PULSE EXPERIENTIAL TEAM ASSIGNMENT

Team #: 37

1. Title of your PULSE experiential assignment.

Provide a creative and informative title.

The Sun's Darkside: Understanding Skin Cancer

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 assignment focuses on skin cancer, the abnormal, uncontrolled growth of cells in the outer layer of the skin, most often triggered by DNA damage from UV radiation. It can appear as new growths, changes to existing moles, or sores that won't heal. The three main types are basal cell carcinoma, squamous cell carcinoma, and melanoma. We chose this topic because skin cancer is one of the most commonly diagnosed cancers globally, and yet it remains widely misunderstood and underestimated by the general public. Early detection and awareness are critical to improving outcomes, which made this a meaningful and timely subject to explore. For our format, we built an educational website that combines **p**odcasts, written articles, and interactive quiz questions. Different people learn in different ways, and we wanted our resource to be engaging and accessible to anyone, regardless of their scientific background. The quizzes in particular help reinforce key ideas in an approachable, low-pressure way. Our goal is to raise awareness, deepen public understanding, and foster empathy for those affected by skin cancer. We hope this resource empowers people to recognize warning signs earlier, make informed choices about sun safety, and support advocacy efforts. Ultimately, we want to create a space where anyone can learn about skin cancer in a way that feels relevant and meaningful to their everyday lives.

3. Provide up to 6 keywords relevant to your PULSE experiential assignment.

3-6 keywords are ideal.

Skin Cancer, UV Radiation, Carcinogenesis, Melanoma, Early Detection, Cancer Prevention

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).

Section D: Diseases of the Skin – Dermatopathology II: Skin Tumors

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

Overview/Types of Skin Cancer

- Identify and distinguish between the main types of skin cancer
- Describe the visual characteristics and appearance of each skin cancer type
- Recognize the key risk factors that contribute to the development of skin cancer
- Compare the severity and behavior of different skin cancers

Etiology

- Identify the major etiological agents of skin cancer
- Describe the molecular mechanisms by which HPV promotes skin carcinogenesis
- Explain the role of Merkel Cell Polyomavirus in Merkel Cell Carcinoma
- Distinguish the biological effects of UVA, UVB, and UVC radiation
- Analyze biological, genetic, iatrogenic and phenotypic risk factors
- Evaluate environmental and lifestyle risk factors

Pathogenesis

- Explain how UV radiation acts as a complete carcinogen
- Describe the role of p53 as the guardian of the genome
- Outline the genetic and molecular pathways underlying BCC and SCC
- Identify the key oncogenic mutations driving melanoma progression and how skin tumors evade immune destruction
- Explain the carcinogenic mechanisms of arsenic and co-factors
- Assess the relationship between the endocannabinoid system and skin cancer

Signs & Symptoms

- Differentiate between signs and symptoms in the context of skin cancer.
- Identify common early signs of skin cancer, including changes described by the ABCDE rule (asymmetry, border, colour, diameter, evolution).

- Describe common signs and symptoms of basal cell carcinoma.
- Describe common signs and symptoms of squamous cell carcinoma.
- Describe signs and symptoms of melanoma.
- Recognize body areas where skin cancer most commonly appears.
- Understand the importance of detecting changes in moles or skin growths for early identification of skin cancer.

Treatments

- Compare the utility of Mohs micrographic surgery, standard/wide excision, and C&E (Curettage and Electrodesiccation).
- Differentiate the molecular mechanisms behind immunotherapy, systemic chemotherapy, radiation, and targeted therapy.
- Compare the efficacy of localized non-surgical and topical therapies.
- Evaluate treatment options based on severity, location, and nature of the cancer.
- Outline management strategies for malignant wounds, chronic pain, radiation burns, and pruritus.
- Discuss psychosocial, supportive care, and mitigation of treatment-related toxicities.

Case Studies

- Apply concepts to scenario-based case studies to further solidify understanding

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

Skin cancer is one of the most commonly diagnosed cancers worldwide, yet public awareness of its causes, warning signs, and prevention is low. Because UV radiation exposure, something many people encounter daily through sun exposure, is one of the leading causes of skin cancer, we felt it was especially important to educate the public on this topic. Early detection significantly improves survival outcomes, making awareness a potentially life-saving tool. We chose skin cancer not only because of its high prevalence, but also because it is a topic that directly affects people of all ages and backgrounds, making it highly relevant to a broad audience. For our medium, we built an educational website incorporating podcasts, written articles, and interactive quiz questions. Different learners absorb information in different ways, and by offering audio, text, and interactive content, we ensure our resource is inclusive and engaging for a wide range of users. The podcasts allow learners to engage passively (e.g., while commuting), the articles provide deeper reading for those who want more detail, and the quizzes reinforce key concepts in a fun and low-pressure way. Together, these formats make complex medical information accessible, helping to increase health literacy and inspire action around skin cancer prevention and advocacy.

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?)

Claude (Anthropic), ChatGPT, Gemini & Copilot

- Used for image generation
- Neither of these AI tools were originally our first choice, but suitable images related to our specific skin cancer content could not be found on the internet, and none of our team members have a background in graphic design or illustration
- Together, these tools allowed us to generate custom, relevant visuals that matched the tone and style of our site
- Alternative tools considered included stock image sites (e.g., Unsplash, Pexels), but these did not have images specific enough to our content or matched our website style

- ChatGPT was used to create case studies for students to apply their knowledge to real-life simulated scenarios. To ensure no false information or hallucination occurred, we cross-referenced the case-studies with our sources to make sure all the information was valid, and we all took the time to review it carefully to ensure the case studies were precise and relevant to our project.

Canva

- Used for image generation
- Canva was the best tool for this purpose because it is user-friendly, free to access, and the images were licensed for use to use however we need

NotebookLM (Google)

- Used for the generation of AI-powered podcasts
- NotebookLM was the best tool for this purpose because it allowed us to convert our written content into an engaging audio format, catering to auditory learners and making our site more interactive
- A podcast-style format also mimics a lecture, which is familiar and comfortable for a student audience
- Alternative tools considered included recording our own voices, but NotebookLM produced a more polished and consistent result. Using our own voices would have been time-consuming

Novelty

- While each of these tools is individually well-known, using them together in a coordinated, multi-format educational website represents a creative and integrated approach to health communication that goes beyond a standard single-format resource.

AI Tools we considered using, but did not use

- We did not use ChatGPT for providing research information (we only used it to generate case studies based off info we collected ourselves), as we wanted to ensure the information was accurate and not AI-generated text (which tends to hallucinate and provide incorrect information)

- We also considered using Synthesia and Pictory for video generation, but we decided to use NotebookLM for podcasts as there is less production complexity, it is smoother, cleaner, easier to understand, and better compliments our article. Also the video products of the mentioned tools were of poor quality and often missed out on key information

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?

Our PULSE assignment is innovative in both its format and its integrated use of modern technology to communicate health information about skin cancer to a general audience. While information about skin cancer exists across various medical websites, textbooks, and health blogs, most of these resources present information in a single format. What makes our assignment novel is that we used written articles, AI-generated podcasts, and interactive quiz questions into one cohesive, easy-to-navigate educational website. An innovative component of our assignment is the integration of AI-generated tools, specifically the use of NotebookLM to produce podcasts and Claude/ChatGPT for custom image generation. Rather than relying on stock photos or pre-existing media, we generated visuals and audio content that are tailored specifically to our material. Unlike clinical or academic resources on skin cancer that are written for healthcare professionals, our website is designed specifically for people with no prior scientific background. The combination of accessible language, engaging multimedia, and self-testing through quizzes makes our resource stand out as genuinely learning-centred.

