

# **Photodetection of cervical intraepithelial neoplasia**

- Screening, colposcopy, biopsy, treatment**
- Optical biopsy**
- See and treat**

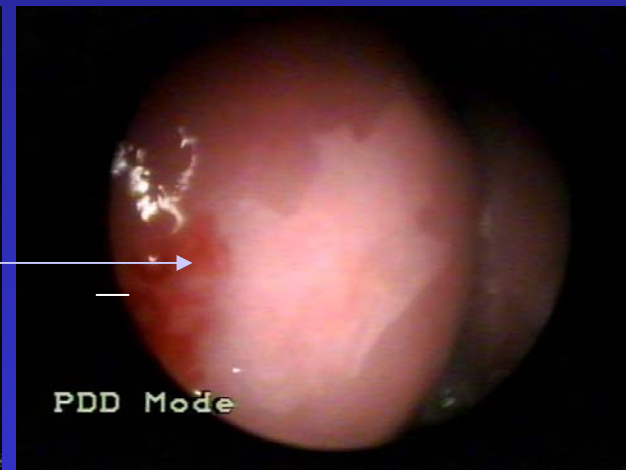
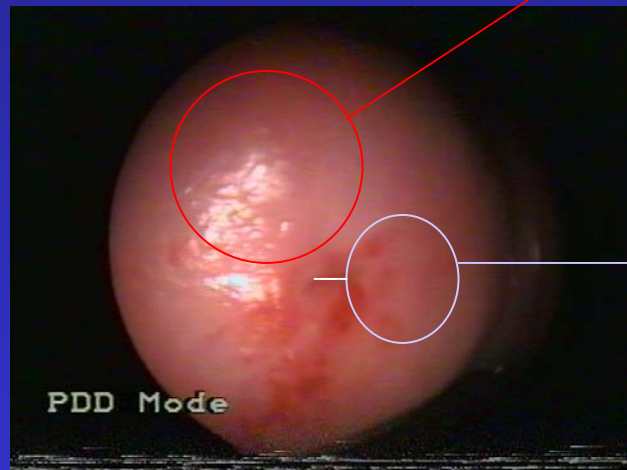
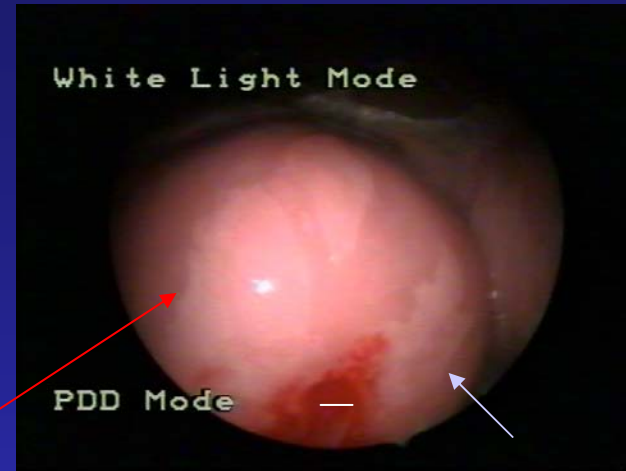
# **Photodetection of cervical intraepithelial neoplasia**

- 5-aminolevulinic acid-induced porphyrin fluorescence**
- Autofluorescence**
- Life time imaging**

# Pat 10

## Cervix after acetic acid

### Cervix



# Performance of colposcopy for diagnosis of squamous intraepithelial lesions

First author	Se	Sp
Benedet, 1976	0.99	0.53
Benedet, 1991	0.95	0.44
Crisforoni, 1995	0.97	0.35
Edebiri, 1990	0.87	0.67
Ferris, 1993	0.97	0.24
Javaheri, 1980	1.00	0.87
Lozowski, 1982	0.96	0.29
Seshadri, 1990	0.87	0.34
Stafl, 1973	0.99	0.26
Unweighted mean	0.95	0.44
Weighted mean	0.96	0.48

