

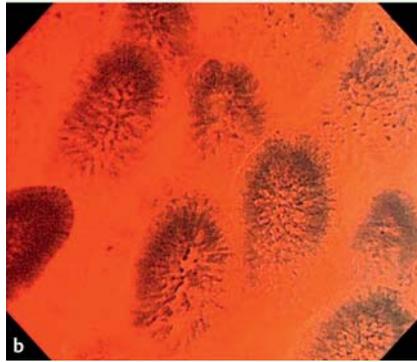
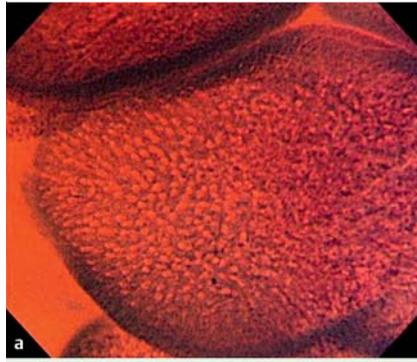
## Endocytoscopy provides an in vivo virtual histopathological diagnosis of Whipple's disease



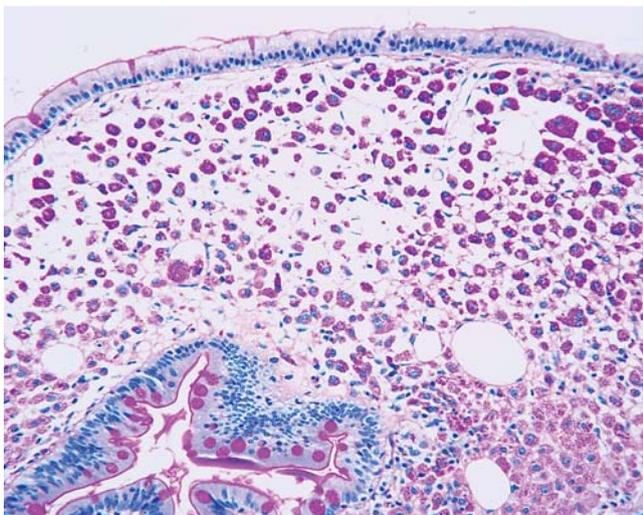
**Fig. 1** Conventional high definition white-light endoscopy of the second part of the duodenum in a 36-year-old woman who presented with fever, diarrhea, and weight loss showing yellow-white shaggy mucosa.



**Fig. 2** Endoscopy with narrow band imaging of the second part of the duodenum showing elongated wide villi and loss of minute vessels inside each villus.



**Fig. 3** Endocytoscopic view of: **a** Whipple's disease in the ileum showing swollen and enlarged villi; **b** normal ileum.



**Fig. 4** Histopathological appearance of Whipple's disease in a biopsy taken from the duodenal mucosa showing widening and flattening of the villi and infiltration of dilated lacteals.

Whipple's disease is a rare multisystem malabsorption syndrome caused by *Tropheryma whipplei*. Whipple's disease shows pathognomonic findings on endoscopy, previously described as pale yellow shaggy mucosa [1]. Histopathology often reveals widening and flattening of the villi and infiltration of dilated lacteals. Recently, other studies have reported further endoscopic characteristics of Whipple's disease [2–4].

A 36-year-old woman presented in April 2011 with fever, diarrhea, and weight loss, so we performed endoscopy. High definition white-light endoscopy (CF-H260AZI, Olympus, Tokyo, Japan) revealed yellow-white shaggy mucosa in the second part of duodenum (Fig. 1) and in the ileum. Optical/digital chromoendoscopy using a narrow band imaging system (Olympus) showed elongated wide villi and loss of minute vessels inside each villus (Fig. 2). An endocytoscopic view at a magnification of  $\times 385$  (Olympus) revealed swollen and enlarged villi (Fig. 3a) that were significantly bigger than normal (Fig. 3b). In addition, there were numerous small purple spots and vacuoles inside each villus, which may correspond to foamy macrophages. The diagnosis of Whipple's disease was confirmed by periodic acid–Schiff (PAS) staining (Fig. 4) and polymerase chain reaction (PCR) analysis. The patient was started on a 2-week course of ceftriaxone (2g/day, intravenously) followed by trimethoprim–sulfamethoxazole (4g/day, orally). To date, she has gained 32 kg from her baseline weight.

Endocytoscopy is based on the principle of contact light microscopy and can achieve a magnification of up to  $\times 385$ , thereby obtaining “optical biopsies” [5]. This is the first report to characterize Whipple's disease by in vivo imaging with endocytoscopy. Whipple's disease has pathognomonic findings of flattened and widened villi, and endocytoscopy easily recognizes these mucosal alterations. Although rare, Whipple's disease should be included in the differential diagnosis of patients presenting with chronic diarrhea. The advent of endocytoscopy may aid physicians in the diagnosis of this disease without the need to take biopsies in the future.

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**Competing interests:** None

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