Welcome to the IBD Nurse Fellowship Program!

The program consists of 13 modules:

Module 1 – Ulcerative Colitis
Module 2 – Crohn's Disease
Module 3 – Ulcerative Colitis vs. Crohn's Disease
Module 4 – Management of Ulcerative Colitis
Module 5 – Management of Crohn's Disease
Module 6 – IBD and Surgery
Module 7 – Medication Adherence in IBD
Module 8 – Health Promotion and Maintenance in IBD
Module 9 – Nutrition and IBD
Module 10 – Extra-intestinal Manifestations of IBD
Module 11 – Anemia in IBD
Module 12 – Fatigue in IBD
Module 13 – Anxiety and Depression in IBD

Each module is divided into sections, all of which are listed in the Table of Contents. The Table of Contents allows you to click on the page numbers to navigate to each section. Each page has a Home Button on the bottom right-hand corner that will take you back to the Table of Contents.

The learning objectives are at the beginning and end of each module. Before completing the module, you will have the opportunity to take a self-directed quiz, which will test your knowledge on several of the key concepts and takeaways from the module. It is recommended that you take the quiz and accomplish all of the learning objectives before moving on to the next module.

This program is supported through an educational grant from janssen

IBD nurse fellowship PROGRAM

csgna
Canadian Society of Gastroenterology Nurses & Associates
Société canadienne des infirmières et infirmiers en gastroentérologie et travailleurs associés

CANIBD
Canadian Nurses IBD Group

Module 2

Crohn's disease

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Learning objectives

After completing Module 2 you will be able to:

- Summarize the anatomy and explain the function of the gastrointestinal tract
- Define Crohn's disease
- Summarize the epidemiology of Crohn's disease
- Explain the etiology and pathology of the disease
- Identify the clinical features of Crohn's disease
- Assess disease activity using the CDAI and HBI indexes
- Describe the impact that Crohn's disease has on certain populations
- Explain the prognosis of the disease

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Section 1

Anatomy and function of the gastrointestinal tract

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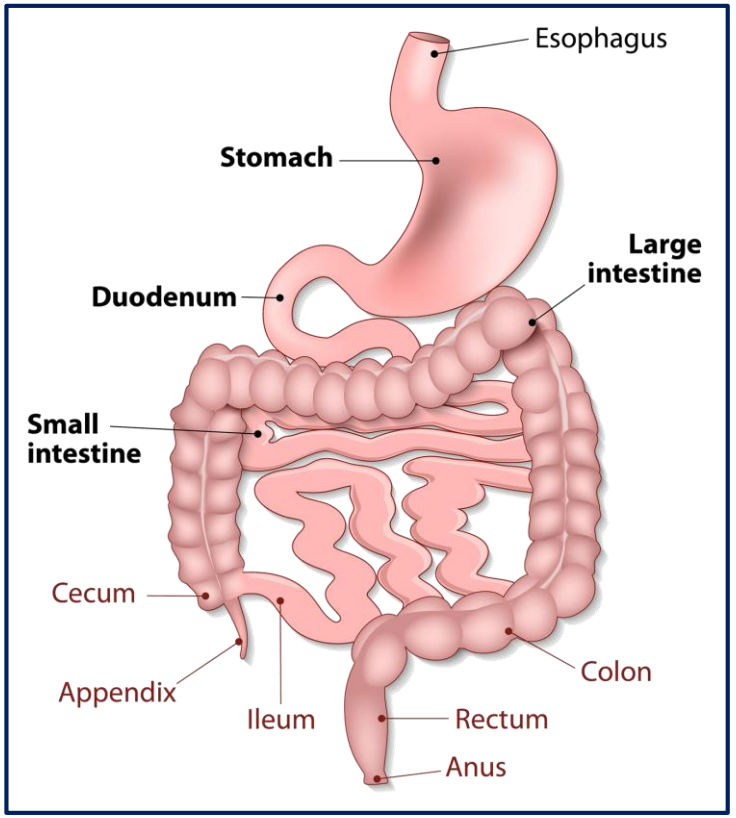
Anatomy and function of the GI tract

- Oropharynx (back of the throat) – where the food passes from the mouth to the esophagus
- Esophagus – a long (~ 25 cm), thin, and muscular tube that connects the oropharynx to the stomach
- Stomach – where food is stored before being passed into the duodenum (it also produces and secretes several important substances to control the digestion of food)
- Duodenum – the first short segment of the small intestine
- Small intestine (jejunum and ileum) – where absorption of micronutrients occurs (measures between 3 and 4 meters)



