

## Photodynamic Diagnosis (PDD) for Central Type Lung Cancers

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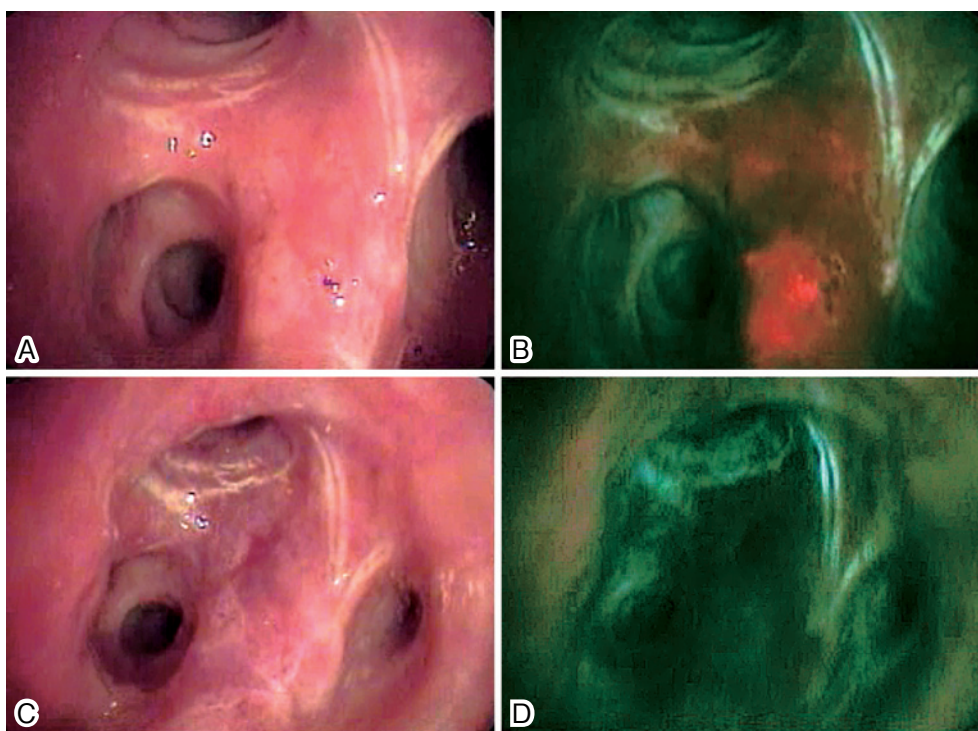


Fig. 1

Photodynamic therapy (PDT), which uses a tumor-specific photosensitizer and low-power laser irradiation, has become the treatment of first choice for central early-stage lung cancer. To obtain a complete response with PDT, the selection of indications is extremely important, including the extent of disease on the bronchial mucosa and the depth of invasion to the bronchial wall<sup>1</sup>. Therefore, a photodynamic diagnosis (PDD) system using autofluorescence bronchoscopy (AFB) and a photosensitizer, NPe6, should help decrease the risk of local recurrence after PDT<sup>2</sup>. Just before PDT, we perform PDD with a AFB equipped with a diode laser (408 nm) to excite the photosensitizer and capture the red fluorescence emitted from the tumor; in this way we can accurately define the tumor margins (**Fig. 1A, B, Fig. 2A, B**). Immediately after PDT, PDD is again performed to confirm the loss of red fluorescence emitted from the tumor, and a sufficient dose of laser illumination is given. This procedure confirms that all the NPe6 in the tumor had been excited by laser irradiation (664 nm), resulting in the red fluorescence of the tumor no longer being able to be observed (**Fig. 1C, D**). If red fluorescence is observed, additional laser irradiation is necessary (**Fig. 2C, D**).

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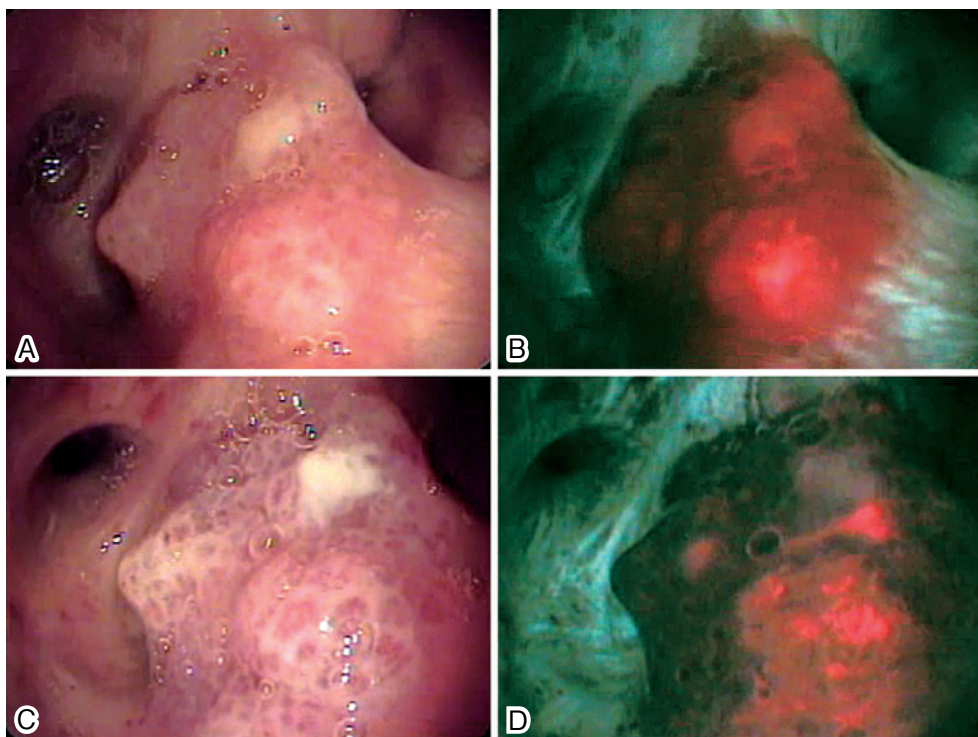


Fig. 2

**Fig. 1** A 78-year-old man with a centrally located early-stage lung cancer. (A) Videoendoscopy revealed a superficial lesion. A thickened squamous cell carcinoma can be visualized at the right upper bronchus. (B) Before PDT, PDD with AFB and NPe6 was performed. The red fluorescence excited by the diode laser (408 nm) from the AFB system revealed a cancerous lesion. (C) Immediately after PDT with a diode laser (664 nm), videoendoscopy revealed a cancer lesion. (D) Immediately after PDT, loss of the red fluorescence from the tumor was confirmed with PDD.

**Fig. 2** A 68-year-old man with a centrally located lung cancer. (A) Videoendoscopy revealed a nodular lesion, which was a squamous cell carcinoma at the bifurcation of the left bronchus into upper and lower branches. (B) Before PDT, PDD with AFB and NPe6 was performed. The red fluorescence excited by the diode laser (408 nm) from the AFB system revealed a cancerous lesion. (C) Immediately after PDT with a diode laser (664 nm), videoendoscopy revealed a cancer lesion. (D) Immediately after PDT, red fluorescence from the tumor is still observed with PDD.

### References

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2. Usuda J, Ichinose S, Ishizumi T, et al.: Outcome of photodynamic therapy with NPe6 for bronchogenic carcinomas in central airways more than 1.0 cm in diameter. *Clin Cancer Res* 2010; 16: 2198-2204.