*Mitchell MF et al Obstet Gynecol 93 : 462-70, 1999*

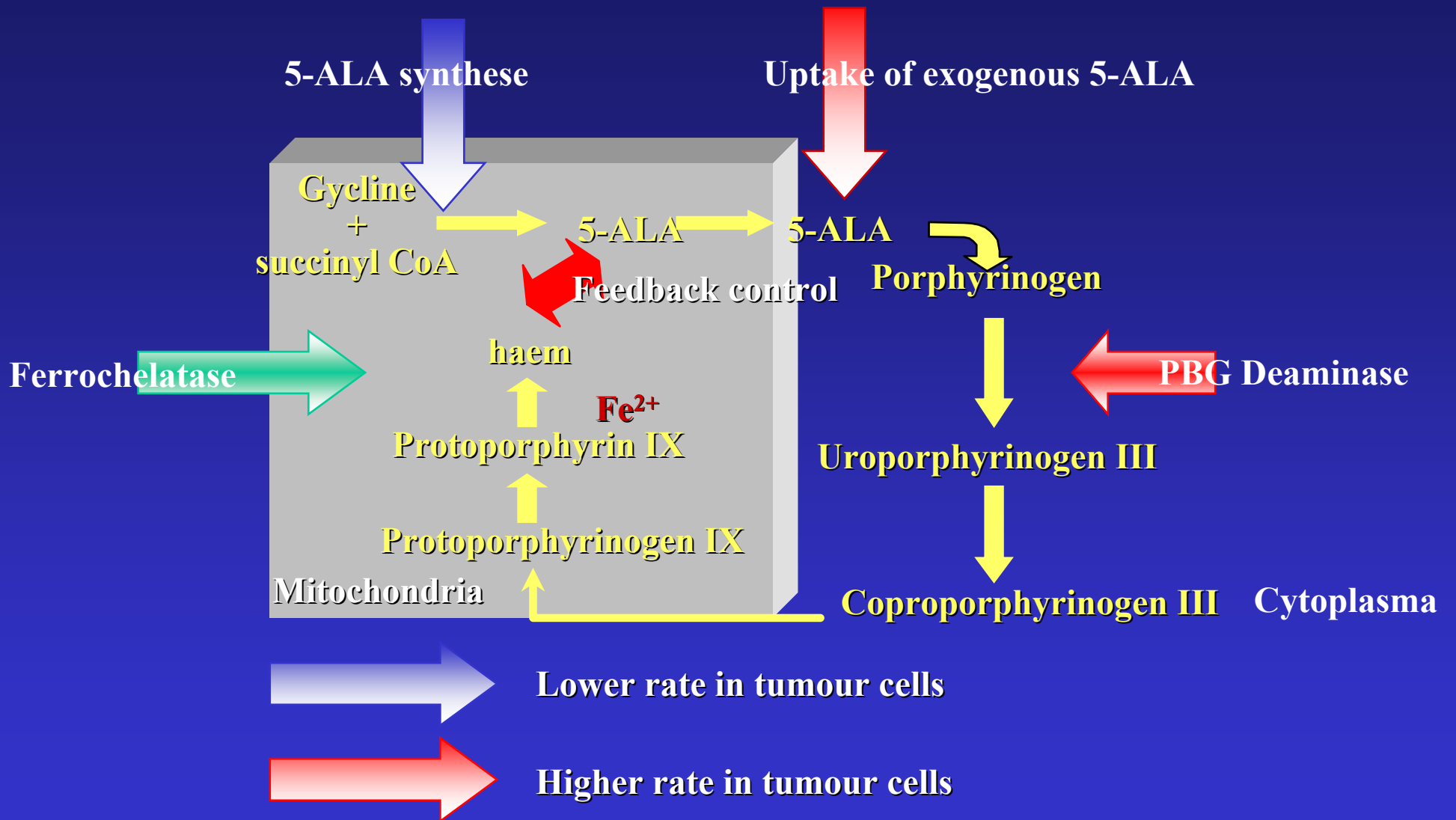
# Photodetection of cervical intraepithelial neoplasia using 5-aminolevulinic acid-induced porphyrin fluorescence

**METHODS** Sixty-eight women attending our colposcopy clinic underwent a gynecologic examination, including cytology, human papillomavirus (HPV) testing, and colposcopy. They received 10 mL 0.5% or 1.0% 5-aminolevulinic acid (5-ALA) topically. After 30-360 minutes, real-time image analysis was performed, and spectra were obtained from 685 sites.

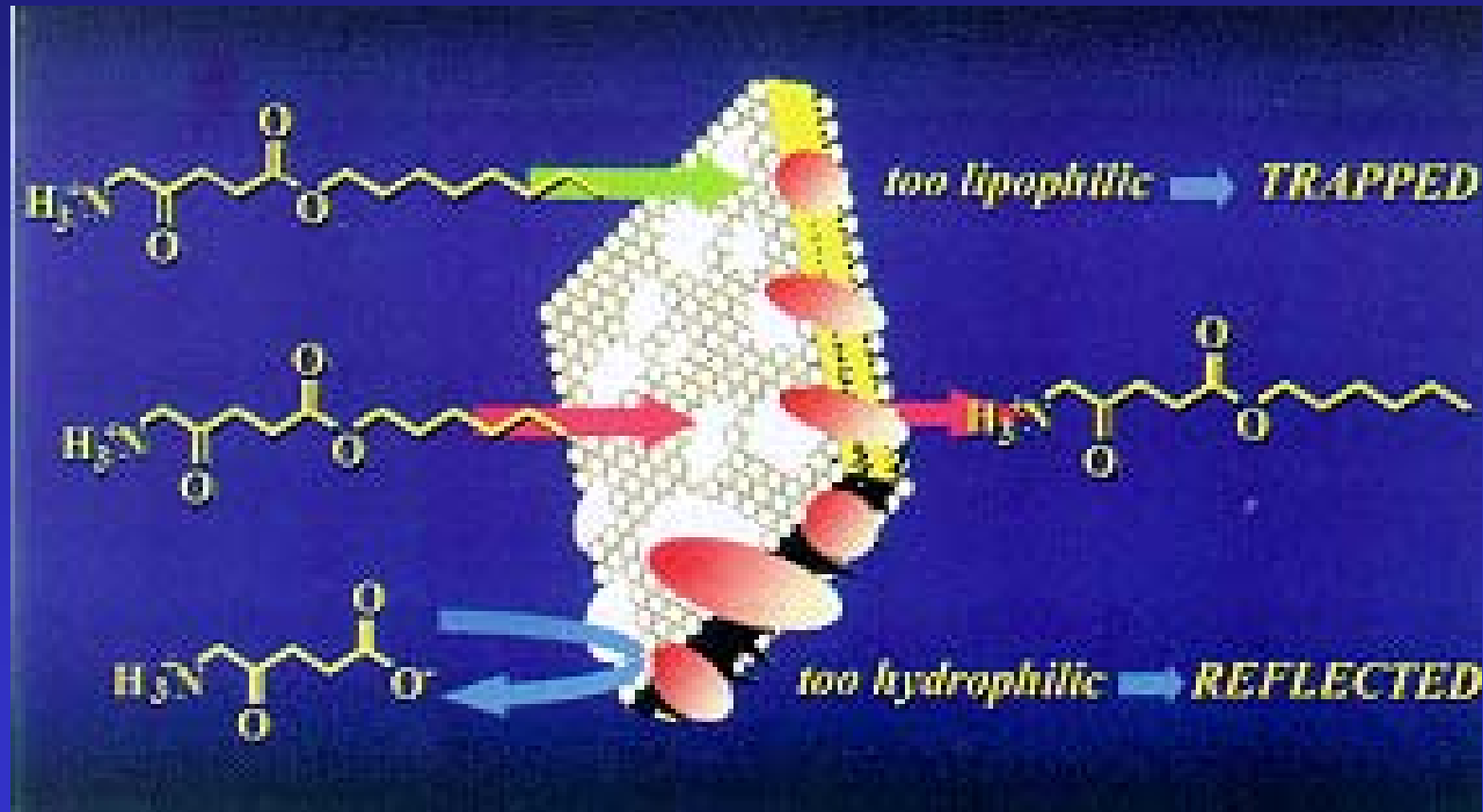
**RESULTS** Using 1% 5-ALA, fluorescence imaging after 60-90 minutes achieved similar sensitivity and specificity compared with colposcopy in detecting CIN with 94% and 51% versus 95% and 50%, respectively. However, the specificity was markedly improved by fluorescence spectroscopy, achieving 75%.

