LETTER TO THE EDITOR

Clin Endosc 2022;55:699-700
https://doi.org/10.5946/ce.2022.123
pISSN: 2234-2400 • eISSN: 2234-2443

Open Access

CLINICAL ENDOSCOPY

Artificial intelligence-based colorectal polyp histology prediction using narrow-band image-magnifying colonoscopy: a stepping stone for clinical practice

Ji Young Chang

Health Promotion Center, Ewha Womans University Seoul Hospital, Seoul, Korea

To the Editor

Recently, narrow-band imaging (NBI) has gained Food and Drug Administration 510(k) clearance for assessing the neoplastic potential of colorectal polyps. Using the NBI International Colorectal Endoscopic (NICE) classification or the Japan NBI Expert Team (JNET) classification during colonoscopy, endoscopists can make high-confidence histological predictions for diminutive polyps ≤5 mm.[1] The NICE classification evaluates the pit patterns and microvessels of polyp surfaces and classifies them into three types: type 1, 2, and 3 for hyperplastic polyps or sessile serrated lesions, adenomas, and deep submucosal invasive cancers, respectively.[2] According to the JNET classification, hyperplastic polyps or sessile serrated lesions, adenomas or carcinomas with low-grade structural atypia, high-grade intramucosal neoplasia or shallow submucosal invasive cancer, and deep submucosal invasive cancer are classified as types a, 2A, 2B, and 3, respectively.[3,4]

Although these classifications increase the histological predictive value, concerns still exist regarding disagreements among observers because of their subjective nature, which requires training and abundant endoscopic experience. The need for a reliable and objective system has fueled the development of software that automatically evaluates NBI colonoscopy images for histological prediction of polyps. Thus, comparing the efficacy of these newly developed technologies in NBI implementation is essential as a decision-making support tool for routine clinical practice.

Racz et al.[5] compared the accuracy of a developed artificial intelligence-based polyp histology prediction (AIPHP) method to the NICE classification and pathologic results. The AIPHP software was created using a machine learning method and measured five geometrical and color features of the image at optical maximum magnification. A total of 373 polyps were analyzed using AIPHP and NICE classifications. AIPHP's accuracy was significantly higher for non-diminutive polyps than for diminutive polyps (92.2% vs. 82.1%, p=0.0032). In addition, the accuracy of the NICE classification was superior for non-diminutive polyps compared to diminutive polyps (99.4% vs. 95.2%, p=0.014). AIPHP correctly predicted neoplastic and hyperplastic polyps in 92.2% and 77.6% of the cases, respectively (p<0.0001). The accuracy of AIPHP tended to increase with increasing polyp size, whereas the NICE prediction was close to 100% for polyps of all sizes.

A similar study was reported by a Japanese research team that investigated the endoscopic microvascular density (eMVD) using magnifying NBI images via image-editing software, especially focusing on epithelial tumors.[4] eMVD was significantly higher in early colorectal carcinoma or high-grade dysplasia than in adenoma (0.152±0.079 vs. 0.119±0.059, p<0.050), implying continuous angiogenesis progression throughout the adenoma-carcinoma sequence. The best cutoff value for dis-

Received: April 7, 2022 **Accepted:** April 26, 2022

Correspondence: Ji Young Chang
Health Promotion Center, Ewha Womans University Seoul Hospital, 260 Gonghang-daero, Gangseo-gu, Seoul 07804, Korea
E-mail: lidia0826@hanmail.net

tinguishing carcinoma/high-grade dysplasia from adenoma was 0.133 (area under the curve, 0.62; 95% confidence interval, 0.54–0.71), with a 56.9% sensitivity, 67.0% specificity, and a 62.7% accuracy. In addition, the tumor size was not associated with eMVD. Lastly, the eMVD in JNET type 2B tumors was significantly higher than that in JNET type 2A tumors (0.162±0.079 vs. 0.111±0.050, $p<0.050$), whereas no significant differences in eMVD were found between any two NICE classification groups. The fact that NICE type 2 tumors might include both type 2A and 2B tumors in the JNET classification may explain this discrepancy.

