PHOTODYNAMIC THERAPY

Y. Korotka, Sumy State University, group ЛІС - 201
N. Horobchenko, EL adviser

The subject of the article is photodynamic therapy that first attracted widespread attention because many photosensitizers are taken up slightly more by cancers than by the adjacent normal tissue. Unfortunately, the dream that this might be exploited to give selective necrosis of cancers without damaging adjacent tissues has not been realized. Nevertheless, damage by photodynamic therapy in many normal tissues heals so well that the final result may effectively be selective necrosis of small tumors.

Photodynamic therapy is probably most useful for early invasive cancers in patients who are unsuitable for surgery. Good results have been reported for endoscopic photodynamic therapy for small cancers of the major airways, esophagus, stomach, and colon, but it cannot treat tumor that has spread beyond the wall of the organ of origin. Experimental work suggests that normal bone is remarkably resistant to photodynamic therapy, so it may be a useful treatment for oral cancers that have invaded the mandible or maxilla, avoiding the need for mutilating surgery or radical radiotherapy. The first requirement for successful clinical use of lasers is to understand how light at the wavelength used can interact with living tissue. Most of the simple applications are thermal, but the effect produced depends on how much heat is delivered, how fast it is delivered, and the volume of tissue in which it is absorbed. This technique involves treatment with low power red light (usually from a laser) after administration of a photosensitizing drug. There is no increase in tissue temperature. Unlike thermal damage, connective tissues like collagen and elastin are largely unaffected, so there is much less risk to the mechanical integrity of hollow organs and healing takes place with more regeneration and less scarring. However, photodynamic therapy is more complicated as it involves delivery of both drug and light, and, for best results, close collaboration between scientists and clinicians is essential. From a medical point of view, lasers are a convenient but sophisticated source of light in the visible, ultraviolet, and infrared parts of the spectrum. They are easy to control, and the light beam can be focused to a small spot and can be transmitted via thin flexible fibers, making internal delivery of light feasible.

In conclusion, these studies show that photodynamic therapy is not without problems. Treating sensitive areas like the

mouth and skin can be painful, and healing may take several weeks. Most of the new applications of lasers are already in early clinical trials. Others are more speculative, but for all, the basic validity of the required biological effects has been established. Work is still needed to identify which applications will find a place in routine medical practice and how these techniques will compare with other therapeutic options. Nevertheless, the evidence is mounting that laser treatments can offer considerable advantages over other options for a range of conditions.

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