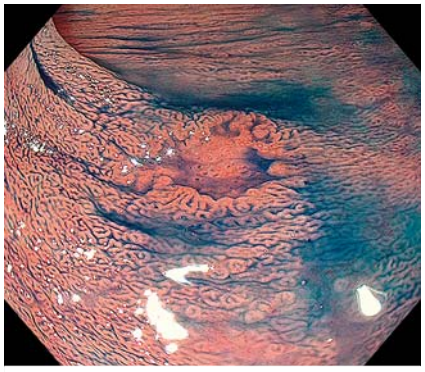
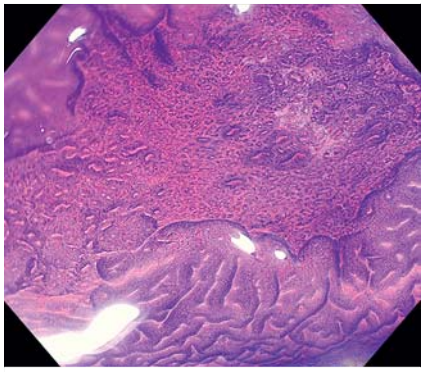
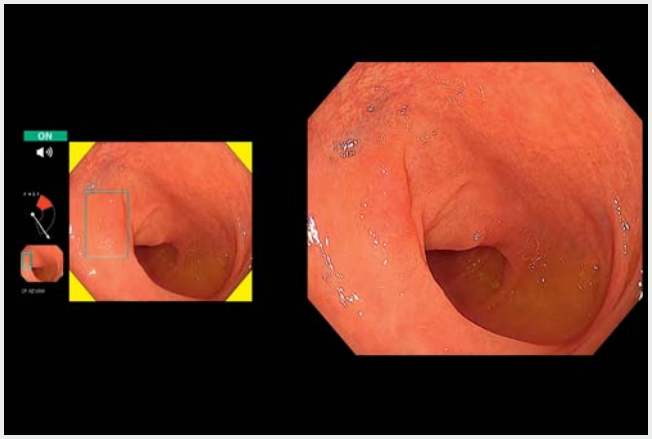
Identification of a small, depressed type of colorectal invasive cancer by an artificial intelligence-assisted detection system



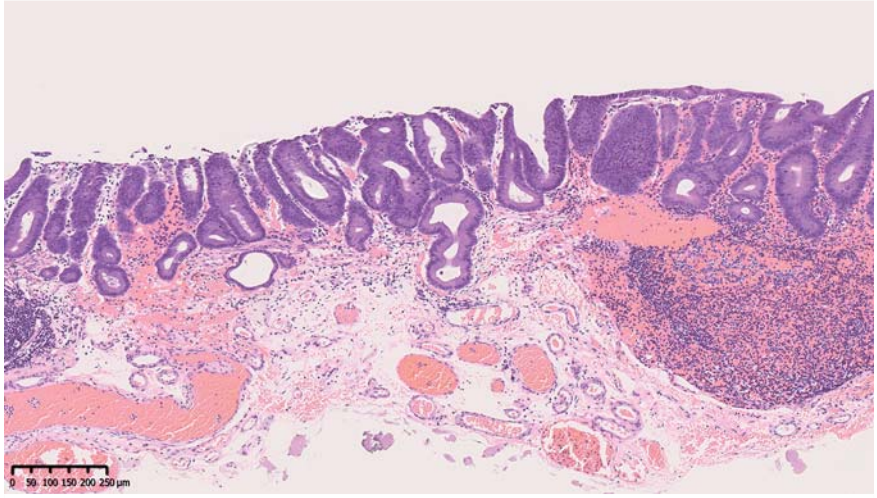
▶ **Fig. 1** Spraying of indigo carmine revealed a clear depression (Paris 0-IIc lesion).



▶ **Fig. 2** Crystal-violet dye staining with magnification, showing irregular-shaped pit patterns of varying sizes (Kudo's type V_I pit pattern).



