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Blue Light Imaging and Linked Color Imaging Improve Visualization of Barrett Neoplasia by Non-Expert Endoscopists

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Background & aim: Endoscopic recognition of early Barrett neoplasia is challenging, since these lesions are subtle and therefore easily missed. Therefore, optical chromoscopy techniques have been developed to improve the visualization of mucosal and vascular patterns. Blue light imaging (BLI) and linked color imaging (LCI) may assist endoscopists in appreciation of neoplastic lesions. The aim of this study was to evaluate BLI and LCI for the visualization of Barrett neoplasia in comparison with WLE alone, when assessed by non-expert endoscopists.

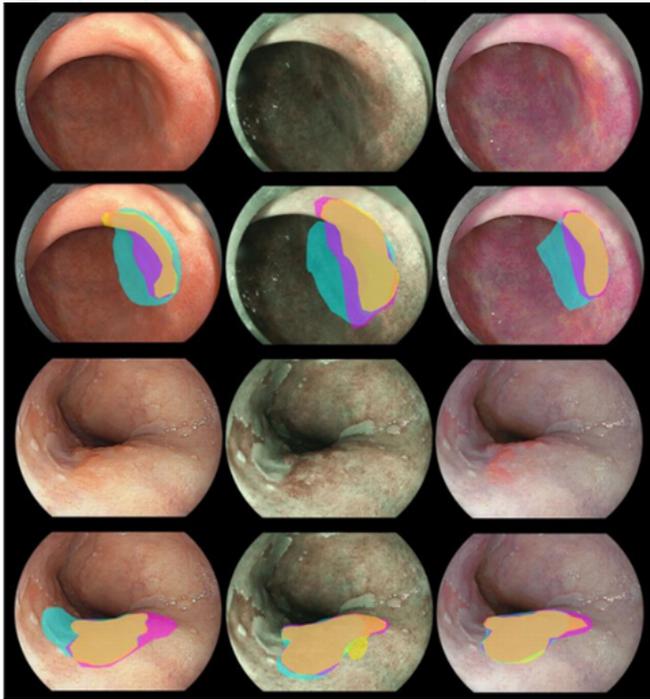
Methods: Corresponding white light endoscopy (WLE), BLI and LCI images of 30 unique neoplastic Barrett lesions were prospectively collected and delineated by three expert endoscopists to establish ground truth (Figure 1). These images were then scored and delineated in an online module by 76 non-expert endoscopists from three countries and with different levels of expertise (fellows in training, junior endoscopists (< 5 years) and senior endoscopist (> 10 years)), in four separate assessment phases with a wash-out period of two weeks in between each phase. Assessment 1: WLE only; Assessment 2: WLE+BLI; Assessment 3: WLE+LCI; Assessment 4: WLE+BLI+LCI. The outcomes of this study were: 1) appreciation of macroscopic appearance and ability to delineate lesions (VAS-scores); 2) preferred technique (ordinal scores); 3) assessors' delineation performance in terms of overlap with expert ground truth.

Results: Median VAS scores for phases 2-4 were significantly higher than in phase 1 for appreciation of the Paris Classification, surface relief and the ability to delineate the lesion ($P < 0.001$). Assessors preferred BLI and LCI over WLE for appreciation of macroscopic appearance ($P < 0.001$) and delineation of lesions ($P < 0.001$). Linear mixed-effect models indicated that the combined addition of BLI and LCI to WLE in phase 4 was associated with an increase in delineation performance by the assessors ($P < 0,001$). The addition of only BLI or LCI next to WLE was not significantly associated with an increase in scores. Adjusting for the effect of endoscopic expertise and country of origin did not change the results.

Conclusions: The use of BLI and LCI has significant additional value for the visualization of Barrett neoplasia, when used by non-expert endoscopists. Assessors appreciated the addition of both BLI and LCI better than the use of WLE alone. The addition of BLI and LCI next to WLE furthermore led to quantifiable improved delineation performance, by increasing the ability to discriminate neoplastic tissue from its surroundings. This might allow for better targeted biopsy acquisition in daily practice.

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[https://www.giejournal.org/article/S0016-5107\(20\)30305-9/fulltext](https://www.giejournal.org/article/S0016-5107(20)30305-9/fulltext)



Exemplary cases of early neoplastic Barrett lesions, visualized in overview, by corresponding images in white light endoscopy, blue light imaging and linked color imaging. All images were delineated independently by 3 expert endoscopists to establish the ground truth. Expert delineations are displayed in blue, pink and yellow.

FUJIFILM SUMMARY

Barrett neoplasia is a common condition, yet challenging to identify during early stages. This study compares visualization of Barrett neoplasia with BLI, LCI and WLE when assessed by non-expert endoscopists.

Key Takeaways:

1. Median visual analog scale (VAS) scores (for appreciation of the Paris Classification, surface relief and the ability to delineate the lesion) were higher when any combination of light mode was used (WLE + BLI, WLE + LCI, WLE + BLI + LCI), compared to WLE alone.
2. Assessors preference was BLI and LCI over WLE.
3. BLI + LCI + WLE increased delineation performance.

The use of BLI & LCI added significant value for visualizing Barrett's neoplasia for non-expert endoscopists.

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