

PULSE EXPERIENTIAL TEAM ASSIGNMENT

1. Title of your PULSE experiential assignment. <i>Provide a creative and informative title.</i>
Internal Affairs: Diseases of the Gastrointestinal Tract
2. Please summarize your PULSE experiential assignment (max 300 words). <i>Provide a non-technical (lay) summary of your PULSE assignment. Prompts to think about: What is the topic? What is the format? Why did you choose this topic and format? The summary for lay audience is a brief and accessible summary of the assignment that is used to explain complex ideas, technical writing and scientific terms to people who do not have prior knowledge of the subject (e.g., high school science level). This summary should include the importance, impact, and content of your assignment to a broader audience.</i> <i>[Team 23 is an example of an informative lay summary.]</i>
This assignment focuses on diseases of the gastrointestinal tract, such as cancer, inflammatory bowel disorders, ulcers, and more. This assignment is presented in the form of a visual novel, where the learner takes the role of a gastrointestinal doctor seeing and treating their various patients throughout the course of the day. The learner will have an opportunity to speak with the patient before treatment, allowing them to obtain a variety of information regarding the patient that will assist in diagnosis. Next, the learner will be able to perform several tests and screening methods on the patient and come to an appropriate diagnosis. Finally, the learner will be presented with several options regarding the patient's disease and treatment. Through this process, the learner will be able to gain knowledge on a wide variety of GI diseases and everything that comes with treating them. We chose this topic because GI diseases are prominent in today's society, affecting a wide demographic of people. However, these pathologies are often ignored or overlooked, merely attributed to stress or a bad diet. By basing our project on this topic, we aim to emphasize the importance of early diagnosis and treatment of these diseases, raising awareness and promoting the upkeep of gut health. Additionally, we decided to present this topic in a visual novel medium, helping us appeal to a wider audience and make the information more fun to learn. By doing so, we are able to condense a large amount of dense information into an easily accessible, enjoyable format.
3. Provide up to 6 keywords relevant to your PULSE experiential assignment. <i>3-6 keywords are ideal.</i>
Gastrointestinal Diseases, Visual Novel, Esophageal Cancer, Peptic Ulcer, Disease, Acute Appendicitis, Ulcerative Colitis, IBD, Crohn's Disease, Colonic Diverticular Disease, Colorectal Adenocarcinoma, Hernia, Adhesions

4. Identify the course topic with which your PULSE assignment most aligns. <i>Refer to the various topics outlined under ‘Course content and Schedule’ in the syllabus (e.g. Inflammation).</i>
Diseases of the GI Tract
5. What are the learning outcomes? <i>There should be a minimum of 2 learning outcomes for your assignments. For further information on learning outcomes, the Centre for Teaching and Learning offers information: https://teaching.uwo.ca/curriculum/coursedesign/learning-outcomes.html</i>
• Understand different terminologies related to GI anatomy • Understand different terminologies related to GI pathologies • Explain the role and importance of the GI tract in maintaining overall health • Describe the symptoms, risk factors, demographics, diagnostic methods, prognosis, and treatment methods of various GI pathologies • Differentiate between various GI pathologies and understand their significance
6. Why did the team select the chosen topic and the medium? How will the topic and medium of choice help learners?
We chose this topic because GI diseases are prominent in today’s society, affecting a wide demographic of people. However, these pathologies are often ignored or overlooked, merely attributed to stress or a bad diet. By basing our project on this topic, we aim to emphasize the importance of early diagnosis and treatment of these diseases, raising awareness and promoting the upkeep of gut health. Additionally, we decided to present this topic in a visual novel medium, helping us appeal to a wider audience and make the information more fun to learn. By doing so, we are able to condense a large amount of dense information into an easily accessible, enjoyable format.
7. Did the team use an artificial intelligence (AI) technology tool? If so, which AI technology tool(s) did the team use? What other technology tools did the team use? Is the technology tool novel? Is the team using this technology tool in a novel fashion? If the team did not use technology tool, why did the team decide against using the technology tool(s)? <i>Please include details (e.g., for what purpose was the tool used for? Why was the tool the best tool to use for your assignment? Are there alternative tools that were considered?)</i>
Yes, artificial intelligence technology was used. All group members used Google Gemini. Artificial intelligence was used for the purpose of generating character images for the visual novel. This technology tool is novel, providing human-like graphic design when provided with a clear, readable prompt generated by the user. The team used this technology in a novel fashion, using it for assistance regarding artistic aspects

of the project that would otherwise be too time-consuming, allowing the team to focus their attention on the educational and informative aspects of the project. Gemini was preferred over other artificial intelligence tools as it provided the most accurate, best quality images for the visual novel. Alternative tools such as Chat-GPT were considered, but Gemini offered better results.

8. How is your PULSE experiential assignment innovative and/or novel?

Describe what about the PULSE assignment is innovative/novel. Is there a particular component or content that is innovative/novel? How is it different from other content that already exists?

By utilizing the visual novel medium, the PULSE assignment was able to be completed in an innovative, novel way. This distinguishes it from the more common mediums this assignment was completed in, such as a podcast, infographic, or learning module.