The gastrointestinal tract

- Large intestine (colon) – where water absorption and bacterial fermentation of indigestible waste occur
- Rectum and anus – complete the intestinal tract and allow for waste disposal

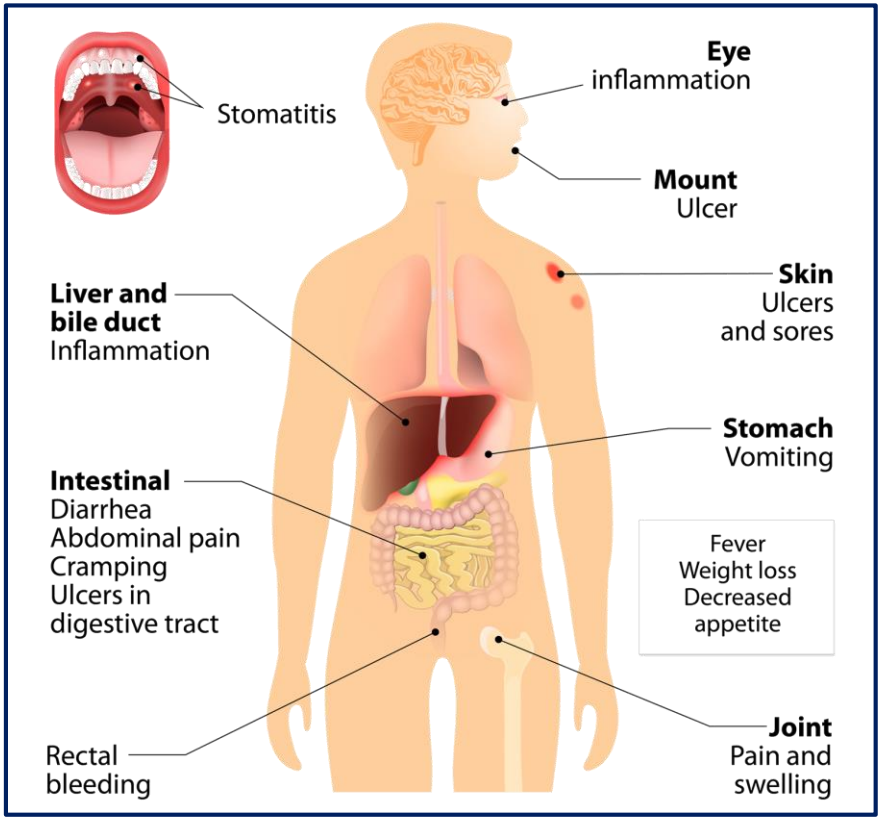
Feldman M *et al.*, 2015; Taylor T, 2015.

Section 2

Introduction to Crohn's disease

What is Crohn's disease?

- Crohn's disease (CD) is a chronic disorder that causes inflammation of any area of the GI tract from the mouth to the anus
- Most commonly affects the small intestine
- The symptoms and complications of CD differ, depending on what part of the intestinal tract is affected
- CD is classified as mild, moderate or severe based on:
  - Age at diagnosis
  - Location of the disease
  - Disease behaviour (inflammatory, penetrating and/or stricturing)

