and ApaI genetic variants in the VDR gene can modulate vitamin D signalling in the gut, influencing the gut barrier, immune responses, and microbiotal compositions. These alterations can contribute to the development of inflammatory conditions such as IBD. These variants may also influence vitamin D's crucial roles in the brain, potentially impacting mood.

Result Taq1 T>C: TT

Carriers of the TT genotype are associated with a greater microbiome diversity and increased levels of certain genera that modulate complex carbohydrate catabolism and short-chain fatty acid synthesis.

Result Fok1 T>C: TC

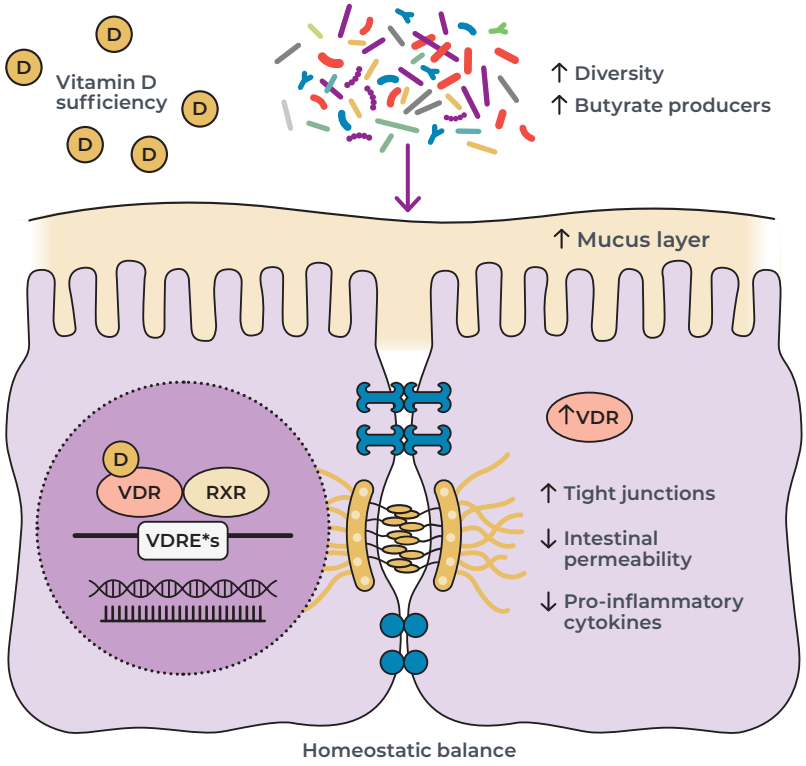
The TC genotype is associated with a decreased ability to activate vitamin D-related genes. TC carriers are known to have lower levels of vitamin D and are at increased risk for IBD including Crohn's disease and ulcerative colitis. Ensure adequate vitamin D intake and supplement when necessary. Other important nutrients include zinc, magnesium and omega 3 fatty acids(DHA). Physical activity, stress management and a healthy weight, together with a high fibre diet support VDR function. Probiotics (Lactobacillus rhamnosus GG, plantarum) might also increase VDR expression and activity. Monitor vitamin D levels.

Result ApaI G>T: GG

The GG genotype is considered to lead to conventional VDR function. Ensure adequate vitamin D levels.

Your vitamin D results

Healthy gut



*VDREs (vitamin D responsive elements) regulate the expression of 3% of the genome

Priority level: Low

Recommendations:

While you do not carry sufficient genetic risk variants to make this a moderate or high priority focus area, it is still important to check and maintain healthy vitamin D levels, and follow a healthy diet and lifestyle that supports good gut health.

Potential areas of risk

Inflammatory bowel disease (IBD) | Crohn's disease | Moods & emotional state | Immune dysregulation | Presence of pathobionts

Inflammation

Inflammation is the body's fundamental biological response to injury and infection. While acute inflammation serves as a protective mechanism within the gastrointestinal tract, chronic or dysregulated inflammation is a key driver in the development and progression of various gut pathologies. This persistent inflammatory state can disrupt the delicate balance of the gut microbiota, compromise the integrity of the intestinal barrier, and contribute significantly to conditions such as Inflammatory Bowel Diseases (IBD). Chronic inflammation can also compromise the integrity of the blood brain barrier, allowing inflammatory molecules and even immune cells from the periphery to infiltrate the central nervous system (CNS). This can result in damaged neurons, disruption of synaptic function, and impaired neurogenesis, leading to problems with memory, focus, and overall cognitive abilities. Neuroinflammation also plays a crucial role in mood disorders, as inflammatory mediators can alter neurotransmitter systems and neural circuits responsible for regulating emotions.

IL-10

Interleukin-10 (IL-10) is a crucial anti-inflammatory cytokine that plays a vital role in maintaining gut homeostasis. Referred to as an immunosuppressive cytokine, IL-10 helps to dampen excessive immune responses and promote immune tolerance in the gastrointestinal tract, preventing chronic inflammation. IL-10 also influences brain health by mitigating neuroinflammation. Adequate levels are generally considered neuroprotective, helping to preserve cognitive function and positively influence mood by counteracting the detrimental effects of pro-inflammatory cytokines.

Result -1082 A>G: AG

The AG genotype is linked to increased production of IL-10 with higher plasma levels. AG carriers have reduced risk of IBS and may also be related to a higher pain threshold of initial defecation and defecation urgency.