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 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 attached document

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.

Ensuring the accuracy and credibility of our PULSE assignment was a central priority throughout the entire research and content creation process. To guarantee that all information presented was evidence-based, our team drew from a combination of peer-reviewed journal articles, authoritative medical databases, and established clinical resources. For our scientific and clinical content, we sourced information from reputable databases and platforms including PubMed, PubMed Central (PMC), StatPearls, and the National Cancer Institute's PDQ Health Professional Summaries. These sources provided peer-reviewed, regularly updated clinical evidence that formed the backbone of our more technical sections, including etiology, pathogenesis, and treatment. We also consulted the 11th edition of Robbins & Kumar Basic Pathology, a widely used and authoritative medical textbook, to support foundational explanations of skin cancer mechanisms. For accessible but credible health information, we relied on reputable institutions including the Mayo Clinic, Cleveland Clinic, Canadian Cancer Society, BC Cancer, and the American Cancer Society. All references were tracked using a numbered Vancouver citation system, with in-text superscript citations mapped to a comprehensive reference list. Each factual claim throughout the website was assigned a corresponding citation to ensure full traceability of our sources. With respect to AI-generated content, our team used Claude and ChatGPT for image generation and did not rely on these tools for any factual or medical content. All written content, including articles, podcast scripts, and quiz questions, was researched and authored by team members directly from the verified sources listed above. ChatGPT was used to create case studies for students to apply their knowledge to real-life simulated scenarios. To ensure no false information or hallucination occurred, we cross-referenced the case-studies with our sources to make sure all the information was valid, and we all took the time to review it carefully to ensure the case studies were precise and relevant to our project.This approach ensured that no AI-generated misinformation was incorporated into our educational resource. Additionally, our team cross-referenced claims across multiple sources wherever possible to verify consistency and accuracy. For instance, information on UV radiation mechanisms and p53 mutations was corroborated across both the Benjamin & Ananthaswamy review and the Didona et al. overview, and information on treatments was verified across both NCI PDQ summaries and the American Cancer Society guidelines. This multi-source verification process helped safeguard the integrity of all content presented on our site.

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?

We worked collaboratively and communicated openly throughout the assignment, dividing responsibilities based on each member's interests, whether etiology, pathogenesis, or treatments, and held regular check-ins to share progress. When creating content, we were mindful of potential biases, particularly the assumption that audiences would be familiar with medical terminology or that skin cancer only affects certain skin tones. To address this, we used inclusive language, represented diverse skin types in our visuals, and presented information in plain, accessible terms, ensuring our content was equitable and welcoming to all learners. This assignment significantly deepened our understanding of skin cancer. Simplifying complex medical concepts for a lay audience challenged us to think critically about what we truly understood, making us stronger learners in the process. We estimate the assignment took approximately 10–12 hours, spanning planning, research, content writing, website design, and AI tool integration. Our use of multiple formats (podcasts, articles, and quizzes) works well in reaching different types of learners. This also presented a valuable opportunity to contribute a publicly accessible resource on a widely misunderstood disease. Key challenges included ensuring content accuracy, navigating new tools like NotebookLM and Google Sites for the first time, and finding common meeting times as a group of four pre-med students with demanding schedules. Next time, we would establish a more structured timeline earlier to reduce last-minute pressure. Overall, we are proud of the resource we created and believe it has genuine potential to raise awareness about skin cancer in a meaningful way.

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…

Homepage: DD

Etiology and pathogenesis: EG

Signs and Symptoms: PK

Treatment: SSH

Case studies: DD

Website design: PK

Formatting Pulse team document: EG, DD, PK. SSH

Fact checking information: EG, DD, PK. SSH

Formatting references and annotated bibliography: EG, DD, PK. SSH

15. References

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Annotated Bibliography

1. **Cleveland Clinic. Skin Cancer Overview. Cleveland Clinic [Internet]. Cleveland Clinic. 2021. [cited 2026 April 10]. Available from: https://my.clevelandclinic.org/health/diseases/15818-skin-cancer**

   This article from Cleveland Clinic provides a broad but thorough overview of skin cancer, covering what it is, how it develops, and the main types. It explains that skin cancer occurs when abnormal cells grow in skin tissue, often triggered by ultraviolet light exposure and breaks down the three primary forms, basal cell carcinoma (which develops in the lower part of the outer skin layer), squamous cell carcinoma (which forms in the outer skin layer itself) and melanoma (which originates in melanocytes and is considered the most dangerous because of its ability to spread to other parts of the body). Cleveland Clinic is a well-established, non-profit academic medical center and the article is reviewed and grounded in evidence including the American Academy of Dermatology and the National Cancer Institute, which adds strong credibility. One limitation is that it is written for a general audience, so it lacks the depth you would find in a peer-reviewed journal. For this assignment, the overview section will be used to establish a foundational definition of skin cancer, while the section on the three main types will support a more detailed discussion of how each type differs in origin, behavior and level of risk.

2. **Mayo Clinic. Basal Cell Carcinoma - Symptoms and Causes [Internet]. Mayo Clinic. 2025. [cited 2026 April 10]. Available from: https://www.mayoclinic.org/diseases-conditions/basal-cell-carcinoma/symptoms-causes/syc-20354187**

   This Mayo Clinic article focuses specifically on basal cell carcinoma, describing it as a type of skin cancer that starts in the basal cells found at the bottom of the skin's outer layer. The overview explains that these cells are responsible for producing new skin cells and that when UV radiation from sunlight damages their DNA, it can trigger abnormal and uncontrolled cell growth. The article notes that basal cell carcinoma most commonly appears on sun-exposed areas like the face and neck and while it can spread to surrounding tissue, this is relatively rare compared to other skin cancers. Mayo Clinic is one of the most respected medical institutions in the world and its health library content is written and reviewed by medical staff, making it a highly credible source for a health-focused assignment. The main limitation is that it is written for a general audience rather than a clinical or research one. This source will be used specifically to support the section of the assignment covering basal cell carcinoma, providing a clear and reliable explanation of what causes it, where it typically develops and why it is considered the most common.

3. **Basal Cell Carcinoma [Internet]. Bccancer.bc.ca. 2025. [cited 2026 April 10]. Available from: https://www.bccancer.bc.ca/books/skin-cancer-prevention-early-diagnosis-courses/course-readings/skin-cancer-early-diagnosis-readings/basal-cell-carcinoma**

   This resource is part of a clinical education course on skin cancer prevention and early diagnosis and specifically addresses distinct subtypes of the disease. The 4

subtypes covered in this source are nodular BCC, which appears as a translucent bump often with visible blood vessels; pigmented BCC, which contains brown pigmentation that can make it difficult to distinguish from melanoma; superficial BCC, which tends to appear as a flat, scaly, reddish patch and is more commonly found on the trunk; and sclerosing BCC, which is the most aggressive subtype and presents as a scar-like, pale, and ill-defined lesion. BC Cancer is a provincial cancer agency operating under the BC Ministry of Health and this content is developed for healthcare professionals as part of a formal continuing education program, which gives it a higher level of clinical authority than general patient-facing websites. The main limitation is that it does not include citations or references, making it harder to trace the underlying evidence. This source will be used to support a more detailed breakdown of how basal cell carcinoma is not a single uniform disease, but rather a group of distinct subtypes that each carry different visual presentations and levels of risk.