*Peter Hillemanns et al Cancer 2000, 88 : 2275-82*

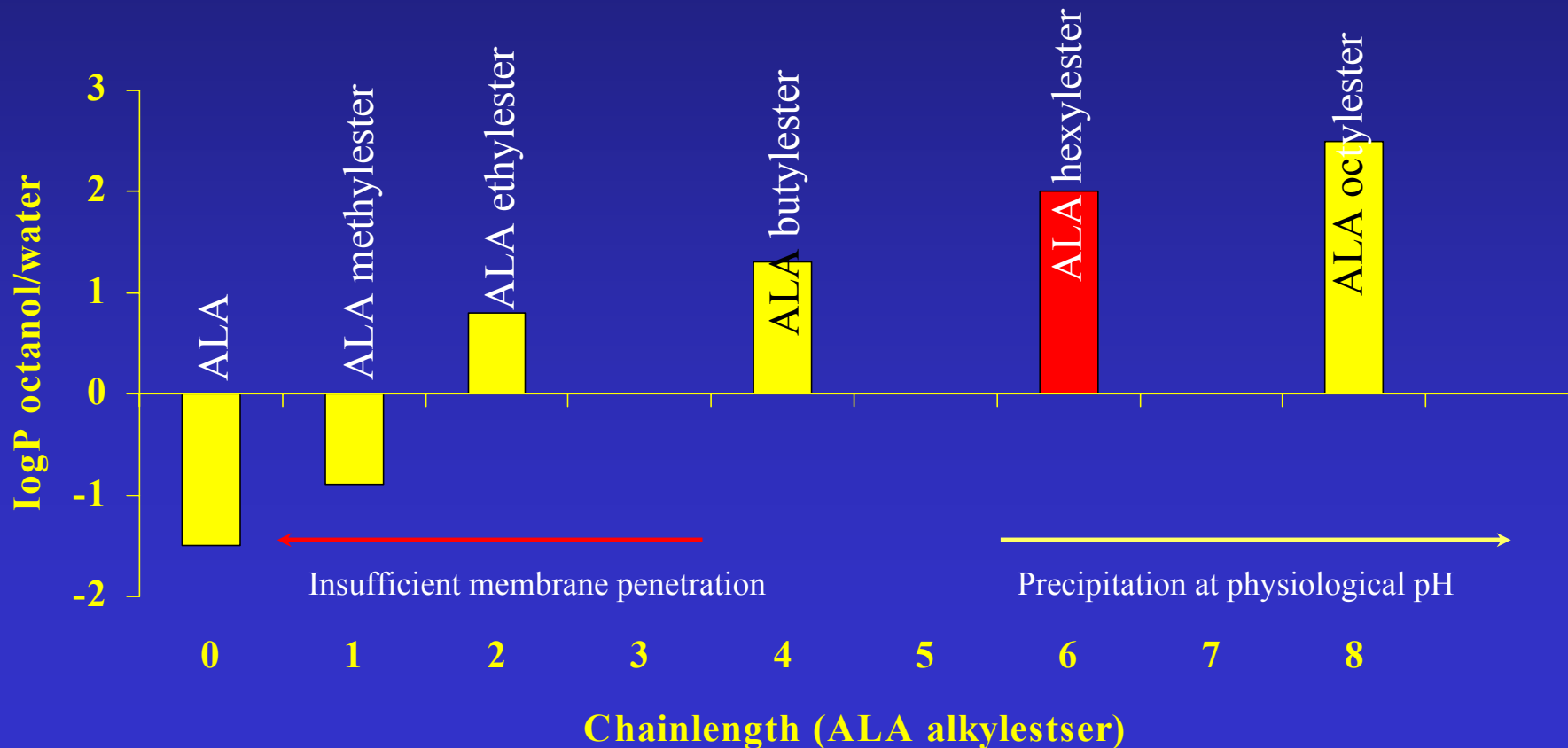
# Haem Biosynthesis



# Transport across cell membrane

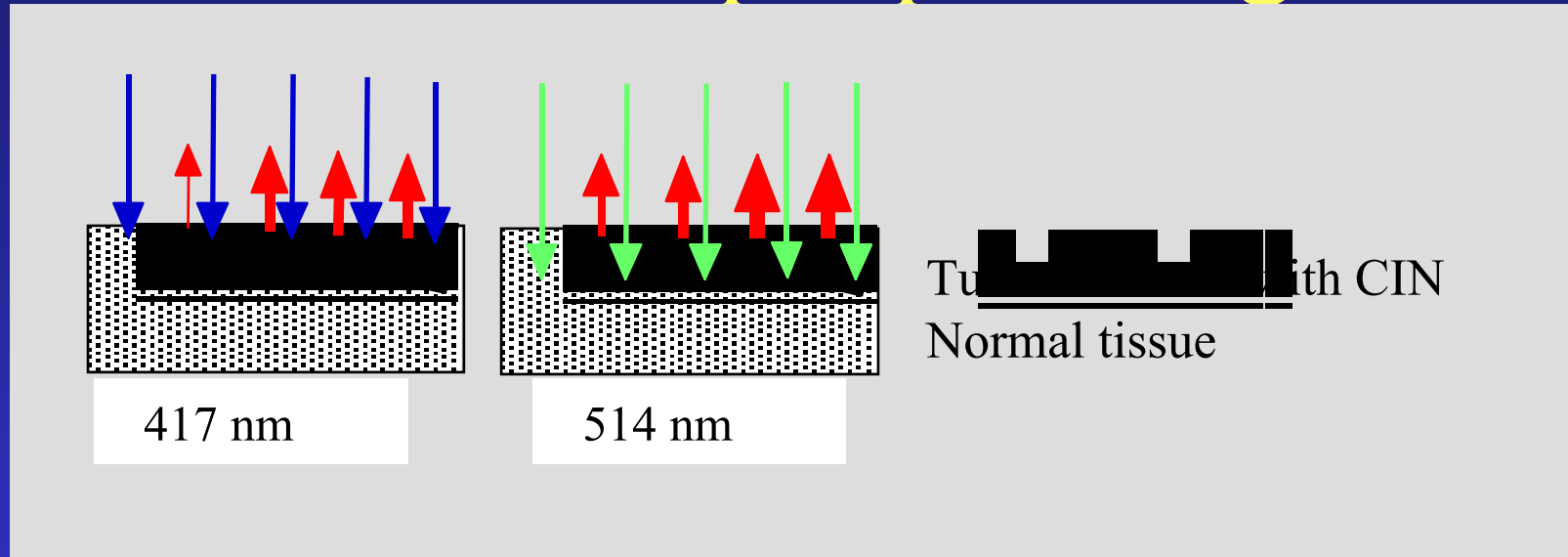


