



***In vivo* assessment and evaluation of lung cancer detection using an integrated spectral and imaging endoscopy system**

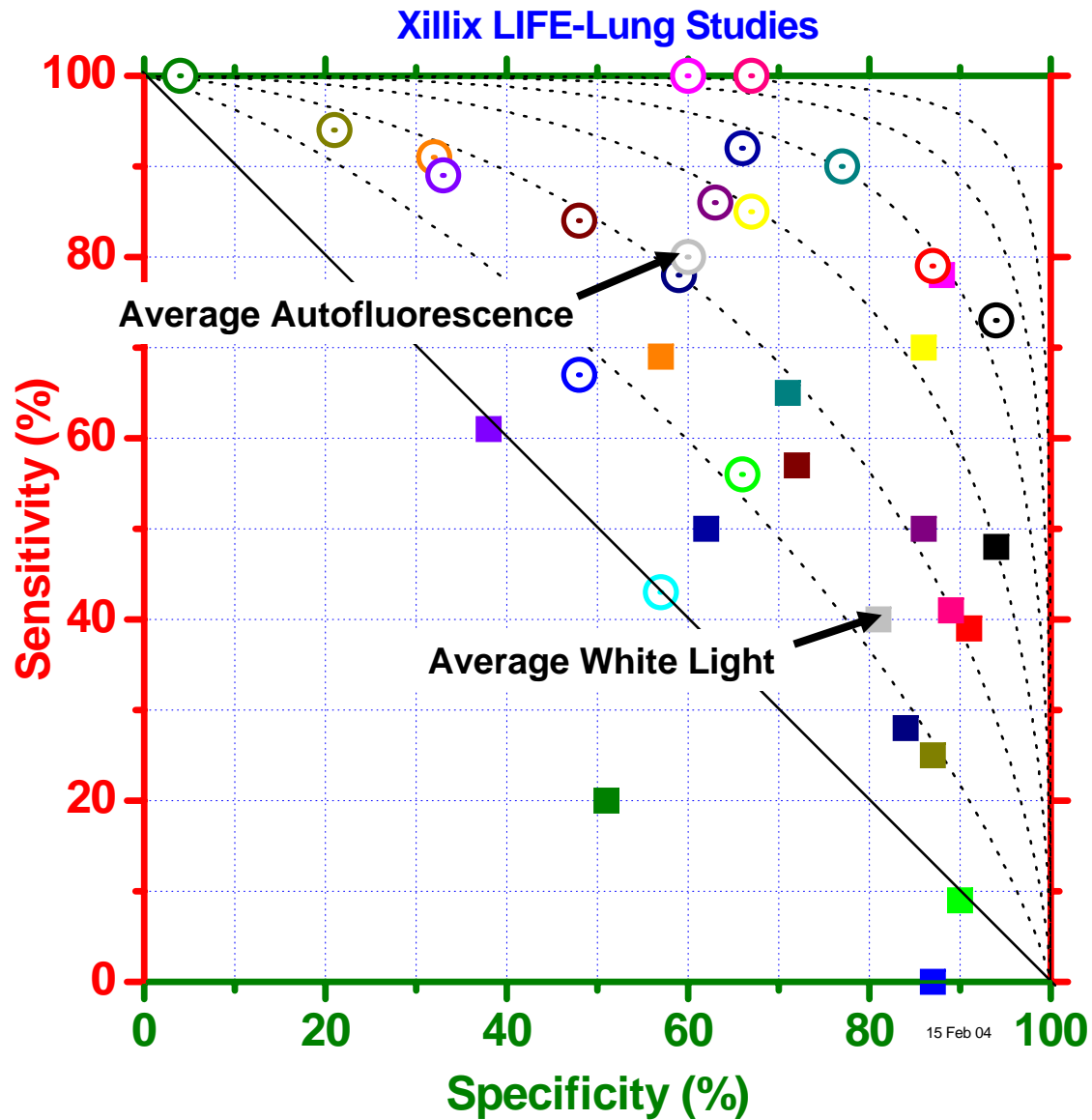
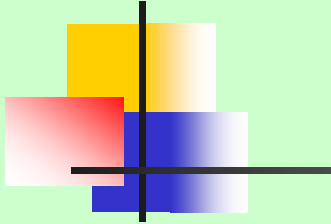
Y.Fawzy, D. Reinders, M. Tercelj, M.Petek, and H.Zeng

Presented by: **Yasser Fawzy, Ph.D**

Perceptronix Medical Inc.

Lung Cancer Imaging Diagnostic Problem

Subjective methodology no quantification



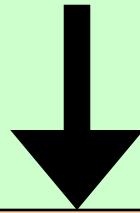
- Lam
- Lam
- Lam
- Weigal
- Kurie
- Venmans
- Venmans
- Vermlyen
- Khanavkhar
- Metwally
- Thiberville
- Van Rens
- Yokomise
- Ikeda
- Shibuya
- Sato
- Lee
- Average

