EDITORIAL

Optical biopsy and sessile serrated polyps: Is DISCARD dead? Long live DISCARD-lite!

The concept of optical biopsy or in vivo histology whereby endoscopists would make a determination during the procedure as to whether colorectal polyps were premalignant or benign is one of the most exciting developments in colonoscopy in the past decade. Taking this further and resecting the polyp but not sending for pathological evaluation would be a paradigm shift in the practice of colonoscopy to the so-called DISCARD strategy.[1] The importance of this concept has been highlighted by the American Society for Gastrointestinal Endoscopy (ASGE) in a Preservation and Incorporation of Valuable Endoscopic Innovations (PIVI) statement[2] in which 2 standards were set: first, that the surveillance intervals set by the strategy should be 90% or more concordant with those set by using conventional pathology; second, that the negative predictive value for polyps in the rectosigmoid should be $\geq$90% or higher. This second statement potentially allows small hyperplastic polyps to be left in situ.

There is a significant drive to implement the DISCARD strategy. The cost savings are potentially large, up to $33 million per year in the United States because pathology costs make up approximately 10% of the total costs of colonoscopy with polypectomy.[3] Patients would benefit from being told their surveillance interval on the day of the procedure, a "one-stop shop," decreasing anxiety and saving both the patient and clinician time and another visit. Capital costs for implementing such a strategy would be relatively small as one of the major endoscopic tools for characterizing colonic polyps, narrowed spectrum endoscopy (narrow-band imaging [NBI], Olympus, Tokyo, Japan; FICE [Fuji Intelligent Color Enhancement], Fujinon, Tokyo, Japan; iSCAN, Pentax, Tokyo, Japan), is already built into the current generation of endoscopic systems from the 3 largest manufacturers. There remain issues regarding training and accreditation for DISCARD, as well as the need to be able to store high-definition images of each lesion indefinitely as part of the patient record.[4]

There are also medicolegal concerns. What happens if a patient gets colorectal cancer for which the endoscopist elected to DISCARD a lesion or left a polyp in situ? Citing national practice guidelines is one way to respond to such medicolegal problems. The European Society for Gastrointestinal Endoscopy issued guidance on this in 2014, suggesting optical biopsy for experienced endoscopists by using narrowed spectrum endoscopy or confocal laser endomicroscopy under strictly controlled conditions was acceptable in clinical practice.[5] The ASGE Technology Committee has now issued guidance that is very similar, stating that "thresholds established by the ASGE PIVI for real-time endoscopic assessment of the histology of diminutive polyps have been met, at least with NBI optical biopsy, with endoscopists who are expert in using this advanced imaging technology and when assessments are made with high confidence."[6] In both cases, this guidance only applies to polyps 5 mm or smaller; however, diagnostic performance by community-based gastroenterologists has been disappointing in clinical studies, with a number of major studies in the United States and Europe reporting performance that would fall well short of the PIVI thresholds and potentially put patients at risk. How are endoscopists to decide whether they are "expert" enough to start implementing optical biopsy in their practice? Nevertheless, the door to optical biopsy implementation and associated cost savings is now very clearly open on both sides of the Atlantic.

In this study, the authors present one of the largest series to date (N = 242) to try to differentiate sessile serrated polyps from hyperplastic polyps by using specific features seen with magnified narrow-band imaging.

In the past decade as optical biopsy has developed, so has our understanding of colorectal polyps as malignant precursors and the pathways to colorectal cancer. Specifically, there now appear to be multiple pathways to colorectal cancer that have distinct molecular/genetic features.[7] The most prominent "new" one of these is the serrated pathway. This differs from the well-known adenoma-carcinoma sequence in that cancers have *BRAF* mutations and high levels of CpG island methylation, which silences downstream genes.[8] These molecular/genetic alterations are not found in adenomas, but are found in a pathologically

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TABLE 1. Diagnostic performance of endoscopic optical biopsy methods to differentiate hyperplastic polyps from sessile serrated polyps