Result -819 T>C: CC

The CC genotype may lead to decreased IL-10 expression and lower serum levels. Coupled with gut microbial dysfunction, this could predispose to a proinflammatory gastrointestinal (GI) environment, potentially contributing to low mood and IBS-related symptoms. Consider these to upregulate IL-10; exercise, vitamin D, and cinnamon extract. Also reduce the proinflammatory response by means of stress management, mindfulness, and following an anti-inflammatory diet. Gain further insights with follow-up functional testing: hs-CRP, cytokine response, gut inflammation biomarkers, and vitamin D status.

IL-23R G>A (R381Q)

Result: GG

The interleukin-23 receptor (IL-23R) is found on the surface of certain immune cells and binds to interleukin-23 (IL-23), a pro-inflammatory cytokine. This triggers a signaling pathway leading to the production of other pro-inflammatory cytokines, serving as the body's defense against extracellular bacteria and fungi. While some genetic variations in IL23R can influence an individual's risk of developing gut-related disorders, others are protective.

Individuals with the GG genotype exhibit lower richness and diversity of commensal bacterial families. This genotype is associated with a higher risk for several chronic inflammatory and autoimmune diseases due to robust TH17 cell effector functions that lead to an increased production of pro-inflammatory cytokines. Limit intake of processed foods and salt. Follow a plant-based, anti-inflammatory diet that is high in fibre and includes fermented foods. Supplement considerations for immune support include omega 3 fatty acids, vitamin D, zinc, curcumin, ginger and medicinal mushrooms (Reishi, Shiitake, Maitake). Gain further insights with follow-up functional testing: hs-CRP, gut inflammation biomarkers and composition, and vitamin D status.

TNF-α -308 G>A

Result: GG

TNF-α is a potent pro-inflammatory cytokine that plays a vital role in immune defense and maintaining intestinal health, acting as an important component of homeostasis. In certain situations, its potent pro-inflammatory nature means that dysregulation, particularly overproduction, can lead to chronic inflammatory conditions like IBD. The TNF-α -308 G>A SNP can influence the amount of TNF-α produced, with the A allele generally associated with higher levels.

The GG genotype is associated with normal expression of this cytokine, which, alongside a healthy diet and lifestyle, supports healthy gut inflammation and immune responses. This genotype is associated with a more favorable response to anti-tumour necrosis factor (TNF) treatment.

TNFSF15 A>G

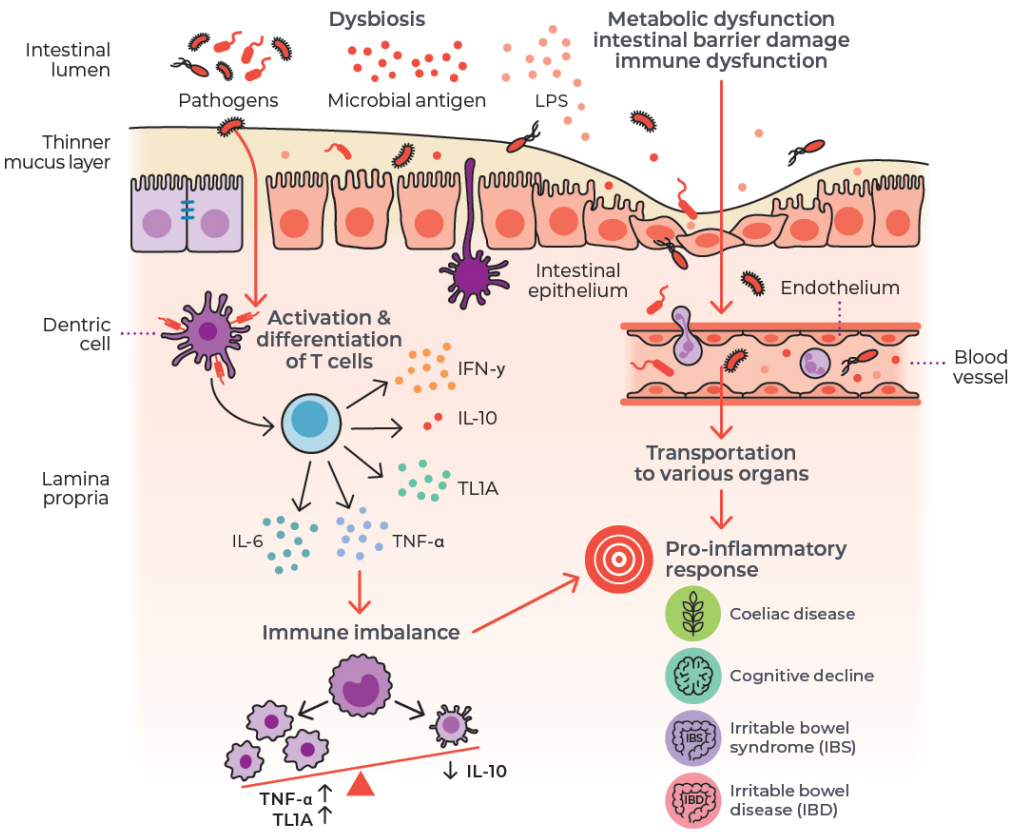
TNFSF15 belongs to the TNF superfamily and encodes a cytokine, TL1A (TNF-like ligand 1A). It plays crucial roles in modulating inflammation and maintaining the integrity of the gut mucosal barrier. The A>G genetic variant leads to an altered function of TNFSF15 which has been associated with increased risk of irritable bowel syndrome (IBS) and symptom burden.