Work Objectives

Developed

I. Spectral Measurement Module

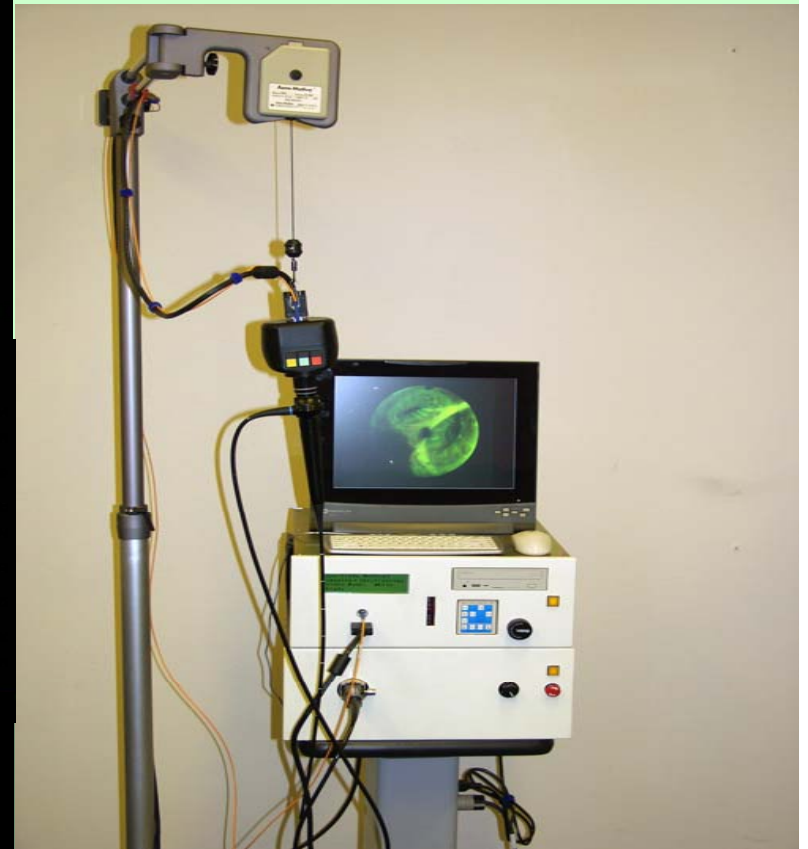
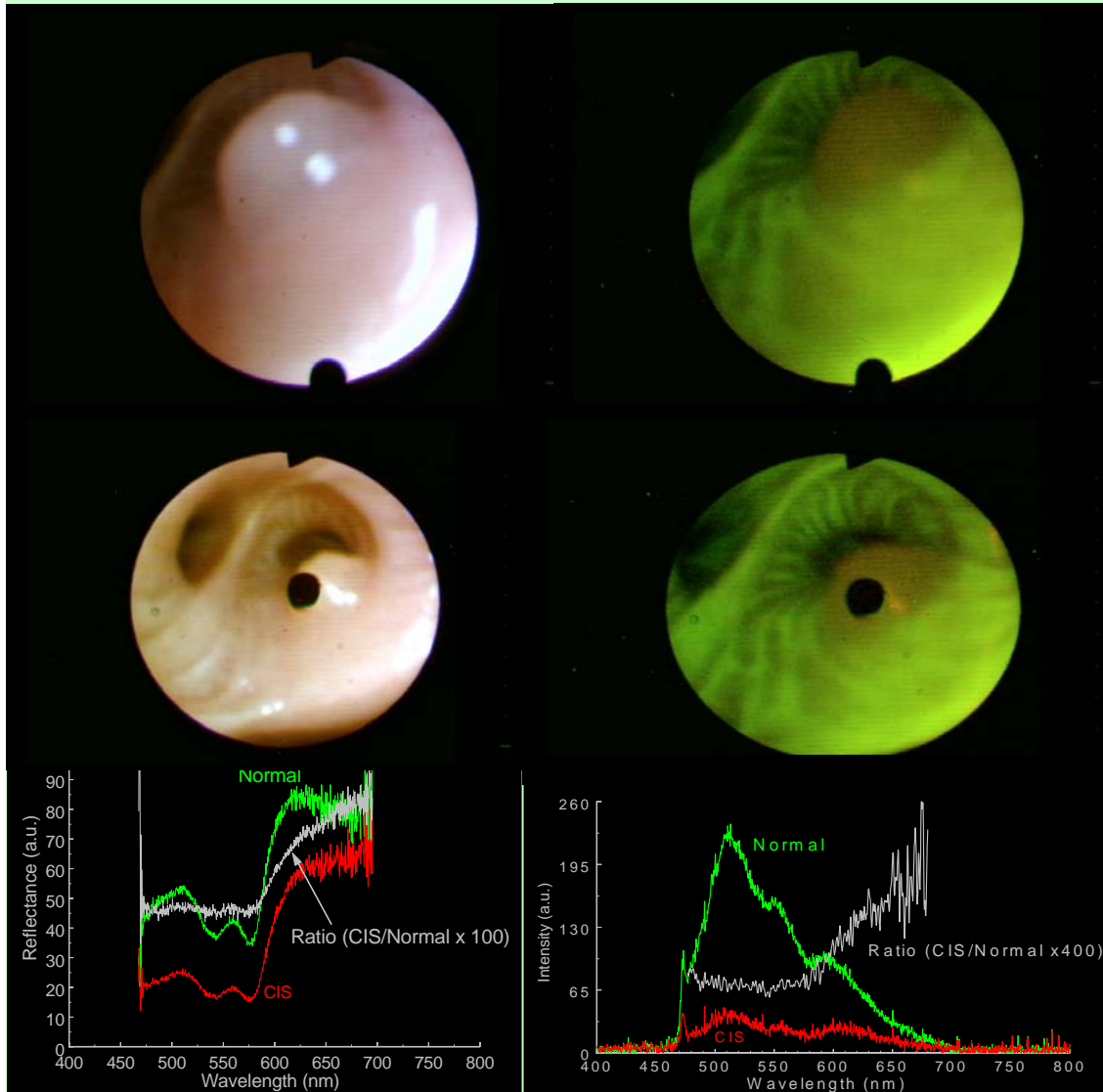
II. Spectral Analysis and Classification