9. If you used an AI tool, please copy and paste the prompt(s)/question(s) used along with the output(s)/answer(s) from the AI tool.

The response here is to allow others to replicate the team's work. If the prompts/outputs are lengthy (over 1 page), please attach it as a separate document and note below [Please see attached document].

- Prompt: Generate me a cartoon character image of an Asian woman in her 20s. Give me 3 separate sprites next to each other with space in between. Each sprite should have a different expression: normal, concerned, and thinking. Make the background transparent. I'm using them to make a visual novel. This time, give me the 3 expressions you gave me as separate sprites next to each other: normal, concerned, thinking.
- Output:



All other images were generated using a similar prompt, just with different character descriptions.

10. If you did not use an AI tool, please attach a copy of the team's notes to the assignment.

<i>The response here is to allow others to observe the 'behind the scenes' team's work.</i>
We only used the AI tool for image generation. We also attached our background information notes as well, which was purely our own research without AI assistance (to the OWL Brightspace Submission).
11. How did the team ensure the veracity of the information presented in the PULSE assignment? <i>The response should highlight how the team has ensured that the information presented in the assignment is evidence-based and not spreading misinformation. You should specifically mention which databases (if any) or textbook materials you used, and how you kept track of the sources/references for each claim. If AI provided you with false information, please describe how the team has fact-checked the AI response and the legitimate (scientific) sources you used. A reference document should be provided in the reference section (15. References) below. Please ensure to include in-text citations in your assignment where applicable.</i>
The team ensured the veracity of the information presented in the PULSE assignment in 2 ways: examining and cross-referencing the journals and websites used as references to confirm their accuracy, as well as comparing them to the lecture notes, and not using AI to gather/generate information.
12. Write a meaningful team reflection about the PULSE session (max 250 words). <i>Prompts to help your team write the reflection: Were there any team/individual biases that surfaced when creating content for the assignment? Did the team implement any practices to ensure the content was equitable, diverse, and/or inclusive? How has the PULSE assignment helped with the team's learning? If the team had to estimate, how long did the assignment take? What worked well for your team? What would the team do differently next time? What were the opportunities and challenges with creating the PULSE assignment to help others' learning? Were there any barriers or limitations?</i>
We took into consideration the different demographics affected by the various GI pathologies discussed in this assignment. This includes sex, age, and racial groups, ensuring the material was reflective of diverse populations. A method that worked well for the team was splitting the content into equal, manageable sections and assigning them to each group member, allowing each individual to contribute an appropriate amount of work and prevent overloading. One thing the team would do differently next time is begin the actual creation of the visual novel earlier. We didn't anticipate how large the final result would be, and creating, organizing, and adding the visual novel mechanics to over 200 slides took much more time than we thought. The visual novel was a great medium to do the assignment in. On top of providing an engaging experience for the learner, it also allowed us to include a wide variety of

information. Most notable was the addition of incorrect options (diagnosis methods, treatment methods, etc.), giving us an opportunity to explain why these options were incorrect and why other options were a better fit.

A challenge we faced was adding the visual novel mechanics to PowerPoint. Although this wasn't difficult, it was tedious, having to manually create hyperlinks on each slide linking to the different options and their results. If we were to do this again, we would consider a different platform than PowerPoint – perhaps RenPy, a software specifically designed for visual novel creation.

13. Write the contributions of individual team members using unique initials.

Example: All team members contributed to the design of the prompts used in the technology tool, ChatGPT (GPT-3.5). T.K and T.K2 fact checked the information presented by ChatGPT using published literature on PubMed (PMID 29211319, 32477271). Y.Z finalized and formatted the final infographic and compiled the prompts and outputs. P.E was involved in...

All team members contributed to planning, and the introductory slides of the visual novel (slides 1-3). Each team member did research, design, and prompting for the patients they were responsible for.

BJ: Slides 4-67; curation of references list; visual novel-like progression mechanics

AJ: Slides 68-136; PULSE assignment template (Q1-13)

ZJF: Slides 137-208; overall theme and colour scheme of visual novel slides

AM: Slides 209-223; general idea of VN & game format

15. References

Please provide a numbered reference list with Nature citation style. [Please feel free to use citation management software (i.e., free citation manager, e.g., Zotero and Mendeley)]