Result: AG

The AG genotype can promote immunopathology and exacerbate existing inflammation. It is associated with increased risk for both IBS-diarrhoea and IBS-constipation. Given that the protein VEGF is known to downregulate this inflammatory activity, strategies that enhance its expression are beneficial. These include engaging in aerobic exercise and consuming proteins from legumes (such as beans, peas, and lentils) and dairy products. Functional biomarkers to test include: Inflammatory profile with hs-CRP, cytokine response testing, stool tests for dysbiosis, digestive function, and intestinal inflammation.

Your inflammation results

Inflamed gut



Priority level: Moderate

Recommendations:

Diet & lifestyle: Follow a plant-based, anti-inflammatory diet, high in fibre fermented foods. Manage stress, avoid environmental procarcinogens, maintain a healthy fat percentage and engage in regular aerobic exercise. Limit processed foods and salt.

Neutraceuticals: Vitamin D, zinc, magnesium, omega 3 fatty acids (DHA), ginger extract, curcumin, medicinal mushrooms (Reishi, Shiitake, Maitake) and probiotics: *Lactobacillus rhamnosus GG, plantarum, Reuteri, Paracasei* and *Bifidobacterium animalis.*

Follow-up testing: Vitamin D status, inflammatory profile with hs-CRP, cytokine response testing, potential food sensitivities/intolerances, stool tests for dysbiosis, digestive function, and intestinal inflammation such as GI Map & Intestinal Permeability & Absorption (IPA) analysis.

Potential areas of risk

- Inflammatory bowel disease (IBD)
- Irritable bowel syndrome (IBS)
- Moods & emotional state
- Cognitive function
- Immune dysregulation

Oxidative stress

Oxidative stress refers to the imbalance caused between the production of harmful reactive oxygen species (ROS) and the body's ability to neutralise them with antioxidants. In the gastrointestinal tract, various factors like diet, the gut microbiota, inflammation, and environmental exposures can contribute to ROS production. While a low level of ROS can play a role in normal cellular signalling, excessive oxidative stress can damage cellular components like DNA, proteins, and lipids in the gut lining. This can result in disruption of the intestinal barrier, promotion of inflammation and alterations in gut microbiota, all increasing the risk of gut disorders.

SLC39A8 G>A (Ala391Thr)

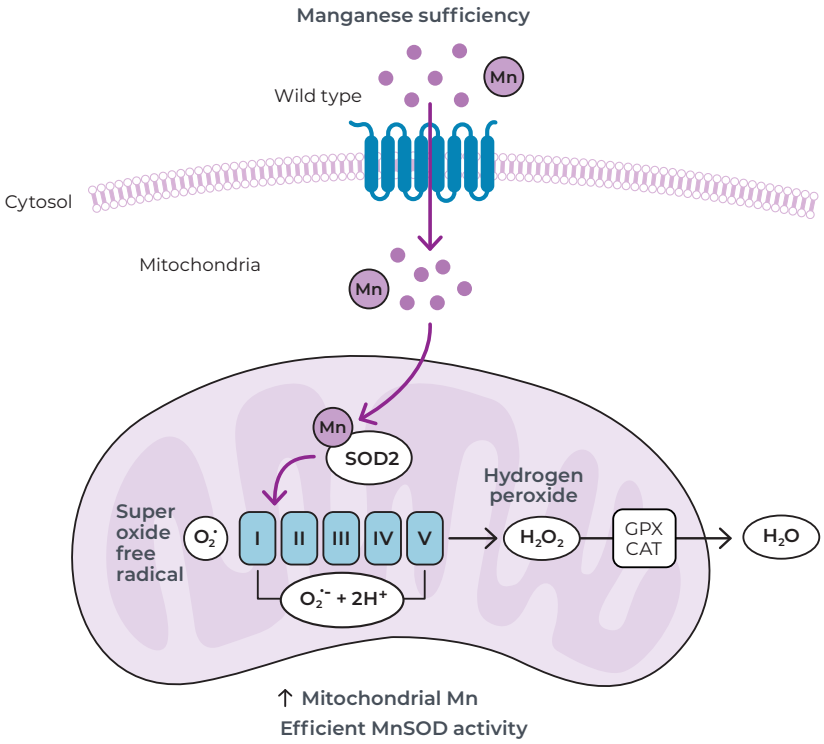
Result: GG

The SLC39A8 gene encodes a protein, ZIP8, which functions as a transporter for essential metals like zinc, manganese, and iron, as well as the toxic metal cadmium. These metals play critical roles in various biological processes, including enzyme activity, immune function, and cellular metabolism, all of which are relevant to gut health. The Ala391Thr genetic variant can affect manganese uptake and homeostasis, which might have downstream effects on various cellular processes in the gut, including enzyme function and antioxidant defense. Manganese deficiency in the colon can result in barrier dysfunction and this has been associated with an increased susceptibilty to Crohn's disease.

The GG genotype is associated with proper SLC39A8 protein functioning, ensuring regulated uptake of essential nutrients like manganese and zinc. This is crucial for healthy cell function and overall gut health, making adequate intake of these nutrients important.

Your oxidative stress results

Normal mitochondrial activity



Priority level: Low

Recommendations:

While you do not carry sufficient genetic risk variants to make this a moderate or high priority focus area, it is still important to follow a healthy diet and lifestyle that supports good gut health.

Potential areas of risk

- Increased intestinal permeability
- Inflammatory bowel disease (IBD)
- Crohn's disease

Detoxification

Detoxification refers to the body's complex processes of neutralising and eliminating harmful substances, including environmental toxins, metabolic byproducts, and byproducts of oxidative stress as well as components from the diet and gut microbiota. In the gastrointestinal tract, efficient detoxification mechanisms are crucial for maintaining a healthy environment. The gut lining is constantly exposed to a variety of potentially harmful compounds, and its ability to process and remove these substances is vital for preventing cellular damage and maintaining barrier integrity. Reduced detoxification capacity in the liver may lead to an accumulation of toxins and increased oxidative stress within the gut environment. This can promote inflammation and impair gut barrier function which contributes to the development of Inflammatory Bowel Disease (IBD).

