PULSE EXPERIENTIAL TEAM ASSIGNMENT

The Road to MS: Navigating the Path from Symptom to Diagnosis

Multiple Sclerosis (MS) is an autoimmune disease in which an individual's immune system mistakenly attacks the protective covering of nerves, disrupting the signals in the body. This hinders how our body and brain communicate with each other. Often, this disease can lead to muscle weakness, difficulty walking, fatigue, and vision problems. MS is a lifelong condition, but its severity and progression vary from person to person.

Our project is an interactive infographic with an embedded supplementary podcast that helps learners explore the journey of MS. From investigating its causes and symptoms to its effects on mobility, future treatments and prognosis, our infographic provides a clear, visual way to understand how MS affects the body. Viewers can navigate through different sections to learn about diagnosis, types of MS, treatment options, and emerging research.

This format was chosen because visual learning can make complex medical topics more engaging and accessible. Furthermore, by making our infographic interactive with an embedded podcast, we were better able to drive home our message. The infographic simplifies scientific concepts. This allows the learner to obtain an immersive experience and grasp key ideas without overwhelming medical jargon. Through the use of simple terms and metaphors, the issues surrounding MS are simplified. This project is primarily designed for students, but it is able to explain the disease to anyone curious about MS.

MS research is rapidly evolving, and promising therapies offer hope for better disease management and improved quality of life. By creating this resource, we aim to raise awareness, encourage discussion, and help learners appreciate the importance of early diagnosis, treatment, and ongoing scientific discovery in MS care.

Multiple sclerosis
Neurologic disorder
Autoimmune disorder
Neurodegeneration
Immunosuppressants
Remyelination

4. Identify the course topic with which your PULSE assignment most aligns.
Refer to the various topics outlined under 'Course content and Schedule' in the syllabus (e.g. Inflammation).

Diseases of the Central Nervous System

5. What are the learning outcomes?
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

- **Understand the pathophysiology of Multiple Sclerosis**
  Learners will be able to explain how MS affects the nervous system, particularly its impact on the myelin sheath, nerve function, and muscle control. They will also recognize the variability in MS progression and its effects on mobility.

- **Identify symptoms, diagnosis, and treatments for MS**
  Learners will be able to describe the common signs and symptoms of MS, outline the diagnostic process, and understand available treatment options, including disease-modifying therapies, symptom management strategies, and emerging research on future treatments.

- **Explain how research and innovation in MS are aiding in the management of the disease.**
  Learners will explore current advancements in MS research, including precision medicine, stem cell therapy, and remyelination strategies, to better understand how science is shaping new treatment approaches.

- **Develop awareness for individuals living with MS**
  Learners will gain insight into the daily challenges faced by individuals with MS, including physical, cognitive, and emotional impacts, fostering a more compassionate and informed perspective on the disease.

6. Why did the team select the chosen topic and the medium? How will the topic and medium of choice help learners?

Our group decided to use an interactive story-based infographic/podcast style to ensure active learning for students and learners. First and foremost, our infographic was not

formatted like a typical infographic, where students would normally be presented with a set of paragraphs to read through. We formatted our infographic like an interactive workbook and story. We wanted to emphasize that this was an active learning journey that follows the diagnosis of a hypothetical individual. We made sure to teach a concept and allow students to actively participate by following up on Maya's diagnosis journey. This hypothetical application allowed students to encounter a real-world example of the issue at hand. After Maya's journey, we also made sure to incorporate knowledge questions based on the content to further solidify the ideas taught as they were being taught. The audio component further allows students to engage in the content being taught, rather than passively reading through it. As the audio was more conversational, the content became more relatable and "real" in the sense that it was like an individual telling a personal story.