References

1. Shaheen NJ, Falk GW, Iyer PG, Gerson LB. ACG clinical guideline: Diagnosis and management of Barrett's esophagus. *American Journal of Gastroenterology*. 2016 Jan;111(1):30–51. doi:10.1038/ajg.2015.322
2. Goldblum JR. Current issues in Barrett's esophagus and barrett's-related dysplasia. *Modern Pathology*. 2015 Jan;28. doi:10.1038/modpathol.2014.125
3. Ishimura N, Okimoto E, Shibagaki K, Ishihara S. Endoscopic diagnosis and screening of Barrett's esophagus: Inconsistency of diagnostic criteria between Japan and Western countries. *DEN Open*. 2021 Nov 15;2(1). doi:10.1002/deo2.73
4. Debi U, Sharma M, Singh L, Sinha A. Barium esophagogram in various esophageal diseases: A pictorial essay. *Indian Journal of Radiology and Imaging*. 2019 Apr;29(02):141–54. doi:10.4103/ijri.ijri_465_18
5. Businello G, Parente P, Mastracci L, Pennelli G, Traverso G, Milione M, et al. The pathologic and molecular landscape of esophageal squamous cell carcinogenesis. *Cancers*. 2020 Aug 4;12(8):2160. doi:10.3390/cancers12082160
6. Zhao L. Diseases of the Gastrointestinal Tract [PowerPoint slides]. *PATHOLOGY 3500: Introduction to Pathology, University of Western Ontario*; 2026 [cited 2026 Apr 13]. Available from: westernu.brightspace.com/
7. Parfitt J. Diseases of the GI Tract [Lecture Notes]. *PATHOLOGY 3500: Introduction to Pathology, University of Western Ontario*; 2026 [cited 2026 Apr 13].
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11. Sacks OA, Hall J. Management of diverticulitis. *JAMA Surgery*. 2024 Jun 1;159(6):696. doi:10.1001/jamasurg.2023.8104
12. Cleveland Clinic. Appendicitis [Internet]. Cleveland Clinic; 2023 Sep 5 [cited 2026 Apr 13]. Available from: <https://my.clevelandclinic.org/health/diseases/8095-appendicitis>
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14. Dubinsky M, Bleakman AP, Panaccione R, Hibi T, Schreiber S, Rubin D, et al. Bowel urgency in ulcerative colitis: Current perspectives and future directions. *American Journal of Gastroenterology*. 2023 Jun 12;118(11):1940–53. doi:10.14309/ajg.0000000000002404
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18. Nakashima J, Patel P, Preuss CV. Mesalamine (USAN) [Updated 2024 Feb 15]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2026 Jan-. [cited 2026 Apr 13]. Available from: www.ncbi.nlm.nih.gov/books/NBK551714/
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16. Annotated Bibliography

An annotated bibliography is a list of sources (books, articles, websites, etc.) that you used for your project. Each entry has two parts:

1. *Citation – written in the required citation style (same formatting and order as the Nature citation style in your list of references).*
2. *Annotation – a short paragraph that summarizes, evaluates, and explains how the source is useful for your assignment.*

Why do this?

- *Helps you keep track of your research.*
- *Shows your instructor you read and understood your sources.*
- *Develops critical thinking by requiring you to evaluate the quality and relevance of each source.*

Write the annotation (about 150–200 words each)

- *Summary: Briefly describe the main argument or purpose of the source.*
- *Evaluation: Comment on the credibility, strengths, or weaknesses of the source.*
- *Relevance: Explain how you will use this source in your assignment.*

1. **Shaheen NJ, Falk GW, Iyer PG, Gerson LB. ACG clinical guideline: Diagnosis and management of Barrett's esophagus. American Journal of Gastroenterology. 2016 Jan;111(1):30–51. doi:10.1038/ajg.2015.322**
 - a. The purpose of this article is to provide a holistic, end-to-end understanding of Barrett's Esophagus. It contains standardized information regarding diagnosis, risk factors, progression, and treatment, as well as novel developments from a wide variety of sources. The article is highly credible, written by professionals in the field, and references over 190 peer-reviewed sources to summarize the disease into compact, digestible information. A primary strength of this source is its status as the "gold standard" for Barrett's Esophagus, offering in-depth and well-cited research for all aspects of the condition. This source was used as a vault of information; it served as the cornerstone for our development and characterization of Barrett's Esophagus.
2. **Goldblum JR. Current issues in Barrett's esophagus and Barrett's-related dysplasia. Modern Pathology. 2015 Jan;28. doi:10.1038/modpathol.2014.125**
 - a. The purpose of this article was to provide a realistic histological image of an esophageal biopsy for a patient with Barrett's Esophagus. It also provided significant information regarding dysplasia and the progression of Barrett's Esophagus into adenocarcinoma. The author is highly cited and well-established, referencing approximately 30 articles to establish the correlation between Barrett's Esophagus and patterns of dysplasia. This

source was primarily used as a reference image for the patient's pathological results; however, the goal was to highlight that this specific case would not show any dysplasia, instead showing characteristic goblet cell metaplasia.

3. **Ishimura N, Okimoto E, Shibagaki K, Ishihara S. Endoscopic diagnosis and screening of Barrett's esophagus: Inconsistency of diagnostic criteria between Japan and Western countries. DEN Open. 2021 Nov 15;2(1). doi:10.1002/deo2.73**

- a. The purpose of this article was to serve as a source for the gross anatomical basis of Barrett's Esophagus. It detailed the primary gross occurrences of the disease and how it would present during an endoscopy. The paper references approximately 100 other articles, synthesizing a significant amount of data to assist in the visual diagnosis and determination of disease progression toward adenocarcinoma. With reputable authors and frequent citations by other researchers, the source's credibility is well-established. This article was used as a reference for a patient's biopsy results, while also using its data to illustrate how the esophagus physically appears when Barrett's Esophagus is present.

