

Irritable Bowel Disease



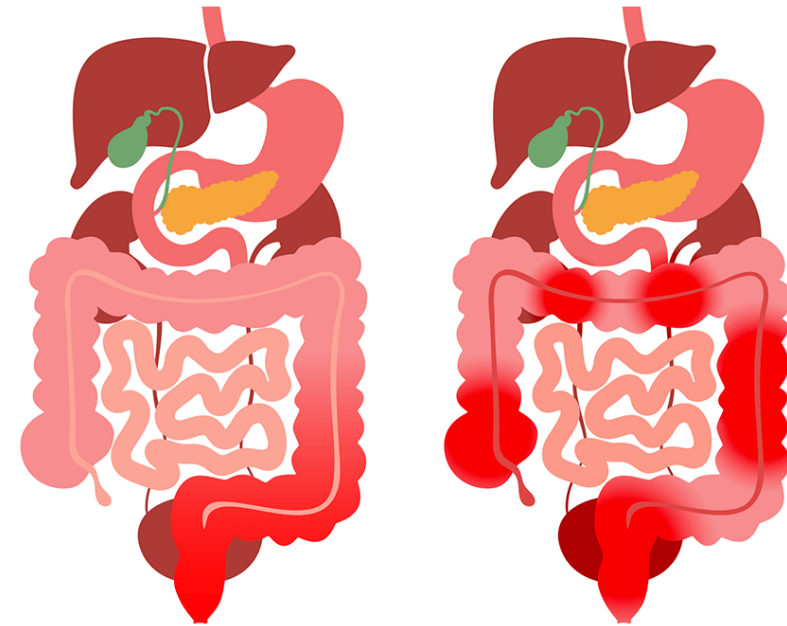
Definition:

Inflammatory Bowel Disease (IBD) is a chronic, idiopathic inflammation of the gastrointestinal (GI) tract, characterized by periods of remission and exacerbation.

It primarily encompasses two main disorders: Crohn's Disease (CD) and Ulcerative Colitis (UC).

Does not include IBS

INFLAMMATORY BOWEL DISEASE (IBD)



Ulcerative colitis

Crohn's disease

IBS is a functional gastrointestinal disorder, meaning there's no visible damage or inflammation in the digestive tract.

Symptoms include abdominal pain, bloating, and changes in bowel habits (diarrhea, constipation, or both). Symptoms can vary widely among individuals.

The exact cause is unknown, but factors may include abnormal gastrointestinal motility, increased sensitivity to pain, stress, and diet.

Diagnosis is based on symptoms and the exclusion of other conditions. There are no specific tests for IBS.

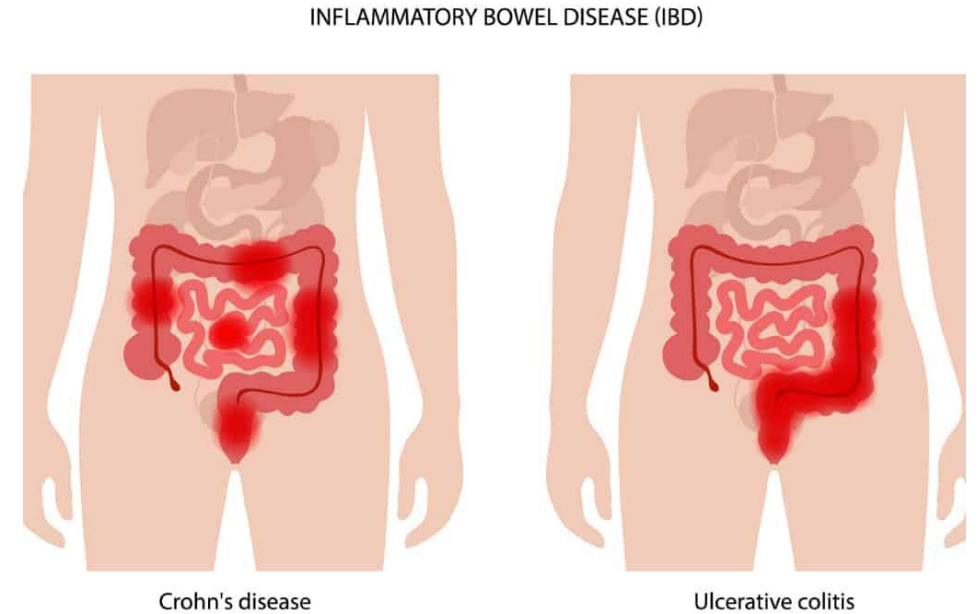
Focus on dysbiosis and stress

According to a [study](#) led by the Crohn's & Colitis Foundation, about 0.7% of Americans are diagnosed with IBD,

This equates to nearly 1 in 100 people.

This prevalence varies among racial groups, with the highest rates observed in white individuals.