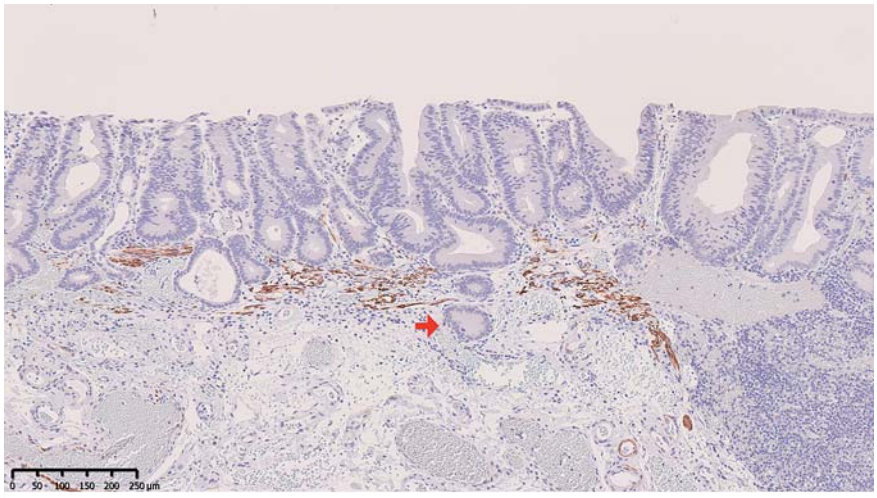
Video 1 The EndoBRAIN-EYE (Cybernet Systems, Tokyo, Japan) outputs bounding boxes of suspected polyp candidate areas. The left image is the system's output, and the right image is the original endoscopic image.



▶ **Fig. 3** Photomicrograph of the specimen (hematoxylin and eosin staining), showing a well-differentiated adenocarcinoma.

A 64-year-old man underwent surveillance colonoscopy with a computer-aided detection (CADe) system (EndoBRAIN-EYE; Cybernet Systems, Tokyo, Japan) [1]. The system identified a 5-mm slightly reddish lesion in the sigmoid colon. Spraying with indigo carmine enabled identification of a clearly depressed area on the lesion (▶ **Fig. 1**, ▶ **Video 1**). The lesion showed type V_I pit pattern, indicating high grade dysplasia or slightly invasive submucosal cancer [2]. Endoscopic mucosal resection was performed. Pathological examination showed a well-differentiated adenocarcinoma with slight invasion of the submucosal layer (▶ **Fig. 2**, ▶ **Fig. 3**, ▶ **Fig. 4**).

Artificial intelligence (AI) technology has regulatory clearance and is increasingly used during colonoscopy. A meta-analysis showed that CADe systems increase adenoma detection rates [3]. However, identifying subtle nonpolypoid lesions (e. g. 0–IIc type depressed lesions; laterally spreading tumors without granules) with CADe is still considered challenging. This is clinically relevant because a recent randomized trial found that such nonpolypoid tumors may be one of the causes of post-colonoscopy colorectal cancer [4]. Such lesions have greater



▶ **Fig. 4** Photomicrograph showing that one cancerous gland (red arrow) invaded the submucosal layer beyond the muscularis mucosa (desmin immunostaining).

malignant potential than other tumor morphologies and are often overlooked because of their appearance [5]. To the best of our knowledge, this is the first report of detection of a depressed, type 0–IIc lesion by CADe in real time during clinical colonoscopy. This AI-assisted detection was of particular value because the lesion was found to be a submucosally invasive colorectal cancer.

Endoscopy_UCTN_Code_TTT_1AQ_2AB

Acknowledgment

We thank Dr. Trish Reynolds, MBBS, FRACP, from Edanz (https://jp.edanz.com/ac) for editing a draft of this manuscript.

Competing interests

Shin-ei Kudo, Masashi Misawa, and Yuichi Mori have received speaking honoraria from Olympus Corporation (Tokyo, Japan) and have ownership interest in the products of Cybernet Systems (Tokyo, Japan). Masashi Misawa, Shin-ei Kudo, and Yuichi Mori have patents (Japan Patent JP 6059271 and JP 6580446) licensed to Cybernet Systems and Showa University.

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Endoscopy 2022; 54: E592–E593
DOI 10.1055/a-1704-8103
ISSN 0013-726X
published online 21.12.2021

Georg Thieme Verlag KG, Rüdigerstraße 14, 70469 Stuttgart, Germany