4. **Debi U, Sharma M, Singh L, Sinha A. Barium esophagogram in various esophageal diseases: A pictorial essay. Indian Journal of Radiology and Imaging. 2019 Apr;29(02):141–54. doi:10.4103/ijri.ijri_465_18**

- a. The purpose of this article was to introduce the current gold standard in diagnosing esophageal squamous cell carcinoma. Specifically, it explains the use of a barium swallow x-ray, a mechanism that utilizes contrast to visualize esophageal constriction in the presence of a mass. Although the paper is concise, it provides a wealth of visual information that is heavily supported by over 75 referenced articles. Furthermore, the authors are highly cited, and the paper itself has been frequently referenced, establishing its academic credibility. This source was used to mimic the results for a patient with esophageal squamous cell carcinoma and served as the basis for interpreting clinical findings and their utility in diagnosing the disease.

5. **Businello G, Parente P, Mastracci L, Pennelli G, Traverso G, Milione M, et al. The pathologic and molecular landscape of esophageal squamous cell carcinogenesis. Cancers. 2020 Aug 4;12(8):2160. doi:10.3390/cancers12082160**

- a. The purpose of this article was to introduce the biopsy results for a patient with esophageal squamous cell carcinoma (ESCC). Specifically, it illustrates the general progression of the disease and the molecular differences between malignancy and dysplasia. The paper is written by credible authors and has been frequently cited by other academic works;

additionally, it contains over 130 references, which reinforces its credibility and accuracy regarding biopsy findings. This source and its associated imagery were used to mimic a pathologist's report for a patient with ESCC, serving as the basis for interpreting clinical results and suggesting a formal diagnosis.

6. **Zhao L. Diseases of the Gastrointestinal Tract [PowerPoint slides]. PATHOLOGY 3500: Introduction to Pathology, University of Western Ontario; 2026 [cited 2026 Apr 13]. Available from: westernu.brightspace.com/**
 - a. This PowerPoint presentation by Dr. Liena Zhao outlines the normal structure and function of the gastrointestinal tract and details key GI pathology topics, including peptic ulcer disease, acute appendicitis, diverticular disease, inflammatory bowel disease, bowel obstruction, and colorectal cancer. It explains the etiology, pathogenesis, and clinical manifestations of these common conditions. This source is highly credible as it serves as official course material. Its core strength lies in providing high-yield, easily digestible summaries of complex pathological mechanisms paired with clear clinical correlations. This source was used to gather information on the mechanism, symptoms, pathophysiology, treatment methods, and diagnostic methods on a wide variety of diseases, seen in several patients' cases throughout the visual novel.
7. **Parfitt J. Diseases of the GI Tract [Lecture Notes]. PATHOLOGY 3500: Introduction to Pathology, University of Western Ontario; 2026 [cited 2026 Apr 13].**
 - a. These lecture notes by Dr. Jeremy Parfitt outlines the normal structure and function of the gastrointestinal tract and details key GI pathology topics, including peptic ulcer disease, acute appendicitis, diverticular disease, inflammatory bowel disease, bowel obstruction, and colorectal cancer. It explains the etiology, pathogenesis, and clinical manifestations of these common conditions. This source is highly credible as it serves as official course material. Its core strength lies in providing high-yield, easily digestible summaries of complex pathological mechanisms paired with clear clinical correlations. This source was used to gather information on the mechanism, symptoms, pathophysiology, treatment methods, and diagnostic methods on a wide variety of diseases, seen in several patients' cases throughout the visual novel.
8. **Paiji C, Sedarat A. Endoscopic management of esophageal cancer. Cancers. 2022 Jul 22;14(15):3583. doi:10.3390/cancers14153583**
 - a. The purpose of this article was to provide a broad overview of how various stages of esophageal squamous cell carcinoma (ESCC) are managed. Although the paper details numerous clinical mechanisms, its

primary use case in this project was to support the palliative care options required for advanced cases of ESCC. The source is written by credible authors, has been cited multiple times, and references more than 170 other articles to consolidate extensive research regarding ESCC management and treatment. This source was used to substantiate the recommended treatment path for a patient and to introduce novel research and therapeutic developments relative to other traditional sources.

9. Sellars H, Boorman P. Acute appendicitis. Surgery (Oxford). 2017

Aug;35(8):432–8. doi:10.1016/j.mpsur.2017.06.002

- a. The purpose of this article was to provide general clinical information regarding acute appendicitis. Specifically, it served as a reference point for the anatomical location of McBurney's point and its diagnostic significance in cases of suspected appendicitis. While the article is compact, it is information-dense; although it does not reference an extensive number of sources, it is well-cited and offers significant clinical implications for the disease. This source was used as a stand-in for a physical examination to demonstrate the location of McBurney's point and explain how its clinical properties, such as rebound tenderness, reflect the presence of acute appendicitis.