GSTM1 Insertion/Deletion

Glutathione S-transferase M1 is the most biologically active member of the GST super-family and is involved in Phase II detoxification in the liver. It is responsible for the removal of xenobiotics, carcinogens, and products of oxidative stress. GSTM1 may contribute to maintaining a healthy redox balance in the gut environment. The absence of this enzyme, could impact the gut's ability to handle environmental toxins and byproducts of oxidative stress, increasing an individual's risk of gut-related disorders.

Result: Deletion

The deletion genotype results in an absent GSTM1 enzyme. This is associated with reduced liver detoxification capacity and increased risk for oxidative stress and inflammation. Carriers of this genotype who are exposed to higher levels of environmental toxins, pathogens and/or follow a modern Western diet are more susceptible to developing dysbiosis, further weighing on the body's detoxification ability. They are also at increased risk for IBD and NAFLD. Reduce toxin exposure and maintain a healthy weight. Increase intake of good quality protein, bitter foods (dandelion greens, arugula, endive, radicchio) and fibre. Nutrients for targeted support include: sulforaphane, N-Acetyl Cysteine, Alpha-Lipoic Acid, phosphatidylcholine, and probiotics (Lactobacillus rhamnosus (LGG) and plantarum, Bifidobacterium bifidum). Consider functional stool (GI Map and OMX) testing that provide insight into detoxification markers, bile health, dysbiosis and short chain fatty acid metabolism. Also consider tests such as ToxDetect that assess environmental toxin exposure.

GSTT1 Insertion/Deletion

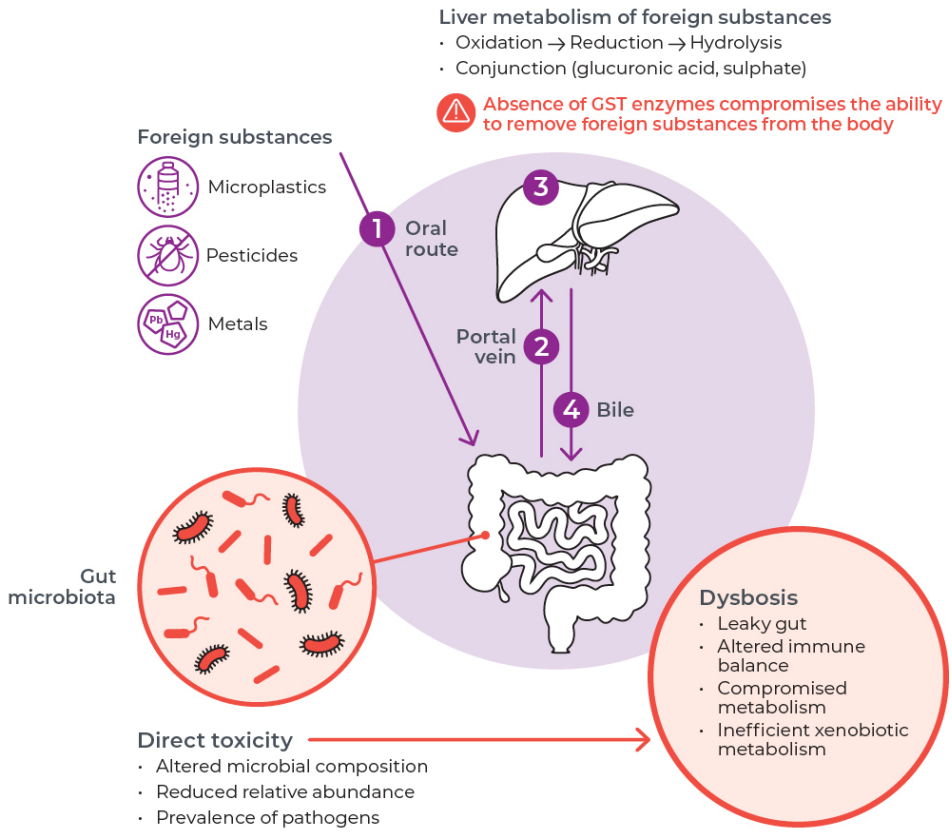
Result: Insertion

The Glutathione S-transferase Theta 1 (GSTT1) gene encodes an enzyme involved in the detoxification of various electrophilic compounds, including environmental toxins and products of oxidative stress, by catalysing their conjugation with glutathione. Individuals lacking functional GSTT1 have impaired detoxification of certain compounds and reduced protection against oxidative stress which may contribute to the development of chronic intestinal inflammation and gut-related disorders.

The insertion genotype results in a functional GSTT1 enzyme and the ability to conjugate harmful metabolites from toxin exposure.

Your detoxification results

Dysbiosis



Priority level: High

Recommendations:

Diet & lifestyle: Adopt a Mediterranean style diet, with high quality protein, bitter greens, fibre-rich foods and choosing organic produce when possible. Maintain a healthy weight and reduce toxin exposure.

Neutraceuticals: Sulforaphane, N-Acetyl Cysteine, Alpha-Lipoic Acid, phosphatidylcholine, and probiotics (*Lactobacillus rhamnosus (LGG)* and *plantarum, Bifidobacterium bifidum*).