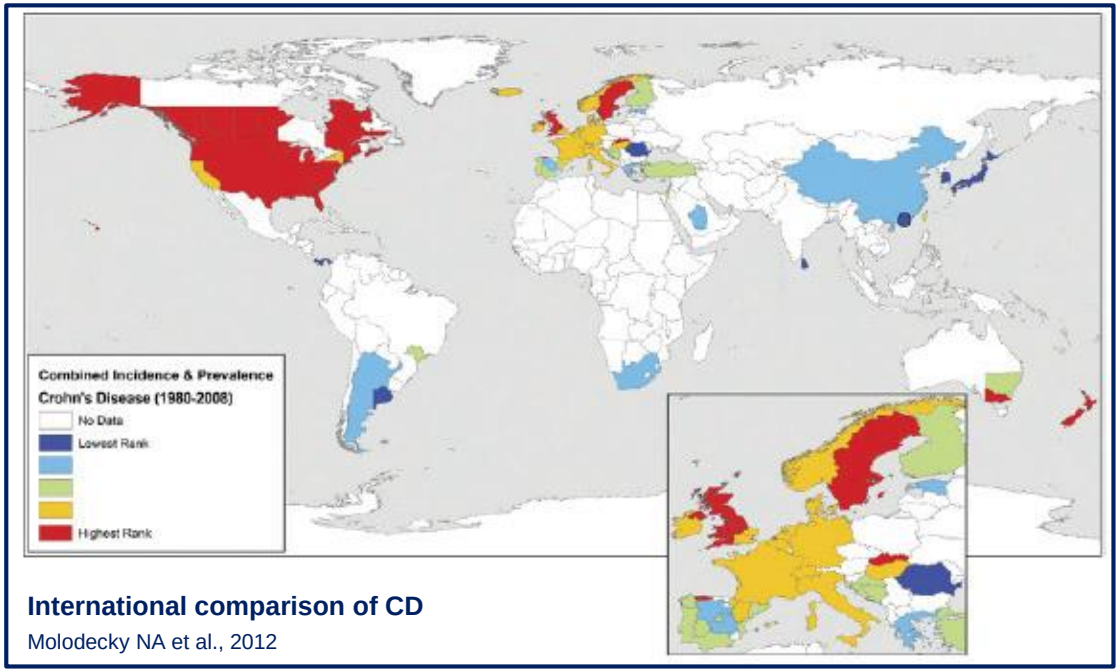


Areas affected by Crohn's disease and its common symptoms

CCFC Impact Report, 2012.

Epidemiology of Crohn's disease

- Geographic and temporal trends in incidence of Crohn's disease (CD) have been observed
- There are approximately 129,000 Canadians living with CD, with more than 5,700 new cases being diagnosed every year
- Several studies have found that incidence is rising internationally for CD
- International studies are very similar to Canadian findings with respect to:
  - Age of onset
  - Prevalence by age
- Both international and Canadian findings suggest that males are more likely to get CD as children, while females are more likely to develop the disease as adults



International comparison of CD
Molodecky NA et al., 2012

CCFC Impact Report, 2012; CCFC Fast Facts, 2012; Feldman M *et al.,* 2015; Molodecky NA *et al.,* 2012.

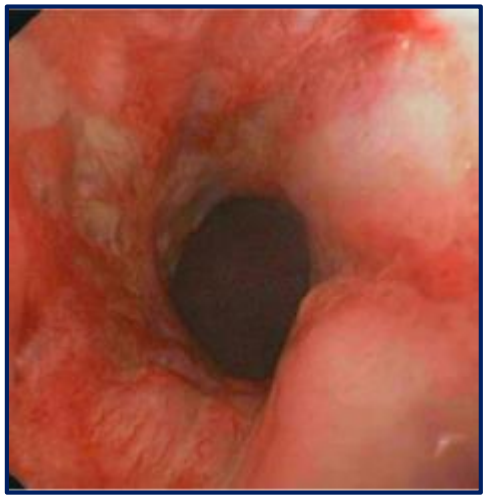
Etiology of Crohn's disease

- Similar to ulcerative colitis, the etiology of Crohn's disease (CD) has not been determined
- Several factors have been suggested to be contributors to the development of CD:
  - Initiating event – caused by an inappropriate response to a pathogen or a decrease in the diversity of the microbial flora
  - Genetic predisposition – based on observations that family members of affected individuals are at an increased risk for developing the disease
    - The relative risk among first-degree relatives is 8 to 10 times higher than in general population
    - Approximately 1 in 5 patients with CD report having at least one affected relative
  - Ethnicity – Eastern European Jews are at 2- to 4-fold higher risk of developing IBD than non-jews of the same geographic location
    - The concordance rate among monozygotic twins is as high as 67% for CD
  - Environmental factors – the rising incidence of CD over decades and in developing countries suggests an environmental contribution to the expression and development of the disease
    - Breast-feeding is suggested to be protective against IBD
    - CD has been associated with higher socioeconomic status, which is likely related to the hygiene hypothesis and intestinal mucosal immunity
    - Antibiotic, NSAID and oral contraceptive use are associated with the development of CD
    - Smoking, and increased consumption of refined sugars (and lower intake of fruits and vegetables) are also associated with the development of the disease

CCFC Impact Report, 2012; Feldman M *et al.,* 2015.