Globally, the incidence and prevalence of IBD are increasing, making it a critical area for public health and medical research

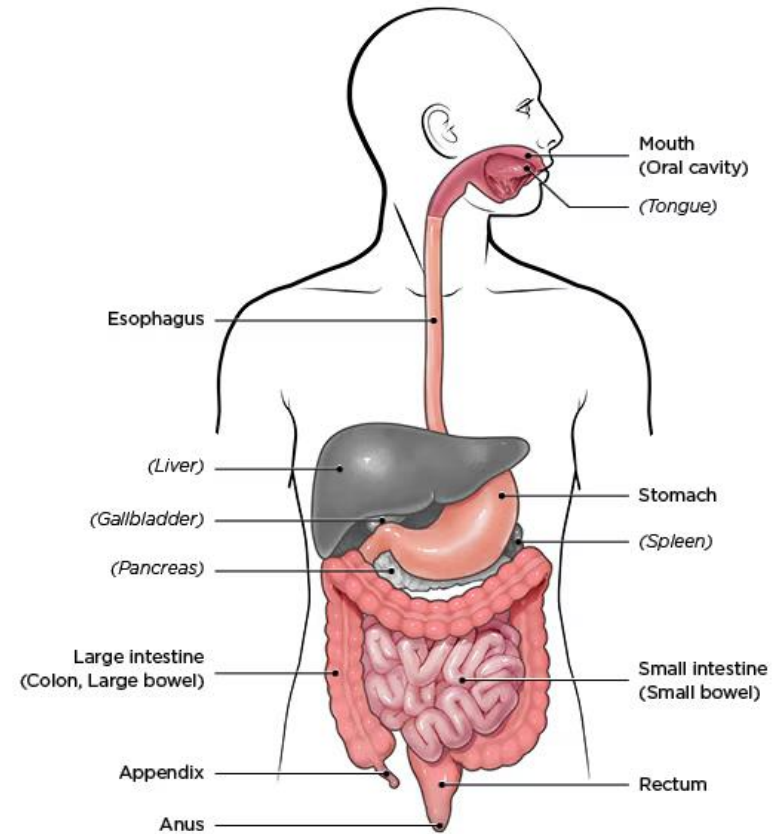


Canada has one of the highest incidence rates of Crohn's disease and ulcerative colitis in the world.

As of 2023, approximately 322,600 Canadians are living with IBD, which is about 0.8% of the population.

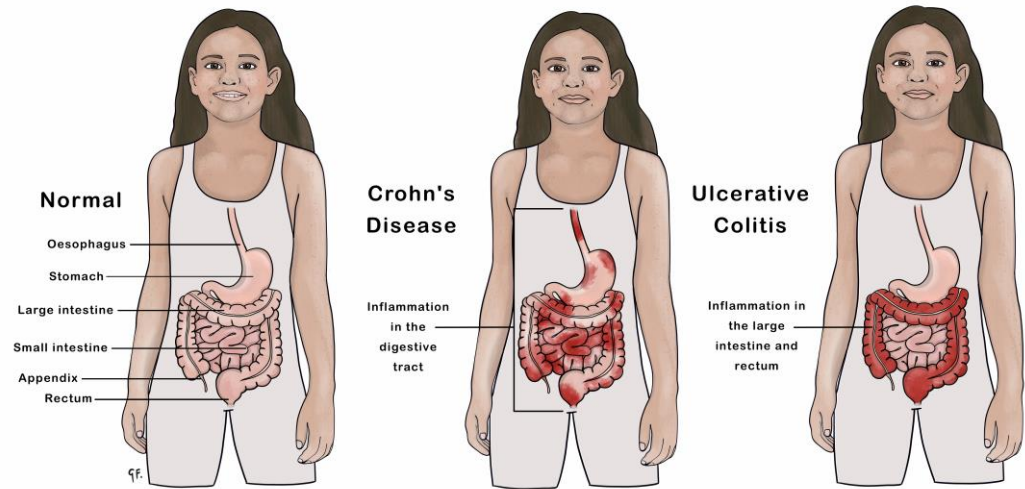
This number is projected to rise to 470,000 by 2035, making up 1.1% of the population.

Each year, around 11,000 new cases are diagnosed, increasing to 14,000 annually by 2035



Children under the age of 10 are seeing a particularly rapid increase in diagnoses, with the incidence doubling since 1995.

The highest rates of new diagnoses are among children and seniors, as improved therapies have allowed people with IBD to live longer



Factors For Children

Children with a family history of IBD are more likely to develop the condition due to genetic factors.

Increased consumption of processed foods and reduced fiber intake, along with less exposure to infections, may impair immune development and lead to IBD.

Frequent antibiotic use in early childhood can disrupt the gut microbiome, essential for gut health and preventing inflammation.



Factors For Seniors

The immune system's effectiveness declines with age, increasing the risk of autoimmune diseases like IBD.

Lifelong exposure to pollutants, dietary changes, and infections can contribute to IBD development in later life.

Multiple medications (polypharmacy) and common health conditions in seniors, such as diabetes, can affect gut health and increase IBD risk.