Follow-up testing: GI Map and OMX, liver function panel and ToxDetect

Potential areas of risk

Increased intestinal permeability

Inflammatory bowel disease (IBD)

Serotonergic pathway

The serotonergic pathway is a vital signaling system involving the neurotransmitter serotonin (5-HT), which has a profound impact on gut health. More than 90% of the body's serotonin is produced in the gut where it is influenced by gut microbiota. 5-HT, together with its receptors, plays a key role in the regulation of motility and secretion through the digestive system, modulation of visceral sensitivity and communication along the gut-brain axis. Alterations in the serotonergic pathway have been implicated in the development of irritable bowel syndrome (IBS), which is characterised by altered bowel habits, abdominal pain, and visceral hypersensitivity.

HT3E *76 G>A

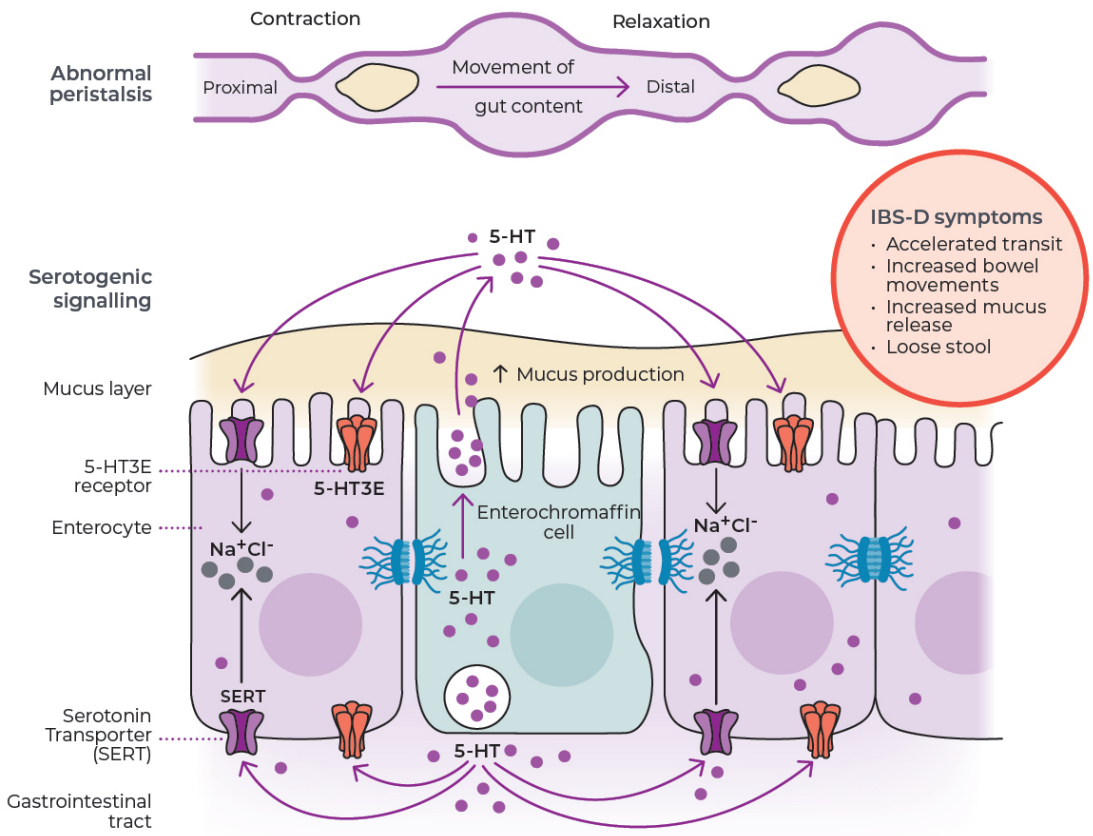
Result: AA

The HT3E gene encodes the 5-HT3E subunit of the serotonin (5-hydroxytryptamine) receptor type 3. Serotonin is a crucial neurotransmitter in the gut, playing a significant role in various functions, including motility, secretion, and visceral sensitivity. The HT3E subunit shows more restricted expression in gastrointestinal tissues compared to other subunits. The *76 G>A genetic variation alters receptor function and consequently serotonin signaling in the gut, increasing the risk of IBS particularly the diarrhoea-predominant subtype (IBS-D).

The AA genotype is linked to increased expression of this receptor in intestinal cells, elevating the risk for IBS-diarrhoea. To counteract this, consider compounds that antagonize this receptor, such as those found in Panax ginseng, Ligusticum striatum, galanolactone, ginger (gingerols and shogaols), peppermint (menthol), cannabinoids, capsaicin (chilli peppers), and quinine, as well as certain medications like ondansetron and palonosetron. Conversely, some foods like nuts, bananas, tomatoes, and plums may activate this receptor and should be considered for limitation. Stress management, use of probiotics (S. boulardii, Lactobacillus strains: acidophilus, plantarum, rhamnosus, Bifidobacterium infantis) and implementing a low FODMAP diet may also show benefit. Follow up with functional testing including organic acid profiles, food intolerance tests and functional testing for gut motility.

Your serotogenic pathway

Impaired serotogenic signalling



Priority level: High

Recommendations:

Diet & lifestyle: Consider a low FODMAP diet. Include foods that are receptor antagonists: Ginger (gingerols and shogaols), peppermint (menthol), capsaicin (chilli peppers) and quinine. Limit nuts, bananas, tomatoes and plums.

Neutraceuticals: Panax ginseng, Ligusticum striatum, galanolactone, cannabinoids.

