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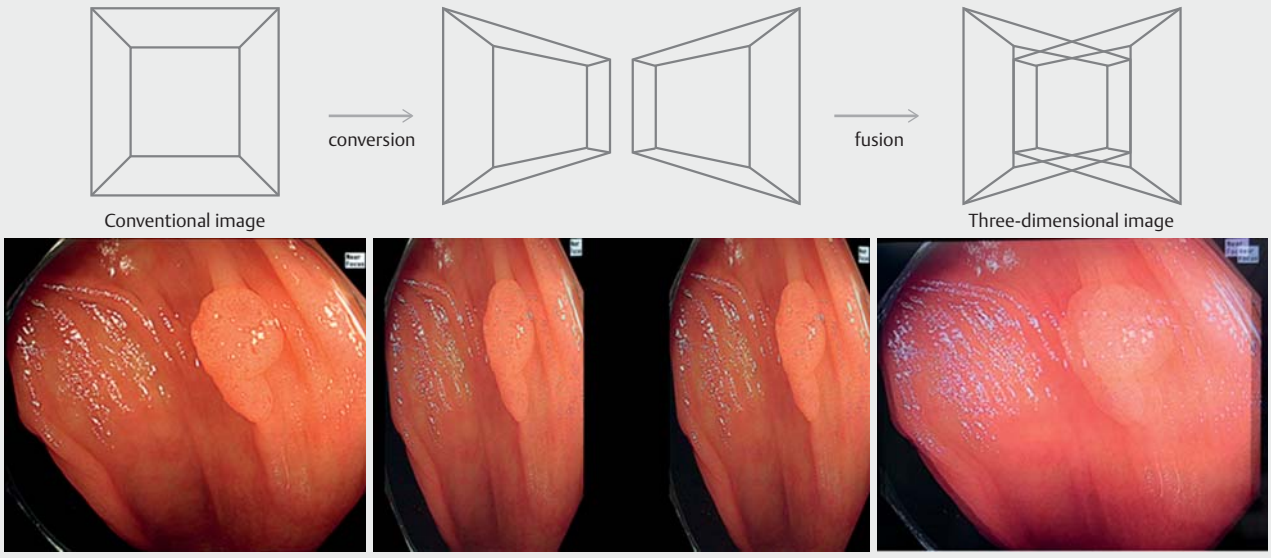
Three-dimensional imaging system for colonoscopy

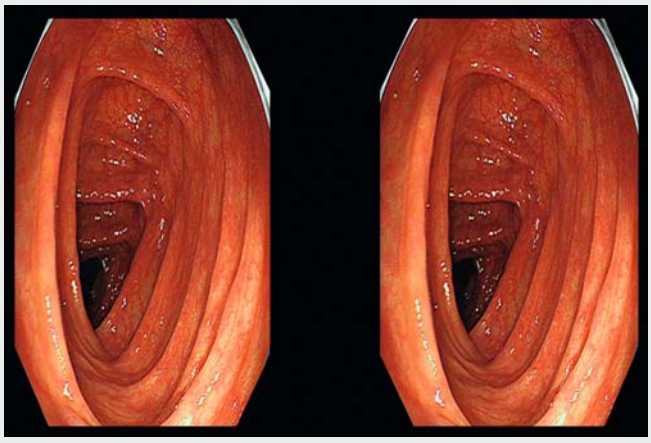


▶ **Fig. 1** Explanation of a 3 D image system. The 2 D endoscopic image can be converted to a 3 D image in real time.

Three-dimensional (3 D) imaging techniques have been developed in the medical field. In laparoscopic surgery, such techniques are widely used; they provide the surgeon with spatial information and increase the safety of surgical techniques [1 – 3]. In gastrointestinal endoscopy, Sakata et al. reported the efficacy of 3 D imaging for improved detection of colonic lesions using simulated 3 D colonoscopy [4]. However, to create a conventional 3 D image, two optical axes are required.

A novel 3 D imaging processor (HD-3D-A; Shinko Optical, Tokyo, Japan), which can create 3 D virtual video images from conventional two-dimensional (2 D) endoscopic video images, has been developed recently [5]. This imaging processor is connected to a monocular endoscopic system and converts conventional endoscopic images into a pair of images, as if they were obtained from two different points that match the operator's convergence angle [4] (▶ **Fig. 1**). This system can be used in combination with a conventional endoscope, and 3 D images can be easily viewed using 3 D glasses and a 3 D monitor.

Here for the first time, we report the use of this 3 D system in gastrointestinal endoscopy. In gastrointestinal endoscopy, the 3 D image also provides the endoscopist with space perception, helping them to evaluate the status of the intestinal tract space (▶ **Video 1**). In addition, we can more precisely visualize the



▶ **Video 1** Three-dimensional (3 D) colonoscopy in a patient with a colonic adenoma. This video is presented in a side-by-side format. The 3 D version can be viewed using the 3 D video equipment.

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shape of a gastrointestinal tumor using a 3 D image compared with a 2 D image (▶ **Video 1**). During colonoscopy, 3 D images provide visual cues to the next fold and aid in easy insertion to the cecum. Although further studies are required to demonstrate the efficacy of a 3 D system in gastrointestinal endoscopies, we believe this system may have additional benefits compared with a conventional 2 D endoscopy.

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Competing interests

None

The Authors

Tomoaki Matsumura[1], Hideaki Ishigami[1], Kenichiro Okimoto[1], Daisuke Maruoka[1], Tomoo Nakagawa[1], Mai Fujie[2], Makoto Arai[1]

1 Department of Gastroenterology and Nephrology, Graduate School of Medicine, Chiba University, Chiba City, Japan

2 Clinical Engineering Center, Chiba University Hospital, Chiba City, Japan

Corresponding author

Makoto Arai, MD
Department of Gastroenterology, Graduate School of Medicine, Chiba University, Inohana 1-8-1, Chiba-City, 260-8670, Japan
Fax: +81-43-2262088
araim-cib@umin.ac.jp

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