10. Mostbeck G, Adam EJ, Nielsen MB, Claudon M, Clevert D, Nicolau C, et al.

How to diagnose acute appendicitis: Ultrasound first. Insights into Imaging. 2016 Feb 16;7(2):255–63. doi:10.1007/s13244-016-0469-6

- a. The purpose of this article is to examine how ultrasound serves as a confirmatory step in the diagnosis of acute appendicitis. Specifically, it focuses on the advantages of ultrasound over radiation-based imaging methods, such as CT scans, and details how different pathological presentations appear from various scanning angles. The source is highly cited and features a credible list of authors who reference over 50 peer-reviewed articles to summarize this specific diagnostic technique. This source was used to justify the choice of imaging for a patient with acute appendicitis and to provide a visual basis for how the disease is identified through non-invasive, radiation-free technology.

11. Sacks OA, Hall J. Management of diverticulitis. JAMA Surgery. 2024 Jun

1;159(6):696. doi:10.1001/jamasurg.2023.8104

- a. The purpose of this article was to serve as a holistic review source for diverticulitis. It covers multiple facets of clinical management and provides protocols for addressing various stages and progressions of the disease. The paper is well-regarded in the field, featuring a credible author list and a bibliography that references numerous peer-reviewed studies. Initially, the article was used to highlight the clinical differences between diverticulitis and acute appendicitis; subsequently, it became the primary

source for creating and evaluating a patient scenario. The source was used to establish how the disease presents, including specific symptoms and appropriate management strategies based on the patient's diagnostic results.

12. Cleveland Clinic. Appendicitis [Internet]. Cleveland Clinic; 2023 Sep 5 [cited 2026 Apr 13]. Available from:

<https://my.clevelandclinic.org/health/diseases/8095-appendicitis>

- a. The purpose of this paper was to provide the general, yet differentiable, symptoms associated with acute appendicitis. Moreover, it serves as the primary treatment reservoir for the information utilized within the visual novel. While this paper is not a traditional formal journal article, it was published by the Cleveland Clinic, a highly recognized institution whose content is rigorously medically reviewed and widely used by clinicians as a reliable reference. This source was used to identify the correct management protocols for acute appendicitis and to illustrate how a patient's specific symptoms correlate with the progression of the disease.

13. Minordi LM, Larosa L, Berte G, Pecere S, Manfredi R. CT of the acute colonic diverticulitis: A pictorial essay. Diagnostic and Interventional Radiology. 2020 Nov 5;26(6):546–51. doi:10.5152/dir.2020.19645

- a. The purpose of this paper was to provide clinical diagnostic signs for diverticulitis, specifically focusing on the use of CT imaging for acute colonic diverticulitis. The paper is written by credible authors, is well-cited, and provides multiple visual angles demonstrating how CT can identify various aspects of the disease, ranging from the presence of diverticula to the formation of abscesses and other potential complications. This source was used as the basis to mimic the results for a patient with diverticulitis, allowing for the creation of a representative radiologist report. Furthermore, it was utilized to illustrate how complications, such as an abscess, are visually identified and interpreted through CT imaging in a clinical setting.

14. Dubinsky M, Bleakman AP, Panaccione R, Hibi T, Schreiber S, Rubin D, et al. Bowel urgency in ulcerative colitis: Current perspectives and future directions. American Journal of Gastroenterology. 2023 Jun 12;118(11):1940–53. doi:10.14309/ajg.0000000000002404

- a. This review identifies tenesmus, or inappropriate bowel urgency as a critical, symptom of ulcerative colitis that significantly impairs patient quality of life. The authors summarize the multifactorial pathophysiology behind tenesmus, explaining how it occurs due to active mucosal inflammation, decreased rectal compliance and hypersensitivity. This source is credible, featuring an international panel of experts and robust

clinical data. This source was used to prove tenesmus as a potential symptom of ulcerative colitis.

- 15. Tripathi MK, Pratap CB, Dixit VK, Singh TB, Shukla SK, Jain AK, et al. Ulcerative colitis and its association with salmonella species. Interdisciplinary Perspectives on Infectious Diseases. 2016;2016:1–7. doi:10.1155/2016/5854285**

a. This study investigates the potential link between *Salmonella* species (specifically *S. Typhi* and *S. Paratyphi A*) and ulcerative colitis. Using nested PCR on rectal biopsies, the researchers found a significantly higher prevalence of *Salmonella* DNA in UC patients compared to healthy controls. The source is credible, coming from an academic institution in a region where these pathogens are commonly found. This source was used for proof that a correlation exists between past *Salmonella* infection and the presentation of ulcerative colitis.

- 16. Sacco R, Tanaka T, Yamamoto T, Bresci G, Saniabadi AR. Adacolumn leucocytapheresis for ulcerative colitis: Clinical and endoscopic features of responders and Unresponders. Expert Review of Gastroenterology & Hepatology. 2014 Aug 27;9(3):327–33. doi:10.1586/17474124.2014.953060**

a. This article documents the endoscopic presentation of severe ulcerative colitis, specifically highlighting the loss of normal vascular patterns and the presence of deep, extensive mucosal ulcerations. The source is credible, originating from a peer-reviewed case study in the *World Journal of Gastroenterology*, providing an example of a single, extreme case. This source was used for its figure of a colonoscopy of a patient with ulcerative colitis, providing the radiological evidence for the lack of skip sections and transmural inflammation seen in ulcerative colitis.

