PHOTORADIATION THERAPY WITH HEMATOPORPHYRIN DERIVATIVE AND AN ARGON DYE LASER OF BLADDER CARCINOMA


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INTRODUCTION

Hematoporphyrin Derivative (HpD) which has an affinity for malignant tumors is excited by light exposure and reacts photodynamically in tumor tissue. Therefore it is possible to treat malignant tumor selectively without any damage to surrounding normal tissues. HpD is excited by a light in the spectrum from ultraviolet to visible red. Previously arc lamps and slide projectors were used for excitation of HpD but laser beams which facilitate photoradiation via endoscopes has been used recently. Much of the early basic and clinical studies on HpD and light photoradiation therapy was performed by Dougherty and his coworkers1. Hayata et al. investigated photoradiation therapy using an argon dye laser following an intravenous HpD administration in mice, and on cultured human lung cancer cells2, and in experimentally induced canine lung cancer and demonstrated its therapeutic effectiveness3. Malignant bladder tumor were treated by this new technique in this study.
MATERIALS AND METHODS

Hematoporphyrin Derivative

HpD and Photofrin were used in this study. HpD was provided by Dr. Dougherty, Department of Radiation Biology, Roswell Park Memorial Institute, Buffalo, New York, who prepared it by means of a modification of Lipson's method\(^4\) and Photofrin, a commercial name for HpD, was provided by Oncology Research and Development Co., Ltd. Cheektowaga, New York. They were both stored in darkness until used.

Laser equipment

An argon laser system was used as a light source in this study. This system consists of an argon laser, model 171-08, 15 W, 457.9-514.9 nm (Spectra Physics, Co., Mountain View, CA) and a dye laser, model 375-01, using Rhodamine B dye. The whole line wavelength of the argon dye laser beam was converted to approximately 630 nm wavelength beam by a dye laser. A quartz fiber (400 micron, Quartz Products Co., Plainfield, N.Y. and Fujikura-Muto Co., Tokyo) was used for the transmission of laser beam. The maximum laser output power at the quartz fiber tip was 600 mW. A flexible cytoscope (Takei Ikakoki Co., Ltd., Tokio) was used (Fig. 1).

Fig. 1. Flexible cytoscope (Takei Ikakoki Co. Ltd, Tokyo). A quartz fiber is inserted through a instrumentation channel of cytoscope.

Procedures

2.5 mg/kg body weight HpD or Photofrin was injected intrave-