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Methods to become a high performer in characterization of colorectal polyp histology

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A B S T R A C T

The recent advent of advanced imaging technologies has brought real time characterization of polyp histology to the forefront. This concept of optical diagnosis of diminutive polyp histology can bring about a huge paradigm shift in the management of these lesions. Instead of resecting and sending all the diminutive polyps to pathology, there is the potential to practice “resect and discard” for those predicted to be adenomas and “do not resect” strategy for the recto-sigmoid polyps predicted to be hyperplastic. However, one of the major steps before the clinical implementation of real-time histology can be a reality, will be training endoscopists with varying levels of experience in novel imaging technologies. The two major methods for training include didactic teaching and the computer based method. After the initial training, it is imperative that the endoscopists practice this skill during performance of routine colonoscopy to auto validate and assess their own competency. Both practice and reinforcement can help endoscopists become high performers in the characterization of polyp histology.

The advent of advanced imaging technologies like electronic chromoendoscopy has afforded endoscopists the unique ability to characterize the histology of colorectal polyps, in-vivo during colonoscopy. Although dye based chromoendoscopy for real-time polyp histology has been used for

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decades especially in Japan [1,2], it did not gain popularity in the western countries. This was probably due the perceived hassle and inconvenience of having to spray dye over the lesion, the extra cost involved and lack of proper training in recognition of pit patterns seen with dye-based chromoendoscopy. Electronic chromoendoscopy like narrow band imaging (NBI), i-Scan or FICE are push button technologies that alter the color of the image and thereby highlight the surface vascular and mucosal patterns. These are more convenient and easy to use and can help the endoscopist in differentiating between the two major histologic types of polyps – adenomatous and hyperplastic polyps. There are also some other advanced imaging technologies that can help characterize colorectal polyp histology (Table 1).

Accurate characterization of colon polyp histology in real-time, by the endoscopist has important potential clinical implications. It could be utilized for the proposed paradigm shift in managing diminutive (≤5 mm) polyps – the 'resect and discard strategy' for adenomatous polyps and the "do not resect" strategy for recto-sigmoid hyperplastic polyps. The estimated cost savings have been estimated to be a billion dollars annually in the US [3,4], mainly by obviating the expenditure involved in the histopathological evaluation of the resected polyp specimens. In-vivo characterization of polyp histology can also make screening colonoscopy more efficient by the ability to communicate the follow up surveillance interval recommendations to the patient immediately after the procedure, without having to wait for the histology results [4].

The rationale for real-time histology of colorectal polyps is based on the evidence that more than two third of the polyps removed during colonoscopy are diminutive (≤5 mm) and these lesions rarely harbor advanced histology like high-grade dysplasia or cancer [5]. Resecting and sending these polyps to pathology in order to know whether they are adenomatous or hyperplastic polyps confers a huge cost burden with limited clinical benefit in return, especially if the same information can be garnered during the colonoscopy. Furthermore, although pathology has been considered the gold standard traditionally, in reality, it is rather a reference standard. The accuracy of pathologists in polyp histology characterization is less than perfect and estimated to be about 85–95% [6,7]. If the endoscopists can discern the histology of diminutive polyps with similar degree of accuracy during colonoscopy, then the histopathology expenditure becomes superfluous and can be avoided.

The American Society of Gastrointestinal Endoscopy (ASGE) proposed PIVI (Preservation and Incorporation of Valuable Endoscopic Innovation) thresholds needed to be achieved before real time histology can be implemented in clinical practice using an endoscopic technology. According to these [8], endoscopic technology when used with high confidence to determine histology of ≤5 mm colorectal polyps to be resected and discarded without pathologic assessment should provide ≥90% agreement in assignment of post-polypectomy surveillance intervals when compared with decisions based on pathology assessment of all identified polyps. Furthermore, endoscopic technology when used with high confidence to leave suspected recto-sigmoid hyperplastic polyps ≤5 mm in place without resection should provide ≥90% negative predictive value (NPV) for adenomatous histology.

Therefore, real-time polyp histology characterization by endoscopists seems to be a rational and cost saving strategy. If this practice is economically attractive and more efficient without jeopardizing patient outcomes, then it may become acceptable and desirable by the gastroenterologist community. Several studies from academic institutions, by investigators with special interest in advanced imaging technologies have shown that reasonably high accuracies can be achieved in the in-vivo diagnosis of polyp histology [9–20]. Meta-analyses looking at the performance of NBI in the characterization of polyp histology have been previously published [21,22].Recent meta-analysis of 20 studies predicting

Table 1
Different advanced imaging technologies.

Wide field	Narrow field
Chromoendoscopy	Confocal microscopy (CLE)
Narrow band imaging (NBI)	Endocytoscopy (EC)
Fuji intelligent chromoendoscopy (FICE)	
i-Scan	
Autofluorescence imaging (AFI)	