- 17. Ascarelli A, Francone M, Cannata D, Cannavale A, Carbone I, Passariello R. MRI of the colon. Imaging in Medicine. 2010 Feb;2(1):195–9. doi:10.2217/iim.10.1**

a. This article goes over the role of MRI as a non-invasive alternative to traditional endoscopy for inflammatory bowel diseases. The author argues that MRI's superior soft-tissue contrast and lack of ionizing radiation make it the preferred medium for characterizing transmural inflammation and detecting extraluminal complications like fistulas or abscesses. The source is credible, published in a specialized clinical journal, with a detailed technical comparison of how MRI distinguishes between active inflammation and chronic fibrotic scarring. This source was used for its figure of an MRE scan of a patient with ulcerative colitis, providing the radiological evidence for the surface-level, mucosal inflammation of ulcerative colitis, compared to the deep, transmural counterpart seen in Crohn's Disease.

- 18. Nakashima J, Patel P, Preuss CV. Mesalamine (USAN) [Updated 2024 Feb 15]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2026 Jan-. [cited 2026 Apr 13]. Available from: www.ncbi.nlm.nih.gov/books/NBK551714/**
- a. This clinical reference provides an overview of the pharmacology, indications, and administration of several pharmaceutical agents used in the treatment of inflammatory bowel diseases. The authors argue that Mesalamine is the first-line method for treating mild-to-moderate ulcerative colitis due to its ability to modulate the cyclooxygenase and lipooxygenase pathways directly at the mucosal surface. The source is credible, serving as a vital resource for healthcare professionals with its clear breakdown of several formulations. This source was used for the treatment plan the doctor presents the two patients who suffer from IBD.
- 19. Kim JS, Park SM, Kim B-W. Endoscopic management of peptic ulcer bleeding. Clinical Endoscopy. 2015;48(2):106. doi:10.5946/ce.2015.48.2.106**
- a. This review details the role of endoscopic intervention in managing peptic ulcers and associated acute peptic ulcer bleeding. The authors argue that early endoscopy (within 24 hours) is essential for diagnosis and stabilization. The source is highly credible, published in a specialized peer-reviewed journal. This source was used for its figure of an endoscopy of a patient with a gastric peptic ulcer and associated bleeding, providing the radiological evidence for *H. Pylori*-associated peptic ulcer.
- 20. Gupta A, Shetty S, Mutalik S, Chandrashekar H R, K N, Mathew EM, et al. Treatment of H. pylori infection and gastric ulcer: Need for novel pharmaceutical formulation. Heliyon. 2023 Oct;9(10). doi:10.1016/j.heliyon.2023.e20406**
- a. This review synthesizes current knowledge on the mechanisms of *H. pylori* and peptic ulcer disease. The authors argue that the bacteria's ability to survive the acidic gastric environment through urease production and disruption of the mucosal barrier via toxins like CagA and VacA are the primary causes of ulcers. Additionally, it provides a comprehensive summary of various treatment methods that can be used for peptic ulcers. This source is credible, published in a peer-reviewed medical journal with a focus on diagnostic accuracy. This source was used for the treatment plan the doctor presents the two patients who suffer from peptic ulcers.
- 21. Cho Y-H, Chae MK, Cha JM, Lee JI, Joo KR, Shin HP, et al. Cerebral venous thrombosis in a patient with Crohn's disease. Intestinal Research. 2016;14(1):96. doi:10.5217/ir.2016.14.1.96**
- a. This study investigates the contrasting etiopathogenesis of inflammatory bowel disease (IBD) between Western and Eastern populations, focusing on the interplay of genetics and environment. The authors argue that while

the NOD2 gene is a primary driver of Crohn's in Western countries, its influence is significantly lower in Eastern patients, suggesting that distinct environmental factors like diet and hygiene play a larger role in non-Western regions. This source is credible, published in an international journal specializing in IBD. This source was used for its figure of a colonoscopy of a patient with Crohn's Disease, providing the radiological evidence for the skip sections and mucosal "cobblestoning" seen in Crohn's Disease.

22. Sinha R. Recent advances in intestinal imaging. Indian Journal of Radiology and Imaging. 2011 Jul;21(03):170–5. doi:10.4103/0971-3026.85363

- a. This clinical imaging study demonstrates the effectiveness of MR Enterography (MRE) in diagnosing Crohn's disease by providing high-resolution visualization of bowel wall thickening and mesenteric inflammation. The source is credible, published in a peer-reviewed radiology journal, clearly demonstrating how contrast agents can distinguish between active disease and chronic scarring. This source was used for its figure of an MRE scan of a patient with Crohn's Disease, providing the radiological evidence for the deep, transmural inflammation of Crohn's Disease, compared to the surface-level, mucosal inflammation seen in ulcerative colitis.

