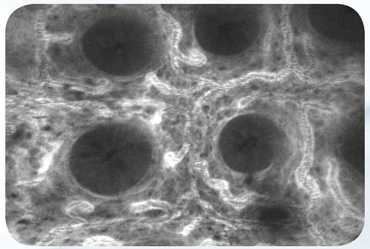
Endomicroscopy. More than meets the eye.

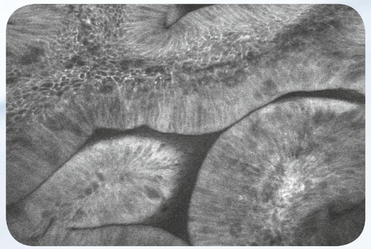
New horizons in diagnostics and therapy.

Endomicroscopy is an innovative and unique endoscopic imaging modality. It allows in vivo microscopy of the whole mucosal layer with cellular resolution during ongoing gastrointestinal endoscopy.

This is achieved by a miniaturized confocal microscope, which is embedded into the distal tip of an otherwise normal endoscope. The endomicroscope can be placed at any area of interest within the intestine during the ongoing examination. The blue laser light of the endomicroscope interacts with contrast agents within the mucosa, which have to be applied topically or intraveniously. This results in endomicroscopic images from the surface down to the deepest parts of the mucosal layer.



Left: Normal colonic mucosa showing regular crypt architecture and vascular pattern



Right: Colonic adenoma with tubular crypt architecture and reduced amount of goblet cells

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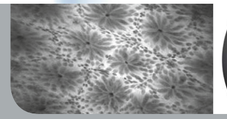
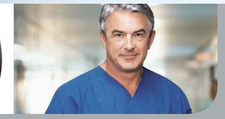
Histology. In vivo.

Endomicroscopy. A deep insight into the cellular structure of the mucosa.





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A whole new range of possibilities.

The fundamental difference between Endomicroscopy and other endoscopic imaging techniques is obvious: Histology is not predicted, but displayed directly in vivo. Thus the endoscopist can make accurate statements about tissue architecture, inflammatory cell infiltration, malignant cell changes and mucosal changes. This is the perfect way to take targeted biopsies.

Benefits of Endomicroscopy

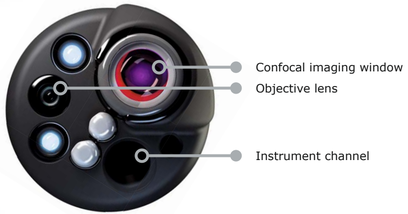
- Variety of indications: Endomicroscopy is highly beneficial for different kinds of gastrointestinal diseases
- High accuracy: Kiesslich et al. proved that the overall accuracy rate for confocal Endomicroscopy is 91% in the UGI tract and 93% in the LGI tract
- Endomicroscopy is safe: Complications occur only in a very low percentage of procedures (~1%)
- Learning curve: Dunbar et al. demonstrated "that there is a reasonable learning curve for Endomicroscopy"
- Cost effectiveness: Fewer conventional biopsies thanks to targeted, "smart" biopsies

In vivo microscopy at cellular resolution

Technique: Integration of confocal microscope into the distal tip of an endoscope

Procedure: Mucosa is stained with contrast agents and scanned with a blue laser beam

Result: high resolution microscopic images (0.7 µm laterally)



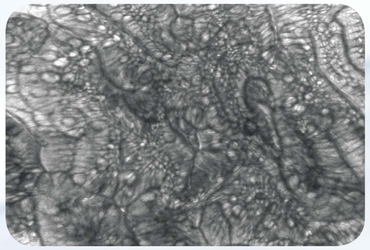
Endomicroscopy will make you question your present daily routine.

Sanduleanu et al. proved for the first time the ability of Endomicroscopy to differentiate colorectal lesions based on cellular, vascular and nuclear changes using flouresceine and acriflavine as combined contrast agents (Clin Gastroenterol. Hepatol. 2010 Apr; 8(4):371-8). The endomicroscopic visualization of nuclei enabled differentiation of low-grade from high-grade dysplasia with high accuracy (96.7%).

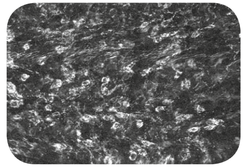
Patients at risk for colorectal cancer were investigated using Endomicroscopy. During examination, floureseine 10% was used in conjunction with acriflavine hydrochloride 0.05% to characterize tissue architecture and cytonuclear features of colorectal epithelium. Conventional histology was used as the gold standard.

Endomicroscopy for in vivo characterization of colorectal lesions

n	72 patients
Identified and endomicroscopically examined lesions	68 adenomas, 30 hyperplastic polyps, 12 inflammatory polyps, 6 invasive cancers
Endomicroscopic differentiation of low-grade and high-grade dysplasia	Accuracy: 96.7%
Interobserver agreement (kappa-coefficient)	Pathologist 0.92 Endoscopist 0.88
Endomicroscopic prediction of final histology	Sensitivity: 97.3% Specificity: 92.8% Accuracy: 95.7%



Tubulovillous adenoma with high-grade dysplasia showing crowding of crypts and enlarged, round nuclei (white dots highlighted after using acriflavine hydrochloride 0.05 %)



The bright signals in the endomicroscopic image represent active EGF receptors. Neoplastic lesions express significant more EGFR than non-neoplastic lesions

Endomicroscopy is the future. Molecular imaging at first hand.

Most recently Goetz et al. entered the field of molecular imaging using Endomicroscopy (Gastroenterology 2010 Feb;138(2):435-46). Molecular imaging became possible due to flouresceine labelling of antibodies which specifically target the Epidermal Growth Factor Receptor (EGFR). This fundamental new diagnostic possibility for gastrointestinal endoscopy visualizes molecular details and functions and may enable personalized therapy of patients with colorectal cancer in the future.

There is more behind Endomicroscopy.

DVD.

The Endomicroscopy DVD includes three highly interesting examination sequences as well as a detailed explanation of the technique and advantages of Endomicroscopy.

Website.

In co-operation with leading experts, PENTAX has developed an online platform for Endomicroscopy. Interesting topics and interactive learning elements ensure lively, international discourse.
Visit: **www.endomicroscopy.info**

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Training.

PENTAX Campus is a well established training programme with highly qualified consultants. You will learn all about Endomicroscopy and how to integrate it into your clinical routine.

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