4. Mayo Clinic. Squamous Cell Carcinoma of the Skin - Symptoms and Causes [Internet]. Mayo Clinic. Mayo Clinic; 2023. [cited 2026 April 10]. Available from: https://www.mayoclinic.org/diseases-conditions/squamous-cell-carcinoma/symptoms-causes/syc-20352480

This Mayo Clinic article provides an overview of squamous cell carcinoma of the skin, a type of cancer that originates in the squamous cells that make up the middle and outer layers of the skin. The overview explains that while squamous cell carcinoma is one of the more common forms of skin cancer, it is generally not life-threatening on its own. However, when left untreated, it has the potential to grow large, invade surrounding tissue, and spread to other areas of the body, which can lead to serious complications. The article also notes that UV radiation from sunlight and tanning beds is the primary cause. Mayo Clinic's reputation as one of the leading medical institutions in the world lends strong credibility to this content and its health library is reviewed by medical staff and grounded in peer-reviewed literature. The same limitation applies here in that it is written for a general audience. This source will be used to introduce and define squamous cell carcinoma in the assignment, particularly to highlight how it differs from basal cell carcinoma in terms of where it develops and its potential to spread.

5. Mayo Clinic. Melanoma - Symptoms and Causes [Internet]. Mayo Clinic. Mayo Clinic; 2023. [cited 2026 April 10]. Available from: https://www.mayoclinic.org/diseases-conditions/melanoma/symptoms-causes/syc-20374884

This Mayo Clinic article introduces melanoma as the most dangerous form of skin cancer, originating in the melanocytes, which are the cells responsible for producing the pigment that gives skin its color. The overview explains that melanoma most commonly develops on sun-exposed areas of the body but can also form in the eyes and, in rare cases, inside the body. UV radiation from sunlight and tanning beds is identified as the leading cause, though the article acknowledges that melanoma can also occur in areas with little to no sun exposure. The typical moles section is useful because it establishes a clear baseline for what a normal mole looks like, describing them as uniform in color, round or oval in shape and generally smaller. This context is important because it

helps readers understand what warning signs to watch for when a mole begins to change. The article carries strong institutional credibility and is reviewed by medical staff, though it remains aimed at a general audience rather than a clinical one. This source will be used in the assignment to introduce melanoma and to support a discussion of how to distinguish a normal mole from a potentially cancerous one.

6. Cancer C. Types of melanoma skin cancer [Internet]. Canadian Cancer Society. 2015. [cited 2026 April 10]. Available from: https://cancer.ca/en/cancer-information/cancer-types/melanoma-skin/what-is-melanoma/types-of-melanoma

This page from the Canadian Cancer Society and the two sections being used for this assignment cover superficial spreading melanoma and acral lentiginous melanoma. The superficial spreading section explains that this is the most common form of melanoma, accounting for roughly 70% of all melanoma cases. It typically grows outward across the surface of the skin before potentially spreading deeper. It most commonly appears on the back in men and the legs in women. Acral lentiginous is much rarer, representing less than 5% of all melanoma cases. It has no connection to UV exposure and tends to develop on the soles of the feet or under the nails, making it especially difficult to detect. The Canadian Cancer Society is a well-established health organization in Canada, and its cancer information is developed with input from medical experts and grounded in clinical references, giving it strong credibility. A limitation is that it is written for a general readership rather than a clinical one. This source will be used in the assignment to contrast the two ends of the melanoma spectrum, showing how the most common subtype differs significantly from a rarer but harder-to-detect form that disproportionately affects people with darker skin tones.

7. Merkel Cell Carcinoma: Symptoms, Treatment & Prevention [Internet]. Cleveland Clinic. 2022. [cited 2026 April 10]. Available from: https://my.clevelandclinic.org/health/diseases/17971-merkel-cell-carcinoma

The overview explains that the cancer can spread quickly to the lymph nodes and other organs, making it potentially life-threatening. The section on Merkel cells provides useful background context, describing them as a type of neuroendocrine cell that serves a dual function, sitting near nerve endings to help detect touch while also producing hormone-like substances. First identified by German physician Friedrich Merkel in the late 1800s, these cells are found deep within the epidermis. The article also notes that while UV exposure is a major contributing factor, a common childhood virus called Merkel cell polyomavirus is found in roughly eight out of ten people diagnosed with this cancer and a weakened immune system allows the virus to trigger cancerous cell growth. Cleveland Clinic is a well-established non-profit academic medical center and draws from reputable sources including the American Cancer Society and the National Cancer Institute, which adds credibility. A weakness is that the article has not been updated since 2022, so some information may not reflect the most current research. This source will be used in the assignment to introduce Merkel cell carcinoma as a rare but serious skin cancer.

8. Cancer CCS / S canadienne du. Kaposi sarcoma [Internet]. Canadian Cancer Society. [cited 2026 April 10]. Available from: https://cancer.ca/en/cancer-information/cancer-types/soft-tissue-sarcoma/what-is-soft-tissue-sarcoma/types-of-soft-tissue-sarcoma/kaposi-sarcoma

This source describes Kaposi sarcoma as a rare cancer that originates in the cells lining the lymph, setting it apart from the more commonly discussed forms of skin cancer. One of its most distinctive characteristics is that it can appear in several parts of the body simultaneously, including the skin, lymph nodes and sections of the gastrointestinal tract. The opening section makes clear that infection with human herpesvirus 8 and a weakened immune system are the primary risk factors. The symptoms section outlines how the cancer most often first appears on the skin as brown growth bumps but can also produce symptoms throughout the body including swollen lymph nodes and unexplained weight loss. The Canadian Cancer Society is a well-established and widely trusted national health organization in Canada and grounded in credible references including the National Cancer Institute and peer-reviewed research, making this a reliable source. A limitation is that some of the references cited date back to the late 1990s and 2018, so the page may not fully reflect more recent developments in research or treatment. This source will be used in the assignment to introduce Kaposi sarcoma as a skin-related cancer particularly because of its viral and immunological origins.

9. Sebaceous Carcinoma: Symptoms, Causes & Treatment [Internet]. Cleveland Clinic. [cited 2026 April 10]. Available from: https://my.clevelandclinic.org/health/diseases/24087-sebaceous-carcinoma

The article introduces sebaceous carcinoma as a rare form of skin cancer that originates in the sebaceous glands, which are the oil-producing glands found beneath most of the skin's surface. The overview explains that while the cancer most commonly develops on the eyelids due to the high concentration of sebaceous glands in that area. The section on whether the cancer is aggressive is particularly important, confirming that sebaceous carcinoma spreads quickly and tends to return even after treatment, with roughly one in four people experiencing a recurrence or metastasis following their initial diagnosis. Cleveland Clinic is a well-respected medical center, and this article is medically reviewed and draws from credible sources including the American Academy of Dermatology, making it a reliable source. One weakness is that the article has not been updated since 2022, which means it may not capture recent clinical developments. This source will be used in the assignment to discuss sebaceous carcinoma as one of the lesser known but clinically significant rare skin cancers, with particular focus on its origin in the oil glands, its tendency to mimic benign eyelid conditions and its aggressive behavior.

