
References

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Introduction: Computer-aided diagnosis (CAD) powered by artificial intelligence is attracting increased attention as an option to improve the performance of optical biopsy for evaluating colorectal polyps [1]. Although positive preliminary data have been shown for applying CAD to endoscopy (EC) (500-fold ultra-magnifying endoscopy; Olympus Corp., Tokyo, Japan) [2, 3], no prospective studies have been reported.

Aims & Methods: The present study is an initial prospective trial to validate the feasibility of applying CAD to endoscopy in a routine colonoscopy practice. A total of 88 patients (38 women, 50 men; mean age 64 years) in whom colorectal polyps had been detected using EC for colonoscopy were prospectively enrolled in the study between January and March 2017. When a polyp was detected, an on-site endoscopist predicted the polyp pathology using the CAD system [2], which was designed to output the predicted pathology of the target lesion—whether neoplastic or non-neoplastic—together with the probability of the diagnosis (0–100%) immediately after obtaining a methylene blue-stained EC image. The endoscopists obtained as many images as they thought were needed, each of which was evaluated using image-based analysis. The diagnostic ability of the CAD for each image was assessed with reference to the final pathology of the resected specimen. The main outcome measures were diagnostic specificity sensitivity, accuracy, positive predictive value, and negative predictive value of the CAD system for identifying neoplastic change with high confidence (probability >90%). Prior to initiating the trial, 13,861 EC images were used for machine-learning the CAD model.

Results: Overall, 126 lesions (62 neoplastic lesions, 64 non-neoplastic lesions; mean size 6 mm) were detected, all of which were successfully analyzed using the CAD system. A total of 1014 EC images of neoplastic lesions and 1480 EC images of non-neoplastic lesions were obtained during the colonoscopies of these patients. Among them, 55% (1378/2494) were diagnosed with high confidence (CAD probability was >90%). Prior to the initiation of the trial, 13,861 EC images were used for machine-learning the CAD model.

Conclusion: This prospective trial revealed that applying CAD to EC was feasible, with a negative predictive value of >90%, which is likely to meet the threshold required for optical biopsy of colorectal polyps. Our next goal is to increase the proportion of high confidence diagnoses, which is currently limited to 55%. (This study is registered as UMIN Clinical Trial Registry No. 00013917 and supported by Grants-in-Aid for Scientific Research No. 15K19351 from the Japan Society for the Promotion of Science.)

Disclosure of Interest: All authors have declared no conflicts of interest.

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