

The Development of New Potent Photosensitizers in Photodynamic Cancer Therapy

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1990 Fiscal Year Final Research Report Summary

The Development of New Potent Photosensitizers in Photodynamic Cancer Therapy

Research Project

Project/Area Number

63440060

Research Category

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Allocation Type

Single-year Grants

Research Field

Urology

Research Institution

Kanazawa University

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1988 - 1990

Keywords

photodynamic therapy / hematoporphyrin derivative / HpD-oligomer / aluminium phthalocyanine / pheophorbide / argon dye laser / gold vapor laser / titanium sapphire laser

Research Abstract

To identify a more promising photosensitizer than HpD, which has been widely used in clinical PDT, we have done a comparative study on three new photosensitizers : Pheophorbide derivative (PH-1126), Hematoporphyrin oligomer (HpO, M. W. : 3,000) or Aluminium phthalocyanine (AlPC), in regard to cellular and tumoral uptake of photosensitizers, pharmacokinetic study, spectroscopic study and photodynamic tumor eradicating ability with laser light irradiation. Argon dye laser (ADL, 630 nm), Gold vapor laser (GVL, 628 nm) and Titanium-sapphire laser (TSL, 675 nm) were applied to the present study.

All of three photosensitizers showed better cellular or tumoral uptake compared to HpD. After sensitization with each of the new photosensitizers, irradiation with ADL or GVL showed comparable tumor destruction to HpD-PDT on a tumor bearing nude mice system. AIPC, having an advantage of good absorption in red light region with a peak at 675 nm, revealed stronger tumor regression using TSL than HpD on the nude mice tumor system. This laser, emitting a light of 675 nm in wavelength, has deep tissue penetration compared to ADL or GVL. Tissue distribution study revealed that more AIPC localized in malignant tumor than HpD and skin concentration of AIPC was more rapidly reducing after drug administration than that of HpD. HpD-injected group showed stronger skin hypersensitivity after long wave ultraviolet exposure on mice dorsal skin. These results suggested that ALPC may be the most promising photosensitizer in PDT. Comparative studies on the fluorescence spectroscopic properties of several photosensitizers dissolved in aqueous solution and 0.1 mM CTAB micellar solution, biochemically close to human body fluid, suggested that HpO incorporated into tumor cells and tissues was thought to be aggregated. Further, it was shown that the cell killing effects of microwave hyperthermia was enhanced by the presence of aggregated—HpO. An in vitro experimental study of a combination therapy of adriamycin and HpD-PDT on KK-47 bladder cancer cells showed that adriamycin treatment followed by HpD-PDT resulted in joint potentiation in cell killing effect.▲ Less

Research Products (75 results)

	All	Other
	All	Publications (75 results)
[Publications] Miyoshi et al.: "Spectroscopic study of haematoporphyrin oligomers in tumour tissue." <i>Lasers in Medical Science</i> ,. 3. 185-193 (1988)		▼
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