10. Meyers JM, Munger K. The Viral Etiology of Skin Cancer. Journal of Investigative Dermatology. 2014 Oct;134:E29-32.

This article investigates the development and biological mechanisms of viral involvement in skin cancers, specifically beta human papillomaviruses (HPVs) and Merkel cell polyomavirus. The paper argues that these viruses function as synergistic etiological agents along with ultraviolet (UV) radiation to facilitate

carcinogenesis, especially in vulnerable populations like those living with Epidermodysplasia Verruciformis or immunosuppression. The authors provide a detailed analysis of how viral proteins contribute to cancer by inhibiting apoptosis through BAK degradation and disrupting Notch signaling pathways. The article is highly credible, authored by researchers from Harvard Medical School and Tufts University. A significant strength of the source is its clear explanation of the molecular "hit-and-run" mechanism, which offers a sophisticated view of how viral gene expression can initiate cancer without being required for its maintenance. The source also provides specific biochemical pathways that elevate it above more generalized summaries of skin cancer causes. This source is relevant to our project because it provides a critical biological dimension to the etiology of skin cancer, moving beyond environmental factors alone. We will use this source to illustrate how viral infections and genetic susceptibility interact with UV light to drive malignancy, specifically focusing on non-melanoma skin cancers and Merkel cell carcinoma.

11. **Mihaela Craescu, Rebegea L, Niculet E, Bobeica C, Tatu AL. Environmental factors' contribution in skin cancer etiology. Annals of the "Dunarea de Jos" University of Galati Fascicle II Mathematics Physics Theoretical Mechanics. 2020 Dec 26;43(2):165-9.**

    This review explores the multi-faceted etiology of skin cancer, identifying ultraviolet radiation (UVR) as the primary physical hazard responsible for carcinogenesis. The authors argue that while non-melanoma skin cancers (BCC and SCC) typically result from cumulative, chronic exposure, melanoma is more strongly associated with intermittent exposure and severe sunburns during childhood. Beyond solar light, the source details modifiable risks like artificial tanning, phenotypic traits, genetic inheritance, and medical conditions like immunosuppression or AIDS. Published in the peer-reviewed Annals of "Dunarea de Jos" University of Galati, this source is highly credible, featuring input from specialists in radiotherapy, pathology, and dermatology. Its primary strength is the clear distinction it draws between UVA and UVB wavelengths and their specific roles in premature aging versus DNA mutation. While it functions as a review article rather than primary experimental research, it provides a robust and comprehensive synthesis of current clinical understanding. We will use this source to categorize risk factors into environmental, biological, and iatrogenic groups. Specifically, its data on the intensity of tanning beds compared to natural sunlight and the distinction between cumulative and intermittent UV exposure will be crucial for explaining why different skin malignancies manifest in different populations.

12. **Swanbeck G, Hillstrom L. Analysis of etiological factors of squamous cell skin cancer of different locations [Internet]. Semantic Scholar. Swedish Cancer Society. Department of Dermatology, University Hospital, Uppsala, Sweden; 1969. Available from: https://pdfs.semanticscholar.org/537b/4d1a3fb1b5b7d95295344da20d09958fbd95.pdf**

    The authors investigate the etiological factors of squamous cell carcinoma (SCC) specifically occurring on the lower limbs. They argue that while ultraviolet

radiation contributes, SCC in this region frequently arises from non-solar triggers. These include physical trauma, such as old burn scars and mechanical injuries, or chronic dermatoses like Acrodermatitis Chronica Atrophicans and long-standing leg ulcers. The source also examines iatrogenic factors, noting that past medical treatments involving arsenic, tar, and X-ray therapy are significant precursors with latency periods often exceeding twenty years. This source is highly credible as a specialized retrospective study utilizing comprehensive data from the Swedish National Cancer Registry. A major strength is its focus on a specific anatomic location to uncover non-solar risk factors that generalized studies might overlook. Although its age (1969) means some discussed treatments like arsenic are now clinically obsolete, its clinical observations on the link between chronic injury, infection, and malignancy remain foundational. We will use this source to broaden our assignment's scope beyond the standard sun-exposure narrative. It provides critical evidence for how physical injury and chronic skin conditions serve as "pre-malignant" states.

13. Osterlind A. Etiology and epidemiology of melanoma and skin neoplasms. Current Opinion in Oncology. 1991 Apr;3(2):355-359.

The author explores the etiological pathways of cutaneous malignant melanoma (CMM) and non-melanoma skin cancers (NMSC). The author argues that CMM is primarily triggered by intermittent, intense sun exposure and the total number of pigmented nevi, whereas squamous cell carcinoma (SCC) results from lifelong cumulative UV exposure. The author emphasizes that childhood sunburns and exposure patterns occurring before age 15 have a disproportionately large influence on the later development of melanoma. This source is highly credible, published in Current Opinion in Oncology by an expert from the Danish Cancer Registry. A significant strength is its synthesis of various large-scale case-control studies from diverse geographic regions, including Australia, Canada, and Denmark, to provide a global perspective on risk factors. One potential weakness is its age; published in 1991, some of the "recent" research it cites is now several decades old. We will use this source to contrast the distinct behavioral and environmental causes of CMM versus SCC. This source provides the necessary epidemiological data to link modern lifestyle changes to the rising incidence of skin malignancies.

14. Glodde N, Jakobs M, Bald T, Tuting T, Gaffal E. Differential Role of Cannabinoids in the Pathogenesis of Skin Cancer. Life Sciences. 2015 Oct;138:35-40.

This study investigates the impact of both external (THC) and internal (endocannabinoid) systems on the growth and development of skin cancer. Using various mouse models, the authors determined that the body's internal cannabinoid system does not influence skin cancer pathogenesis. However, they found that systemically applied THC significantly inhibited melanoma growth in vivo. This effect is not a result of direct cellular toxicity but instead occurs because THC antagonizes the pro-inflammatory tumor microenvironment by reducing the infiltration of pro-tumorigenic myeloid cells, such as macrophages and neutrophils, into melanoma tissue. Published in the peer-reviewed journal Life Sciences, this source is highly credible. The researchers, affiliated with the

University of Bonn, utilized rigorous methodologies, including the use of genetically modified (Cnr1/2-/-) mice to isolate specific receptor effects and confirm receptor-dependent mechanisms. A major strength of the paper is its clear distinction between in vitro and in vivo results, which allowed the authors to precisely pinpoint the tumor microenvironment as the primary site of action. A notable limitation is the reliance on murine models, meaning these findings may require further validation in human clinical settings before therapeutic conclusions can be drawn. This source is essential for discussing how the inflammatory microenvironment contributes to skin cancer progression.

15. Benjamin CL, Ananthaswamy HN. p53 and the Pathogenesis of Skin Cancer. Toxicology and Applied Pharmacology. 2007 Nov 1;224(3):241-8.