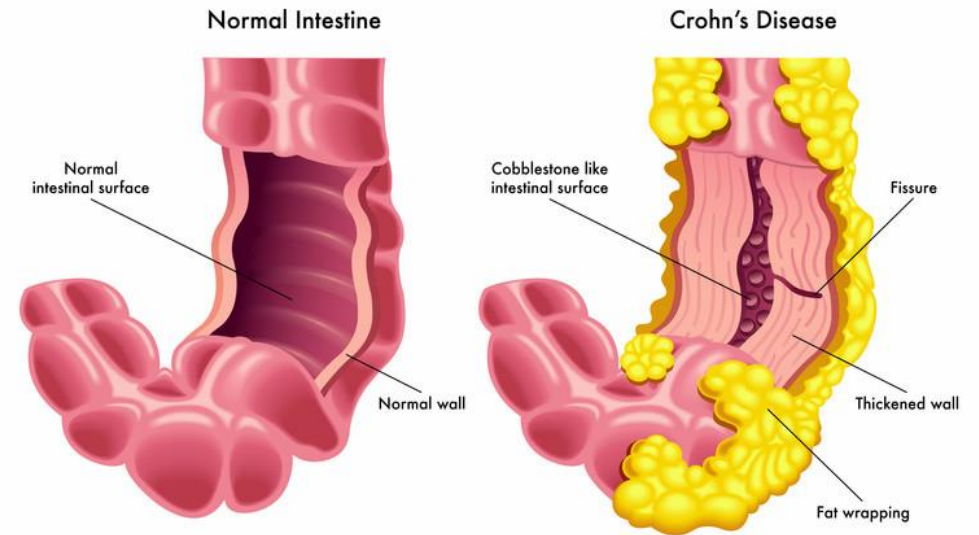


Crohn's Disease

Affects any part of the GI tract from the mouth to the anus, but most commonly the end of the small intestine (ileum) and the beginning of the colon.

Involves all layers of the bowel wall (transmural inflammation).

Can cause patchy areas of inflammation (skip lesions).

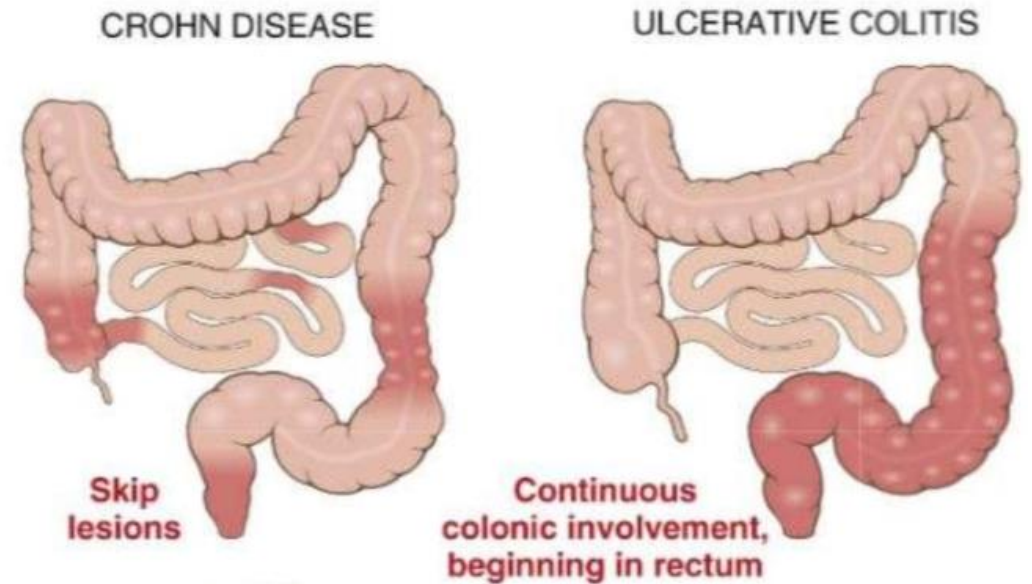


UC

Limited to the colon (large intestine) and rectum.

Involves only the innermost lining of the colon (mucosal inflammation).

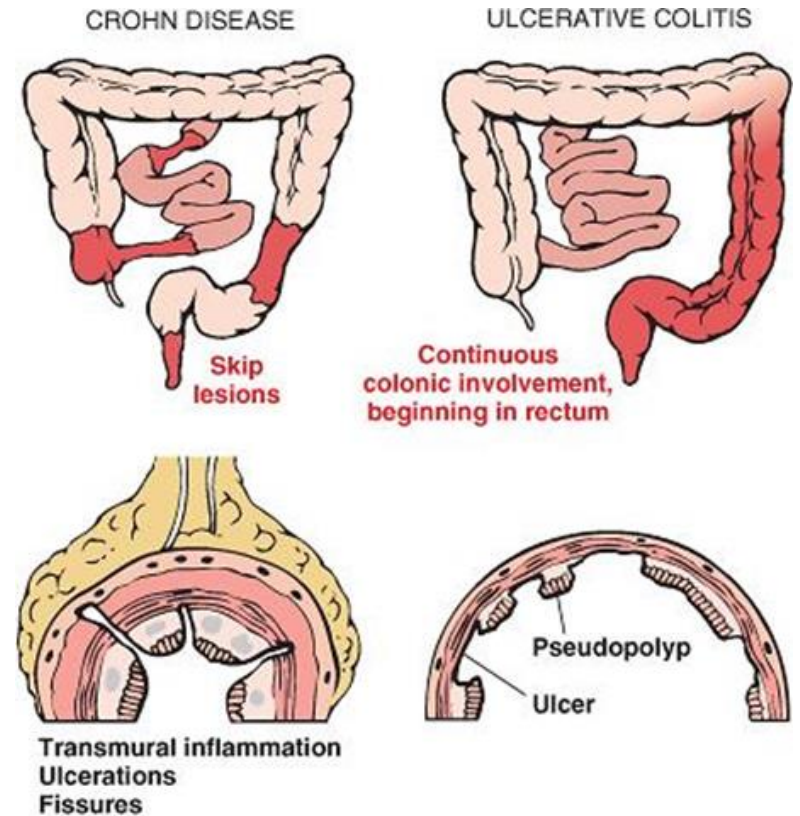
Characterized by continuous inflammation without skip lesions.



