

# Confocal Endomicroscopy of the Stomach: Gastritis, Intestinal Metaplasia, Adenoma, and Gastric Cancer



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## Abstract

In the stomach, neoplastic lesions often arise in the setting of precursor conditions such as gastritis, intestinal metaplasia, or adenomatous lesions. Biopsies may, therefore, underestimate disease severity or even miss the diagnosis (sampling error). Endomicroscopy is able to visualize typical features of such pathologies. It enables *in vivo* microscopy of gastritis with definition of enhanced vascularity and vascular leakage, but the typical cobblestone appearance of the gastric mucosa is preserved. The presence of intestinal metaplasia is confirmed by columnar absorptive cells with brush border and goblet cells within villiform foveolar epithelium. Gastric neoplasia is characterized by crowded glands with intraluminal folding and glandular budding and branching accompanied by increased density of dilated and distorted capillaries. Finally, in gastric cancer, gland and overall mucosal architecture is progressively lost. These features are shown side by side with white-light endoscopic findings. Endomicroscopy is used in such a setting to rapidly screen larger areas (optical biopsies) and subsequently target tissue sampling to areas with highly suspicious microscopic patterns. In experienced hands, it therefore constitutes an important part especially in the presence of neoplastic lesions within noncircumscribed gastric premalignant conditions. This article is part of an expert video encyclopedia.

## Keywords

Endomicroscopy; Gastric adenoma; Gastric cancer; Gastritis; Intestinal metaplasia; Standard endoscopy; Video.

## Video Related to this Article

Video available to view or download at doi:10.1016/S2212-0971(13)70050-5

## Materials

Confocal endomicroscopy (Pentax EC-3870CIFK; Pentax, Tokyo, Japan) was performed in a patient with multiple gastric pathologies. For fluorescent imaging, fluorescein (5 ml, 10%) was injected after white-light endoscopy. Butylscopolamine (20 mg) was injected for reduction of peristalsis. Because the neoplastic lesion was inside the hiatal hernia, some breathing artifacts were still present. Biopsies were targeted according to endomicroscopy and confirmed the presence of gastric cancer within adenoma and intestinal metaplasia.

## Background and Endoscopic Procedures

Endomicroscopy is a point technique providing ultrahigh magnification in real time.<sup>1</sup> Therefore, at first a thorough inspection with white-light endoscopy is performed. Note that the endomicroscope provides a near-focus view onto the mucosa. Then the endomicroscope is subsequently targeted onto lesions to image gastritis,<sup>2</sup> intestinal<sup>3</sup> metaplasia, and gastric<sup>4</sup> adenoma with a central carcinomatous part.<sup>5</sup>

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## Key Learning Points/Tips and Tricks

- Endomicroscopy is especially helpful in the setting of diffuse precancerous pathologies with few sites of overt intraepithelial neoplasia.
- Thorough white-light endoscopic inspection (optionally augmented by chromoendoscopy) is necessary to target endomicroscopy to regions of interest.
- These regions are then endomicroscopically scanned.
- This serves as a basis to obtain microscopically targeted biopsies or to guide endoscopic resection.

## Scripted Voiceover

Time (min:sec)	Voiceover text
00:00	In this patient, a gastric lesion was found partially within a hiatal hernia. It had a central ulceration. Close-up view revealed villous and irregular surface patterns.
00:16	In the corpus, reddish lesions are found in the presence of irregular mucosa.
00:25	One such lesion is screened with endomicroscopy after the injection of fluorescein.
00:34	The typical cobblestone appearance of gastric mucosa is seen. The endomicroscopic image has an edge length of 475 $\mu\text{m}$ , representing an approximately 1000-fold magnification <i>in vivo</i> .

00:45	The bright contrast indicates extravasation of fluorescein into the tissue, corresponding to the reddish areas. The capillaries are brightly contrasted with intraluminal fluorescein, black dots in the lumen represent erythrocytes.	3:29	The mucosal microarchitecture is progressively lost: the epithelial height and size of the individual cells are irregular in superficial sections.
01:10	When screening the surrounding mucosa further, a completely different mucosal pattern is observed. Intestinal metaplasia is identified by columnar absorptive cells with brush border. The mucosa has a villiform appearance. Black spots within the epithelial cells correspond to mucin. This allows the easy identification of goblet cells, a typical feature of intestinal metaplasia.	4:06	Residual pit-like architecture is seen, but irregular cells are no longer confined by a basal membrane.
01:41	Again, the strong contrast and extravasation of fluorescein into the lamina propria and the epithelium indicates enhanced vessel leakiness as a sign of gastritis.	4:15	Often, very dark irregular cells indicate neoplasia.
1:53	Then the confocal imaging window that can be seen at the 7 o'clock position is targeted onto the lesion in the hiatal hernia.	4:26	The endomicroscopic optical biopsies clearly indicate malignancy. Biopsies were targeted to the most suspicious part and confirmed the <i>in vivo</i> diagnosis.
2:03	A completely different mucosal pattern is observed, indicating neoplasia: Crowded glands with intraluminal folding, glandular budding and branching, pits of variable size and massive leakage of fluorescein are observed.		
2:19	In some parts of the lesion, the epithelial height is still regular, and the basal membrane is intact even in deeper optical sections. The lesion is carefully screened by moving the tip across the mucosa.		
3:03	Other parts show destruction of the superficial layers and significant cell shedding, associated with leakage of		

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