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Michael Weber

Laser Clinic Dr. Weber, Germany

Systemic and interstitial photodynamic laser therapy: New options in oncology

Photodynamic therapy is one of the most interesting and promising approaches in the treatment of various cancers. Treatments are easy to perform and – in contrast to chemotherapy – normally without severe side-effects. The principle is the stimulation of a light-sensitive drug which is injected into the blood. Through endocytosis, the photosensitizer binds to tumour cells anywhere in the body with high specificity. The process takes several hours and tumour cells will have turned light sensitive at the end. Tumour tissue is subsequently destroyed by irradiation with light of appropriate wavelength according to the absorption spectra of the various photosensitizers. The basic principle behind this mechanism is the development of radical oxygen species.

In contrast to traditional chemotherapy PDT does not only destroy cancer cells by oxygen radicals but also initiates a lot of different reactions in the treated area with a stimulation of the immune system (PDT-immunisation). Photosensitizers are mostly porphyrin molecules and derivatives either from the human heme (without the iron atom) or plant-derived chlorophyll (without the magnesium atom). Accordingly, they are called hematoporphyrins or chlorines. Some are already approved and used in therapy, e.g. Photofrin for treatment of early stage bronchial and gastric cancer.

Red (in most cases), blue or yellow light is used for light activation of photosensitizers either from outside or through an endoscope. Due to the limited penetration depth of light effective photosensitizer stimulation and tumour destruction can only be achieved at the surface of the skin or in the tissue just a few centimetres underneath the skin. An effective treatment of deep tumours or metastases (e.g. liver cancer or lymph nodes) has normally not been possible and therapeutic applications have so far been primarily used to treat dermatological tumours. Due to this limitation, progress has been slow until recently.

Today, new technological developments that facilitate systemic and interstitial photodynamic therapies overcome this barrier and constitute the basis for massive growth in the field. The lecture will focus on presenting the new technology of systemic and interstitial photodynamic laser therapy, newest photosensitizers (with very specificity and low side-effects) and clinical results from the last few years of research and development in Germany.

Biography

Michael Weber is a medical practitioner for more than 20 years in Germany and leader of three medical centers for general and internal medicine, pain and cancer treatment. Furthermore he is a certified bio-chemist and medical doctor. He is working in research with many national and International institutions and universities. He is president of the International society for Medical Laser applications and editor in chief of the Inter-national Journal for Medical Laser Applications. He is also Co-editor of several other journals.

weber@webermedical.com

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