# A logarithmic plot of the octanol/water partition coefficient $P$ of a series of ALA esters





# Principle of fluorescence imaging tumor depth profiling

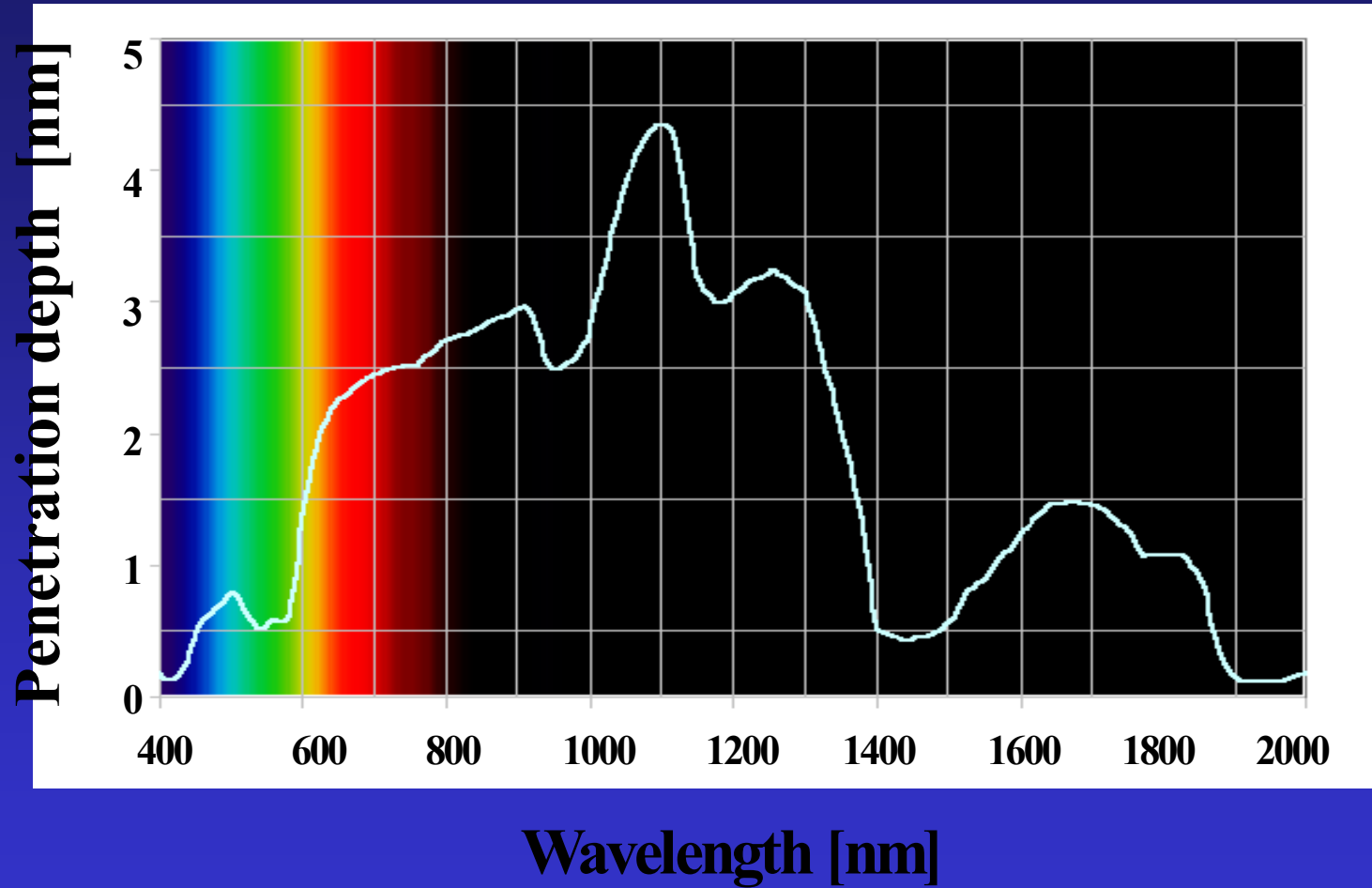


Principle of fluorescence imaging tumor depth profiling