This review explores the central role of the p53 tumor suppressor gene in the development of non-melanoma skin cancer (NMSC). The authors argue that p53 is the primary target for UV-induced DNA damage, specifically through C to T transitions at dipyrimidine sites. They detail how p53 normally coordinates essential protective processes including DNA repair and apoptosis, as seen in the formation of sunburn cells, but its mutation allows for the early clonal expansion of damaged keratinocytes. This process progressively drives the transition from normal skin to actinic keratosis and, eventually, invasive carcinoma. Published in the reputable peer-reviewed journal Toxicology and Applied Pharmacology and authored by experts from the M. D. Anderson Cancer Center, this source is highly credible. Its key strengths include a comprehensive synthesis of human clinical data alongside mouse model studies, particularly regarding mutational hotspots and the downstream impact of p53 loss on key regulators such as p21 and MDM2. A weakness is that the review dates to 2007 and lacks the most recent advancements in genomic sequencing technologies. This source will be utilized to explain the molecular initiation of NMSC within our assignment.

16. Hunt KM, Srivastava RK, Elmets CA, Athar M. The Mechanistic Basis of Arsenicosis: Pathogenesis of Skin Cancer. Cancer Letters. 2014 Nov;354(2):211-9. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4193806/

This review examines the pathogenesis of arsenic-induced skin cancer, or arsenicosis, arguing that arsenic promotes malignancy through several synergistic pathways including the generation of oxidative stress via reactive oxygen species, the disruption of immune responses through the unfolded protein response pathway, and direct genotoxicity coupled with the inhibition of DNA repair mechanisms. The source further details how arsenic alters critical signal transduction pathways to facilitate cell survival and proliferation, with a key highlight being arsenic's role as a potent co-carcinogen that significantly accelerates UV-induced damage. Published in Cancer Letters, this article is highly credible; the authors, researchers at the University of Alabama at Birmingham, provide a robust synthesis of global epidemiological data alongside specific molecular findings, and a major strength is the use of detailed diagrams illustrating the intersection of oxidative stress and inflammatory signaling, though one minor limitation is the highly technical nature of the signal transduction sections, which may be dense for readers without a strong background in

molecular biology. This source will be used to illustrate how non-UV environmental factors contribute to skin cancer pathogenesis, and is specifically valuable for explaining the role of endoplasmic reticulum stress and oxidative damage in disabling the body's natural immune defenses.

17. Erb P, Ji J, Kump E, Mielgo A, Wernli M. Apoptosis and Pathogenesis of Melanoma and Nonmelanoma Skin Cancer. Sunlight, Vitamin D and Skin Cancer. 2008;624:283-95.

This book chapter argues that the pathogenesis of skin cancer is a failure of apoptosis, detailing how UV radiation not only causes direct DNA damage but also mutates surveillance genes like p53 and downregulates Fas-ligand, allowing transformed cells to escape elimination by the immune system. For basal cell carcinoma, the authors identify the Hedgehog signaling pathway and the Gli2 transcription factor as primary drivers of apoptosis resistance, while for melanoma they map a complex progression involving NRAS/BRAF mutations and the loss of PTEN that drives uncontrolled growth. Published by Springer and authored by experts from the University of Basel, this source is highly credible, with its greatest strength being the seamless integration of molecular signaling pathways with potential therapeutic interventions such as gene silencing via siRNA, though a minor weakness is that some specific therapeutic data was unpublished at the time of printing and the source relies heavily on murine and in vitro models requiring further human validation. This source will be used to bridge the initial DNA damage caused by UV light with the sophisticated immune evasion strategies that established tumors employ.

18. Didona D, Paolino G, Bottoni U, Cantisani C. Non Melanoma Skin Cancer Pathogenesis Overview. Biomedicines. 2018 Jan 2;6(1):6.

This review provides a comprehensive overview of the pathogenesis of non-melanoma skin cancers, primarily basal cell carcinoma, squamous cell carcinoma, and the precursor lesion actinic keratosis, arguing that while cumulative UV radiation is the primary driver of carcinogenesis, it functions through a complex interplay of direct DNA damage, the production of reactive oxygen species, and the induction of local immunosuppression, and further details both the field cancerization model and the differentiated pathway of SCC development. Published in the peer-reviewed journal Biomedicines, this source is highly credible and offers a contemporary 2018 synthesis of the literature by authors affiliated with major dermatology departments in Germany and Italy, with a significant strength being the inclusion of diverse pathogenic factors such as mitochondrial DNA deletions, heparanase activation, and viral co-factors like HPV, though its broad overview nature means it may lack the granular laboratory detail found in more specialized primary research papers. This source will be used to establish the modern framework for NMSC risk factors in the assignment, and is particularly valuable for explaining the continuum from actinic keratosis to invasive SCC and for identifying specific molecular markers such as Complement factor H and Serpin A1 that characterize tumor progression.

19. Mayo Clinic Staff. Skin Cancer [Internet]. Mayo Clinic. 2025. [cited 2026 April 10]. Available from: https://www.mayoclinic.org/diseases-conditions/skin-cancer/symptoms-causes/syc-20377605

This source provides a detailed overview of skin cancer, including its definition, types, symptoms, causes, and risk factors. It explains that skin cancer occurs when abnormal skin cells grow, often due to DNA damage caused by ultraviolet (UV) radiation from the sun or tanning devices. The page identifies the main types of skin cancer and highlights that melanoma is the most dangerous because it is more likely to spread. It outlines common signs and symptoms, such as new skin growths, non-healing sores, rough patches, and changes in moles, as well as typical locations on the body. The source also discusses key risk factors, including sun exposure, tanning bed use, fair skin, and weakened immune function, while emphasizing prevention strategies like sun protection. In terms of evaluation, this source is credible because it is published by the Mayo Clinic, a globally recognized provider of evidence-based health information. Its strengths include clear explanations and comprehensive coverage. However, it lacks detailed citations to primary research studies. This source is relevant to my assignment because it provides reliable background information on the causes, symptoms, and risk factors of skin cancer.

20. Cleveland Clinic Staff. Skin Cancer: Symptoms, Types & Treatment [Internet]. Cleveland Clinic. 2023. [cited 2026 April 10]. Available from: https://my.clevelandclinic.org/health/diseases/15818-skin-cancer

This source provides a comprehensive overview of skin cancer, including its causes, common types, symptoms, and treatment options. It explains that skin cancer develops when there are changes in how skin cells grow, often due to exposure to ultraviolet (UV) radiation. The page identifies three main types of skin cancer - basal cell carcinoma, squamous cell carcinoma, and melanoma - and outlines typical symptoms such as new growths, changes in existing moles, or sores that do not heal. It also emphasizes that early detection is critical, as most skin cancers are highly treatable or curable when identified in their early stages. In terms of evaluation, this source is credible because it is published by the Cleveland Clinic, a well-respected nonprofit academic medical center known for providing medically reviewed and evidence-based health information. Its strengths include its clear organization and broad coverage of key concepts related to skin cancer. However, it is designed for a general audience and does not include detailed research data or citations to primary studies. This source is relevant to my assignment because it provides a strong foundational understanding of skin cancer, including its symptoms, types, and treatment. I will use it to support general background information.

