UV-C light can **damage and kill cancer cells by causing DNA lesions, inducing cell death through mechanisms like apoptosis, and creating reactive oxygen species (ROS)**. It can be used in therapy, sometimes in a pulsed form, to selectively target and destroy tumor cells while causing less damage to healthy cells. [1, 2, 3, 4]

**How UV-C light damages and kills tumor cells**

- **DNA damage:** UV-C radiation can cause direct damage to DNA, creating photoproducts. In some cancer cells, this damage is not repaired effectively, leading to cell dysfunction and death.
- **Inducing cell death:** The DNA damage and other effects can trigger the intrinsic apoptotic pathway (a programmed cell death process) in cancer cells.
- **Generating reactive oxygen species (ROS):** UV-C light can stimulate the production of ROS, which can overwhelm a cell's ability to handle oxidative stress, leading to cell injury and death.
- **Targeting cell receptors:** Pulsed UV-C light can activate specific cell receptors, such as the FAS receptor, which is more abundant in cancer cells and promotes their injury and death. [1, 4]

**Therapeutic applications**

- **Targeted therapy:** Researchers are developing methods to use UV-C light to selectively kill cancer cells. A key feature of this approach is that by carefully controlling the irradiation conditions, it's possible to damage tumor cells while largely sparing non-tumor cells.
- **Enhancing other treatments:** UV-C light can be used in conjunction with other cancer treatments. For example, it can enhance the effectiveness of radiotherapy, and it can be used to activate photosensitizers for photodynamic therapy (PDT).
- **Surgical assistance:** In some cases, UV-C light can improve the visibility of cancer cells during surgery, helping surgeons to more effectively remove tumors and destroy any remaining microscopic cancer cells. [1, 2, 3, 5, 6]

**Limitations and considerations**

- **Penetration depth:** The ability of UV-C light to penetrate deeply into tissue is a major challenge. However, recent advances using nanomaterials aim to overcome this limitation.
- **Risk of promoting cancer:** While it can be used to treat cancer, UV exposure (especially from the sun) is also a major risk factor for skin cancer. This is because UV radiation can also cause DNA damage and mutations that contribute to cancer development. [2, 5, 7, 8]

*AI responses may include mistakes.*

[1] https://www.imrpress.com/journal/FBS/14/4/10.31083/j.fbs1404027/htm
[2] https://pmc.ncbi.nlm.nih.gov/articles/PMC11486887/
[3] https://www.sciencedaily.com/releases/2012/08/120821143221.htm
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[6] https://www.theguardian.com/society/2022/jun/17/scientists-harness-light-therapy-to-target-and-kill-cancer-cells-in-world-first
[7] https://pmc.ncbi.nlm.nih.gov/articles/PMC3709783/
[8] https://www.mdanderson.org/cancerwise/can-uv-light-really-be-used-as-a-cancer-treatment.h00-159779601.html