Furthermore, providing a multifaceted sensory experience allows students to engage through multiple learning styles, which has been shown to enhance learning and retention. The images, audio, and text work together to facilitate an in-depth learning experience that would not be possible if a different medium were chosen for our topic. Together, the information is also repeated numerous times in different formats, which again allows for active recall and enhanced retention. In the end, by choosing the story-based interactive infographic, we were able to reach various learning styles and enhance the learning experience for a vast group of students, providing a more relatable approach to learning about multiple sclerosis. The use of testable questions throughout ensure the learner is engaged, and the multiple choice questions at the end test the reader's knowledge in an applicable manner to assess their understanding of the content.

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)?
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?)

In this assignment, we used a combination of ChatGPT and Notebook LM. We also used CANVA for other technological resources.

Our group decided it was important to learn how to manipulate AI tools to enhance the effectiveness of a presentation. We looked into using ChatGPT to generate slides in Canva, but it was discovered that that option was in Beta format and only available under a paid ChatGPT account. We manually created slides in Canva and utilized Notebook LM for the podcast, which covers the same information, adding the link to the audio on our first slide of the infographic.

If an AI prompt was used from ChatGPT, we fact-checked through multiple references and cross-checked with course content to decide what content to include. We further humanized the content by rewriting the general idea prompted by ChatGPT. This humanization step was very important for our group as we believed it would help us connect to our audience at a deeper level and make the infographic and podcast more conversational than cookie-cutter.

The AI podcast-making software is novel and not commonly utilized. Using this tool was important for us to recognize how there are many different ways AI tools can be used to enhance our work and bring out a new level of understanding to content. Again the information was researched and uploaded fully by our group, and the software was only used to put our content into audio format. All group members then listened to the audio to verify the information.

In recent years, AI has become a prominent tool in the educational world. It is important to learn how to use these tools to our benefit and use them to enhance education. We believe AI should be seen as a tool to promote learning, as was done through the main purpose of this assignment. This assignment allowed us to see how we can use technology to enhance the learning experience. We learned to properly use the resource rather than falsely believing everything it provides. Through fact-checking the information provided to us, we learned how the tool can help us gain different outlooks on learning a topic. By incorporating our infographic into a podcast using Notebook LM, we were able to make use of a novel AI tool. The AI was used to make learning our topic more conversational and discussion-like. It is not as intimidating as a bunch of words on a page or a lecturer lecturing. Through using the podcast format, we incorporated our audience into our teaching to enhance the overall effectiveness of teaching the topic of MS to younger students or more novice individuals in the world of MS.

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?

Learning content is often provided to students through a student-lecturer relationship. Despite this being effective at some times, it is not always the best way to teach content. Hands-on interactive learning has always been more effective at teaching novel content to individuals. Through creating an interactive infographic, we were able to engage with students at a deeper level, which is innovative to content created previously. Through having a conversational podcast with our story-based infographic following the diagnosis journey of a patient, students get an idea of how doctors come to diagnose MS as if they were the ones diagnosing the disease themselves. This allows for first-hand learning and understanding that comes from participating in the treatment journey rather than reading off a page. We further incorporated questions through our infographic to establish connections between concepts taught to the students so they are able to see the real-world applications of their learning and how it may impact a diagnosis journey. The

podcast further enhances this experience by providing a conversational understanding of an individual experiencing the disease. It provides almost direct experience with someone being diagnosed, almost as if it were a close friend or family member reciting their experiences. This is very effective at teaching and is novel as it simulates first-hand experience instead of giving students a video to listen to or an infographic to watch.

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].

Please see the attached document.

10. If you did not use an AI tool, please attach a copy of the team's notes to the assignment.
The response here is to allow others to observe the 'behind the scenes' team's work.

Please see the attached "Draft & Brainstorm - PULSE Project Team 25" pdf.

11. How did the team ensure the veracity of the information presented in the PULSE assignment?
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.

We made sure to do research across multiple resources. We cross-referenced reliable websites, research, lecture material from the CNS lectures, and the textbook to ensure the veracity of the information presented. We asked AI to expand upon which websites it pulled information from. For example, in ChatGPT, we asked a question and then built on that prompt and asked ChatGPT to explain what sources it had pulled information from. We were then able to go to those sites that ChatGPT reported and verify that they were legitimate and reputable. The websites that we cross-checked with the most were the Multiple Sclerosis Society of Canada, PubMed and the Mayo Clinic. The sources were checked as the information was pulled, and the sites are listed below in our reference list.

