PULSE EXPERIENTIAL TEAM ASSIGNMENT

1. Title of your PULSE experiential assignment. *Provide a creative and informative title.*
GRWM to Become Cancerous (Hallmark by Hallmark)
2. Please summarize your PULSE experiential assignment (max 300 words). *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.* *[Team 23 is an example of an informative lay summary.]*
Our PULSE experiential assignment explores the development of cancer using the Hallmarks of Cancer framework, which outlines the key biological changes cells acquire during malignant transformation. We chose to present this content in the form of a short, influencer-style vlog video inspired by "Get Ready With Me" (GRWM) social media content. In the video, a normal cell is personified as an influencer going through a "day in the life", where it slowly breaks biological "rules" that normally regulate cell growth and behaviour. We utilized relatable, pop-culture style metaphors and analogies that connect pathology concepts to familiar online experiences to both engage the audience, and hopefully allow the ideas to be easier to integrate into memory. This format was chosen to make complex cancer biology accessible to a lay audience, including high-school level learners, or individuals without an extensive science background. By translating technical terminology into everyday language and visual storytelling, the video can help learners understand the step-by-step process by which cancer arises. Overall, this assignment aims to improve scientific literacy by presenting core pathology concepts in an engaging, memorable and approachable way.
3. Provide up to 6 keywords relevant to your PULSE experiential assignment. *3-6 keywords are ideal.*
Neoplasia, Hallmarks of Cancer, Tumour Biology
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).*
Neoplasia
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*
• By the end of this lesson, students will be able to describe the hallmarks of cancer and explain how each hallmark contributes to tumor development and progression.

- By the end of this lesson, students will be able to interpret the rogue-cell process in the animation to analyze how breaking normal cellular rules and processes contributes to tumour growth and metastasis.

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

Our team chose the hallmarks of cancer to be our topic because it is a concept that is both highly relevant and frequently misunderstood. By employing the hallmark framework, we can show how normal cells gradually break the rules and become cancerous or malignant via a structured approach, tying directly to our course content of neoplasia. Notions like oncogenes, tumour suppressor genes, angiogenesis, and metastasis can be abstract or even intimidating on paper; however, by presenting them as part of a narrative with visual components, learners can visualize and remember how these processes work. The short animation style with a relatable story was chosen as it makes the material more approachable, engaging, and easier to follow. It allows viewers to connect complex cellular events with familiar, memorable scenarios. The video format also lets us combine storytelling, visuals, and analogies to reinforce key pathology concepts in a method that is both intuitive and entertaining.

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?)

Yes, our team did use an artificial intelligence (AI) technology tool. We used ChatGPT, which is a relatively non-novel tool. We chose to use this tool when one of our teammates was suddenly unable to participate in our meeting, and we were trying to go through our script as a team and edit. In order to sound as cohesive as possible, we asked ChatGPT for suggestions on how we can use our missing teammate's ideas and existing script, but generate it in a way that flowed well with all of our other parts.

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?

This PULSE assignment is innovative/novel because it translates complex cancer biology into a social media-inspired narrative format rarely used in pathology education. By framing cancer hallmarks as "rules" broken by a cell over time, the project offers a novel approach that contrasts more traditional and strictly academic resources. The use of relatable daily-life metaphors makes the content more personal and memorable, while still maintaining scientific content accuracy.

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].

https://chatgpt.com/share/698d05f6-8aa4-8001-8e65-ccae1fc41587

Uploaded a file

hi! this is our script, except we have edited every other part except for the "evading growth suppressors" because our group member isnt here. we were hoping you can help us reword it in a way that follows the structure of the other sections and flows well?

This script is SO good 😭 the metaphors are consistent and the traffic theme flows really nicely. I'll rewrite Evading Growth Suppressors so it matches the rhythm, tone, and structure of your other sections — cleaner, slightly punchier, and more in line with how you explain the molecular details in the others.

I'll keep your traffic analogy, simplify some phrasing, and make the explanation flow like your Ras, BCL-2, and telomerase sections.

Here's a polished version you can directly swap in:

Evading Growth Suppressors (Reworded Version)

_____:
"When the gas pedal gets stuck down — those oncogenes are screaming 'go, go, go.' But even in a speeding car, there are still red lights and traffic officers. In normal cells, those are tumour suppressor genes.

p53 is like the head of traffic control. It monitors the cameras and checks for damage. If a car looks too wrecked, it shuts the whole intersection down.

And then there's the retinoblastoma-associated protein, RB — the traffic cop standing at the G1/S intersection with a giant stop sign. It only waves cars through when it's actually safe to enter DNA replication."

Lucy:
"So even if I'm flooring it, there's still someone who can pull me over?"

_____:
"Exactly. In a healthy cell, the p53–p21–RB pathway acts like a hard checkpoint. If there's DNA damage or too much division, p53 activates p21, which keeps RB in its active form. RB then blocks the cell from passing the G1/S checkpoint. No replication. No division. End of story."