21. Bobotsis R. Signs and symptoms of non-melanoma skin cancer [Internet]. Canadian Cancer Society. 2024. [cited 2026 April 10]. Available from: https://cancer.ca/en/cancer-information/cancer-types/skin-non-melanoma/signs-and-symptoms

This source outlines the common signs and symptoms associated with non-melanoma skin cancer, emphasizing visible changes in the skin as the primary indicators. It explains that warning signs include a sore that does not heal or

repeatedly returns, along with other symptoms such as bleeding sores, scaly red patches, and unusual growths on the skin. The page also describes how these cancers may appear in different forms, including shiny or pearly lumps, wart-like growths, or areas that are itchy, darker than normal, or have visible blood vessels. This source is credible because it is produced by the Canadian Cancer Society, a trusted organization that provides medically reviewed and evidence-based health information. Its strengths include clear descriptions and practical examples that make it easy for a general audience to understand. However, it lacks detailed scientific explanations or references to primary research, limiting its depth for advanced academic use. This source is relevant to my assignment because it provides clear and reliable information on how to identify potential signs of non-melanoma skin cancer. I will use it to support explanations of symptom recognition and to emphasize the importance of early detection in improving health outcomes.

22. Kumar V, Abbas AK, Aster JC, Deyrup AT, Das A, Robbins SL. Robbins & Kumar Basic Pathology. 11th ed. Philadelphia: Elsevier; c2023. p. 775-793.

Chapter 22 of Robbins & Kumar Basic Pathology provides a comprehensive and detailed examination of skin structure, function, and disease, with a particular focus on the pathogenesis of skin cancers. The chapter explains how normal skin anatomy - including the epidermis, dermis, and associated cell types such as keratinocytes and melanocytes - relates to disease development. It outlines the molecular and cellular mechanisms underlying common skin cancers, including basal cell carcinoma, squamous cell carcinoma, and melanoma, emphasizing the role of ultraviolet (UV) radiation in causing DNA damage and mutations. In addition, it provides detailed descriptions of clinical and histological features used to diagnose and classify skin cancers. In terms of evaluation, this source is highly credible as it is a widely used, peer-reviewed medical textbook authored by experts in pathology and published by Elsevier. Its strengths include depth, scientific accuracy, and detailed explanations of disease mechanisms. However, its complexity may make it less accessible for general audiences. This source is highly relevant to my assignment because it provides in-depth, authoritative information on the types and clinical manifestations of skin cancer, which I will use to support more advanced scientific explanations.

23. Canadian Cancer Society. Finding skin cancer early [Internet]. Canadian Cancer Society. 2025. [cited 2026 April 10]. Available from: https://cancer.ca/en/cancer-information/cancer-types/skin-non-melanoma/finding-cancer-early

This source focuses on the importance of early detection in improving outcomes for both melanoma and non-melanoma skin cancers. It explains that the most effective way to find skin cancer early is through recognizing symptoms and regularly monitoring the skin, particularly for individuals at higher risk. The page outlines strategies for early detection, such as performing routine self-examinations in a well-lit space using mirrors to inspect all areas of the body, including hard-to-see regions. It also emphasizes the importance of seeking medical attention if any changes in the skin are noticed. As with the previous sources, this source is credible because it is published by the Canadian Cancer

Society, a reputable organization that provides medically reviewed, evidence-based information. Its strengths include clear, actionable guidance and accessibility for a general audience. However, it does not provide detailed scientific explanations or specific screening guidelines, which may limit its usefulness for more advanced academic analysis. This source is relevant to my assignment because it provides practical and reliable information about early detection strategies for skin cancer. I will use it to support discussions on prevention and emphasize the importance of regular skin checks in improving patient outcomes.

24. Bobotsis R. Stages of non-melanoma skin cancer [Internet]. Canadian Cancer Society. 2024. [cited 2026 April 10]. Available from: https://cancer.ca/en/cancer-information/cancer-types/skin-non-melanoma/staging

This source explains the concept of staging in non-melanoma skin cancer, focusing on how cancer is classified based on its size, location, and extent of spread within the body. The page emphasizes that healthcare professionals use staging information gathered from diagnostic tests to guide treatment decisions and estimate prognosis. It highlights the importance of staging as a foundational tool in cancer management, helping clinicians assess disease severity and plan appropriate interventions. In terms of evaluation, this source is credible because it is from the Canadian Cancer Society, a trusted national organization that provides medically reviewed, evidence-based information. Its strengths include clarity, reliability, and accessibility for a general audience. However, the source is somewhat limited in depth, as it does not provide detailed staging classifications or extensive clinical data, which may be needed for more advanced academic analysis. This source is relevant to my assignment because it provides a clear explanation of how non-melanoma skin cancer is staged and why staging is important. I will use it to support foundational explanations of cancer classification and to connect staging with treatment planning and prognosis in my discussion.

25. Wright F. Prognosis and survival for melanoma skin cancer [Internet]. Canadian Cancer Society. 2023. Available from: https://cancer.ca/en/cancer-information/cancer-types/melanoma-skin/prognosis-and-survival

This source provides an overview of prognosis and survival for melanoma skin cancer, emphasizing how outcomes vary depending on several factors, particularly the stage of the disease at diagnosis. The page explains that prognosis refers to the predicted course of the disease, while survival statistics estimate the likelihood of living for a certain period after diagnosis. It highlights that melanoma survival rates are generally high, although outcomes differ significantly based on how far the cancer has spread. The source also stresses that survival statistics are general estimates and may not reflect individual outcomes, as factors such as tumor thickness, growth rate, and patient health influence prognosis. In terms of evaluation, this source is credible because it is published by the Canadian Cancer Society, a well-established organization that provides evidence-based cancer information. Its strengths include clarity, accessibility, and reliance on national data. However, it lacks in-depth scientific detail and primary

research references, making it more suitable for general understanding than advanced analysis. This source is relevant to my assignment because it provides reliable background information on melanoma survival rates and prognostic factors. I will use it to support general statements about prognosis and the importance of early detection in improving prognosis.

26. Noyce NC, Gulati A, Cleaver J. Mohs Micrographic Surgery: Evaluation and Treatment of Nonmelanoma Skin Cancer. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025- [Updated 2025 Jul 8; cited 2026 Apr 9]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK617060/

This clinical review by StatPearls provides an overview of Mohs micrographic surgery for BCC and SCC. It demonstrates the sequential removal of thin skin layers followed with an immediate microscopic examination. This explains why MMS achieves the lowest recurrence rates out of any BCC or SCC treatments. It displays the primary indications, the advantage of sparing healthy tissue, superior cure rate, and limitations of MMS such as the high cost to have a specialist surgeon and higher cost. The review also briefly covers the Hedgehog pathway inhibitors related to locally advanced BCC when surgery is no longer recommended. StatPearls is frequently updated and peer-reviewed. It also provides strong NIH-hosted references, and has high credibility. The recent 2025 update also provides alignment with the current clinical standards of the health care system. As a secondary study rather than a primary study, it accurately summarizes existing evidence rather than producing new data and has minor limitations for this academic purpose. This source is the most significant for the MMS subsection, providing the procedural description, indications, advantages, and limitations. It also covers the procedural comparisons between MMS, C&E, and excision. It also provides context for Vismodegib and Sonidegib when surgery is no longer recommended for advanced BCC.