Performing

***In vivo* Evaluation and Assessment**

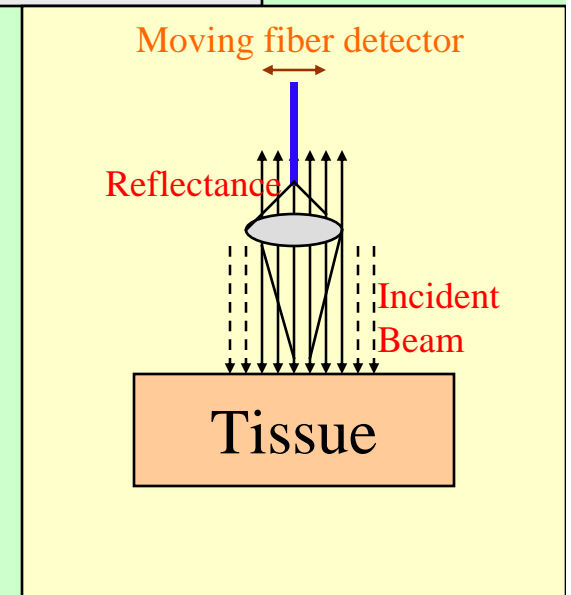
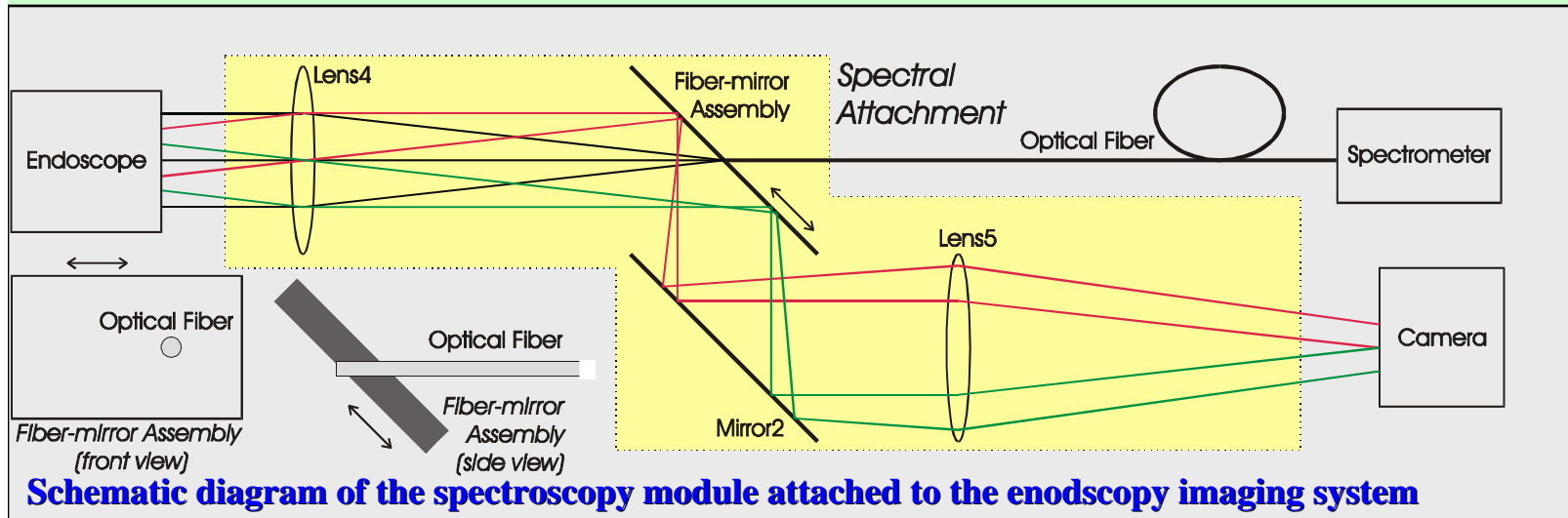
Spectral Endoscopy System