Follow-up testing: Organic acid profiles, food intolerance tests and functional testing for gut motility.

Potential areas of risk

Irritable bowel syndrome (IBS)

Transit time and motility

Gluten intolerance / coeliac disease

Coeliac disease is an immune-mediated, antigen-driven condition triggered by the ingestion of gluten in genetically susceptible individuals, primarily those carrying specific HLA-DQ2 and -DQ8 genes. Gluten consumption leads to an immune response that damages the lining of the small intestine, impairing nutrient absorption and causing various gastrointestinal symptoms.

HLA DQ2/DQ8

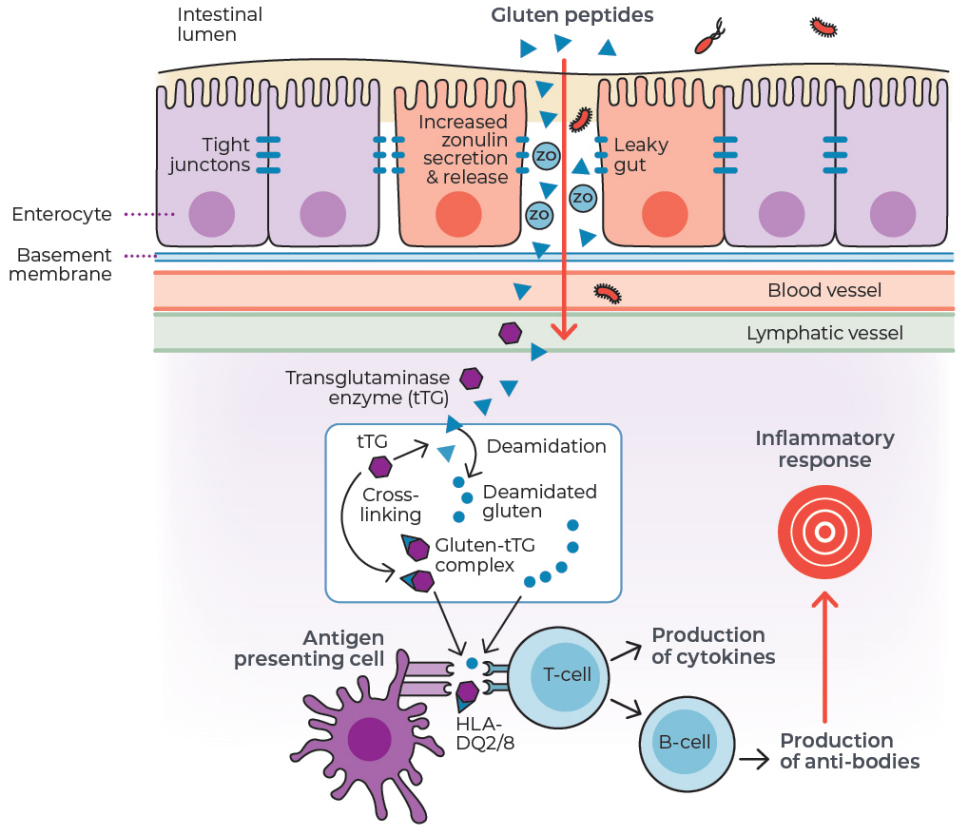
The Human Leukocyte Antigen (HLA) system, consists of a set of genes crucial for immune function. The HLA-DQ2 and HLA-DQ8 are primary genetic risk factors for coeliac disease. This autoimmune disorder, triggered by gluten consumption leads to an immune response that damages the lining of the small intestine, impairing nutrient absorption and causing various gastrointestinal and systemic symptoms.

Result: DQ2.2

The DQ2,2 genotype is considered a low risk of developing coeliac disease when exposed to a gluten-rich diet and other triggering factors. Even though this is a low risk genotype result, coeliac disease cannot be excluded. A high-impact MAGI2 genotype that increases risk for higher intestinal permeability is a compounding genetic risk factor. These carriers are also predisposed to non-coeliac gluten intolerance. Consider a gluten elimination diet especially if symptoms of gluten intolerance are present, such as bloating, cramps, diarrhoea, flatulence, fatigue and joint pain. Bifidobacterium longum ES1 may provide further relief. Consider further investigative functional testing for gluten intolerance including secretory IgA and blood antibody IgA's.

Your gluten tolerance

Gluten intolerant



Priority level: Low

Recommendations:

Diet & lifestyle: Gluten elimination diet.

Neutraceuticals: Probiotic *Bifidobacterium longum ES1.*

Follow-up testing: Secretory IgA and blood antibody IgA's.

Potential areas of risk

Immune dysregulation

Coeliac disease/ gluten sensitivity

Starch degradation

Starch degradation is the process of breaking down complex dietary starches into simpler sugars for absorption in the small intestine. Enzymes like amylase initiate this process, and further breakdown is facilitated by a crucial enzyme complex, sucrase isomaltase, located on the surface of intestinal cells. Efficient starch degradation is vital for gut health, providing adequate energy absorption, influencing the gut microbial composition and diversity and minimising gastrointestinal symptoms such as bloating, abdominal discomfort and flatulence.