Skip lesions are areas of inflammation that appear in patches along the GI tract with segments of normal tissue in between.

This inflammation affects all layers of the bowel wall (transmural), from the mucosa to the serosa.

Skip lesions can occur anywhere in the GI tract, but most commonly affect the end of the small intestine (ileum) and the beginning of the colon.



Crohn's Disease: A patient might have inflamed patches in the terminal ileum, skip a few centimeters of healthy tissue, and then have another inflamed patch in the colon.

These skip lesions are visible during a colonoscopy or imaging study.

Ulcerative Colitis: A patient will have continuous inflammation starting from the rectum and extending upwards through the colon without any intervening normal tissue.

This continuous pattern is consistent throughout the affected area.

Etiology

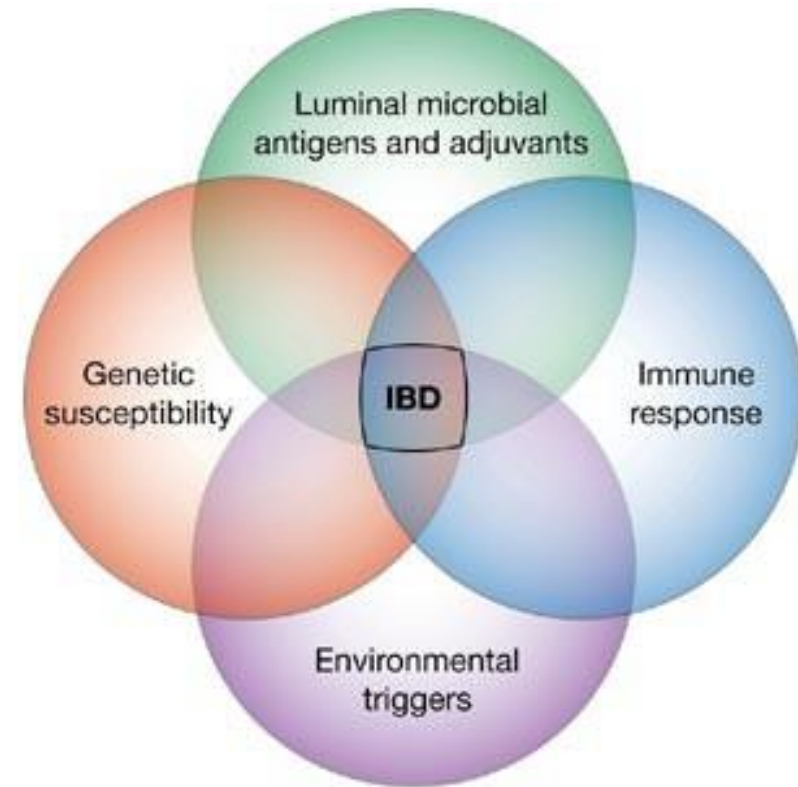
The exact cause of IBD is unknown, but it is believed to result from a combination of:

Genetic predisposition

Environmental factors

Immune system dysfunction

And microbial factors



Symptoms

Abdominal pain and cramping

Persistent diarrhea, which may be bloody

Weight loss and malnutrition

Fatigue and general malaise

Fever

Urgency to defecate

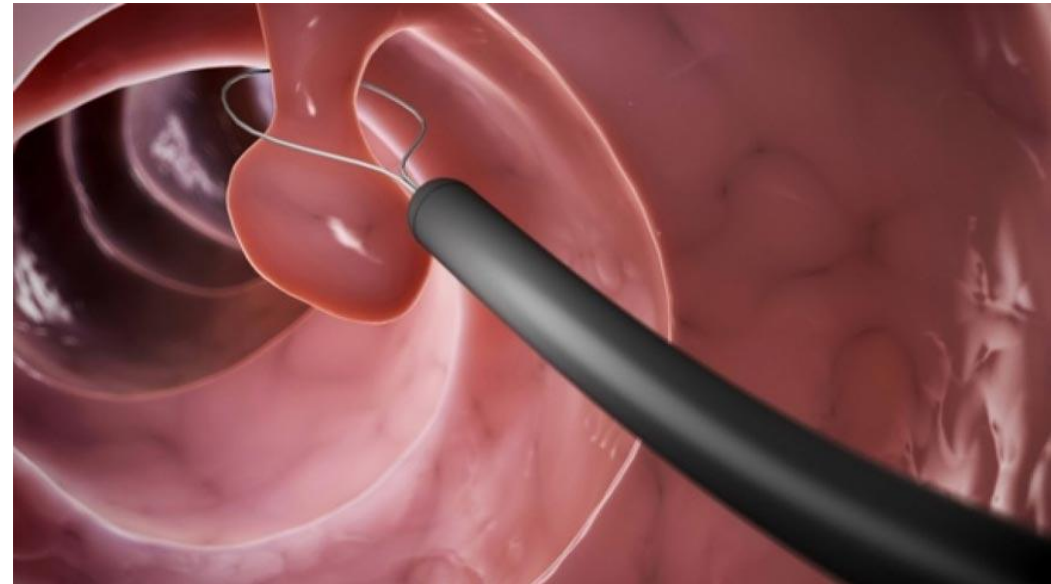
Diagnosis

Clinical evaluation of symptoms

Laboratory tests (e.g., blood tests, stool tests)

Imaging studies (e.g., CT scans, MRI)

Endoscopic procedures (e.g., colonoscopy, upper endoscopy) with biopsy



Blood Tests

1. Inflammatory Markers:

C-Reactive Protein (CRP): Elevated levels of CRP indicate inflammation in the body, which is common in IBD.

