The application and evaluation of a newly developed laser to photodynamic cancer therapy

1987 Fiscal Year Final Research Report Summary

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Research Project

Project/Area Number

60440075

Research Category

Grant-in-Aid for General Scientific Research (A)

Allocation Type

Single-year Grants

Research Field

Urology

Research Institution

Kanazawa University

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1985 – 1987

Keywords

Photodynamic therapy / Gold vapor laser / Hyperthermia / Photobleaching / Hematoporphyrin derivative / Photosensitizers

Research Abstract

1. A gold vapor laser (GVL) exerted spectroscopically photobleaching to HpD and other absorbers in tissue which resulted in an increase in tissue penetration and contributed intratumoral 43° c hyperthermia. A combination of HpD-PDT and the hyperthermia significantly enhanced tumor destruction and cut down irradation time. 2. ALCL-phthalocyanine (PC) and HpD polymer (MW:12000) showed a greater photodynamic cell killing as compared with HpD using 630nm red light. A HPLC study revealed a higher tumor accumulation of PC in tumor-bearing animals. PC was thought to be promising drug in the future. 3. There was no difference of in vitro cellular uptake between HpD and 3 HpD-conjugated monoclonal antibodies obtained from T24 cells. 4. In vitro HpD-cellular

uptake was low in the order: HpD-adriamycin(ADM)(a), ADM-HpD(b) and ADM+HpD(c). The cell killing of ADM received no change in (b) and (c), but a decrease in (a). The effect of laser irradiation on these combinations should be studied. 5. The focusing of GVL beam into a 600um optic fiber was significantly increased when an unstable resonator oprics and 50 < ph>mm bilateral convex lens, FL86mm, were used, the transmission rate being approx.75%. 6. Morphological studies of HpD-photodynamic cell killing revealed a marked degradation of mitochondria and cell membrane as an initial change and then followed by nuclear damage. These changes were supported by the data in biochemical studies and in accordance with intracellular HpD distribution. 7. Focal HpD-PDT with less than 100J/sqcm acheved 100 and 58% CR for 15 and 33 bladder tumors less than 2cm in size using the GVL and an argon dye laser, respectively. 8. A simple laser light scattering device using 3% Intralipos was designed for whole bladder wall HpD-PDT and applied to rabbit bladders bearing Vx2 carcinomas and multiple superficial bladder tumors. The device proved to be clinically useful and approx. 20J/sqcm may be suitable. 9. Endoscopic HpD fluorescence cancer imaging system consists of UV light, photoncounting device and R60 and DIF filters was devised and tested for the rabbit bladder tumors. The results were encouraging for clinical application.▲ Less

Research Products (14 results)

All | Other

All | Publications (14 results)

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