SI G>T (Val15Phe)

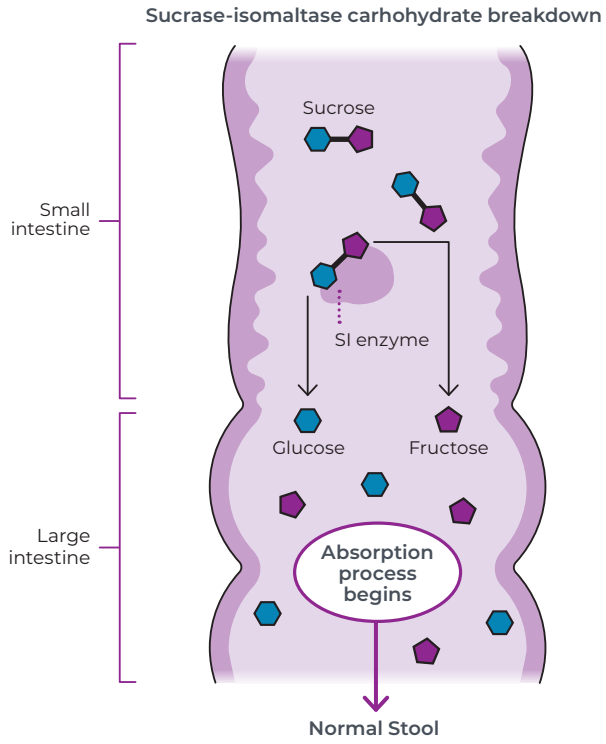
Result: GG

The Sucrase-isomaltase (SI) enzyme is crucial for digesting complex dietary starch in the small intestine. The common Val15Phe genetic variant is associated with reduced enzyme activity and has been associated with increased risk of IBS especially the diarrhoea-predominant subtype (IBS-D), when there is a high intake of starch and sucrose.

The GG genotype of the SI gene is associated with normal enzyme activity and starch degradation.

Your starch degradation results

Normal starch degradation



Priority level: Low

Recommendations:

While you do not carry sufficient genetic risk variants to make this a moderate or high priority focus area, it is still important to follow a healthy diet and lifestyle that supports good gut health.

Potential areas of risk

Irritable bowel syndrome (IBS)

Aberrant microbial metabolite production

Lactose Intolerance

Lactose intolerance is a common digestive disorder that arises from the reduced ability to digest lactose. This occurs due to insufficient levels of the enzyme lactase in the small intestine. Lactase is responsible for breaking down lactose into simpler sugars which is then absorbed into the bloodstream. Poor lactose digestion results in the fermentation of lactose by gut bacteria, leading to various gastrointestinal symptoms, including bloating, gas, abdominal cramps, and diarrhoea.

LCT (MCM6) C>T

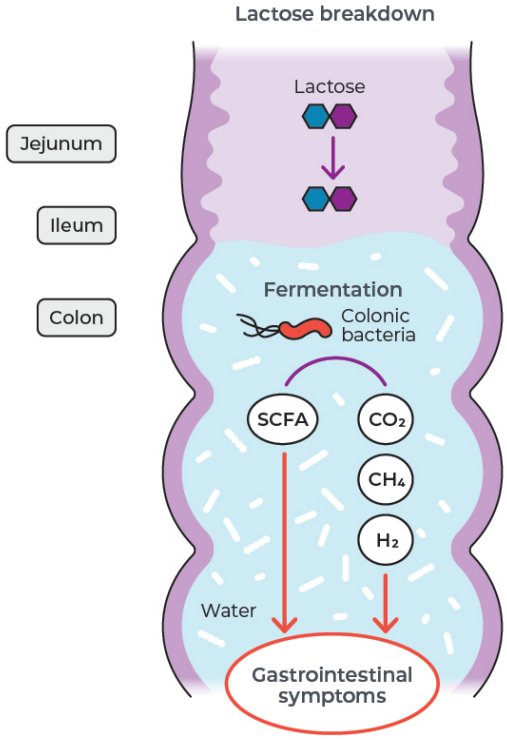
Result: TC

The LCT gene encodes the lactase enzyme which plays a key role in lactose digestion. The C>T genetic variant is associated with decreased enzyme levels, after infancy, leading to lactose intolerance. Symptoms such as bloating, gas, abdominal pain, and diarrhoea are associated lactose intolerance and can negatively impact quality of life. In addition, carrying the genetic variant indirectly shapes the environment of the large intestine and can influence the composition and function of the gut microbial community, where undigested lactose can act as a selective substrate, favoring the growth of certain bacteria capable of fermenting it.

The TC genotype might be associated with reduced lactase production into adulthood. If symptoms of lactose intolerance are present, limit dairy to not more than 1cup per day. Rather opt for lactose free or fermented options (plain yogurt). Supplement with a suitable probiotic (Lactobacillus acidophilus DDS-1/ reuteri).

Your lactose tolerance results

Lactose intolerance



Priority level: Moderate

Recommendations:

Diet & lifestyle: Limit dairy to not more than 1 cup per day. Rather opt for lactose free or fermented options (plain yogurt).

Neutraceuticals: Probiotic (*Lactobacillus acidophilus DDS-1 / reuteri*), lactase

Follow-up testing: SIBO with lactulose breath test, Intestinal Permeability & Absorption (IPA) analysis.

