Artificial intelligence for detecting and delineating a small flat-type early esophageal squamous cell carcinoma under multimodal imaging

Early diagnosis of esophageal squamous cell carcinoma (ESCC) is crucial for improving its prognosis. Effective endoscopic biopsy is key to ensuring no missed diagnoses or misdiagnosis of lesions occur and accurate delineation of the margins of lesions is essential for effective biopsies. Recently, the application of artificial intelligence (AI) in the endoscopic diagnosis of early ESCC has increased; however, most AI systems identified early ESCC with rough square frames [1–3]. For the purpose of precise lesion segmentation, we have developed a new AI system, based on a state-of-the-art algorithm called the YOLACT model [4], that integrates multiple endoscopic imaging modalities to detect and delineate the margins of early ESCC in real time. The AI system was successfully integrated into the endoscopy equipment. The upper left section of the endoscopy monitor showed the current endoscopic imaging modality and the probability score of suspected early ESCC. In this video demonstration, we show that the AI system not only correctly identified each endoscopic imaging modality, but also accurately detected and delineated the margin of a flat-type mucosal cancer with a size of approximately 3 mm under white-light imaging and narrow-band imaging, with or without magnifying endoscopy and iodine staining (▶ Fig. 1; ▶ Video 1). Histopathology of the endoscopically resected specimen showed an early ESCC with invasion of the lamina propria (▶ Fig. 2).

Detecting and delineating subtle early ESCC with AI systems is challenging. To our knowledge, this is the first report of the use of an AI system to detect and de-
lineate a small flat-type early ESCC under multimodal imaging in real time during clinical endoscopy. Unlike with other previously reported AI systems, which require a separate monitor, the proposed AI system was directly connected to an endoscopy monitor commonly used by endoscopists, meaning there is no need for a change in their operating habits, so making our AI system more suitable for clinical use.

Endoscopy UCTN_Code_CCL_1AB_2AC_3AB

Competing interests
The authors declare that they have no conflict of interest.

The authors
Xianglei Yuan1*, Xianhui Zeng1*, Long He1, Liansong Ye1, Wei Liu1, Yanxing Hu2, Bing Hu1,2
1 Department of Gastroenterology, West China Hospital, Sichuan University, Chengdu, China
2 Xiamen Innovision Medical Technology Co., Ltd., Xiamen, Fujian Province, China

Corresponding author
Bing Hu, MD
No. 37 Guo Xue Alley, Wu Hou District, Chengdu, Sichuan, 610041, China
hubingnj@163.com

References

Bibliography
Endoscopy
DOI 10.1055/a-1956-0569
ISSN 0013-726X
published online 2022 © 2022. The Author(s).
This is an open access article published by Thieme under the terms of the Creative Commons Attribution-NonDerivative-NonCommercial License, permitting copying and reproduction so long as the original work is given appropriate credit. Contents may not be used for commercial purposes, or adapted, remixed, transformed or built upon. (https://creativecommons.org/licenses/by-nc-nd/4.0/)
Georg Thieme Verlag KG, Rüdigerstraße 14, 70469 Stuttgart, Germany

ENDOSCOPY E-VIDEOS
https://eref.thieme.de/e-videos

Endoscopy E-Videos is an open access online section, reporting on interesting cases and new techniques in gastroenterological endoscopy. All papers include a high quality video and all contributions are freely accessible online. Processing charges apply (currently EUR 375), discounts and waivers acc. to HINARI are available.

This section has its own submission website at https://mc.manuscriptcentral.com/e-videos

* Co-first authors