ClearVu Elite™

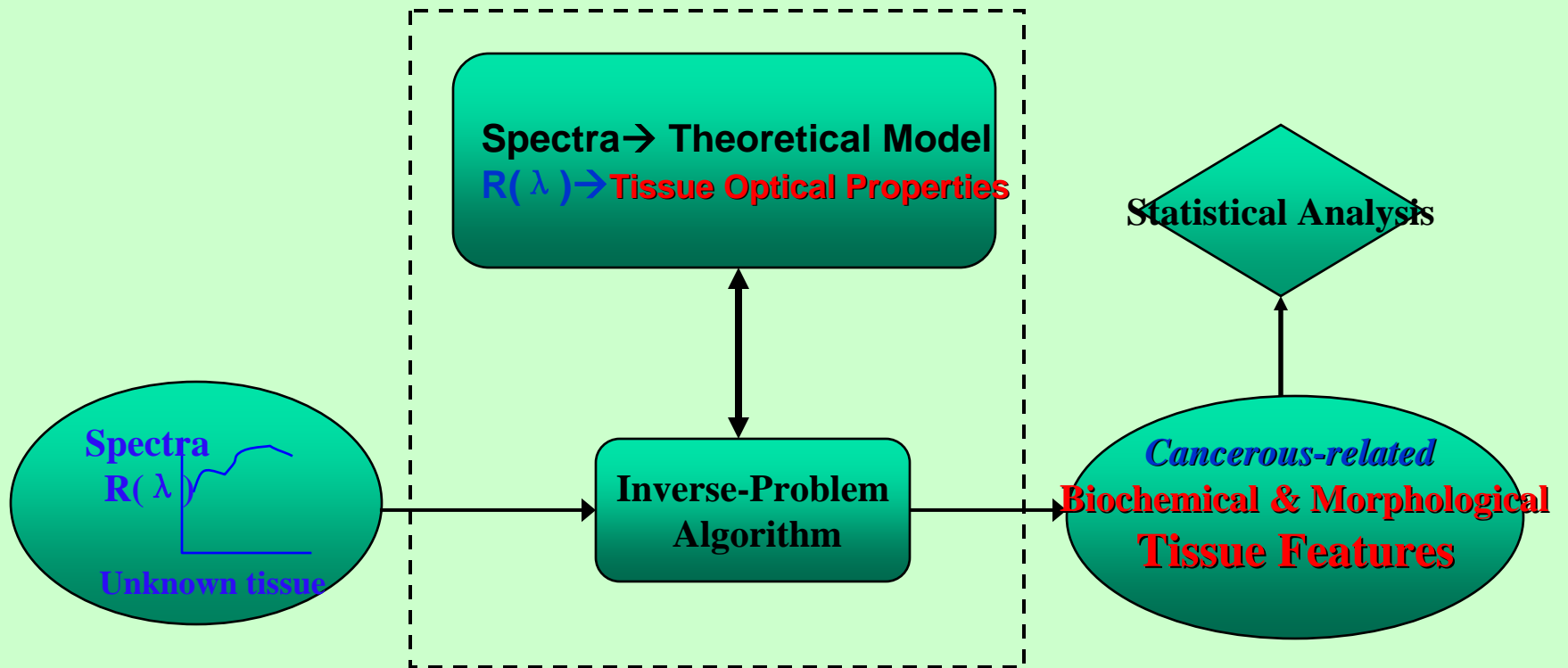
I. Spectral Measurement Module

Measurement Geometry



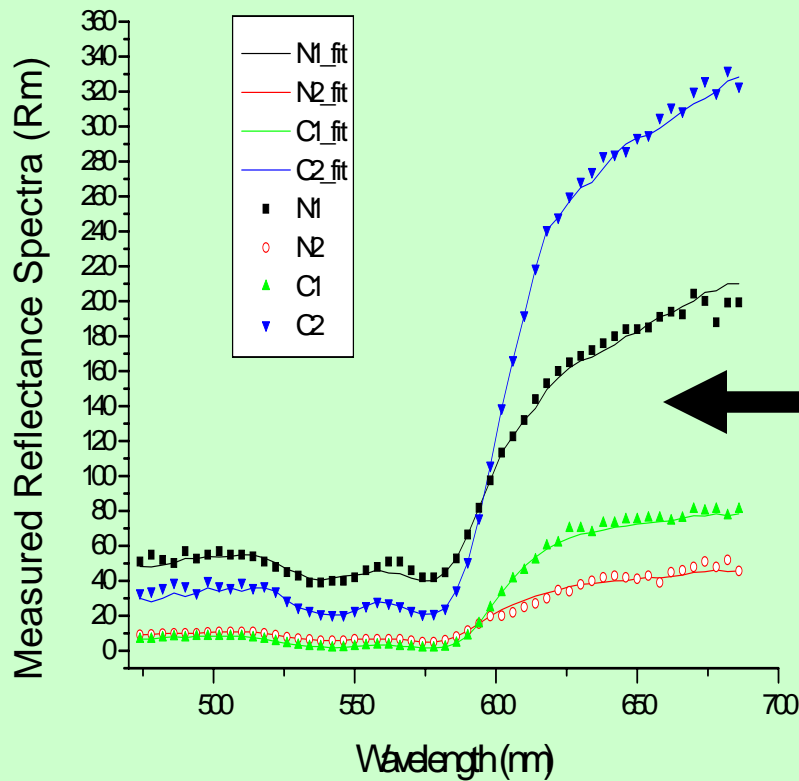
II. Spectral Analysis

Analytical Approach



II. Spectral Analysis

Model Fitting and Tissue Features

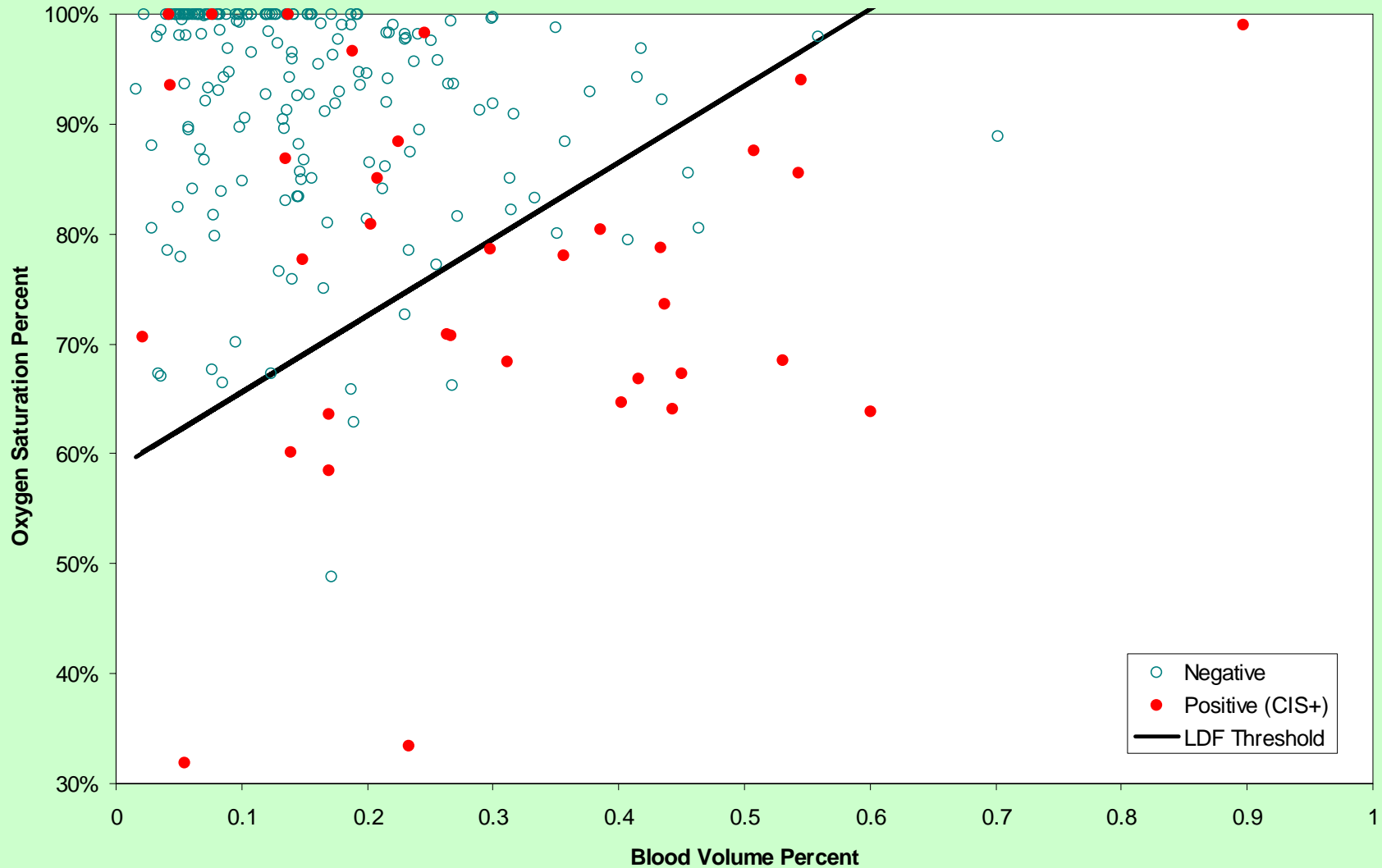


Blood Volume Fraction
Oxygen Saturation Parameter
Scattering Particles Volume Fractions
Scattering Particles Average Size

II. Spectral Analysis