Potential areas of risk

Lactose intolerance

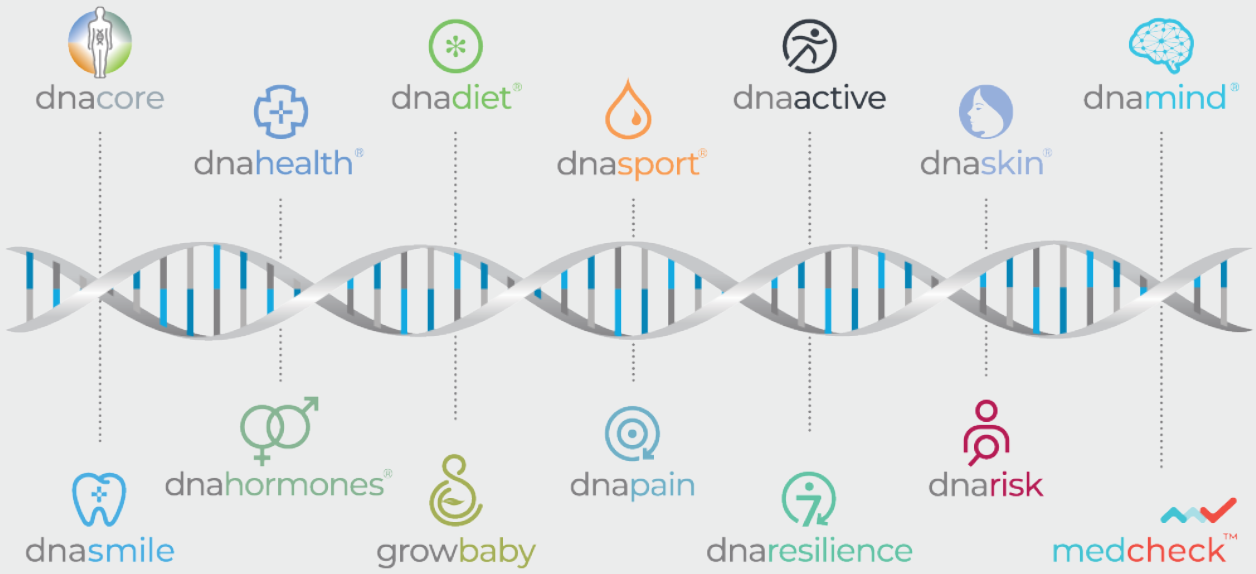
Aberrant microbial metabolite production

Glossary

APOE	Apolipoprotein E
ATG16L1	Autophagy-related 16-like 1
CAT	Catalase
CNS	Central Nervous System
DNA	Deoxyribonucleic Acid
FAs	Fatty Acids
FODMAP	Fermentable Oligosaccharides, Disaccharides, Monosaccharides, and Polyols
FOS	Fructo-oligosaccharides
FUT2	Fucosyltransferase 2
GI	Gastrointestinal
GSTs	Glutathione S-transferases
GSTM1	Glutathione S-transferase Mu 1
GSTT1	Glutathione S-transferase Theta 1
HLA	Human Leukocyte Antigen
HMOs	Human Milk Oligosaccharides
hs-CRP	High-sensitivity C-reactive protein
HT3E	5-hydroxytryptamine type 3E
IBD	Inflammatory Bowel Disease
IBS	Irritable Bowel Syndrome
IBS-D	Irritable Bowel Syndrome-Diarrhoea
IL-10	Interleukin-10
IL-23R	Interleukin-23 receptor
LCT	Lactase
LPS	Lipopolysaccharides
MCM6	Minichromosome Maintenance Complex Component 6
Mn	Manganese
NAC	N-acetylcysteine
NOD2	Nucleotide-binding Oligomerisation Domain-containing protein 2
ROS	Reactive Oxygen Species
SCFAs	Short-Chain Fatty Acids
SI	Sucrase-isomaltase
SIBO	Small Intestinal Bacterial Overgrowth
SLC39A8	Solute Carrier Family 39 Member 8
SNPs	Single Nucleotide Polymorphisms
SOD2	Superoxide Dismutase 2
TLR4	Toll-like Receptor 4
TNF-α	Tumor Necrosis Factor-alpha
TNFSF15	Tumor Necrosis Factor Superfamily member 15
TUDCA	Rauroursodeoxycholic acid
VDR	Vitamin D Receptor
Zn	Zinc

A lifetime of optimal health awaits you

Your genes do not change, which means our laboratories will only ever need one sample* from you. Throughout your life, as your health goals and priorities change, we can continue to provide valuable health insights from this single sample* to support your unique health journey.



*Requires finger prick blood spot sample collection

Our Commitment

DNAlysis Biotechnology is continuously developing new tests with the highest standards of scientific rigour. Our commitment to ensuring the ethical and appropriate use of genetic tests in practice means that gene variants are only included in panels once there is sound motivation for their clinical utility and their impact on health outcomes.

ADVANCED technology | ACTIONABLE interventions | APPROPRIATE use in practice

From the laboratories of:

DNALYSIS Biotechnology

For more information: 011 268 0268 | admin@dnalysis.co.za | www.dnalysis.co.za

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dnalife® Nordic Laboratories®

info@dnalife.healthcare | www.dnalife.healthcare

Denmark Office: Nygade 6, 3.sal · 1164 Copenhagen K · Denmark | **T:** +45 33 75 10 00
South Africa Office: North Block · Thrupps Centre · 204 Oxford Rd · Illovo 2196 · South Africa | **T:** +27 (0) 11 268 0268
UK Office: 11 Old Factory Buildings · Battenhurst Road · Stonegate · E. Sussex · TN5 7DU · UK | **T:** +44 (0) 1580 201 687

Risks and Limitations:

This laboratory uses real-time PCR to analyse the genetic material obtained from the blood spot or buccal swab sample. There are standard and effective procedures in place for handling samples and effective protocols in place to protect against technical and operational problems. However as with all laboratories, laboratory error can occur; examples include, but are not limited to, sample or DNA mislabelling or contamination, failure to obtain an interpretable report, or other operational laboratory errors. Occasionally due to circumstances beyond our control it may not be possible to obtain SNP specific results.