Pathology of Crohn's disease

- Crohn's disease (CD) is not always limited to the gastrointestinal (GI) tract
  - Individuals may experience symptoms affecting the joints, bones, eyes, skin and liver
  - Fatigue is also a common complaint
  - CD-associated osteoporosis – as many adult also have osteoporosis but this is often associated with corticoids
- Clinical features of the GI tract include:
  - Aphthous ulcers – superficial and tiny ulcers that represent focal areas of an immune response
  - Granulomas – a collection of at least five epithelioid cells with or without the presence of giant cells, and without caseating necrosis or foreign bodies
    - Not always found in CD
    - Tumor necrosis factor (TNF) is the key cytokine in the formation of granulomas
  - Linear or serpiginous ulcers – form when multiple ulcers join lengthwise
    - The classic cobblestoned appearance of CD results when linear and transverse ulcers intersect
  - Transmural inflammation – while inflammation of ulcerative colitis is limited to the mucosa, the inflammation in CD is transmural and can be seen throughout all layers of the gut
- In the GI tract, CD has a preference for the distal small intestine and proximal colon



Colonoscopy of the rectum displaying the inflamed mucosa in Crohn's disease

CCFC Impact Report, 2012; Feldman M *et al.,* 2015; Heresbach D *et al.,* 2005; Qin X, 2013.

Image source: https://openi.nlm.nih.gov/detailedresult.php?img=4265509_13256_2014_3005_Fig1_HTML&query=crohn%27s%20disease%20of%20intestine&it=xg&req=4&npos=87.

Section 3

Symptoms, diagnosis and outcomes of Crohn's disease

Clinical features of Crohn's disease

- Symptoms of Crohn's disease can be variable and are often subtle:

Symptom	Description
Diarrhea	• Persistent • Loose, watery, or frequent bowel movements
Abdominal pain	• Crampy pain is common • Varies from person to person
Weight loss and malnutrition	• Commonly seen in patients with an active inflammatory component to their disease
Fever	• A common symptom but varies among individuals
Anemia	• Found in approximately 30% of patients • A consequence of iron deficiency due to blood loss
Fissures, strictures, fistulas and abscesses	• Fissures are tears that occur in the lining of the anus • Strictures are common in CD and can occur in any segment of the GI tract • Fistulas are tunnels that lead from one loop of intestine to another, or that connect the intestine to the bladder, vagina or skin • Deep abscesses can arise secondary to fistulas, especially when the internal opening is higher up the rectum
Perianal disease	• A common symptom of CD • Conditions affecting the rectum and anus • Include fistulas and lesions

CD, Crohn's disease.

CCFC Impact Report, 2012; Feldman M *et al.,* 2015.

Evaluating disease activity

- The Crohn's Disease Activity Index (CDAI) was initially developed to meet the two principle needs of the National Cooperative Crohn's Disease Study:
  1. Establish a uniform set of clinical parameters which could be assessed and recorded in a cohesive fashion among several studies, over a number of years
  2. Develop a numerical index to allow for the proportional degree of illness to be measured with a numerical value
- The CDAI is commonly used to assess disease activity in Crohn's disease
- Calculation of the CDAI can be a complex process and involves 8 items
- A 7-day diary card is completed to obtain information on stool consistency, abdominal pain and general well-being