Erythrocyte Sedimentation Rate (ESR): High ESR levels also suggest the presence of inflammation.

2. Complete Blood Count (CBC):

White Blood Cell Count (WBC): Elevated WBC can indicate inflammation or infection.

Hemoglobin and Hematocrit: Lower levels may indicate anemia, which is common in IBD due to chronic inflammation and blood loss.

Platelet Count: High platelet counts can be a sign of inflammation.

3. Nutritional Markers:

Albumin: Low levels of albumin can indicate poor nutrition or inflammation.

Vitamin B12 and Folate: Deficiencies in these vitamins can occur in IBD, especially if the small intestine is affected.

4. Electrolytes and Liver Function Tests:

Electrolytes: Abnormal levels can result from diarrhea and malabsorption.

Liver Enzymes (ALT, AST): Elevated liver enzymes may indicate liver involvement or complications related to IBD.

5. Antibody Tests:

Perinuclear Anti-Neutrophil Cytoplasmic Antibodies (p-ANCA): Often positive in Ulcerative Colitis.

So we looking for:

AntCRP and ESR: Indicators of general inflammation.

CBC: Can show elevated WBC (inflammation), anemia (low hemoglobin and hematocrit), and high platelets (inflammation).

Nutritional Markers: Low albumin and vitamin deficiencies.

Electrolytes and Liver Function: Potential abnormalities due to complications.

Antibody Tests: p-ANCA and ASCA to help differentiate between Ulcerative Colitis and Crohn's Disease. i-Saccharomyces Cerevisiae Antibodies (ASCA): Often positive in Crohn's Disease.

Management

Medications to reduce inflammation
(e.g., aminosalicylates, corticosteroids,
immunomodulators, biologics)

Nutritional support and dietary
modifications

Surgical intervention in severe cases or
complications (e.g., bowel resection,
colectomy)

Regular monitoring and follow-up care



Potential complications

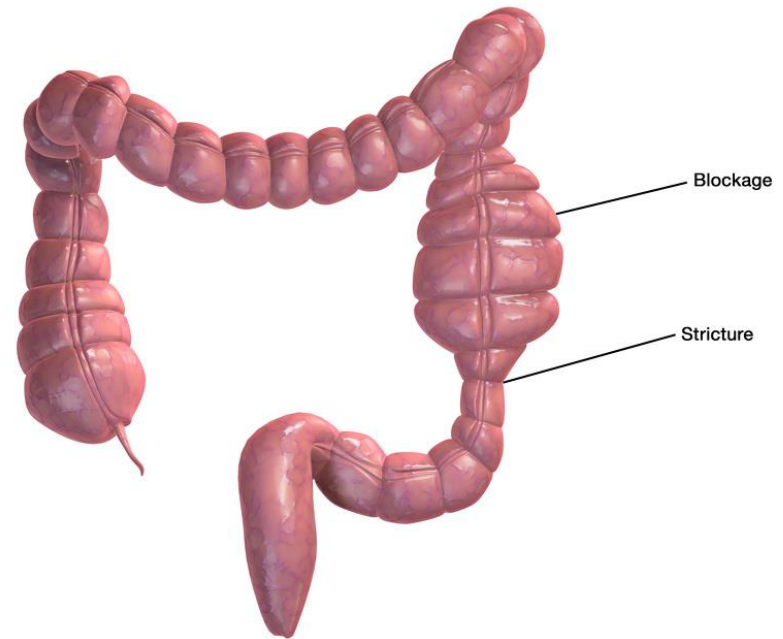
Strictures (narrowing of the intestine)

Fistulas (abnormal connections between different parts of the intestine or other organs)

Abscesses

Increased risk of colorectal cancer

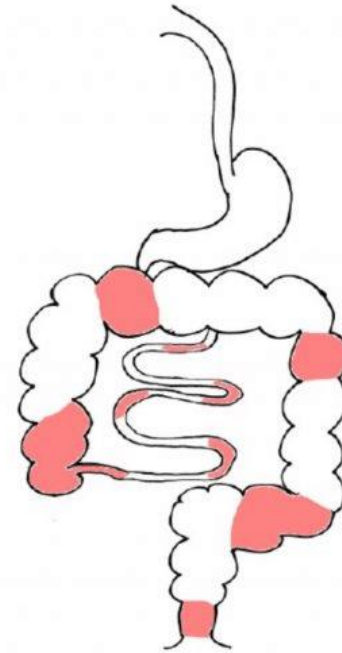
Extra-intestinal manifestations (e.g., arthritis, skin disorders, eye inflammation)



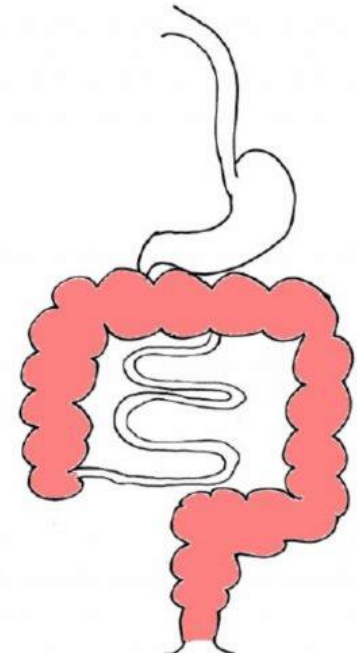
IBD is considered a lifelong condition with no known cure.