23. Higuchi K, Umegaki E, Watanabe T, Yoda Y, Morita E, Murano M, et al. Present status and strategy of NSAIDs-induced small bowel injury. Journal of Gastroenterology. 2009 Jul 1;44(9):879–88. doi:10.1007/s00535-009-0102-2

- a. This review details the several strategies used to locate and treat NSAID-induced small bowel injury, such as peptic ulcers. Some strategies include capsule endoscopy and balloon enteroscopy, and the authors emphasize the importance of early treatment and prevention. The source is highly credible, published in a specialized peer-reviewed journal. This source was used for its figure of an endoscopy of a patient with a duodenal peptic ulcer, providing the radiological evidence for NSAID-associated peptic ulcer.

24. Cleveland Clinic. Large Intestine & Colon [Internet]. 2026 [cited 2026 Apr 13]. Available from: <https://my.clevelandclinic.org/health/body/22134-colon-large-intestine>

- a. This article talks about the anatomy and physiology of the large intestine and colon. It talks about different conditions that will affect the large intestine and colon. It serves as a credible resource, as it was medically reviewed and follows a strict editorial process. This source was utilized to visualize the different anatomy between the right and left sides of the colon and to help the viewer identify the transition point where stool shifts from a liquid to a solid state. This information is important for understanding the difference in

locations in adenocarcinomas and how the symptoms differ because of that. For example, right-side adenocarcinomas typically do not cause early obstruction because the cecum has a larger diameter and the stool remains liquid in that region

25. Kaur K, Zubair M, Adamski JJ. Fecal occult blood test. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2026 Jan [updated 2025 Dec 1; cited 2026 Apr 13]. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK537138/>

- a. This article discusses how Fecal Occult Blood Test (FOBT) is used as a diagnostic and screening tool for identifying occult or hidden blood in the stool. This article was Published through the National Library of Medicine and updated in 2025. The source is very recent, and it represents a highly credible academic source. This source was used to describe how FOBT is used as a primary screening mechanism first for colorectal adenocarcinoma. Especially for detecting blood when it is not evident. It supports lecture notes on screening protocols for individuals over age 50 and also explains that higher risk individuals need to be screened earlier.

26. Mik M, Berut M, Dziki L, Trzcinski R, Dziki A. Right- and left-sided colon cancer – clinical and pathological differences of the disease entity in one organ. Archives of Medical Science. 2017;1:157–62. doi:10.5114/aoms.2016.58596

- a. This source compares the clinical and pathological differences between left-sided and right-sided adenocarcinomas. It talks about patient demographics, specific pathological features, and the accuracy of different diagnostic tests based on tumor location. The article provides evidence that left-sided colon cancers are easier to diagnose and have a better prognosis, whereas right-sided lesions may be flat and thus less obvious. This source was peer-reviewed and has references that support the research and is a credible source. This research was essential for the project to do a differential diagnosis of colorectal adenocarcinoma and to identify key diagnostic indicators of each type.

27. Kumar V, Abbas AK, Aster JC, editors. Robbins Basic Pathology. Chantilly: Elsevier; 2017.

- a. This source is the primary textbook recommended by university pathology professors. This source provides comprehensive academic information on disease pathogenesis, histopathology, and prognosis. It offers vital insights into the molecular pathways of colorectal cancer, specifically the APC/ β -catenin pathway and the microsatellite instability (MSI) pathway. The textbook was used to gather histopathological and gross images and to explain the how of disease development. Its credibility is established by its widespread use in medical education, making it an indispensable resource for students to understand the biological progression from polyp to malignancy.

- 28. Cleveland Clinic. Anatomy & Function of your portal vein [Internet]. 2026 [cited 2026 Apr 13]. Available from: <https://my.clevelandclinic.org/health/body/25048-portal-vein>**
- a. This article explains the anatomy and function of the portal venous system, emphasizing its role as a primary blood source for the liver. The source is credible due to its medical review process by healthcare professionals. It was used to help students connect the concept of portal drainage to the clinical reality of cancer metastasis. Specifically, it illustrates how hematogenous spread through the portal vein makes the liver the most common site for distant colorectal cancer metastases, a key learning point for the visual novel's "bad ending" scenarios.
- 29. Colonic mucosa: Definition [Internet]. [cited 2026 Apr 13]. Available from: <https://www.mypathologyreport.ca/pathology-dictionary/colonic-mucosa/>**
- a. This resource defines the various layers of the colonic mucosa and describes their specific functions. While the site is geared toward general information and lacks formal citations, it provides clear, high-quality descriptions of pathological transitions. The information was applied to emphasize the transition of polyps into invasive adenocarcinoma. Specifically, the source helped illustrate that a tumor becomes "invasive" once it penetrates the submucosa, a distinction that is vital for determining a patient's prognosis and the depth of invasion.
- 30. Menon G, Cagir B. Colon cancer. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2026 Jan [updated 2025 Feb 27; cited 2026 Apr 13]. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK470380/>**
- a. This StatPearls overview provides an exhaustive review of colon cancer, covering etiology, epidemiology, evaluation, and staging. Its strength lies in its recent update (February 2025) and its extensive list of peer-reviewed references. This article provided the statistical data used in the project regarding survival rates and risk factors. It served as a comprehensive "fact-check" for the project's data on treatment integration and the epidemiology of sporadic versus hereditary colorectal cancers.
- 31. [Internet]. [cited 2026 Apr 13]. Available from: <https://www.gastrolab.net/>**
- a. Gastrolab is an extensive digital gallery containing endoscopic and colonoscopy images contributed by various medical professionals. It offers a diverse range of visual evidence for various gastrointestinal diseases and the devices used to treat them. This source was instrumental in providing the colonoscopy image of a right-sided adenocarcinoma, showcasing the characteristic polypoid, fungating "cauliflower" mass. This visual aid allows students to differentiate between the gross appearances of right-side versus left-side lesions.