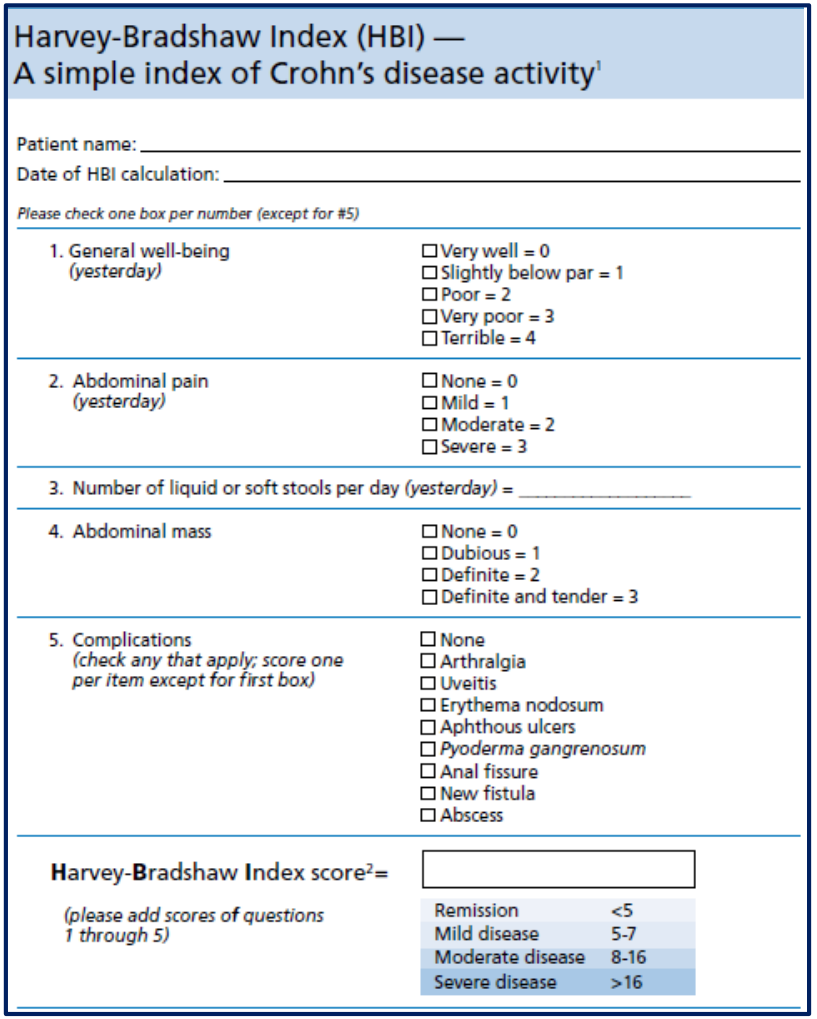
Crohn's Disease Activity Index *- Clinical or laboratory variable*	**Weighting Factor**
Number of liquid or soft stools each day for seven days	x 2
Abdominal pain (graded 0-3 on severity) each day for seven days	x 5
General well-being, subjectively assessed from 0 *(well)* to 4 *(terrible)* each day for seven days	x 7
Presence of complications *(as below and including fever greater than 37.8°C during previous week)* - 1 point each	x 20
Taking anti-diarrheal or opiates for diarrhea	x 30
Presence of an abdominal mass *(0=none, 2 questionable, 5 definite)*	x 10
Absolute deviation of hematocrit from 47%-men, 42%-women	x 6
Percentage deviation from standard weight	x 1

Crohn's Disease Activity Index

Best WR *et al.* 1976; Vermiere S, *et al.,* 2010.

Evaluating disease activity

- The Harvey-Bradshaw Index (HBI) is a simplified version of the CDAI, designed to make data collection and calculation easier
- The HBI does not require the prospective 7-day data collection
- The CDAI and HBI scores have been found to be highly correlated
- The simplicity of the HBI relative to the CDAI makes it more appropriate for use in clinical trials, where resources for complex patient assessments are generally limited
- The HBI is more conducive for long term follow-up and therefore can also be applied in clinical practice



Harvey-Bradshaw Index (HBI) — A simple index of Crohn's disease activity[1]

Patient name: _____

Date of HBI calculation: _____

Please check one box per number (except for #5)

1. General well-being *(yesterday)*	☐ Very well = 0 ☐ Slightly below par = 1 ☐ Poor = 2 ☐ Very poor = 3 ☐ Terrible = 4
2. Abdominal pain *(yesterday)*	☐ None = 0 ☐ Mild = 1 ☐ Moderate = 2 ☐ Severe = 3
3. Number of liquid or soft stools per day *(yesterday)* = _____	
4. Abdominal mass	☐ None = 0 ☐ Dubious = 1 ☐ Definite = 2 ☐ Definite and tender = 3
5. Complications *(check any that apply; score one per item except for first box)*	☐ None ☐ Arthralgia ☐ Uveitis ☐ Erythema nodosum ☐ Aphthous ulcers ☐ *Pyoderma gangrenosum* ☐ Anal fissure ☐ New fistula ☐ Abscess

Harvey-Bradshaw Index score[2]**=** ☐

(please add scores of questions 1 through 5)

Remission	<5
Mild disease	5-7
Moderate disease	8-16
Severe disease	>16

Harvey-Bradshaw Index

Vermiere S, *et al.*, 2010.

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Crohn's disease in specific populations

- Children and adolescents:
  - 25% of new Crohn's disease (CD) diagnoses occur in people younger than 20 years of age
  - CD generally has the same pathophysiology and clinical features in children as it does in adults
  - CD in children and adolescents can cause disturbances in physical growth, sexual maturation, and psychosocial development
- Fertility and reproductive health:
  - CD affects a large number of individuals during their peak reproductive years
  - In general, decreased fertility is associated with increased disease activity
  - Contributing factors to decreased fertility include:
    - The conscious decision to avoid childbearing
    - Decreased libido because of symptoms, such as diarrhea, abdominal pain and fatigue (men and women)
    - Optimal disease control with the goal of remission is the most important predictor of a healthy pregnancy outcome
  - Active perianal disease that may contribute to physical symptoms such as dyspareunia and self-image issues
- Pregnancy:
  - There is a 30% chance each that symptoms during pregnancy will either improve, worsen or remain the same
  - Most pregnancies are normal, but evidence suggests an increased rate of adverse conception outcomes, such as spontaneous abortion, pre-term birth, small child for gestational age and stillbirth

Feldman M *et al.*, 2015.

