The learning curve for narrow-band imaging in the diagnosis of precancerous gastric lesions by using Web-based video (CME)

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Background: A simplified narrow-band imaging (NBI) endoscopy classification of gastric precancerous and cancerous lesions was derived and validated in a multicenter study. This classification comes with the need for dissemination through adequate training.

Objective: To address the learning curve of this classification by endoscopists with differing expertise and to assess the feasibility of a YouTube-based learning program to disseminate it.

Design: Prospective study.

Setting: Five centers.

Participants: Six gastroenterologists (3 trainees, 3 fully trained endoscopists [FTs]).

Interventions: Twenty tests provided through a Web-based program containing 10 randomly ordered NBI videos of gastric mucosa were taken. Feedback was sent 7 days after every test submission.

Main Outcome Measurements: Measures of accuracy of the NBI classification throughout the time.

Results: From the first to the last 50 videos, a learning curve was observed with a 10% increase in global accuracy, for both trainees (from 64% to 74%) and FTs (from 56% to 65%). After 200 videos, sensitivity and specificity of 80% and higher for intestinal metaplasia were observed in half the participants, and a specificity for dysplasia greater than 95%, along with a relevant likelihood ratio for a positive result of 7 to 28 and likelihood ratio for a negative result of 0.21 to 0.82, were achieved by all of the participants. No constant learning curve was observed for the identification of *Helicobacter pylori* gastritis and sensitivity to dysplasia. The trainees had better results in all of the parameters, except specificity for dysplasia, compared with the FTs. Globally, participants agreed that the program's structure was adequate, except on the feedback, which should have consisted of a more detailed explanation of each answer.

Limitations: No formal sample size estimate.

Conclusion: A Web-based learning program could be used to teach and disseminate classifications in the endoscopy field. In this study, an NBI classification for gastric mucosal features seems to be easily learned for the identification of gastric preneoplastic lesions. (Gastrointest Endosc 2014;79:910-20.)

Gastric cancer, the fourth most common and the second most lethal cancer, accounts for more than 10% of cancer deaths worldwide.[1-3] Despite the decreasing incidence and mortality in most industrialized countries, the growing number and aging of the population make it an important world health problem.[1,4] The diagnosis and adequate management of precancerous conditions and dysplastic lesions, as secondary prevention measures, may be the most immediate strategy for improving survival by increasing the curability and reducing the gastric cancer–associated morbidity.[5,6]

Conventional white-light endoscopy evaluation of gastric mucosa correlates poorly with histological findings and cannot accurately differentiate between preneoplastic gastric lesions. Chromoendoscopy, particularly with magnification, may improve the accuracy for the detection of preneoplastic gastric lesions, but it lengthens the time of the endoscopic procedure and is not very popular among endoscopists, particularly in Western countries.[7,8] Thus, high-resolution narrow-band imaging (NBI) produced good results in the characterization of those lesions. Our group developed and validated a simplified NBI endoscopy classification based on the regularity and pattern of the gastric mucosa and the regularity of its vessels. The NBI (without magnification) patterns were highly accurate and reproducible for the detection of metaplasia and, in particular, of dysplasia.[5]

The creation of this new classification arises with the need for its dissemination through adequate training of endoscopists. The learning structure should provide access to a database of labeled images from the prospective imaging modality during the training.[9,10] Over the past decade, an increase was observed in the number of tools available to enhance medical education through Web-based structures. With the widespread availability of Internet resources, building Web-based systems for training in a variety of contrast-enhancement methods plays an important role.[11] Actually, cognitive learning programs based on the study of medical images on the Internet has shown to be beneficial in some specialties, becoming a great tool to improve the diagnostic yield of particular methods.[12]

We hypothesize, in line with the previously mentioned guidelines,[7] that NBI may help in the selection of suspicious areas for biopsy and that a Web-based system may be useful for learning these NBI and other endoscopy classifications. To the best of our knowledge, no study has been conducted in this area. Therefore, by using the worldwide-known video-sharing Website YouTube to show videos of NBI-enhanced endoscopies, we aimed at addressing the learning curve of trainees and nonexpert endoscopists for this new classification and to assess the feasibility of such a Web-based learning system to disseminate this and other diagnostic tools in the endoscopy field.

> **Take-home Message**
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> - This narrow-band imaging classification for the diagnosis of gastric preneoplastic lesions is accurate and easily learned.
> - YouTube-based learning programs may be used as effective e-learning tools in the GI endoscopy field.

METHODS

Study design and selection of participants

Six gastroenterologists from 5 different centers, 3 trainees (T1-3) and 3 fully trained endoscopists (FTs) without significant expertise in NBI (FT1-3), were invited to participate in this study and asked to classify 200 videos of NBI endoscopies, independent of and blinded to other endoscopists' answers, through a Web-based learning system designed by our group. After an initial presentation of the classification, a total of 20 tests, each containing 10 randomly ordered NBI videos of gastric mucosa, were shown to each participant. Participants were asked to use the classification shown in Figure 1. This study was approved by the Ethics Committee and Research Board of both hospitals where endoscopies were performed.

Classification system

The observers classified the NBI videos according to the classification patterns of Pimentel-Nunes et al.[5] Briefly, pattern A shows regular circular mucosal and vascular patterns, pattern B shows a ridge/tubulovillous pattern with regular mucosa and vessels, pattern C shows absent/irregular mucosal and vascular patterns; the presence of *Helicobacter pylori* gastritis (additional pattern +) reveals an alternating vascular density (Figs. 1 and 2). The observers were asked to consider light blue crest (LBC) when they saw blue-whitish, slightly raised areas, which indicate intestinal metaplasia (87% specificity).[5] A brief summary of previous results of this classification is shown in Table 1.

LBC was originally described with high magnification by Uedo et al.[13] However, Pimentel-Nunes et al[5] showed that a variation of this feature as blue-whitish, slightly raised areas was also identifiable in a reproducible way with low magnification.

Selection of endoscopic videos

Videos (N = 224) from a selected database of patients who underwent routine upper GI endoscopy were recorded at 2 tertiary centers. The use of the recorded images for scientific research was approved by the selected patients.[5] This study was approved by the Ethical Committee. A high-resolution Olympus endoscope with NBI (EVIS EXERA II video system center GIF-180; Olympus, Tokyo, Japan) was used. High-resolution videos of low