LDF analysis

Scatterplot of Model Output Values by Pathology



Publications



Journals

- Zeng, H. et al. 2004 Optics Letters, 29(6) (2004) 587-589.
- Terceji, M. et al. 2005. Lung Cancer, 50 (1) (2005) 35-42.
- Fawzy et. al. 2006 J. Appl. Opt., Vol.16 No. 45
- Fawzy et. al. 2006 Journal of Biomedical Optics Vol. 11, No. 4

Patent/Pending Patent

US Patent No. 6898458 (2005)

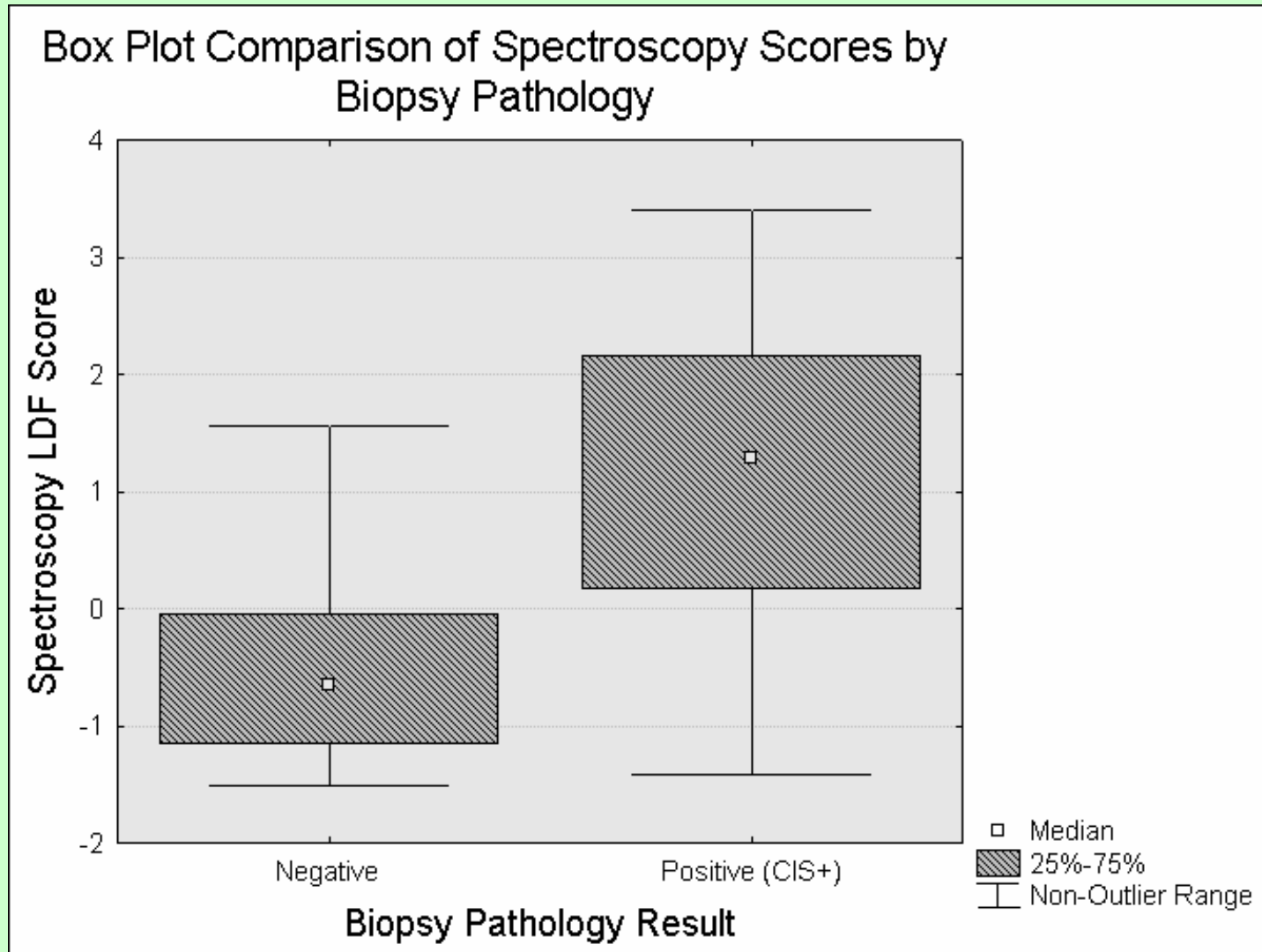
PCT/CA2006/000080 (2006)