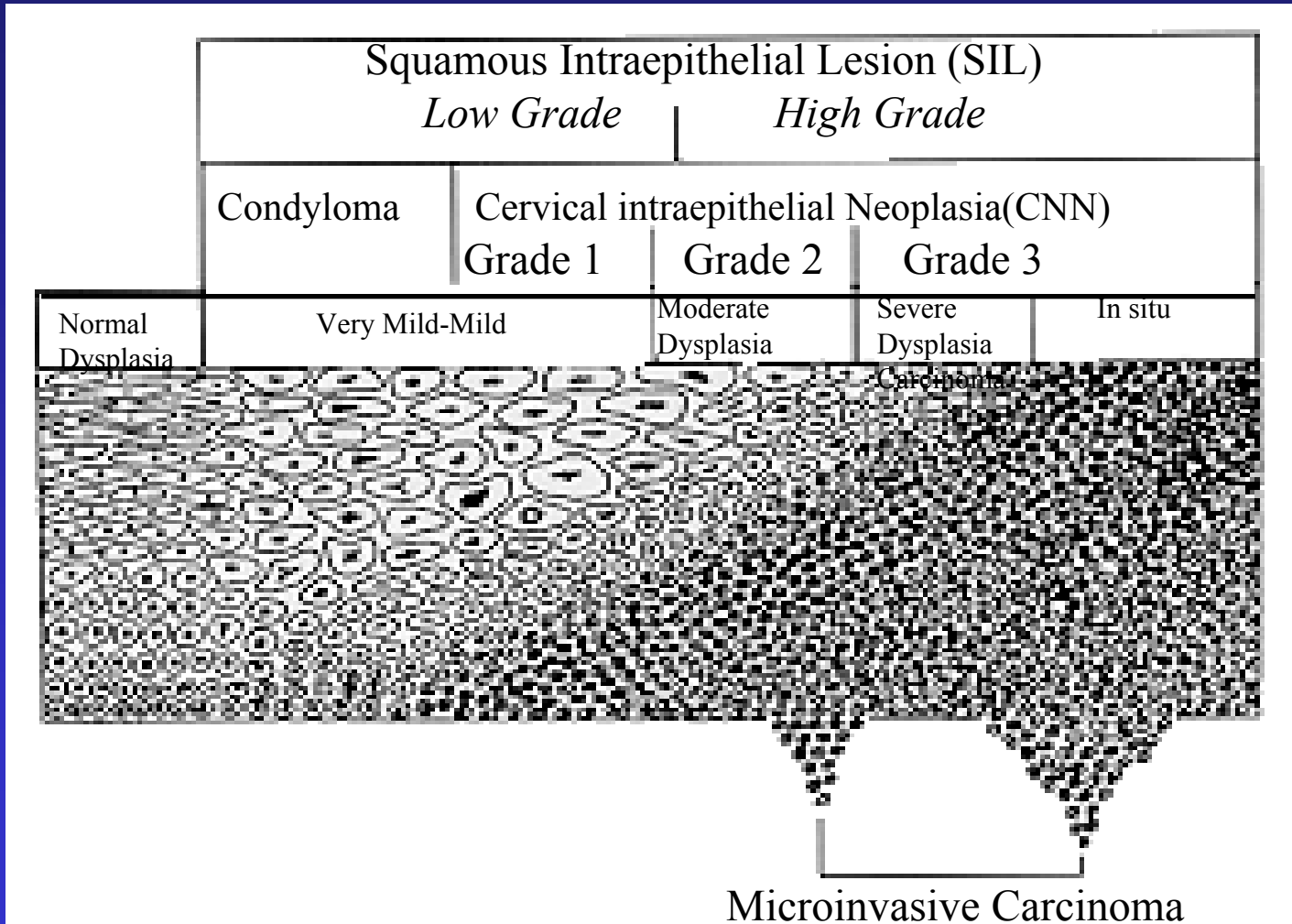
Homogenous excitation of the fluorochrome concentrated in the tumoral tissue at two different wavelengths, corresponding to the absorption maxima of the fluorochrome (417, 514 nm)