Reference	Modality	Defining features	No. of polyps	Sensitivity, %	Specificity, %	Accuracy, %	PPV, %	NPV, %	NICE 2, %
Yamada et al,[10] 2015	Magnifying NBI	DBV and iDSs	242	35	88	62			
	Magnifying NBI	DBV, right sided, and size	4242	46	97	72	93	65	
Yamashina et al,[11] 2015	Magnifying NBI	NICE type 1, ECOs or TBVs	783	98	60	75	63	98	6
Nakao et al,[12] 2013	Magnifying NBI	NBI pit dilation	71	80	72	78			
	Magnifying NBI	Mucous cap	71	94	40	75			
	AFI	Magenta color	71	43	68	53			
Uraoka et al,[13] 2014	Magnifying NBI	VMVs, "dilated and winding vessels"	89	58	88	74	82	69	
	Magnifying NBI	>2 factors (VMVs, >10 mm, right sided)	89	90	76	82	77	89	
	Magnifying chromoendoscopy	No factor proved differentiating	89						
Kimura et al,[17] 2012	Magnifying chromoendoscopy	Type II-O pit pattern	116	66*	97*	98*	91*	88*	60
Hasegawa et al,[14] 2011	Magnifying chromoendoscopy	Stellar IIIL pit pattern and fernlike pit appearance	107	No statistically significant difference compared with TSA					
	Magnifying chromoendoscopy	Fernlike pit appearance	23	36	92	65*	80*	61*	
Kim et al,[15] 2011	Magnifying FICE	Absent or faint vascular patterns, diverse pit patterns	525	38.5					
Hazewinkel et al,[18] 2013	NBI	Cloudlike surface, indistinct borders, irregular shape, and dark spots inside crypts	150	89	96	93*	93*	93*	10
Kutsukawa et al,[16] 2014	Endocytoscopy	Starlike lumens for HP, oval lumens for SSA/Ps	39	83*	96*	92*	91*	93*	

PPV, Positive predictive value; *NPV*, negative predictive value; *NICE*, NBI International Colorectal Endoscopic Classification; *NBI*, narrow-band imaging; *DBVs*, dilated and branching vessels; *iDSs*, irregular dark spots; *Rt*, right sided; *ECOs*, expanded crypt openings; *TBVs*, thick and branched vessels; *AFI*, autofluorescence imaging; *VMVs*, varicose microvascular vessels; *TSA*, traditional serrated adenoma; *FICE*, Fuji Intelligent Color Enhancement; *HPs*, hyperplastic polyps; *SSA/Ps*, sessile serrated adenomas/polyps.
% NICE 2, % of SSPs NICE type 2/tubular adenoma appearance.
*This data is calculated from raw figures reported in the original studies.

BOX 1. Simplified strategy for optical biopsy of diminutive colorectal polyps: DISCARD-lite

- Proximal to rectosigmoid junction: all polyps are assumed premalignant, resect and discard.
- Distal to rectosigmoid: DISCARD strategy as per Preservation and Incorporation of Valuable Endoscopic Innovations, hyperplastic polyps left in situ.
- Surveillance interval: all proximal polyps plus distal polyps characterized as adenomas, interval as for an equivalent number of diminutive adenomas.

distinct subset of hyperplastic polyps called sessile serrated polyps [SSPs]. The concept that some benign "hyperplastic" polyps might be premalignant is potentially a serious problem for the DISCARD strategy because it proposes leaving some hyperplastic polyps in situ. Furthermore, SSPs also seem to predict future colorectal cancer risk, and their presence now changes surveillance intervals in the U.S. Multi-Society Taskforce on Colorectal Cancer 2012 guidelines.[9] Failure to differentiate them from hyperplastic polyps when deciding surveillance intervals as part of the DISCARD strategy potentially might lead to underuse of surveillance.

Therefore, the article by Yamada et al[10] in this issue of *Gastrointestinal Endoscopy* is of current interest. In this study, the authors present one of the largest series to date (n = 242) to try to differentiate SSPs from hyperplastic polyps by using specific features seen with magnified narrow-band imaging (NBI). This potentially offers a lifeline to the DISCARD strategy as currently envisioned. Various other authors have tried to make this differentiation in vivo