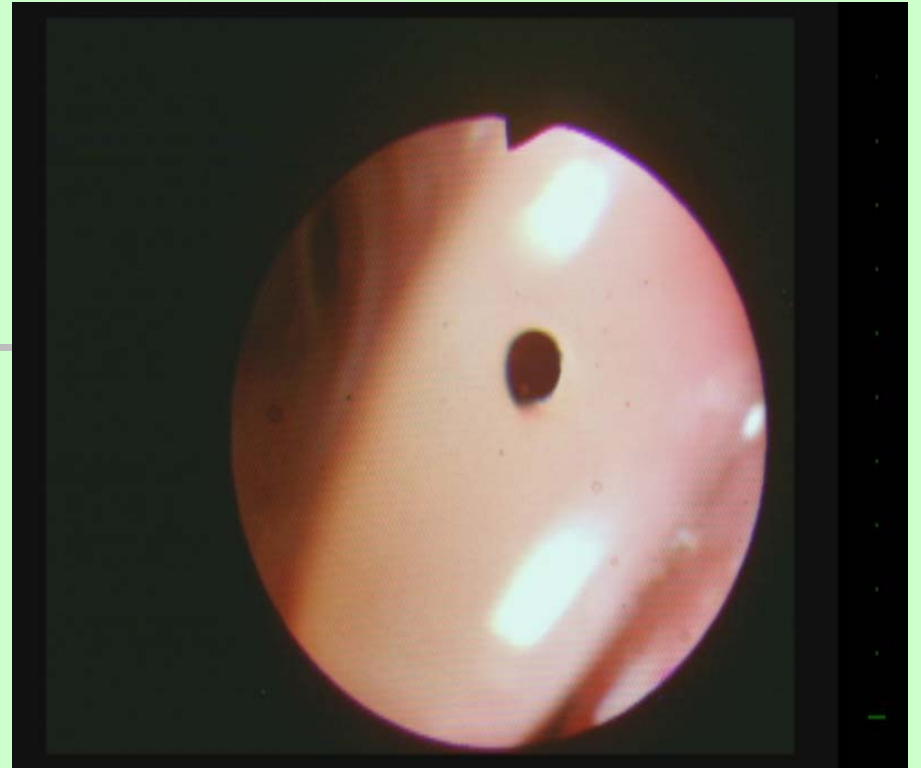
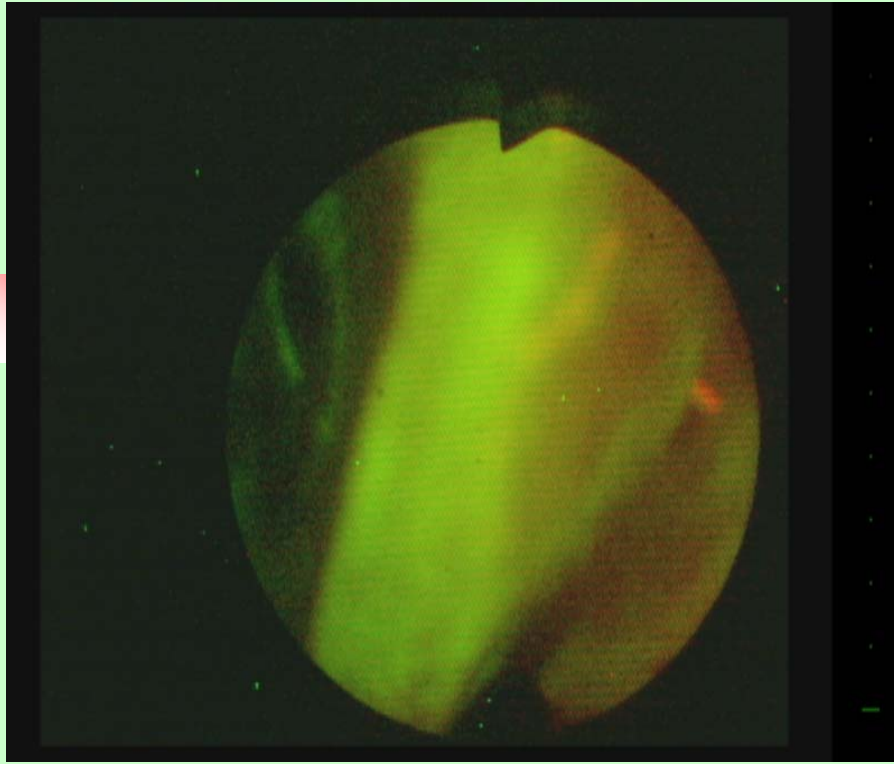
In vivo Evaluation and Assessment *Clinical Study*

- 219 lesions from 135 subjects (437 spectra)
- Biopsy Data → Ljubljana Medical Hospital Clinical Centre, Slovenia
BCCA, Vancouver, BC