Lucy:
"Ugh. That's so restrictive."

_____:
"But cancer cells figure out how to disable the system. They pick up mutations that knock out p53, inactivate RB, or disrupt other checkpoint proteins.

Now the red light is technically still installed in the city… but inside this cell, it's permanently green."

Lucy:
"So I'm just blowing through intersections with no one stopping me?"

_____:
"Exactly. Even with damaged DNA, the cell pushes straight through the G1/S checkpoint and divides anyway.

That's what we mean by *evading growth suppressors*. The brakes are gone. The stop signs don't work. And abnormal cells that should have been held at the intersection just keep multiplying — setting the stage for the rest of cancer progression."

Why this works better structurally:

- Follows your pattern: metaphor → molecular explanation → Lucy commentary → clear hallmark definition.
  Mirrors how you explained Ras and apoptosis.
- Tightens the p53–p21–RB pathway explanation so it sounds intentional rather than repetitive.
- Keeps your traffic analogy consistent and clean.

If you'd like, I can also slightly tweak the tone to make it:

- More dramatic
- More comedic
- More molecular-detailed (if this is for a higher-level class)
- Or make it shorter if you're tight on time limits.

This project is genuinely creative — your group is going to kill this presentation.

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.

N/A

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.

Our group ensured veracity of the information presented in the PULSE assignment by frequently cross-checking and referring to our collective notes from lectures, as well as our online sources throughout both the planning, writing, and delivery of our script. Because our story followed an orderly framework, it was uncomplicated to check the veracity of our information, as we were able to do it sequentially. We ensured to pull our research from academic databases such as Google Scholar, to support the key points included in our assignment. We happened to all use the same review article, but to different extents of course, and we analyzed the issue carefully and

deemed it reputable based on both how the layout of the page was presented, as well as the academic journal's reputation as a credit source.

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?

As a team, we found that turning the Hallmarks of Cancer into an influencer-style "day in the life" vlog really deepened our understanding of the topic. To keep the content equitable and inclusive, we were careful not to make jokes at the expense of real patients or groups, and we chose metaphors (traffic lights, cops, fake IDs, …) that are broadly familiar rather than tied to one culture, gender, or body type. We also tried to avoid language that framed cancer as a personal failure, and stayed focused on biology.

We estimated that brainstorming, research, scripting, revising, and filling out the form took roughly 15-20 hours across several weeks. One main challenge was scheduling in-person meetings. Because of unexpected emergencies and everyone's different class and work schedules, it was difficult to find times when all four of us could meet offline. What worked well was dividing the hallmarks by person while editing each other's sections and adding comments in a shared document.

The assignment encouraged each of us to connect a specific hallmark of cancer to concrete mechanisms and then translate into plain language. Writing the script in parallel with our research notes helped reinforce lecture content and made it easier to see how the hallmarks fit together as a sequence rather than isolated facts.

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 group members contributed to brainstorming the topic and format, designing the overall "arrested cell" storyline, and drafting and revising the PULSE form responses.

L.C. did research and wrote the introduction, damage+mutation, sustaining proliferative signaling, and conclusion parts of the story; contributed to the auditory parts for the final video; coordinated meetings, booked meeting rooms and distributed tasks.

M.H. did research and focused on the angiogenesis and activating invasion+metastasis segments; contributed to the visual concepts for the final video.

J.X. researched and scripted the evading growth suppressors and resisting cell death sections; contributed to the auditory parts for the final video.

N.Y. researched and wrote the enabling replicative immorality parts; contributed to the auditory parts for the final video; cited the sources and completed the annotated bibliography.

All four members cross-checked all scientific content against primary sources before integrating it into the final script.

15. References

1. Hanahan D, Weinberg RA. Hallmarks of Cancer: The Next Generation. Cell [Internet]. 2011 Mar 4 [cited 2026 Mar 13];144(5):646–74. Available from: https://www.cell.com/action/showFullText?pii=S0092867411001279

2. Kaloni D, Diepstraten ST, Strasser A, Kelly GL. BCL-2 protein family: attractive targets for cancer therapy. Apoptosis 2022 281 [Internet]. 2022 Nov 7 [cited 2026 Mar 13];28(1):20–38. Available from: https://link.springer.com/article/10.1007/s10495-022-01780-7

3. Wang H, Guo M, Wei H, Chen Y. Targeting p53 pathways: mechanisms, structures and advances in therapy. Signal Transduct Target Ther 2023 81 [Internet]. 2023 Mar 1 [cited 2026 Mar 13];8(1):92-. Available from: https://www.nature.com/articles/s41392-023-01347-1