27. American Cancer Society. Treating Basal and Squamous Cell Skin Cancer. In: Basal and Squamous Cell Skin Cancer [Internet]. Atlanta (GA): American Cancer Society; c2025 [updated 2025 Oct 9; cited 2026 Apr 9]. Available from: https://www.cancer.org/cancer/types/basal-and-squamous-cell-skin-cancer/treating.html

This ACS page covers the full BCC and SCC treatment procedures. It explains the surgical procedures (MMS, excision, C&E), and local non-surgical therapies (cryotherapy, imiquimod, 5-FU, PDT). It covers advanced systemic treatments such as immunotherapy with pembrolizumab and cemiplimab, radiation therapy, and systemic chemotherapy. It overviews cisplatin/carboplatin combined with paclitaxel for aggressive or refractory cases of the disease. It provides a guide for selection of an appropriate treatment based on tumour type, size, location, depth, and patient health status. It also briefly overviews supportive and palliative care aspects of treatment with more progressed diseases. The ACS is a recognized non-profit health organization with frequently reviewed content by oncologists. As an accessible resource to patients, it allows for better readability but lacks the depth over the molecular level. This would serve as a limitation for technically detailed sections of this research. It has a broad scope which makes it a reliable source for cross-referencing treatments and other categories for BCC and SCC. This source

operates as the backbone reference across many surgical, non-surgical, and advanced treatment sections for BCC and SCC. Its coverage of cisplatin/carboplatin plus paclitaxel in the systemic chemotherapy section is also significant.

28. Canadian Cancer Society. Treatment of Squamous Cell Carcinoma. In: Skin Cancer (non-melanoma) [Internet]. Toronto (ON): Canadian Cancer Society; c2024 [cited 2026 Apr 9]. Available from: https://cancer.ca/en/cancer-information/cancer-types/skin-non-melanoma/treatment/squamous-cell-carcinoma

This CCS resource covers treatment options for SCC. It provides information on surgical procedures (MMS, standard excision, C&E), local non-surgical therapies (cryotherapy, topical 5-FU, imiquimod, PDT), and systemic treatments including radiation, chemotherapy, and immunotherapy for advanced disease. It also encompasses a guide for treatment selection based on the features of the tumour, the patient's health, and the location. It is written with accessibility in mind for both patients and healthcare providers within the Canadian clinical system. The CCS is a nationally renowned health authority with specialists reviewing content continuously, with this page being updated as recently as 2024. Similar to the ACS resource, it provides a broad clinical overview rather than primary research. This limits the depth of the molecular and pharmacological information, but its value lies in putting into perspective the Canadian healthcare system. It also complements the American and international guidelines used in other sections of this research. This reference reinforces the other surgical and local non-surgical treatment sections highlighting SCC treatment, which includes cryotherapy, PDT, and topical and systematic therapies. Used in tandem with Reference 27, it represents both Canadian and international perspectives on the clinical applications of skin cancer treatment.

29. PDQ Adult Treatment Editorial Board. Skin Cancer Treatment (PDQ): Health Professional Version. In: PDQ Cancer Information Summaries [Internet]. Bethesda (MD): National Cancer Institute (US); 2002- [updated 2025 Mar 7; cited 2026 Apr 9]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK65928/

This NCI summary is a PDQ Health Professional Version covering skin cancer treatment. It is a highly evidence-based clinical reference for BCC, SCC, and actinic keratosis. It is hosted on the NCBI Bookshelf and was recently updated in March 2025. It covers surgical and local treatments, immunotherapy (pembrolizumab and cemiplimab), radiation therapy, and incorporates clinical trial data accompanied by pharmacological details for a more advanced medical audience. It gives context into the scale of nonmelanoma skin cancer prevalence, noting more Americans are treated annually than all other cancer types combined. PDQ Health Professional summaries are among the most significant and authoritative oncology references available. This is due to it being produced by NCI editorial boards bringing on continuous and non-stop updates of peer-reviewed trial evidence. The NCI's status as a U.S. federal agency provides it with even greater credibility. It is U.S.-centric which may pose a minor limitation, though pharmacological content is applicable internationally and is consistent

with Canadian clinical practices. This source provides significant support for the immunotherapy section, specifically pembrolizumab for advanced SCC and MCC. It also covers cemiplimab as the first immunotherapy approved specifically for advanced SCC.

30. PDQ Adult Treatment Editorial Board. Melanoma Treatment (PDQ): Health Professional Version. In: PDQ Cancer Information Summaries [Internet]. Bethesda (MD): National Cancer Institute (US); 2019- [updated 2025 May 2; cited 2026 Apr 9]. Available from: https://www.cancer.gov/types/skin/hp/melanoma-treatment-pdq

This NCI PDQ Health Professional Version is a clinical guide to staging melanoma. It covers wide local excision, radiation therapy, SLNB, PD-1/CTLA-4 checkpoint inhibitors (nivolumab, ipilimumab), BRAF inhibitors (dabrafenib, vemurafenib, encorafenib), and MEK inhibitors (trametinib, cobimetinib, binimetinib). It explains the molecular mechanisms for combining BRAF and MEK inhibition to delay resistance, utilizing the MAP kinase/ERK pathway. It also briefly addresses immune-related adverse event management. Updated May 2025 by the NCI, this source holds very high clinical authority. It is peer-reviewed clinical trial evidence. Its molecular and pharmacological depth, especially on BRAF V600K/E mutations and checkpoint biology, is a key strength. It is U.S.-centric but that poses very minor limitations. This is the primary source for the targeted therapy section. It supports all BRAF and MEK inhibitor descriptions made in the research section and covers all of the combination therapy rationale. It also supports nivolumab and ipilimumab in the immunotherapy section. It is also important for describing SLNB and wide excision indications in the surgical section for melanoma.

31. PDQ Adult Treatment Editorial Board. Merkel Cell Carcinoma Treatment (PDQ): Health Professional Version. In: PDQ Cancer Information Summaries [Internet]. Bethesda (MD): National Cancer Institute (US); 2002- [updated 2025 May 9; cited 2026 Apr 9]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK65713/

This NCI PDQ Health Professional summary focuses entirely on Merkel Cell Carcinoma (MCC), which is a rare but highly aggressive skin cancer with substantially higher mortality than BCC or SCC. It covers a variety of treatment modalities such as wide local excision, adjuvant radiation therapy as the standard post-surgical care for reducing recurrence locally and regionally, and pembrolizumab as treatment for advanced or metastatic disease. The staging criteria and MCC's high recurrence risk are also covered in detail. Updated in May 2025, it is the most authoritative and current source available for MCC. MCC is a cancer substantially underrepresented in oncology sources due to its rarity. NCI's credibility and rigorously peer-reviewed professional-level clinical references are its key strengths. The only minor limitation is the disease-specific scope, but it could serve as another strength, representing MCC treatments extensively. This source supports most MCC content across the various sections. It provides great insight into wide excision in the surgical section. It also covers adjuvant radiation as standard post-excision care and pembrolizumab for advanced MCC in the immunotherapy section.

32. Memorial Sloan Kettering Cancer Center. Melanoma Treatment. In: Melanoma [Internet]. New York (NY): Memorial Sloan Kettering Cancer Center; c2026 [cited 2026 Apr 9]. Available from: https://www.mskcc.org/cancer-care/types/melanoma/treatment

This MSKCC resource provides an overview on melanoma treatment covering surgical procedures, radiation therapy, PD-1/CTLA-4 checkpoint immunotherapy (nivolumab, ipilimumab), and BRAF/MEK inhibitor combinations for BRAF-mutated advanced disease. MSKCC has been long involved in immunotherapy clinical trials. It covers the combination between nivolumab and ipilimumab for Stage IV melanoma. It also covers the trade-off of higher survivability in exchange of increased burden of immune-related toxicities. MSKCC is a highly ranked, top cancer institution, and its 2026 copyright date makes it the most current source in the bibliography. The lack of formal references, commonly seen in institutional clinical summaries, produces limitations for academic use. It is best used to add onto the pharmacological claims already supported by the NCI PDQ summaries. This source reinforces the immunotherapy section, supporting nivolumab's combination with ipilimumab and its efficacy and toxicity trade-offs for Stage IV melanoma. It also supports pembrolizumab's overall survival benefits and reinforces BRAF/MEK inhibitor combination therapy in the targeted therapy section.

