

THE CANCER REVOLUTION

Additional Material for Appendix 1

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More about Photodynamic Therapy

Currently, PDT is especially used in bronchial, oesophageal and bladder cancer and with a variety of skin tumours. Photofrin is authorised for use but it has a relatively slow pharmacogenesis and a large accumulation in the skin so that the patient has to be protected from intensive light exposure for weeks. This prevents wider use; we do not use it at all.

With the new developed photosensitisers and advancements in radiation applicators (new lasers) and light sources, the range of indications for PDT has been constantly expanding in the recent years.

In a clinical study, we use a novel dye – natrium salt from Chlorine-e - either topically or systemically.



The laser light applied to the tumour site. This technique is indicated for superficial cancer, for instance inflammatory breast cancer.

Chlorine-e derivative – a novel, topically and systemically administrable dye for PDT

This is a derivative of Chlorine-e, a dye that is derived from chlorophyll which has absorption between 660 and 670 nm. With systemic application, it reaches a maximum accumulation in the tumour mass in about three hours. In the healthy tissue we find only a minimal accumulation and therefore the usual protection against intense light exposure is not needed. After 24 hours, the dye is also eliminated from the tumour tissue, so that it has to be applied three hours before light exposure. This Chlorine-e derivative is also available in a topical version.

Skin tumours

Due to the easy accessibility of this organ, the dermatological use of PDT is already well advanced. Currently, actinic keratosis and superficial basal cell carcinomas are treated with PDT, especially when a good cosmetic effect needs to be achieved. As shown in the previous clinical results, the remission rates are comparable with surgical procedures.

M. Bowen has only a 12% recurrence rate when using a topical application of 5-ALA (5-aminolevulinic acid). However, the recurrence rate of squamous cell carcinoma is significantly higher, at 24%, with topical application of 5-ALA. Therefore, we conducted a study on actinic keratosis, basal cell carcinoma and squamous cell carcinoma with topically applied Chlorine-e derivative. This Chlorine-e derivative is a water-soluble substance of sodium salt in Chlorine-e6 in a low molecular polyvinylpyrrolidone solution.

Clinical results in skin tumours treated with topical Chlorine-e derivatives

In the study, 10 patients with histologically confirmed squamous or basal cell carcinoma and actinic keratosis were included. Three hours before laser light exposure, the centre of the tumour and the surrounding area was rubbed with a Chlorine-e derivative ointment and covered with an occlusion dressing. After removal of the dressing, the tumour centre was exposed to a laser light with a 665 nm wave length for 8 – 10 minutes. The intensity of the laser was J/cm².

Treatment Results

	Patient #	CR	PR	NC	PD
Actinic keratosis	7	7			
Basal cell carcinoma	5	4	1 (was operated)		
Squamous cell carcinoma	2	2			

The therapy was well tolerated by all patients, possibly because the irradiation induced pain was intercepted by pre treatment intra- or subcutaneous local anaesthesia. 93% complete remission was achieved. The cosmetic result was good. In phase 1, just after light irradiation, there was occurrence of oedema and hyperaemia in the light exposure zone.

This lasted about two to four days. Then, in phase 2 within 5-15 days, necrosis of the tumour developed. In phase 3, between the 15th and 20th day, the necrosis was shedding and the healing process commenced.