12. Write a meaningful team reflection about the PULSE session (max 250 words).
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?

The project took about 30-35 hours when we counted the hours we had put into it. A good portion of that was working on the graphics, creating and inserting audio, and trying to create a presentation that was appealing and easy to follow. We broke the project up into sections, which worked well for gathering information, while arranging several online meetings via a group chat. Our focus changed as we worked through the project, shifting from gait issues of the disease to broadening our approach and looking at MS as a whole. We also added new ideas throughout the year, such as utilizing Canva and looking into various other graphic presentation options. However, a lot of sites out there were only available through paid versions, so that was a limitation. One challenge is that we aren't in a classroom situation that allows for a lot of collaboration in person, so we were relying on technology to be able to interact. Regarding equity, diversity and inclusion, we ensured our sources were appropriately fact checked, and ensured our information was stated in an objective manner, simply stating the science content, rather than reflecting opinions or biases of an individual. The team worked well together, and since each team member was assigned a section, the assignment came together smoothly. Following the completion of our research, we discussed our findings and integrated each other's content seamlessly through our project. This helped ensure that we all learned a lot of information about this disease.

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 designing and formulating ideas for the assignment. Following the completion of our research and drafts, we designed our assignment using Canva as a group, making sure to make it visually appealing.

R.M. completed the introduction, signs and symptoms, and living with MS sections. R.M. researched the topics through references 1, 2, 3, 4 and 19. Sections 3,6,7,8 were filled out by R.M. on the outline. Canva slides 1, 2, 11 and 13 were made and formatted by R.M. R.M. also looked through all the slides and content to fine-tune and edit for cohesiveness.

S.P. wrote sections 2a, 2b, 3, 4a, and 4b using references 2 and 5-14. S.P. created pages 3, 4, 5, 6, and 14 in Canva and associated cell diagrams in Biorender. Researched for the use of Genially to make an infographic prior to changing to Canva. Checked over the final draft of the infographic for editing. S.P. also created, designed and attached the linked multiple choice questions in Canva.

J.C. wrote sections 5 and 6, edited section 8 and researched through references 15-18. Created 4 slides in Canva, 7-10. Researched and tested the "podcast" type of AI prompt in Notebook LM and created audio links for the slides in Canva. Researched and tested ChatGPT's ability to take uploaded info and auto-generate a slide show in Canva. Filled out outline sections 11 and 12.

S.G. completed the prognosis and hope section using information obtained from references 20-23. S.G. then filled out slide 12 on Canva.

15. References

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

References

1. Tobin, O. Multiple sclerosis. *Mayo Clinic* (2024). Available at: https://www.mayoclinic.org/diseases-conditions/multiple-sclerosis/symptoms-causes/syc-20350269. (Accessed: 27th January 2025)

2. Multiple sclerosis. *National Institute of Neurological Disorders and Stroke* (2025). Available at: https://www.ninds.nih.gov/health-information/disorders/multiple-sclerosis. (Accessed: 27th January 2025)

3. Multiple sclerosis (MS). *Johns Hopkins Medicine* Available at: https://www.hopkinsmedicine.org/health/conditions-and-diseases/multiple-sclerosis-ms. (Accessed: 1st February 2025)

4. About Multiple Sclerosis (MS). *Pennmedicine.org* Available at: https://www.pennmedicine.org/for-patients-and-visitors/patient-information/conditions-treated-a-to-z/multiple-sclerosis-ms#:~:text=MS%20can%20appear%20at%20any,ages%20of%2020%20and%2040. (Accessed: 1st February 2025)

5. Kumar, V., Cotran, R. S. & Robbins, S. L. *Basic Pathology*. (Elsevier, 2023).

6. Ludwig, P. E., Reddy, V. & Varacallo, M. A. Neuroanatomy, Neurons. *StatPearls [Internet]*. (2023). Available at: https://www.ncbi.nlm.nih.gov/books/NBK441977/. (Accessed: 8th March 2025)

7. Sun, L., Su, Y., Jiao, A., Wang, X. & Zhang, B. T cells in health and disease. *Signal Transduction and Targeted Therapy* **8,** (2023).

