



# Photodynamic Therapy: A Minimally Invasive Approach to Head and Neck Cancer

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## DESCRIPTION

Head and neck cancer is a challenging and often debilitating disease that affects the delicate structures in the upper part of the body, including the mouth, throat, and nasal passages. Traditional treatment methods, such as surgery, chemotherapy, and radiation therapy, can be aggressive and have significant side effects. However, there is a potential alternative on the horizon – Photodynamic Therapy (PDT). PDT is an innovative and minimally invasive treatment that utilizes light-activated drugs to target and destroy cancer cells.

### Understanding Photodynamic Therapy (PDT)

Photodynamic Therapy, often referred to as PDT, is a therapeutic technique that combines light, photosensitizing agents, and oxygen to selectively destroy cancer cells. The fundamental concept behind PDT lies in its ability to exploit the unique properties of photosensitizing agents. These agents are drugs that, when exposed to specific wavelengths of light, become activated and produce reactive oxygen species. These reactive oxygen species, in turn, damage and destroy the target cells.

**Photosensitizer administration:** Patients receive a photosensitizing agent, typically through intravenous injection or topical application, depending on the type and location of the cancer.

**Light activation:** After allowing time for the drug to accumulate in the target tissues (cancer cells), the affected area is exposed to a specific wavelength of light. This light activation leads to the production of reactive oxygen species.

**Cell destruction:** The reactive oxygen species generated during light activation cause damage to the cancer cells, leading to their destruction.

### PDT in head and neck cancer

Head and neck cancer encompasses various types, including oral, pharyngeal, and laryngeal cancers, among others. PDT has shown potential as a treatment option for some of these malignancies.

Its minimally invasive nature and ability to preserve healthy tissues make it an attractive choice for patients and oncologists.

### Applications of PDT in head and neck cancer

**Early-stage cancer treatment:** PDT is particularly effective in treating superficial and early-stage cancers. It can target and eliminate cancer cells in the lining of the mouth, throat, or vocal cords without affecting deeper tissues.

**Palliative care:** For patients with advanced head and neck cancer, PDT can offer palliative relief. By shrinking tumours and relieving symptoms such as pain or difficulty swallowing, PDT can enhance the quality of life.

**Organ preservation:** In cases where traditional surgery might involve the removal of essential structures, such as the larynx, PDT can help preserve these organs. This is especially significant for patients' speech and swallowing functions.

**Reduced side effects:** Compared to chemotherapy and radiation therapy, PDT tends to have milder side effects. This can be significant for patients who may already face challenges related to speech and swallowing.

**Targeted therapy:** PDT's selectivity in targeting cancer cells reduces damage to surrounding healthy tissues, which is a significant advantage in preserving critical functions like speech and swallowing.

However, it's essential to note that PDT is not a one-size-fits-all solution for head and neck cancer. Its effectiveness depends on several factors, including the cancer's stage, location, and the specific photosensitizer used. Therefore, PDT is most suitable for carefully selected cases where it can provide the most benefit.

### Challenges and future directions

While PDT holds great potential in the treatment of head and neck cancer, several challenges remain. One limitation is the depth of light penetration, which restricts PDT to treating superficial tumours. Researchers are continually exploring ways

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to improve light delivery and expand PDT's applicability to deeper-seated tumours.

Another area of active investigation is the development of more efficient and tumour-specific photosensitizers. These agents play a pivotal role in PDT's success, and ongoing research aims to create photosensitizers with enhanced targeting abilities and reduced side effects.

Furthermore, PDT's integration into standard cancer treatment protocols and its accessibility to patients worldwide are areas of concern. As ongoing clinical trials provide more data on PDT's

long-term outcomes, its acceptance and utilization in oncology may grow.

In conclusion, Photodynamic Therapy represents a potential avenue in the fight against head and neck cancer. Its ability to selectively target cancer cells while preserving healthy tissues offers achievement for patients. As research and clinical trials continue to unfold, PDT's role in cancer therapy may continue to expand, potentially revolutionizing the way we approach and treat these challenging malignancies.