32. Heiken JP. Colon cancer screening. *Cancer Imaging*. 2001;2(1):10–4. doi: 10.1102/1470-7330.2001.008.

- a. This article discusses the effectiveness of different colon cancer screening, including colonoscopy, sigmoidoscopy, and barium enema. One of the weakness is that it is published in 2015. However, it remains a strong resource for understanding the procedural differences between tests. This article was used to explain why certain tests may fail to detect right-sided lesions; for instance, a sigmoidoscopy only reaches the lower colon and rectum, whereas a full colonoscopy is required to reach the cecum. This point highlights the clinical importance of selecting the correct diagnostic tool based on suspected tumor location.

33. Medina AA, Lorca Álvaro J, Carretero Del Barrio I, Laso García I, García Cosío M, Mata Alcaraz M, et al. Primary testicular lymphoma: Clinical characteristics and oncological outcomes [Internet]. U.S. National Library of Medicine; 2023 [cited 2026 Apr 13]. Available from: <https://pmc.ncbi.nlm.nih.gov/articles/PMC10489500>

- a. This article discusses the fundamentals and statistics of primary testicular lymphoma. It contains information regarding diagnosis, progression, symptoms and the statistical normal behaviour for this disease. The article pulls from a variety of sources and focuses on drawing the common conclusions. The strength of this source stems from the key distinguishing characteristics that set it aside from an inguinal hernia. Especially in how the lymphoma tumor presents, its locations, symptoms, size and appearance.

34. Assar A Rather M. Abdominal hernias [Internet]. Medscape; 2025 [cited 2026 Apr 13]. Available from: <https://emedicine.medscape.com/article/189563-overview#showall>

- a. This source provides an extensive background and details regarding all types of abdominal hernias. It provided information on what hernias are, statistics, diagnostics symptoms, anatomical differences, location, treatment, management, and prevention information for each type of abdominal hernia. It is a website designed for healthcare professionals by health professionals. It includes many medical professionals, directors, researchers, and personnel who have their qualifications clearly stated next to their names. This source serves as a backbone for any information relating to Hernias.

35. Overview: Hernias [Internet]. U.S. National Library of Medicine; 2023 [cited 2026 Apr 13]. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK395554/>

- a. This is another source that discusses background on hernias. It focuses on few of the major key types of abdominal hernias; inguinal, femoral,

incisional, umbilical, and epigastric. It provides an important overview on diagnostics, symptoms, anatomy, risk factors, prevalence, and development over time. The sources they use range in their type, from brief overviews to extensive documents of studies totalling thousands of pages. This overview focuses on information that is accurately relevant to both doctors and patients, which is also its greatest strength as a source.

36. Sonoskills.com. 2026 [cited 2026 Apr 14]. Available from:
<https://www.sonoskills.com/clients/sonoskills/themes/uploads/155550280520180102.png>

- a. This ultrasound image depicts a real direct inguinal hernia from a real person. It is an accurate depiction of the condition, clearly highlighting the inguinal hernia and inguinal ligament. The credibility of the source comes from the extensive collection of images and case information along with their medical experts. Sonoskills claims to have the largest library of ultrasound cases, with over 100,000 images. The sonograph accurately represents the same condition as the direct inguinal hernia patient depicted in our presentation.

37. Gandy R. Groin Hernia Treatment Sydney [Internet].
Keyholesurgeon.com.au. 2020 [cited 2026 Apr 14]. Available from:
<https://www.keyholesurgeon.com.au/images/groin-hernia-femoral-and-inguinal-hernia-th.jpg>

- a. This is a drawn diagram that represents the relative locations of the inguinal ligament, inguinal hernia and a femoral hernia. The image was published by Dr. Robert Gandy on a website which specializes in publishing keyhole surgeons. This is a strong image for our assignment, showing the locational differences between the inguinal ligament, inguinal hernia and the femoral hernia.

38. Irfan ST. Png ultrasound machine isolated against a transparent background for medical imaging healthcare or diagnostic equipment [Internet].
Freepik.com. 2026 [cited 2026 Apr 14]. Available from:
https://img.freepik.com/premium-psd/png-ultrasound-machine-isolated-against-transparent-background-medical-imaging-healthcare-diagnostic-equipment_1031432-69044.jpg

- a. This image is a cartoon depiction of an ultrasound machine. The credibility regarding the accuracy of this image is lower than previous references and is not verified. However, this cartoon depiction showed importance in clear representation of an ultrasound machine while fitting both the theme and environment of our visual novel project.