4. 10.4: Cancer and the Cell Cycle - Biology LibreTexts [Internet]. [cited 2026 Mar 13]. Available from: https://bio.libretexts.org/Bookshelves/Introductory_and_General_Biology/General_Biology_1e_%28OpenStax%29/2%3A_The_Cell/10%3A_Cell_Reproduction/10.4%3A_Cancer_and_the_Cell_Cycle

16. Annotated Bibliography

1. Hanahan D, Weinberg RA. Hallmarks of Cancer: The Next Generation. Cell [Internet]. 2011 Mar 4 [cited 2026 Mar 13];144(5):646–74. Available from: https://www.cell.com/action/showFullText?pii=S0092867411001279

This review article outlines the “Hallmarks of Cancer” framework, describing essential biological processes that emerge during tumor development, including sustaining proliferative signaling as a central feature of malignant transformation of a cell, “evading growth factors” and “resisting cell death,” Illustrating how cancer cells

achieve growth independence through oncogene activation, constitutive signaling pathways, and autocrine growth factor production. It is a trusted, peer-reviewed source published in Cell, a highly respected journal in cell and molecular biology. One strength of this review article is that it is conceptually dense and gives a clear big-picture map of how multiple genetic and cellular changes cooperate during tumorigenesis. For our assignment, this article justifies focusing on specific hallmarks and provides the conceptual information for our video structure, and directly supports the explanation of uncontrolled proliferation and self-generated growth signals. We also used it primarily to ensure our explanations of hallmarks are accurate and aligned with current cancer biology.

2. Kaloni D, Diepstraten ST, Strasser A, Kelly GL. BCL-2 protein family: attractive targets for cancer therapy. Apoptosis 2022 281 [Internet]. 2022 Nov 7 [cited 2026 Mar 13];28(1):20–38. Available from: https://link.springer.com/article/10.1007/s10495-022-01780-7

This review article explains the roles of pro-survival and pro-apoptotic BCL-2 family proteins in regulating the intrinsic apoptosis pathway, and describes how their dysregulation promotes cancer development and treatment resistance. It also discusses current and emerging BH3-mimetic drugs that target specific BCL-2 family members to re-activate cell death in tumours. This review article is a credible peer-reviewed journal which is published by Springer Nature, a very respected publisher known for its strict publication guidelines. A key strength of this source is that it provides an in-depth discussion about the role of the BCL-2 protein family in apoptosis and how these proteins further play a key role in cancer development. This source is useful for our "resisting cell death" hallmark since it also gives us concrete molecular examples, such as BCL-2 overexpression, and clinically relevant drugs like venetoclax that we can translate into accessible language for our video, while backing our analogies with up-to-date evidence.

3. Wang H, Guo M, Wei H, Chen Y. Targeting p53 pathways: mechanisms, structures and advances in therapy. Signal Transduct Target Ther 2023 81 [Internet]. 2023 Mar 1 [cited 2026 Mar 13];8(1):92-. Available from: https://www.nature.com/articles/s41392-023-01347-1

The author of this article, Wang, and his colleagues provide a detailed review of the p53 tumor suppressor pathway, covering p53 structure, regulation, common mutation patterns, and current therapeutic strategies that attempt to restore or exploit p53 function in cancer because p53, also known as the guardian of the genome, was considered "undruggable". The paper clearly shows how loss of p53 contributes both to evading growth suppressors and to avoiding apoptosis, and how drugs can intervene at different points in this pathway. This source is credible and is published by Signal Transduction and Targeted Therapy, which is a peer-reviewed journal from Springer Nature, a highly respected publisher. A key strength of this source is that it provides a comprehensive review of both therapeutic advances and biological mechanisms. For our assignment, this source supports the biological details behind our "traffic cop/strict parent" analogies and allows us to mention real examples of p53-targeted therapies when we discuss evading growth suppression.

4. 10.4: Cancer and the Cell Cycle - Biology LibreTexts [Internet]. [cited 2026 Mar 13]. Available from: https://bio.libretexts.org/Bookshelves/Introductory_and_General_Biology/General_Biology_1e_%28OpenStax%29/2%3A_The_Cell/10%3A_Cell_Reproduction/10.4%3A_Cancer_and_the_Cell_Cycle

This textbook section offers a clear, introductory explanation of how uncontrolled cell division leads to cancer, with separate subsections on proto-oncogenes and tumor suppressor genes, and an accessible description of p53, RB, and p21 as "brakes" on the cell cycle that can also trigger apoptosis when DNA damage is severe. For the

evaluation of this source, it is credible for introductory research and authored by OpenStax, which is a free, openly licensed textbook and is used widely in college-level and university-level courses. The content of this source is licensed under CC BY 4.0. One key strength of this textbook is that it breaks down complex ideas into simpler concepts, which helps build basic understanding. The writing level is close to what we want for our audience watching the video, and it even uses a “brakes failing” analogy that aligns well with our traffic-law theme. We used this source to check that our plain-language descriptions of tumor suppressor genes, checkpoints, and apoptosis are accurate and understandable for non-experts.