The course of the disease varies among individuals, with periods of remission and flare-ups.

With appropriate management, many individuals can lead active and productive lives.



Crohn's disease



Ulcerative colitis

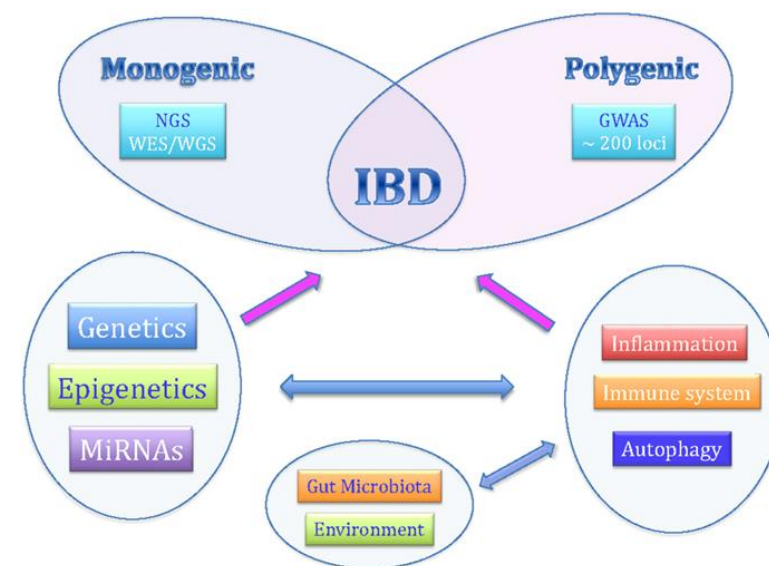
Causes

Research from the Francis Crick Institute has identified specific genetic codes active in macrophages, a type of immune cell that causes inflammation in IBD.

This genetic discovery could lead to new therapeutic targets aimed at controlling these immune responses

Studies have shown that disruptions in the gut microbiome are a main factor

Specific gut bacteria, termed pathobionts, have been found to evade immune defenses and proliferate during disease flares, providing a new understanding of gut-immune interactions in Crohn's disease

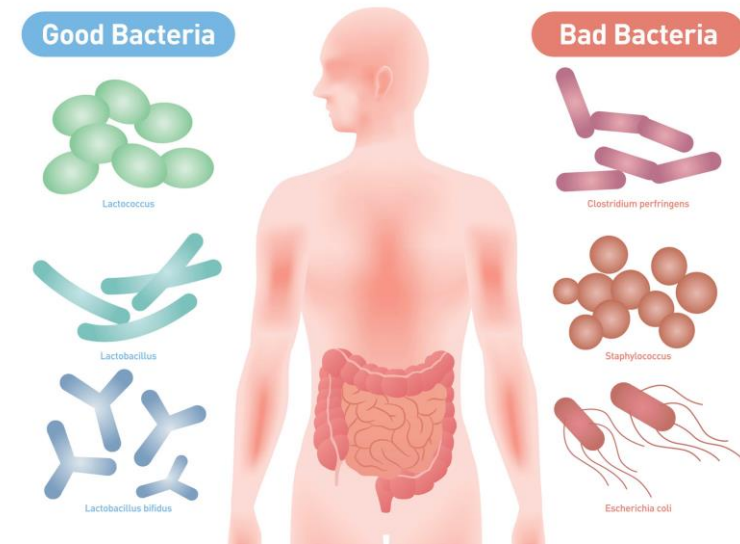


Pathobionts can evade the immune defense by hiding in biofilms.

Biofilms are structured communities of bacteria encased in a self-produced polymeric matrix that adheres to surfaces.

This matrix provides a protective environment for the bacteria, making it difficult for the immune system and antibiotics to eradicate them

Only kill bacteria on the outside layer



What's New

A team of scientists discovered a crucial mechanism in the gut immune system of severe Crohn's disease patients that may improve treatment strategies.

The study found that certain bacteria, specifically *Campylobacter* and *Mannheimia*, can evade antibody coating and cause uncontrolled inflammation, explaining why some patients suffer more severely.

The research highlighted the significant role of Immunoglobulin G (IgG) in severe cases of Crohn's disease, contrasting with the traditionally emphasized role of Immunoglobulin A (IgA) in gut immunity.

Shifting to Treat-to-Target Approach:

Mayo clinic gastroenterologists advocate shifting from symptom control to a treat-to-target approach.

This approach focuses on mucosal healing, which can alter the disease's natural course and improve long-term outcomes.



New Medications

Anti-TNF Agents:

Infliximab, adalimumab, certolizumab pegol, and golimumab: These drugs block tumor necrosis factor-alpha (TNF-alpha), a cytokine involved in systemic inflammation, thereby reducing inflammation and immune system activity in IBD.