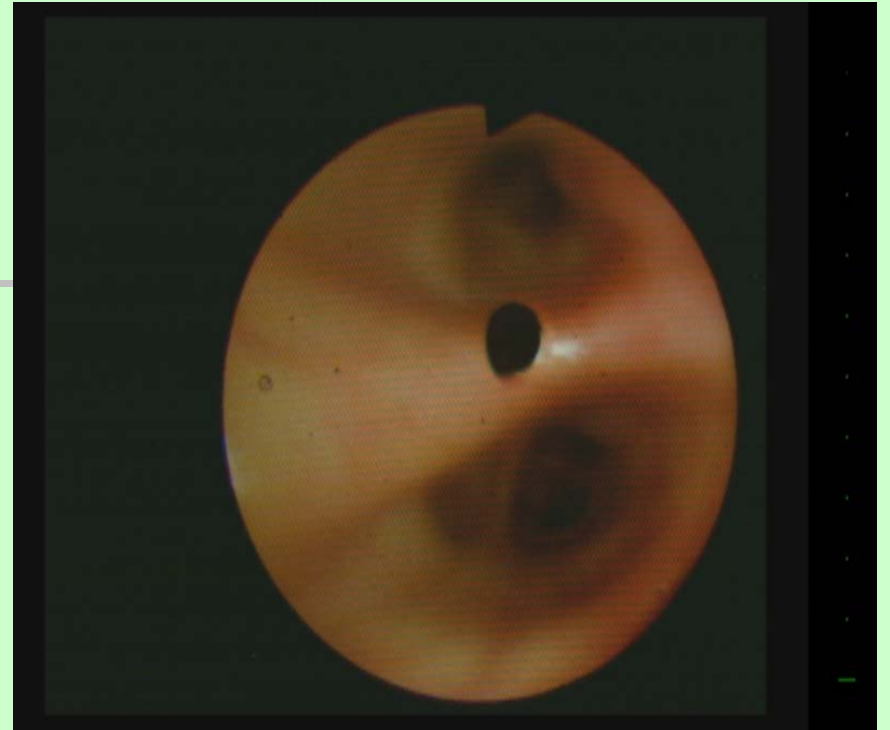
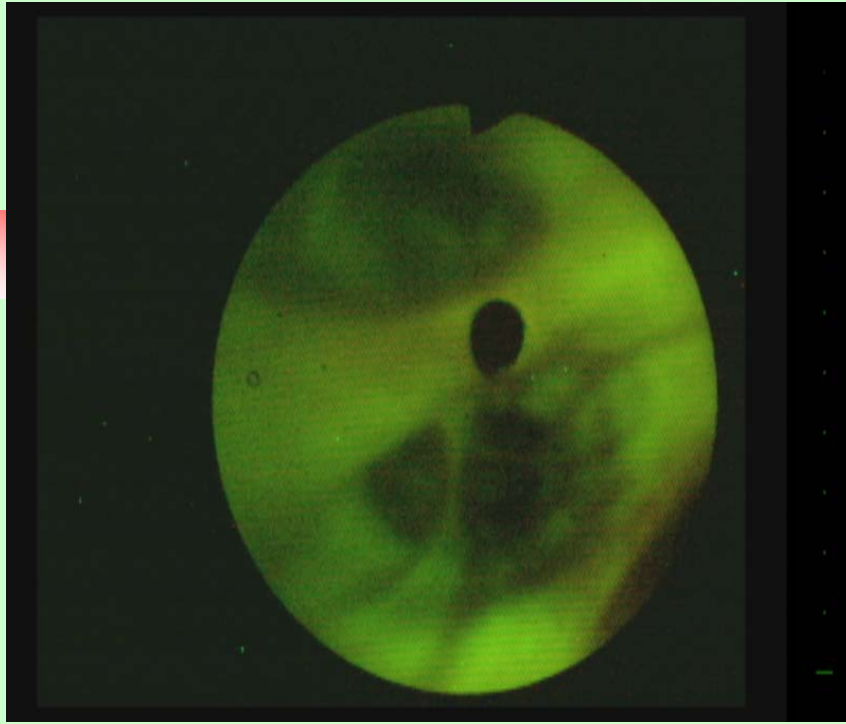
	Diagnosis	Lesions with Processed Diffuse Reflectance Spectra	Number of Processed Spectra
Benign Lesions	Metaplasia, Hyperplasia, and Normal	155	310
	Dysplasia MILD/MODERATE	29	47
Malignant Lesions	CIS/ Cancer	35	80
	TOTAL	219	437

Score Distribution by Pathology





- **Visual: Suspicious**
- **Score: 0.37515 (positive)** (Blood : 0.1486284 O2Sat: 0.776806)
- **Pathology: small cell**