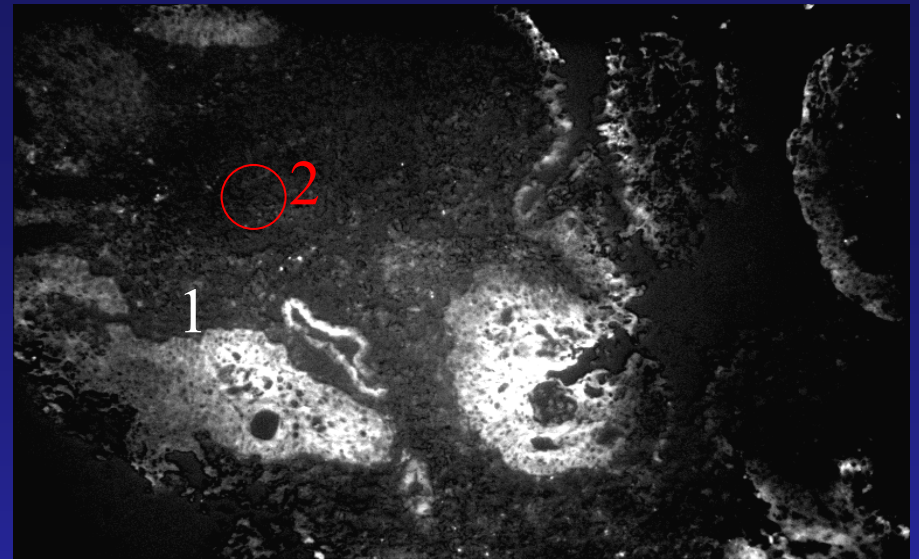
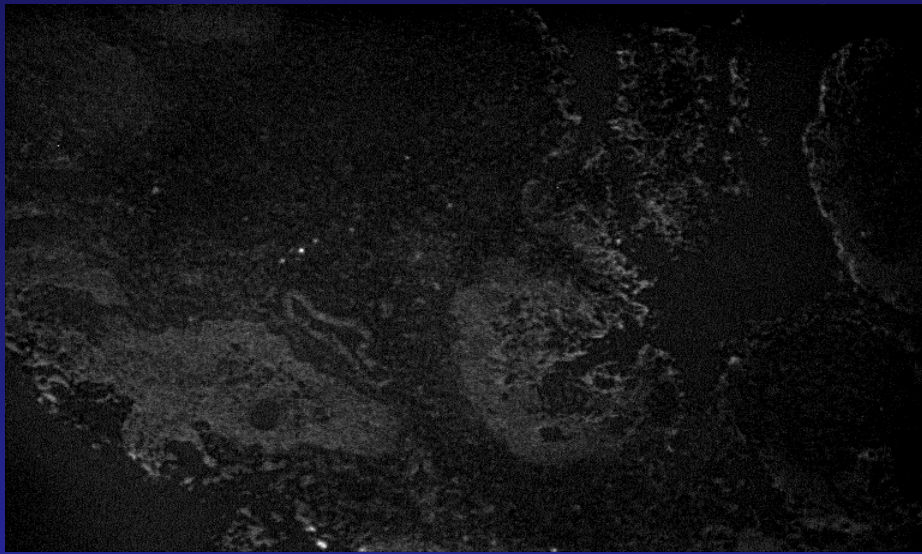
Detection at the emission maxima (610-720 nm)

*Penetration depth of light in tissue in relation to the wavelength*

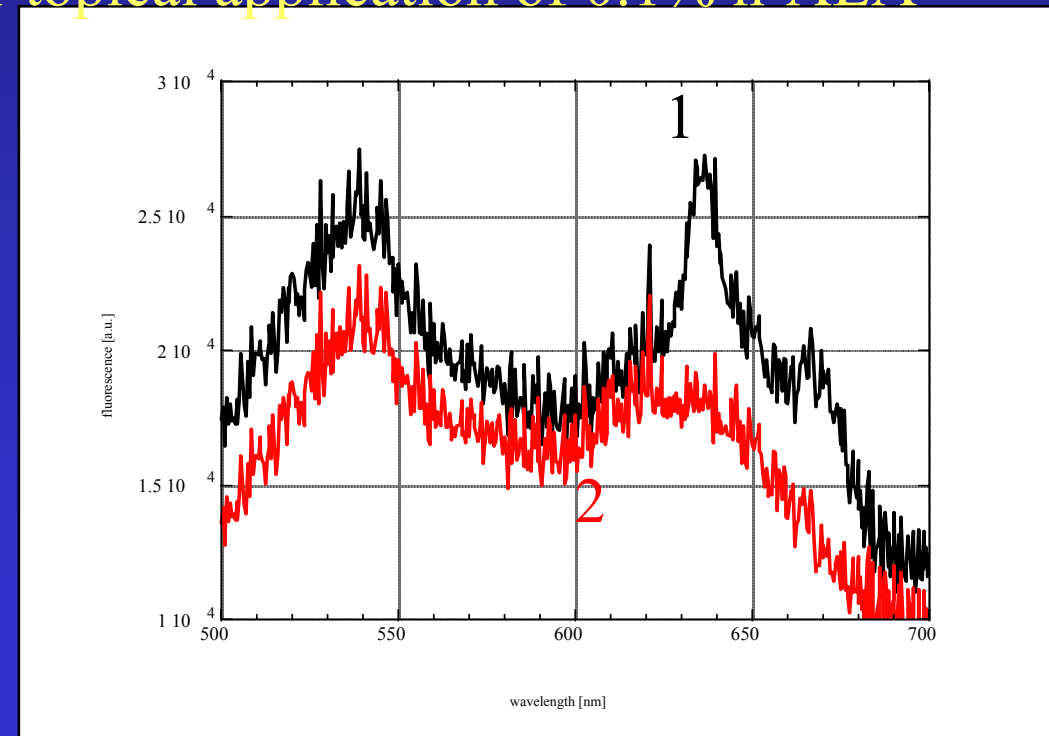
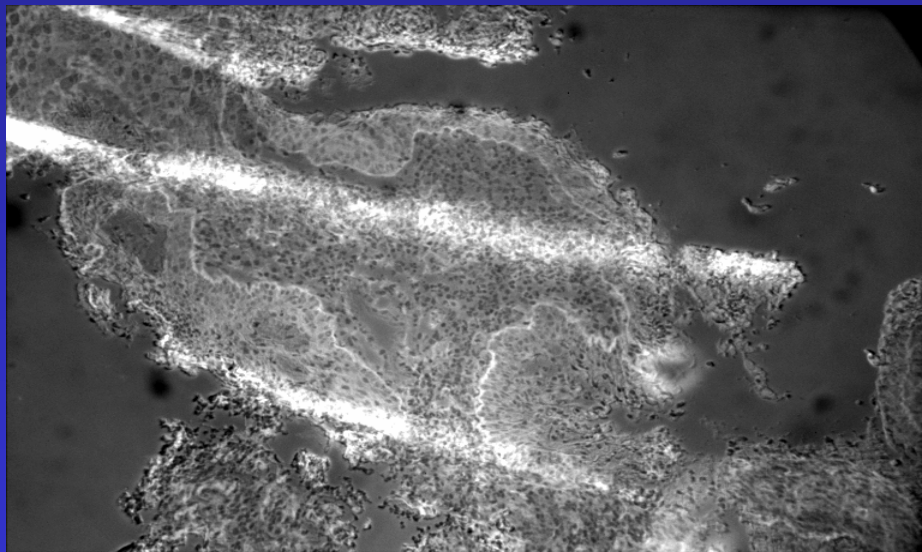