Prognosis

- Meta-analyses done in patients with Crohn's disease (CD) suggest that mortality risk increases from anywhere between 30% to 75%
  - A meta-analysis study is a statistical technique which combines data from multiple independent studies to generate a more precise estimate
- CD is associated with increased death rates from cancer, cardiovascular disease, respiratory disease, GI diseases, infections, and complications following medical and surgical interventions
- Meta-analyses of colorectal and small bowel cancer studies have found that people who have been diagnosed with CD for over 10 years have a 2.9% elevated risk of developing colorectal cancer
  - Other evidence suggests the risk of colorectal cancer is no different than the general population
- The cumulative relapse rate nears almost 50% in the first year after diagnosis, with approximately 10% of patients having a chronic relapse
  - Relapse refers to either the re-appearance of symptoms or re-activation of the disease
- Over a period of 4 years, roughly 22% of patients remain in remission, 25% experience chronically active symptoms, and 53% have a disease that varies between active and inactive states
- Although most people with CD continue to lead productive lives, many individuals experience periods of poor productivity
  - Approximately 10% of patients are disabled by their disease

CCFC Impact Report, 2012; Feldman M *et al.,* 2015.

Section 4

Self-assessment quiz

Self-assessment quiz

- Now that you have reviewed the module content, you have the opportunity to test your knowledge and understanding of the material by completing a self-assessment
- The assessment consists of 5 multiple choice questions
- Please attempt each question before looking at the answer key, which is located on page 25
- The answer key provides the rationale for each answer and indicates where the correct answer can be found in the module

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Question 1

Which of the following characterizes Crohn's disease?

a) Crohn's disease causes inflammation of any area of the gastrointestinal tract from the mouth to the anus

b) Crohn's disease most commonly affects the large intestine

c) The symptoms and complications of Crohn's disease are generally always similar and consistent

d) None of the above

Question 2

Based on epidemiological statistics, both international and Canadian findings suggest which of the following?

a) Males are more likely to develop Crohn's disease as children

b) Females are more likely to develop Crohn's disease as adults

c) Both adult males and females are equally likely to develop Crohn's disease

d) Both a) and b)

Question 3

Which of the following factors has been associated with a reduced risk of developing Crohn's disease or IBD?

a) Having an affected relative

b) Having an inappropriate response to a pathogen

c) Breast feeding

d) Smoking

Question 4

Which of the following clinical features of Crohn's disease gives rise to the classic cobblestone appearance of the gastrointestinal tract?

a) Transmural inflammation

b) Intersection of linear and transverse ulcers

c) Aphthous ulcers

d) Granulomas

Question 5

Which of the following clinical features can occur in any part of the GI tract?

a) Fissures

b) Fistulas

c) Strictures

d) Abscesses

Answer key

1. **The correct answer is a.** Crohn's disease is a chronic disorder that causes inflammation of any area of the GI tract from the mouth to the anus. See page 8 for more information on this topic.

2. **The correct answer is d.** Both international and Canadian findings suggest that males are more likely to get Crohn's disease as children, while females are more likely to develop the disease as adults. See page 9 for more information on this topic.

3. **The correct answer is c.** Breast-feeding is suggested to be protective against inflammatory bowel disease. See page 10 for more information on this topic.

4. **The correct answer is b.** The classic cobblestoned appearance of Crohn's disease results when linear and transverse ulcers intersect. See page 11 for more information on this topic.

5. **The correct answer is c.** Strictures can occur in any segment of the GI tract. See page 13 for more information on this topic.

Congratulations!

You have completed the 2nd module of the program.

Based on what you learned in Module 2, you should be able to:

- Summarize the anatomy and explain the function of the gastrointestinal tract
- Define Crohn's disease
- Summarize the epidemiology of Crohn's disease
- Explain the etiology and pathology of the disease
- Identify the clinical features of Crohn's disease
- Assess disease activity using the CDAI and HBI indexes
- Describe the impact that Crohn's disease has on certain populations
- Explain the prognosis of the disease

If you have answered the quiz questions correctly and achieved the learning objectives, you are ready to move on to Module 3, which will focus on the similarities and differences between ulcerative colitis and Crohn's disease.

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