Anti-Integrin Biologics:

Natalizumab and vedolizumab: These drugs inhibit the migration of leukocytes (white blood cells) to the gut by blocking integrins, which are proteins that allow cells to adhere to blood vessel walls, reducing gut inflammation.

Cytokine blockers: Ustekinumab (targets IL-12 and IL-23) and newer drugs like brazikumab and risankizumab (anti-IL-23): Block interleukins IL-12 and IL-23, which are involved in inflammatory pathways, thus reducing inflammation in Crohn's disease and ulcerative colitis

Jak Inhibitors: Tofacitinib, with others like upadacitinib and filgotinib in development - inhibit Janus kinase (JAK) enzymes, which are involved in the signaling pathways that lead to inflammation, thus helping to reduce immune system activity and inflammation in the gut

Others: Etrolizumab (anti- β 7 integrin) and SHP647 (anti-MAdCAM): Etrolizumab blocks the β 7 integrin, which is involved in the migration of immune cells to the gut, while SHP647 targets MAdCAM-1, another molecule involved in cell adhesion, both reducing gut inflammation

Functional Approach

Anti-inflammatory Diet: Emphasis on a diet that reduces inflammation, such as a plant-based diet rich in fruits, vegetables, and whole grains. The Mediterranean diet is often recommended.

Specific Carbohydrate Diet (SCD): Some patients find relief with the SCD, which eliminates complex carbohydrates thought to be difficult to digest and promote bacterial overgrowth.

Low FODMAP Diet: This diet reduces fermentable oligosaccharides, disaccharides, monosaccharides, and polyols, which can cause bloating and gas in some UC patients.

Elimination Diets: Identifying and eliminating food sensitivities or intolerances through an elimination diet can help reduce symptoms.

Omega-3 Fatty Acids: For their anti-inflammatory properties.

Vitamin D: Often deficient in UC patients and important for immune function.

Curcumin: The active ingredient in turmeric, which has anti-inflammatory effects.

L-glutamine: Supports the integrity of the gut lining.



Aloe Vera: Known for its soothing properties on the gut lining.

Boswellia Serrata: An herb that has anti-inflammatory properties and is sometimes used in UC treatment.

Slippery Elm: Helps soothe the digestive tract.

Stress Management: Stress can exacerbate colitis and Crohn's

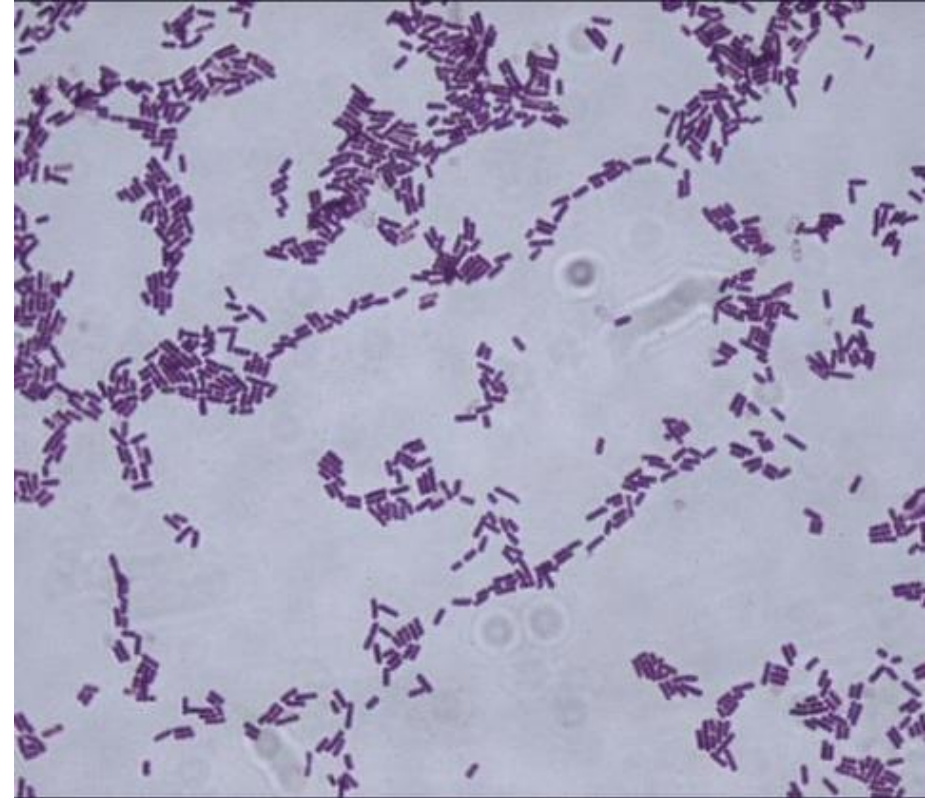


Key Spore-Forming Probiotics

Bacillus coagulans: Known for its ability to survive extreme conditions and support gut health.

Bacillus subtilis: Helps in enhancing gut barrier function and modulating the immune response.

Bacillus clausii: Used in treating gastrointestinal disorders and promoting a balanced microbiome.



A study published in the Journal of Clinical Gastroenterology found that *Bacillus coagulans* supplementation significantly reduced abdominal pain and bloating in IBS patients, suggesting potential benefits for IBD as well

Another study highlighted the role of *Bacillus subtilis* in reducing inflammation and promoting gut health, which could be beneficial for managing IBD symptoms .



