

Duke University

Laser-Induced Fluorescence for Rapid Cancer Diagnosis

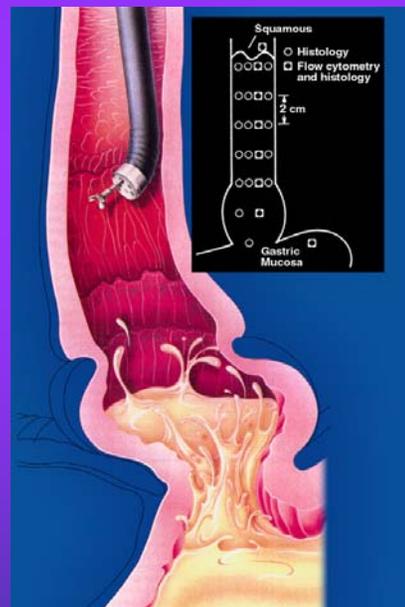
T. Vo-Dinh*¹, Q. Liu¹, J. Scaffidi¹, M. Panjehpour², and B. F. Overholt²

¹Duke University and ¹Thompson Cancer Survival Center

A minimally invasive method using laser-induced fluorescence (LIF) for in vivo cancer diagnosis has been developed by scientists at Duke University, Oak Ridge National Laboratory (ORNL), and the Thompson Cancer Survival Center (TCSC).

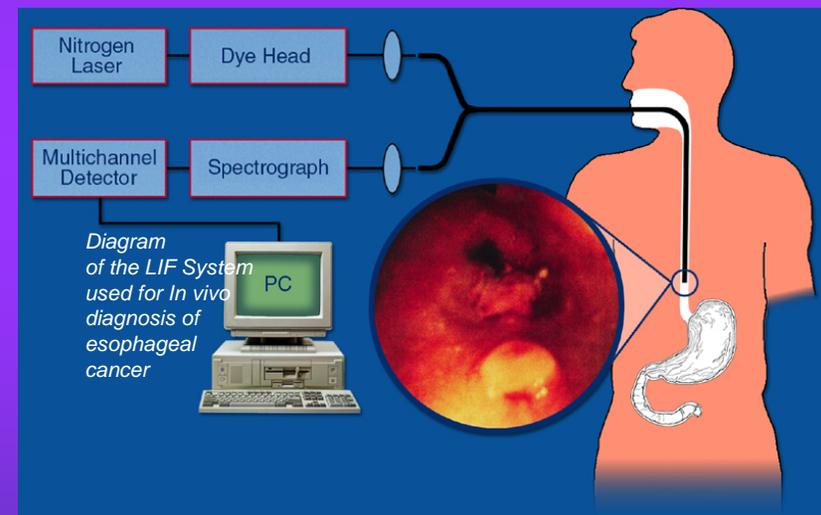
Conventional Biopsy Procedure

- Endoscopy is generally used to detect malignancies in the esophagus.
- Once a suspected tumor is found, it is removed, or biopsies are taken for determination of histopathology. The laboratory results are generally not available for several days.



Conventional protocol for esophageal cancer diagnosis

The LIF Instrument



- Nitrogen dye laser used as the excitation source.
- Fiberoptics probe designed to be inserted into the biopsy channel of an endoscope.
- Spectrograph equipped with a multichannel detector.

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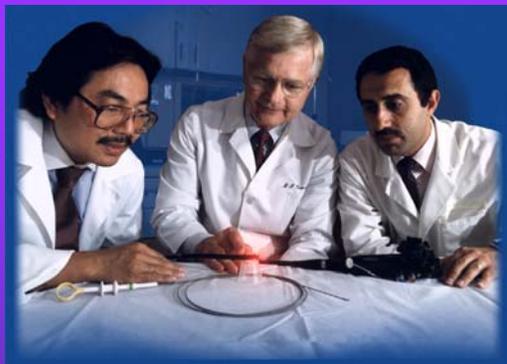
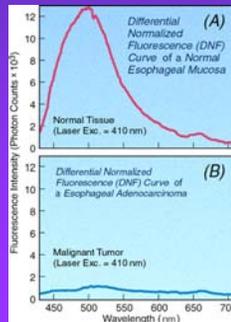
Laser-Induced Fluorescence for Rapid Cancer Diagnosis

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New LIF Procedure

- LIF measurements are conducted during routine gastrointestinal endoscopy examinations.
- The fiberoptic probe only touches the surface of the tissue.
- An LIF measurement is completed in approximately 0.6 seconds.
- No biopsies of the tissues are needed.



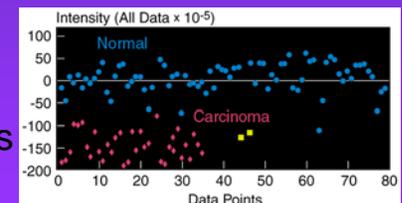
Developers of LIF techniques (Dr. Tuan Vo-Dinh at ORNL, and Drs. Masoud Panjehpour, and Bergin F. Overholt at TCSC)

Conclusion

The DNF method could lead to the development of a rapid in vivo technique for cancer diagnosis that does not require tissue biopsy, thus decreasing the time and cost of cancer detection, prevention, and treatment.

Advantages of the Laser-Induced Method

- The differential normalized fluorescence (DNF) method enhances spectral differences between the normal and malignant tissues.
- This technique greatly improves the accuracy of diagnosis for malignant tissue.
- With the DNF procedure, the differences in spectral features between the normalized fluorescence spectra of normal and malignant tissues become more easily detectable.
- Classification of malignant tissues using the DNF indices is in excellent agreement with histopathological results.
- In esophageal studies, over 98% malignant tissues detected by the DNF method are in excellent agreement with biopsy results.



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