# Cervical squamous carcinoma precursors

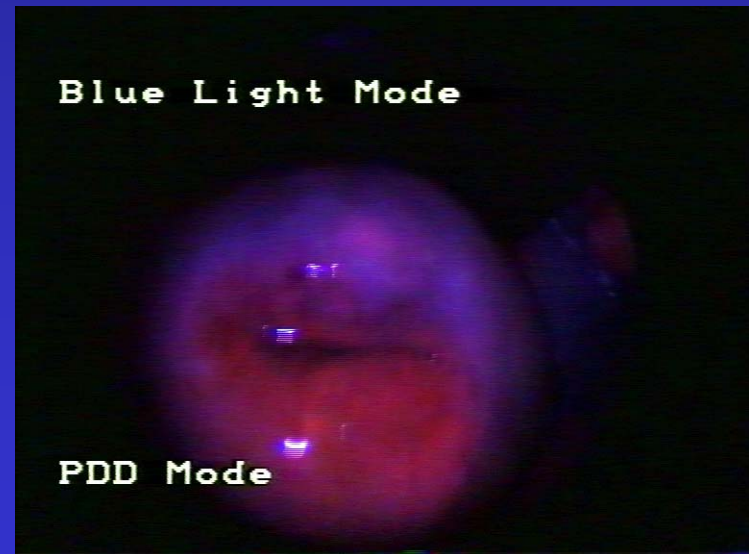
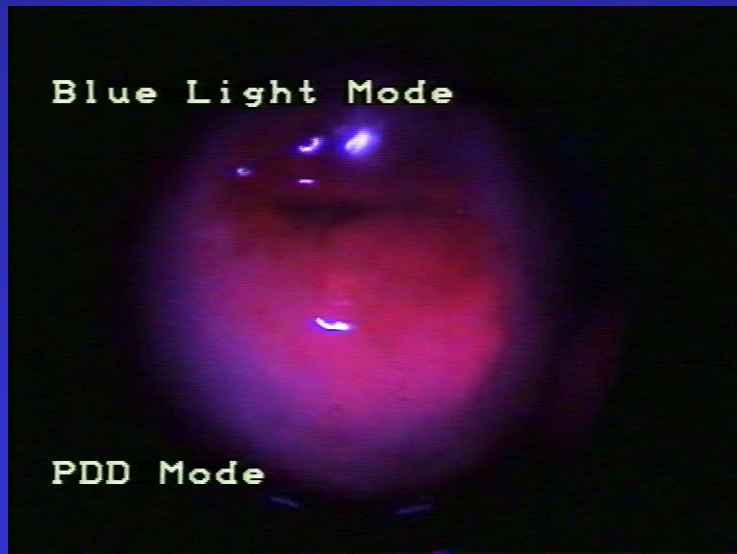
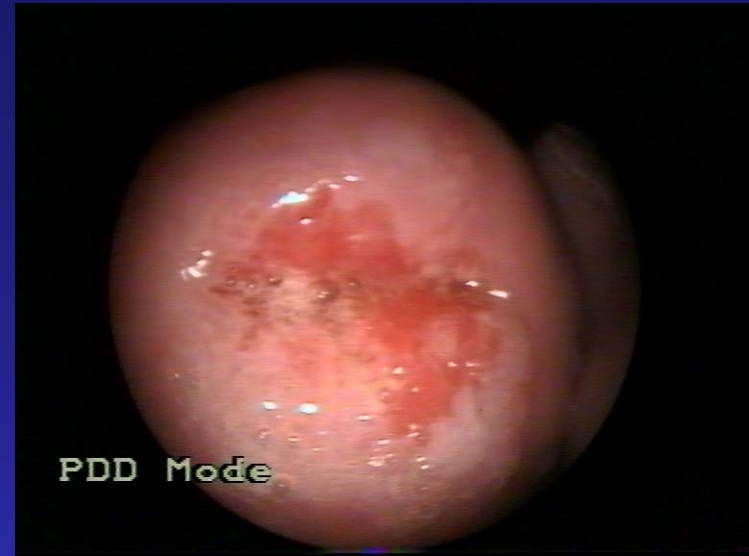
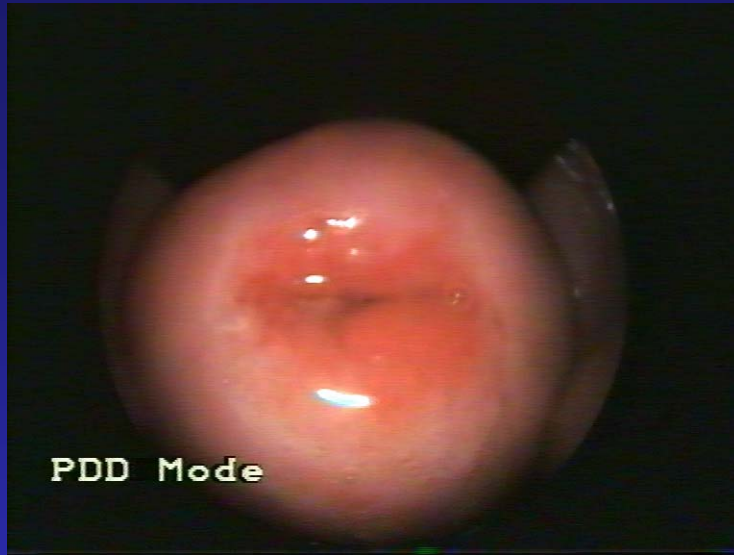