8. Khorooshi, R., Asgari, N., Mørch, M. T., Berg, C. T. & Owens, T. Hypersensitivity responses in the Central Nervous System. *Frontiers in Immunology* **6,** (2015).

9. Compston, A. & Coles, A. Multiple sclerosis. *The Lancet* **372,** 1502–1517 (2008).

10. Anjum, F., Anam , S., Arshad, M. & Ur Rahman, S. *Fundamental Immunological Concepts*. (ResearchersLinks, 2020).

11. Lassmann, H. Multiple sclerosis pathology. *Cold Spring Harbor Perspectives in Medicine* **8,** (2018).

12. 1.Multz , R. & Ahrendsen, J. Multiple sclerosis. *Pathology Outlines - Multiple sclerosis* (2025). Available at: https://www.pathologyoutlines.com/topic/cnsmultiplesclerosis.html. (Accessed: 8th March 2025)

13. Tafti, D., Ehsan, M. & Xixis, K. Multiple sclerosis. *StatPearls [Internet]*. (2024). Available at: https://www.ncbi.nlm.nih.gov/books/NBK499849/. (Accessed: 12th March 2025)

14. Multiple sclerosis - Diagnosis and Treatment. *Mayo Clinic* (2024). Available at: https://www.mayoclinic.org/diseases-conditions/multiple-sclerosis/diagnosis-treatment/drc-20350274. (Accessed: 4th March 2025)

15. Multiple Sclerosis Society of Canada. *Multiple Sclerosis - A Newly Diagnosed Guide* (2021).

16. Manuel Escobar, J. *et al.* Body mass index as a predictor of MS activity and progression among participants in benefit. *Multiple Sclerosis Journal* **28,** 1277–1285 (2022).

17. Campbell, E. *et al.* Access to and use of clinical services and disease-modifying therapies by people with Progressive Multiple Sclerosis in the United Kingdom. *International Journal of MS Care* **19,** 275–282 (2017).

18. Treatments for multiple sclerosis. *MS Canada* (2023). Available at: https://mscanada.ca/managing-ms/treatments-for-multiple-sclerosis. (Accessed: 2nd March 2025)

19. Beier, M. L. Multiple sclerosis and mental health: 3 common challenges. *Johns Hopkins Medicine* (2024). Available at: https://www.hopkinsmedicine.org/health/conditions-and-diseases/multiple-sclerosis-ms/multiple-sclerosis-and-mental-health-3-common-challenges#:~:text=%E2%80%9CFor%2520persons%2520with%2520relapsing%252Dremitting,or%2520hopelessness%2520are%2520more%2520frequent. (Accessed: 27 January 2025)

20. Sybertz, A. Multiple sclerosis (MS) prognosis and life expectancy. *Health Central* (2023). Available at: https://www.healthcentral.com/condition/multiple-sclerosis/ms-prognosis. (Accessed: 23rd February 2025)

21. Collazo, I. Emerging treatments for multiple sclerosis. *Mayo Clinic* (2024). Available at: https://www.mayoclinic.org/diseases-conditions/multiple-sclerosis/expert-answers/emerging-treatments-for-ms/faq-20096786. (Accessed: 23rd February 2025)

22. Hendin, B. What's New in MS Research - November 2024. *MSAA* (2024). Available at: https://mymsaa.org/news/whats-new-in-ms-research-november-2024/. (Accessed: 23rd February 2025)

23. Pathak, L. Personalized treatment for multiple sclerosis: The Role of Precision Medicine. *Neurology Letters* **2,** 30–34 (2023).