

UV-C **can damage vesicle walls by disrupting their molecular structure**, but it can also cause them to form structures like nanotubes or increase their production. For example, high-energy UV-C can damage DNA within the vesicle, preventing its function, while UV-C can also be a shield for early life forms, scattering light to protect the contents inside. Some studies show that UV-C irradiation can increase the production of outer membrane vesicles in certain bacteria, potentially as a stress response. [1, 2, 3, 4]

Molecular damage and repair

- **DNA damage:** UV-C light can damage DNA, causing dimerization which prevents replication and causes infections, according to [uvsmart.nl](https://www.uvsmart.nl).
- **Repair mechanisms:** Research has shown that UV-C irradiation can trigger cellular responses, such as increasing the recruitment of specific proteins to the kinetochore, to delay cell division and allow time for repair. [3, 5]

Physical effects

- **Nanotube formation:** UV-C can cause membrane fluctuations and lead to the formation of nanotubes from the vesicle wall.
- **Increased production:** Some bacteria increase the production of outer membrane vesicles in response to UV-C radiation as a stress response. [1, 4]

Protective effects

- **Shielding:** In the case of pre-biotic fatty acid vesicles, UV-C acts as a protective shield. Its scattering properties can protect the internal components from harmful UV-C radiation.
- **Internal reflection:** UV-C light can be internally reflected at the water's surface, creating a more stable environment within the vesicle. [2, 6]

Other effects

- **Cell wall softening:** In plants, UV-C irradiation can lead to the degradation of cell wall components, resulting in softening of the tissue.
- **Gene regulation:** UV-C can affect gene expression, triggering defense responses and regulating cell cycle genes. [7, 8, 9]

AI responses may include mistakes.

- [1] <https://pmc.ncbi.nlm.nih.gov/articles/PMC11187966/>
- [2] <https://www.biorxiv.org/content/10.1101/2023.01.01.522439v1.full-text>
- [3] <https://www.uvsmart.nl/articles/the-truth-about-uv-c-light-and-its-effectiveness-against-germs>
- [4] <https://www.sciencedirect.com/science/article/pii/S0944501316305274>
- [5] <https://pmc.ncbi.nlm.nih.gov/articles/PMC3674093/>
- [6] <https://www.biorxiv.org/content/10.1101/2023.01.01.522439v1.full.pdf>
- [7] <https://pubs.acs.org/doi/10.1021/jf9906174>
- [8] <https://www.frontiersin.org/journals/plant-science/articles/10.3389/fpls.2021.793989/full>
- [9] <https://www.mdpi.com/1422-0067/25/24/13718>