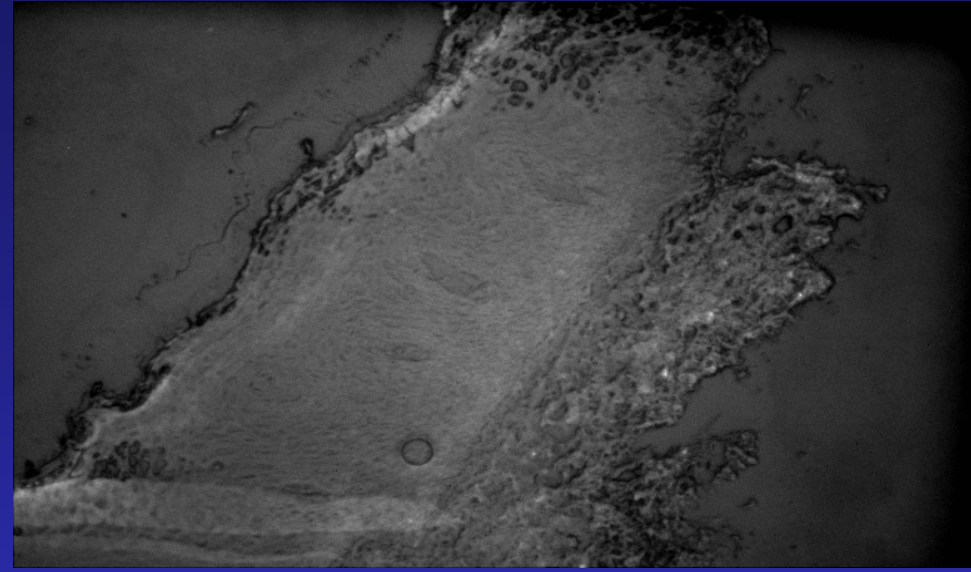
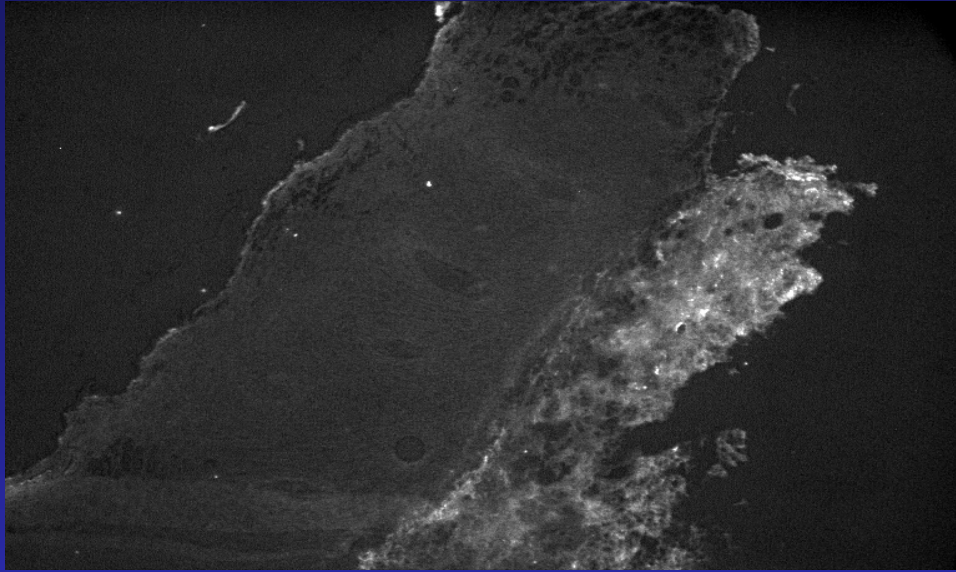
## Fluorescence analysis of CIN after topical application of 0.1% h-ALA



Pat. 12, 10% ALA in 0.9% NaCl, 3h 15 min application time



# Fluorescence analysis of healthy tissue after application of 0.1% h-ALA



# Representative spatial distribution of 5-ALA induced porphyrin fluorescence related tissue type