Spore probiotics, particularly from *Bacillus* species, can survive the acidic environment of the stomach and effectively colonize the intestines temporarily to exert their benefits.

Help reduce inflammation by modulating the immune response and decreasing the production of pro-inflammatory cytokines, which is crucial for managing IBD.



Spore probiotics enhance the integrity of the gut barrier, reducing intestinal permeability (leaky gut), a common issue in IBD that can exacerbate symptoms and inflammation.

They promote a healthy gut by outcompeting pathogenic bacteria, which helps maintain a balanced microbiome and prevents dysbiosis associated with IBD flare-ups.

Spore probiotics are generally well-tolerated and safe for most people, including those with IBD, and are less likely to cause gas and bloating compared to other probiotic strains.



Strategies

- Boswellia (frankincense) and Curcuma (turmeric), are indicated in managing acute flares and maintaining disease remission.
- Spasmolytic and carminative herbs like peppermint, ginger, and chamomile.
- Aloe vera is an example of a mucilaginous herb that modulates inflammation and the immune system.
- Butyrate or mixed-short-chain fatty acid (composed of mixed acetate, propionate, and butyrate) enemas have shown benefits.
- Probiotics are highly indicated for managing acute UC and maintaining remission.

- Acupuncture is superior to conventional pharmacotherapy with higher safety profiles in treating UC and Crohn's
- Stress management is an important aspect of UC and Crohn's treatment.
- Decreasing the overall toxin burden can help mitigate inflammation in the body.
- Fecal microbiota transplantation (FMT) is an emerging therapy that introduces fecal material from a healthy donor into the recipient to correct disruptions in the gastrointestinal ecosystem.

Case Study

35 year old female

UC diagnosed 9 years ago, on and off immunosuppressive agents over the years

Professional bodybuilder

Bloating, abdominal pain intermittently

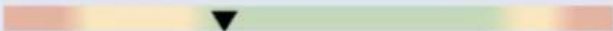
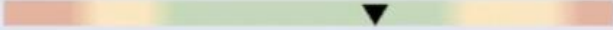
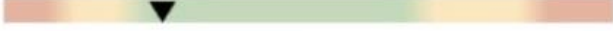
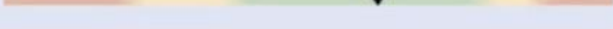
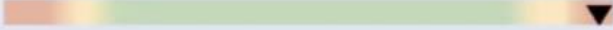
Bloody diarrhea with flares, up to 5-6 times per day

Weight loss

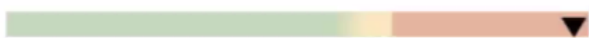
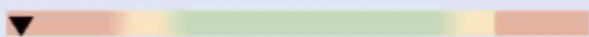
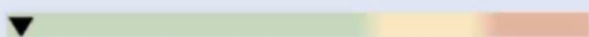
Joint pain

Extreme stress with a new job

High bacteroidetes
and firmicutes
may indicate low
stomach acid

COMMENSAL/KEYSTONE BACTERIA			
COMMENSAL BACTERIA	Result		Reference
<i>Bacteroides fragilis</i>	7.52e9		1.6e9 - 2.5e11
<i>Bifidobacterium</i> spp.	2.99e8		> 6.7e7
<i>Enterococcus</i> spp.	1.24e7		1.9e5 - 2.0e8
<i>Escherichia</i> spp.	1.82e7		3.7e6 - 3.8e9
<i>Lactobacillus</i> spp.	1.37e7		8.6e5 - 6.2e8
<i>Enterobacter</i> spp.	1.81e6		1.0e6 - 5.0e7
<i>Akkermansia muciniphila</i>	<dl L		1.0e1 - 8.2e6
<i>Faecalibacterium prausnitzii</i>	4.81e5		1.0e3 - 5.0e8
<i>Roseburia</i> spp.	1.83e9		5.0e7 - 2.0e10
BACTERIAL PHYLA			
<i>Bacteroidetes</i>	2.74e12		8.6e11 - 3.3e12
<i>Firmicutes</i>	5.09e11 H		5.7e10 - 3.0e11
<i>Firmicutes:Bacteroidetes</i> Ratio	0.19		< 1.0

Elastase –
digestive enzyme
that can be
measured in the
stool

INTESTINAL HEALTH MARKERS			
DIGESTION	Result		Reference
Steatocrit	<dl		< 15 %
Elastase-1	46 L		> 200 ug/g
GI MARKERS			
β-Glucuronidase	2377		< 2486 U/mL
Occult Blood - FIT	86 H		< 10 ug/g
IMMUNE RESPONSE			
Secretory IgA	<210 L		510 - 2010 ug/g
Anti-gliadin IgA	25		< 175 U/L
Eosinophil Activation Protein (EDN, EPX)	0.39		< 2.34 ug/g
INFLAMMATION			
Calprotectin	219 H		< 173 ug/g

- Inhibit Inflammation (Combination of turmeric, boswellia, quercetin, resveratrol)
- Gut lining support (Demulcent herbs)
- Dysbiosis/Repopulation (Probiotics)
- Immune support (Immunoglobulins, Zinc carnosine, Vitamin D)
- Liver support (Milk thistle)
- Digestive support (Enzymes, HCL)

