carcinoma where no obvious primary site of cancer has otherwise been identified.

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Clinical outcome of endoscopic mucosal resection of sporadic, nonampullary duodenal adenoma

To the Editor:

I read with interest the study by Tomizawa and Ginsberg[1] in *Gastrointestinal Endoscopy* in 2018. They identified that increasing adenoma size may be associated with increased risk of recurrence and post-EMR bleeding.[1] The results were very interesting; however, I am concerned about the statistical methods that estimated the effect of increasing adenoma size on the studied outcomes.

First, I question why the authors did not consider adenoma size as a continuous variable, given that there are efficient statistical methods for analyzing continuous variables.[2] Second, I am concerned why the authors did not attempt to estimate relative effect sizes such as odds ratio (OR) for the association between adenoma size and the studied outcomes. In fact, judgment about the presence of associations based only on P value does not provide information about magnitude and direction of association. I estimated OR (95% confidence interval [CI]) for the effect of each category of adenoma size compared with adenoma size of $<$15 as a reference group on the risk of recurrence with the penalization method.[3] The ORs (95% CI) for 15 $\leq$ $<$20 mm, 20 $\leq$ $<$30 mm, and $\leq$30 mm were found to be 0.87 (95% CI, 0.18-4.10), 3.66 (95% CI, 0.95-14.14), and 7.19 (95% CI, 2.02-25.58), respectively. Therefore, only adenoma size $>$30 mm was associated with the risk of recurrence. Here, re-estimating the true association between the studied predictors and the studied outcomes is suggested for the authors.

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Deep learning–based endoscopic image recognition for detection of early gastric cancer: a Chinese perspective

To the Editor:

We read with great interest the recent article in which Kanesaka et al[1] reported a computer-aided system for identifying early gastric cancers (EGC). The diagnostic performance (accuracy of 96.3%) suggests the great potential of computer-aided diagnosis for EGC. This is especially true in countries such as China that have a high incidence of gastric cancer but a low EGC detection rate.[2] Recent reports[3] have estimated that about 679,100 new cases of gastric cancer were confirmed in China each year and that more than 80% of patients received their diagnoses at an advanced stage with poor prognosis.

Thus, computer-aided methods are expected to play an important role in the detection of EGC. However, we regretfully found that most current studies[1,4,5] required high-quality, narrow-band imaging (or laser-based) and magnified images for algorithm training and for diagnosis. Meanwhile, advanced magnifying endoscopes and endoscopists with advanced skills in early detection are not always available in many countries,[6] including China. Given these problems, we believe that training with an algorithm using white light and nonmagnifying images is especially important for China and other countries with limited access to advanced imaging endoscopes. Human eyes may hardly capture minute lesions during initial nonmagnified gastroscopy, but this problem can potentially be solved with the use of computer vision technologies.

Other than traditional image recognition methods, deep learning could enable computer to learn adaptive image features directly from the data sets. The larger data sets that are given, the better performance may be achieved with algorithms. Then China's huge number of patients with gastric cancer (that means mass image data), in a sense, is of great advantage.

The government has made artificial intelligence a national strategy since 2017, and we are confident that deep learning–based endoscopic image recognition would make a big difference in China for screening of EGC, as it has done in skin cancer and diabetic retinopathy.[7,8]

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Response:

We thank Dr Zhijie Wang[1] for his interest in and comments to our work.[2] We appreciate and concur with his kind comments. Magnifying narrow-band imaging (M-NBI) has been shown to enable the evaluation of microsurface and microvasculature of the GI mucosa and has significantly improved the diagnostic accuracy[3]; however, the interpretation of M-NBI images is usually difficult for beginners. In 2010, Dr Tsung-Chun Lee attended Dr Noriya Uedo's presentation about M-NBI diagnosis in gastric mucosal lesions at the Asian Pacific Digestive Week. In that presentation, Dr Uedo explained M-NBI interpretation skills, and the endoscopists in the audience had higher test scores of knowledge after didactic lectures. Dr Tsung-Chun Lee was experienced in computer-aided diagnosis (CAD) of endoscopic images along with his engineering colleague, Professor Hsuan-Ting Chang. Therefore, we began collaboration of CAD for M-NBI diagnosis of early gastric cancer (EGC).[4]

Dr Wang nicely pointed out the unmet clinical need of "early detection" of gastric cancers in nonmagnified white-light endoscopy, especially in places where gastric cancers were still diagnosed at a late stage. Our work has exemplified the value of CAD in the clinical "diagnosis" of EGCs in M-NBI images. These are of 2 different levels: the former as glancing over the forest, and the latter (our work) as verifying the tree. We agree with Dr Wang that further development of CAD to nonmagnified white-light images will provide much value because it is the first step toward detecting EGC, and white-light endoscopy is readily available all around the world. Recently, Hirasawa et al[5] showed the usefulness of convolutional neural networks for EGC detection. In that study, CAD identified 71 of 77 EGCs with a sensitivity of 92.2%. We are optimistic that recent advances in machine vision and deep learning techniques will bring more innovation in this field and possibly be integrated into videoendoscopy image processors in the near future. For lesions detected in white-light images, our CAD algorithms for M-NBI will then serve as a useful tool for lesion characterization.

Furthermore, we do believe that CAD holds much potential to assist less-experienced doctors, to raise the competence level of endoscopic diagnosis in general practice, and thereby to improve healthcare in the community. Some people may ask, will artificial intelligence replace human endoscopists in the near future? The answer is probably no. We believe that the accurate endoscopic diagnosis of EGC relies on 2 principal attributes of the endoscopist: techniques and knowledge.[6] For techniques, the entire gastric mucosa should be systematically observed by the endoscopist to avoid missing minute lesions within the extensive and peristaltic gastric mucosa. Without cleansing out interfering mucus or bubbles, and without adequate distension of the stomach cavity, even the computer cannot make an accurate diagnosis. Current practice still requires a human endoscopist's meticulous techniques to obtain high-quality images. Even with good images, if endoscopists do not have knowledge about the image characteristics of EGC, they cannot detect the lesions.[7] In this task, CAD will be useful to fill in the knowledge gap. Nevertheless, after detection of EGCs, endoscopists should decide the best treatment indication according to