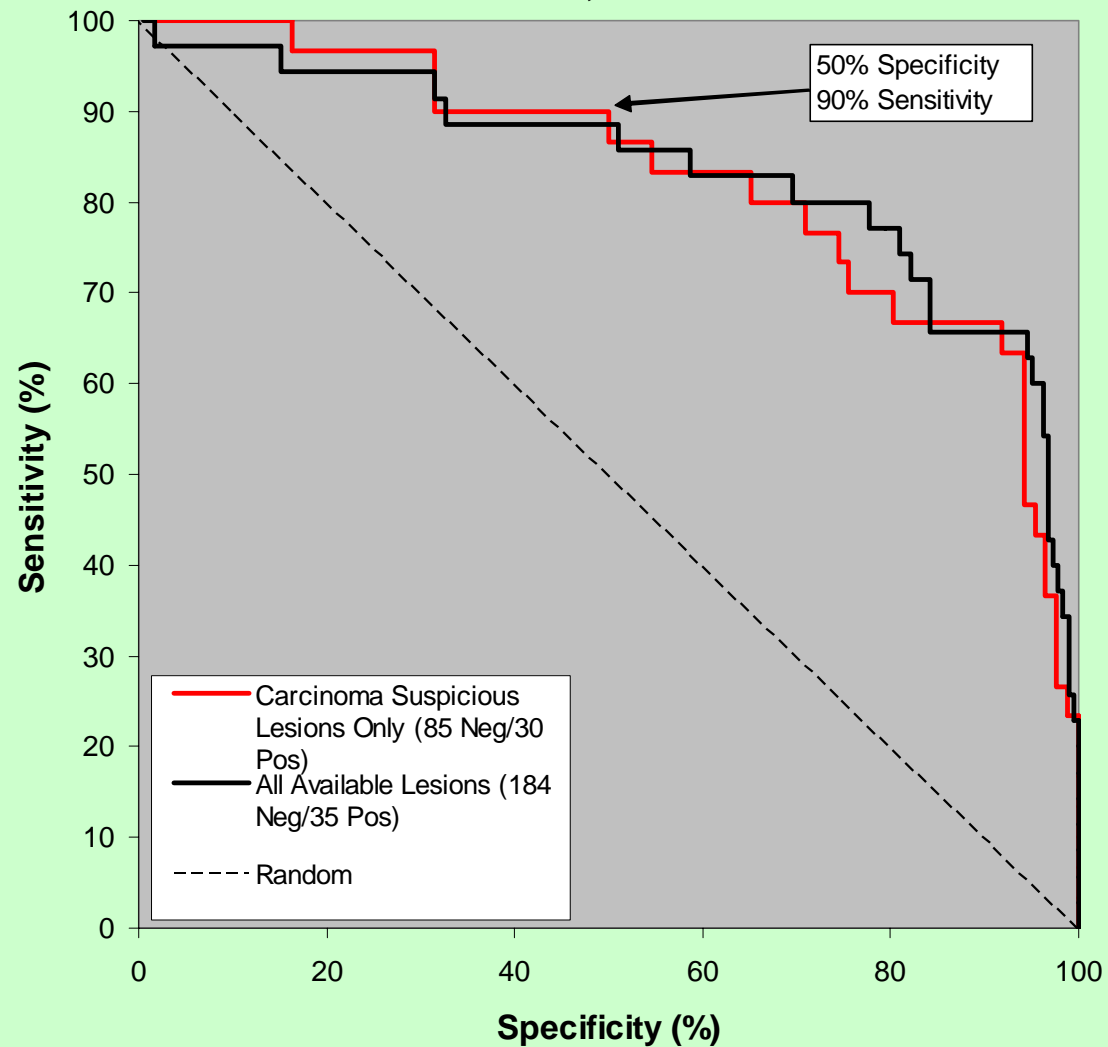
Visual : Suspicious

Score: -1.328172292 (negative) (Blood: 0.0643615 O2Sat: 0.98)

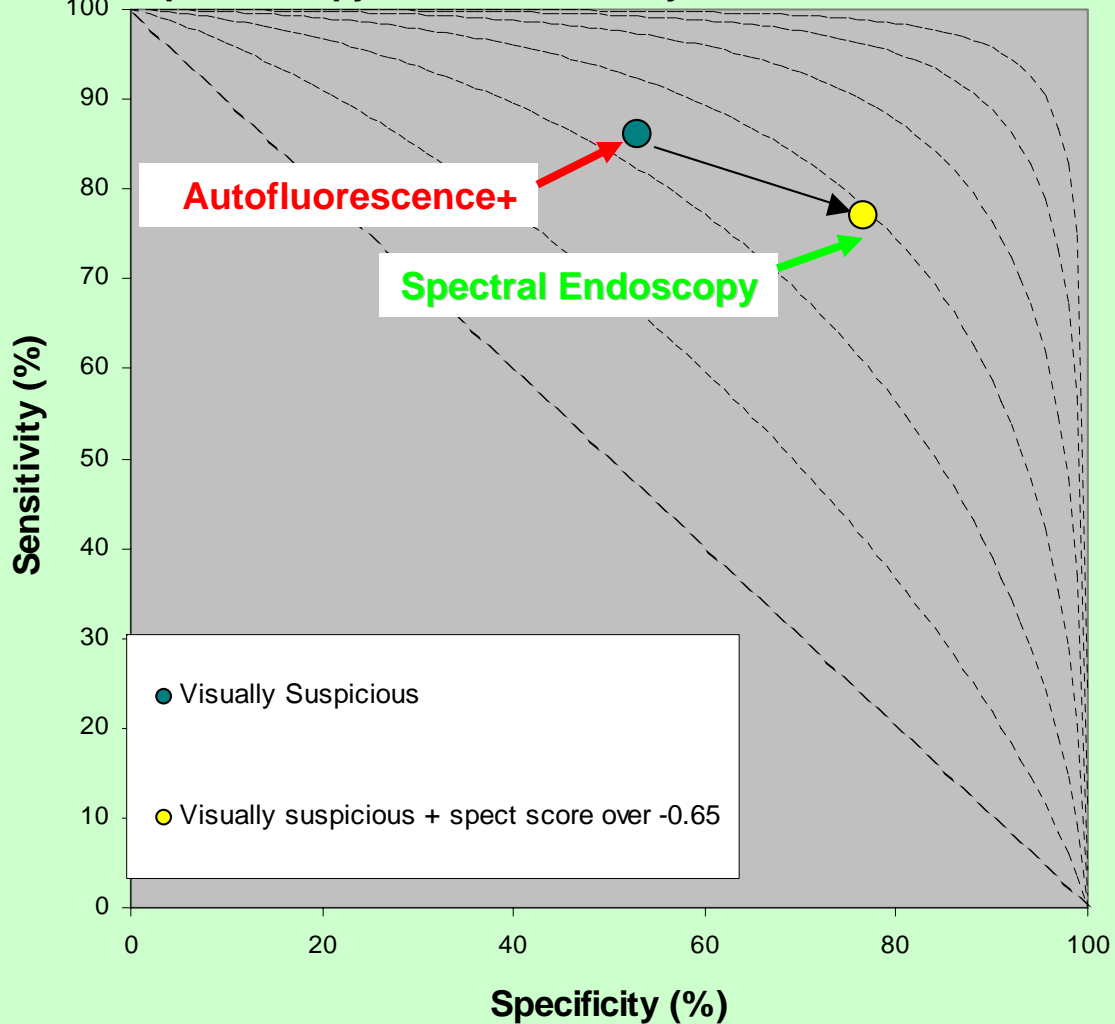
Pathology: Dysplasia - Mild

Effect of Visual Diagnosis

ROC Curve for Spectroscopy Score Performance, Per Lesion



Effective Performance of White Light/Fluorescent Visual Classification With Addition of Spectroscopy - Per Lesion Analysis For Two Threshold Scores



Diagnostic Table

	Negative Pathology (Excess Biopsies)	Positive Pathology (CIS/Cancer)
Total Lesions	184	35
Visually Suspicious	86	30
Visually Suspicious Plus Spectroscopy Positive (Threshold -0.62)	43	27



CONCLUSIONS

- We Developed Device and Method for Spectral Measurement and Analysis Integrated to Endoscopic Imaging
- The System is Undergoing International *In vivo* Clinical Investigational Study
- Initial Results Show that the System can Improve the Specificity to Lung Cancer Detection Without Significant Loss in the Detection Sensitivity.

Perceptronix
Early diagnosis, better outcomes™



THANK YOU