According to USA-based research, NBI-related "characterize, resect, and discard" strategy can reduce the cost by $107.21 per person, compared to the standard care in 50-year-old individuals undergoing screening colonoscopy for 10 years. If real-time histologic diagnostic accuracy is supported using computer-aided or artificial intelligence-based software systems, the cost-effectiveness of colonoscopy would significantly improve in the era of the increasing burden of colorectal cancer worldwide.[6-9] Although it is clear that this study is meaningful as a stepping stone for further technical development and implementation in clinical practice, I would like to ask several questions. First, the accuracy of the AIPHP was influenced by polyp size, whereas that of the eMVD was not. Thus, I wondered how the AIPHP could overcome this problem. Second, using the NICE or JNET classification, the sessile serrated polyps, which are considered as precursors of 15% to 30% of colorectal cancers, are difficult to distinguish from hyperplastic polyps.[10,11] Thus, I would like to know whether the authors have data on this issue. If AIPHP can discriminate between serrated and hyperplastic polyps, it would be a significant differentiating advantage compared to other systems.

Conflicts of Interest

The author is currently serving as a Publication Committee Member of the Korean Society of Gastrointestinal Endoscopy (KSGE). However, she had not involved in the peer reviewer selection, evaluation, and decision process of this article. The author has no conflicts of interest.

Funding

None.

ORCID

Ji Young Chang https://orcid.org/0000-0002-7951-456X

REFERENCES

1. ASGE Technology Committee, Abu Dayyeh BK, Thosani N, et al. ASGE Technology Committee systematic review and meta-analysis assessing the ASGE PIVI thresholds for adopting real-time endoscopic assessment of the histology of diminutive colorectal polyps. Gastrointest Endosc 2015;81:502; e1-502.e16.
2. Hamada Y, Tanaka K, Katsurahara M, et al. Utility of the narrow-band imaging international colorectal endoscopic classification for optical diagnosis of colorectal polyp histology in clinical practice: a retrospective study. BMC Gastroenterol 2021;21:336.
3. Park CH, Yang DH, Kim JW, et al. Clinical practice guideline for endoscopic resection of early gastrointestinal cancer. Intest Res 2021;19:127–157.
4. Gonai T, Kawasaki K, Nakamura S, et al. Microvascular density under magnifying narrow-band imaging endoscopy in colorectal epithelial neoplasms. Intest Res 2020;18:107–114.
5. Racz I, Horvath A, Kranitz N, et al. Artificial intelligence-based colorectal polyp histology prediction by using narrow-band image-magnifying colonoscopy. Clin Endosc 2022;55:113–121.
6. Quezada-Gutiérrez C, Álvarez-Bañuelos MT, Morales-Romero J, et al. Factors associated with the survival of colorectal cancer in Mexico. Intest Res 2020;18:315–324.
7. Oh HH, Joo YE. Novel biomarkers for the diagnosis and prognosis of colorectal cancer. Intest Res 2020;18:168–183.
8. Choi YS, Kim WS, Hwang SW, et al. Clinical outcomes of submucosal colorectal cancer diagnosed after endoscopic resection: a focus on the need for surgery. Intest Res 2020;18:96–106.
9. Xi Y, Xu P. Global colorectal cancer burden in 2020 and projections to 2040. Transl Oncol 2021;14:101174.
10. Yamashina T, Takeuchi Y, Uedo N, et al. Diagnostic features of sessile serrated adenoma/polyps on magnifying narrow band imaging: a prospective study of diagnostic accuracy. J Gastroenterol Hepatol 2015;30:117–123.
11. Gupta V, East JE. Optimal endoscopic treatment and surveillance of serrated polyps. Gut Liver 2020;14:423–429.