33. Swarm RA, Youngwerth JM, Agne JL, et al. Adult Cancer Pain, Version 2.2025, NCCN Clinical Practice Guidelines In Oncology. J Natl Compr Canc Netw. 2025;23(7):e250032. doi:10.6004/jnccn.2025.0032

This is a peer-reviewed NCCN publication which presents the 2025 Clinical Practice Guidelines for adult cancer pain management. It utilizes the WHO analgesic ladder. It covers NSAIDs (ibuprofen, naproxen) and acetaminophen for mild-to-moderate pain, and provides information on escalating to opioids (morphine, oxycodone, fentanyl) for refractory moderate-to-severe pain. It highlights titration principles, and provides strategies for long-acting formulations. It outlines precautions that need to be taken for patients with renal impairment or gastrointestinal contraindications. This can be directly applicable to patients with advanced skin cancer as detailed in the source. NCCN guidelines represent the highest standard in oncology clinical practice, being developed by specialist panels from multiple different disciplines and published in a peer-reviewed journal in 2025. This is the strongest source in the palliative care section of this assignment. The only limitation it poses is its clinician-focused language, which may require deeper understanding of these subjects for a broader academic audience. This is the only reference for the pain management section of palliative care. It supports the step-by-step analgesic approach, and specific agent selection (NSAIDs, acetaminophen, opioids). It is the only source covering titration strategies, long-acting opioid formulations, and precautions for patients with advanced skin cancer.

34. BC Cancer. Care of malignant wounds focused assessment [Internet]. Vancouver (BC): BC Cancer; 2015 [cited 2026 Apr 9]. p. 1-6. Available from: https://www.bccancer.bc.ca/nursing-site/Documents/Malignant%20Wounds%20NO%20NCI%20Update.pdf

This is a BC Cancer clinical guidance document that provides a framework for managing malignant wounds. These wounds arise from tumours invading the skin surface, which most commonly are encountered in advanced or neglected BCC and SCC. It outlines evidence-based palliative wound care strategies. These strategies range from foam, hydrofiber, and alginate dressings for exudate control to antimicrobial dressings and topical antibiotics for infection reduction. It covers odour management and moisture control principles that prioritize patient comfort throughout. BC Cancer is a respected cancer authority in the province of British Columbia. However thorough the document may be, it was last updated in 2015, making it the oldest source in this bibliography, which is a meaningful limitation as wound care materials and practices have advanced. This does not diminish the source enough to negate its extensive library of procedural information and core management principles. It remains largely applicable, but specific product recommendations may be outdated. This source directly supports the malignant wound care section in palliative care, providing the reasoning for advanced dressings and antimicrobial wound management in advanced BCC and SCC. It is also a Canadian institution, which is fitting given this research is done within the Canadian healthcare context.

35. PDQ Supportive and Palliative Care Editorial Board. Pruritus (PDQ): Health Professional Version. In: PDQ Cancer Information Summaries [Internet]. Bethesda (MD): National Cancer Institute (US); 2002- [updated 2022 Nov 10; cited 2026 Apr 9]. Available from: https://www.cancer.gov/about-cancer/treatment/side-effects/skin-nail-changes/pruritus-pdq

This NCI PDQ Health Professional summary covers cancer-related pruritus. It highlights its pathophysiology and management in patients. It addresses itching that arises from skin cancers themselves and as an immune-mediated side effect of checkpoint inhibitor immunotherapy. Management strategies covered are topical capsaicin (depleting nerve endings), menthol-based creams (activating cold receptors), topical corticosteroids (reducing local immune activation), oral antihistamines for histamine-mediated itch, and systemic corticosteroids. Another aspect it outlines is systematic treatment side effects such as fatigue, nausea, and vomiting. This PDQ summary is supported by the NCI's credibility, but its November 2022 update makes it one of the older sources in the bibliography. This may come as a limitation given the rapid advancements made in immunotherapy toxicity management. Many core procedures such as topical and antihistamine strategies remain consistent with current practice, but immunotherapy-related guides should be cross-referenced with more recent literature. This source supports two sections: first, the pruritus management subsection in palliative care (capsaicin, menthol, topical corticosteroids, antihistamines); and second, the systemic treatment side effects and management of immunotherapy-induced adverse events.

36. Cleveland Clinic. Radiation Burn [Internet]. Cleveland (OH): Cleveland Clinic; 2024 Sep 24 [cited 2026 Apr 9]. Available from: https://my.clevelandclinic.org/health/diseases/21995-radiation-burns#management-and-treatment

This is a Cleveland Clinic source describing radiation burn, a predictable complication in the context of irradiated skin. It can range from mild erythema and dryness to moist desquamation and ulceration. Management strategies are organized by severity and include fragrance-free moisturizers for skin barrier maintenance, sun protection (noting irradiated skin remains sensitive for months after treatment), avoiding extreme temperatures, aloe vera-based gels for mild-to-moderate irradiation, and topical steroids or antimicrobial dressings for severe skin lesions and breakdown. The Cleveland Clinic is a globally renowned medical center, and this September 2024 resource is very current and is clinician-reviewed. As a web resource in comparison to a peer-reviewed publication, it lacks the citation traceability, which poses a limitation. The specialist-reviewed guidance closely mirrors the standard care in the radiation oncology setting. This is the primary reference for the radiation dermatitis section under the treatment-related side effects. It supports all the specific management strategies described (moisturizers, sun protection, avoidance of extreme temperatures, aloe vera application for mild reactions, and topical steroids with antimicrobial dressings for severe cases).

37. American Cancer Society. Supportive care [Internet]. Atlanta (GA): American Cancer Society; c2026 [cited 2026 Apr 9]. Available from: https://www.cancer.org/cancer/supportive-care.html

This ACS resource provides coverage for the psychosocial and complementary supportive care throughout cancer treatment. It highlights individual psychotherapy for coping, and peer support groups (in-person and online). It provides insight into family and couples counseling, and formal palliative care integration. Social worker and patient navigator roles for logistical and financial challenges are also highlighted within this source. Complementary approaches such as mindfulness-based therapies, guided imagery, muscle relaxation therapy, and structured breathing are all discussed. They provide management skills when a patient encounters anxiety, depression, and worsened sleep quality. The ACS is specialist-reviewed and a well-respected health authority. The source updated to 2026 makes it one of the most current sources in the bibliography. As a patient-facing resource, it does not directly utilize primary research, which poses a limitation in academic work. It is important to note that it provides an evidence-informed approach towards psychosocial health and broadly endorses strategies employed in oncology and palliative care guidelines. This source is the sole contributor to the entire psychosocial and complementary care section. It supports individual therapy, peer support, family counseling, palliative care, social worker roles, and all complementary strategies described. It is framed as an evidence-informed source that provides meaningful improvements in quality of life alongside traditional skin cancer treatment.