Introduction: Non-polypoid colorectal neoplasms are both prevalent and easily missed during colonoscopy and may account for incident cancers. A real-time optical technique that utilizes Confocal Laser Endomicroscopy (pCLE) for discrimination between various colorectal tissues. Previous studies demonstrated short learning curve among endoscopists in expert centers (1,2). However, this parameter has not been assessed in larger gastroenterology community. Therefore, the aim of our prospective study was to determine the learning curve of pCLE for the diagnosis of colorectal diseases before and after a single training session in a community of non-pCLE expert endoscopists.

Methods: 10 pCLE videosequences of the colorectum obtained in 10 patients were retrieved. These sequences corresponded to normal mucosa (n=2), hyperplastic polyps (n=1), adenomas (n=3), adenocarcinomas (n=2) and ulcerative colitis (n=3). Sequences were analyzed considering the percentage of correct answers before (preteaching) and after (postteaching) the training session. The mean accuracy results for the whole group went up from 24% to 68% (23% to 69% for interns, 28% to 57% for private practice physicians) demonstrating a significant improvement in pCLE image interpretation even after a very preliminary training. The most significant improvement post teaching was observed for the interpretation of hyperplastic (7% to 81% accuracy) and ulcerative colitis (12% to 73% accuracy) sequences, whereas the smallest improvement was observed for cancerous sequences (42% to 56%). Conclusions: Interpretation of pCLE images might improve very rapidly after a structured training and review of standardized images. Provided these results were validated in larger gastroenterology community. Therefore, the aim of our prospective study was to determine the learning curve of pCLE for the diagnosis of colorectal diseases.

Assessment of Portal Hypertensive Enteropathy (PHE) Using Branch-Based Confocal Laser Endomicroscopy (pCLE)

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Background: There is increasing interest in the early detection of portal hypertension (PHT) in an attempt to prevent morbidity associated with late-stage cirrhosis. In addition, there are potentially-reversible conditions (e.g., NAFLD, alcoholic hepatitis) where early biomarkers may help stratify disease severity and modify outcomes. Advances in small bowel endoscopy have revealed that PHE may be more prevalent than previously understood.

Aim: To evaluate the utility of quantitative pCLE for assessing microvascular and morphological changes associated with PHT in the small intestine. Methods: With IRB approval, we enrolled patients with and without PHT scheduled for upper endoscopy at VA Boston. Upon IV injection of 2 mL of 10% sodium fluorescein, real-time endomicroscopy and video microangiography was performed within imaging duodenal villi using pCLE (Mauna Kea Technologies, Newtown, PA). The pCLE mini-probe employed (GastroFlex-UHD™) provides 100Xm magnification, 20 μm optical slice thickness, 1 μm lateral resolution, and a 240μm field of view.

Results: The raw images of tryptophan fluorescence did not consistently distinguish neoplasms from the surrounding normal mucosa, however images with very high contrast were obtained when the intensity of fluorescence from tryptophan was divided by the product of FAD and collagen fluorescence. An example of the high contrast achieved is provided in Figure 1. Conclusions: Tryptophan fluorescence, the intensity of which is greater in cancerous cells than in normal cells is not always increased in neoplasms due the absorption of the emitted fluorescence by tissue hemoglobin. In contrast to tryptophan, FAD fluorescence is decreased in metabolically active cancerous cells and collagen fluorescence is also decreased due to displacement and interruption of the basement membrane by the neoplastic process. The fluorescence ratio of Tryptophan/FAD*Collagen utilizes these differences to maximize tumor image intensity relative to the normal mucosa to produce high contrast images. The technique can be incorporated into endoscopes for real-time imaging.