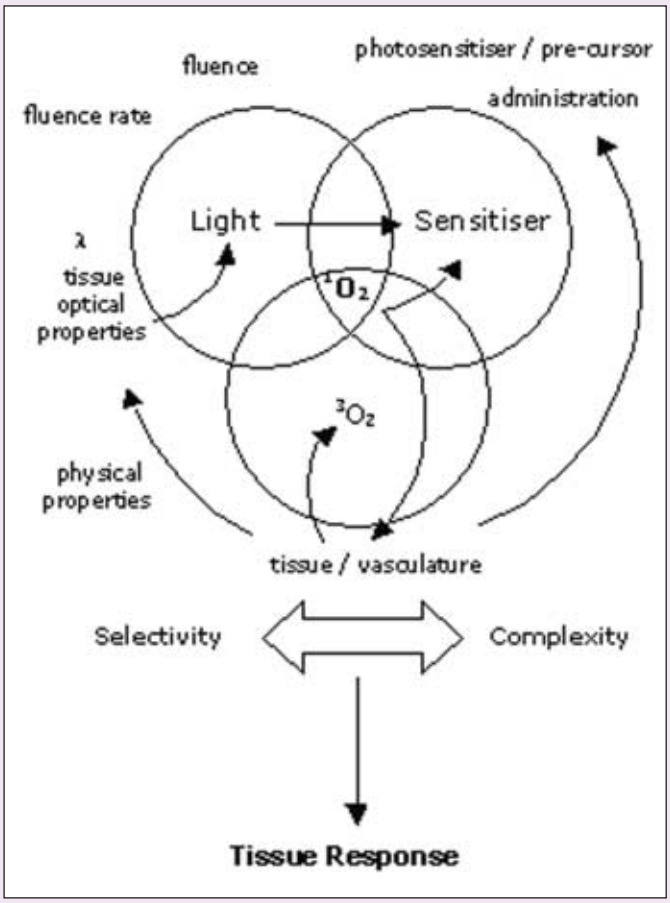
Photodynamic Therapy (PDT), also called photochemotherapy is a treatment modality that uses the interaction between a drug, the photosensitiser and light to obtain its therapeutic effect. PDT offers the potential of increased selectivity over therapies that use drugs or light alone.

Photodynamic Therapy

The earliest references to the use of such methods date back to the Egyptian times, where the combination of ingesting certain plants and exposure to sunlight was used for treating skin conditions. We now know that these plants contained substances that made cells in the skin sensitive to damage by light. These and other photosensitisers have been studied since the 1970's as drugs for the treatment of a variety of diseases.
The basic interaction between most photosensitisers and tissue is mediated by oxygen. When a photosensitiser absorbs a photon, 3 pathways of de-excitation are possible: the radiationless transfer back to the groundstate, fluorescence or intersystem crossing;



a process by which energy is transferred to a metastable triplet state. For a photosensitiser a large proportion of the absorbed energy is transferred to the triplet state and its energy is close to that of the first excited state of oxygen, singlet oxygen, $^1O_2$. Singlet oxygen is highly reactive and almost instantly reacts with its local environment. This oxidative reaction is the basis of the therapeutic effect fundamental to PDT. Since the generation of singlet oxygen depends on the presence of light, photosensitiser and oxygen, the therapeutic effect can only occur when sufficient quantities of each are present in the target tissue and this makes PDT dosimetry critically important. The potential for increased selectivity in PDT is accompanied by an increase in the complexity of dosimetry. While dosimetry is essential the clinical effectiveness of a photosensitiser is also strongly influenced by its inter-and extracellular localisation. For this reason numerous photosensitisers are under investigation, and their different properties are being exploited for treatment of numerous (non-) oncological diseases.

In the last few years PDT has successfully reached widespread clinical acceptance in ophthalmology, dermatology and gastroenterology, and is currently breaking through for treatment of recurrent head-and neck cancer and prostate cancer.