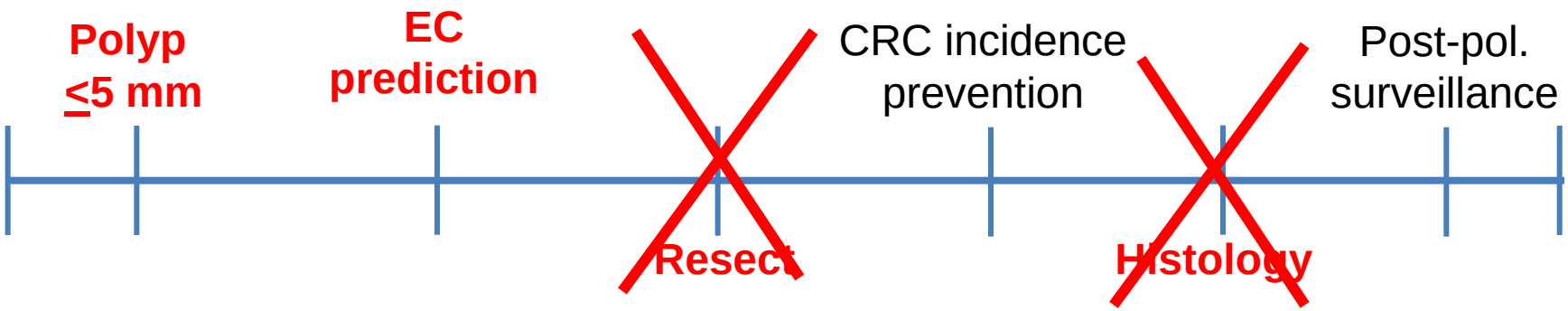
Diminutive polyps: are we ready to resect and discard?

- Who wins….

Diagnostic process

Uncertainty **Certainty**



Does the additional diagnostic value of

histological examination over **EC** prediction

justify its **costs/burden**?

Diminutive (≤5mm) polyps

Polyp Category	Diminutive	Small	Large	Total
Advanced adenomas	0.09%	0.5%	3.9%	4.5%
Non-advanced adenomas	14.4%	9.8%	-	24.2%
Non-adenomaotus polyps	12.2%	6.4%	2.0%	20.6%
-No polyps	-	-	-	50.7
Total	**26.7%**	16.7%	5.9%	100%

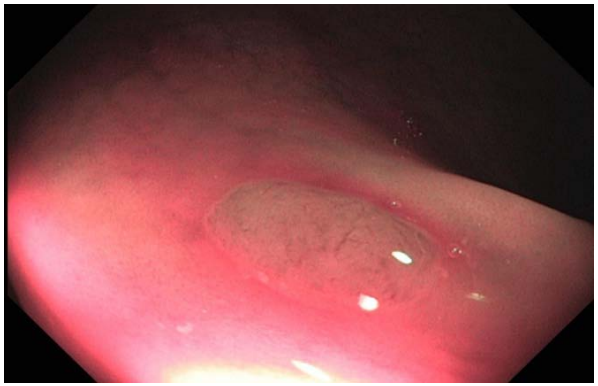
62% of all the polyps

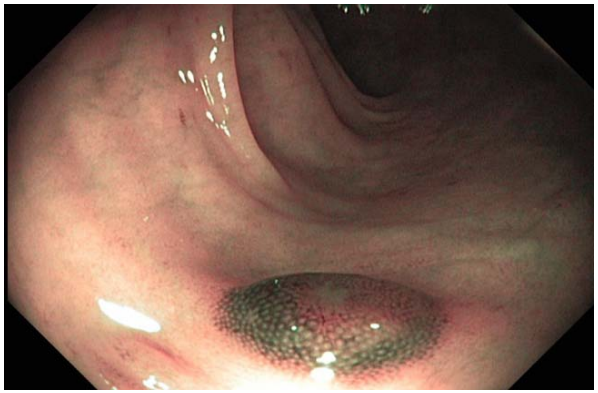
Substantial pathology **cost**

Delay in post-polyp. prescription

Electronic chromoendoscopy (EC)

EC allows to differentiate between adenomatous and non-adenomatous histotype…

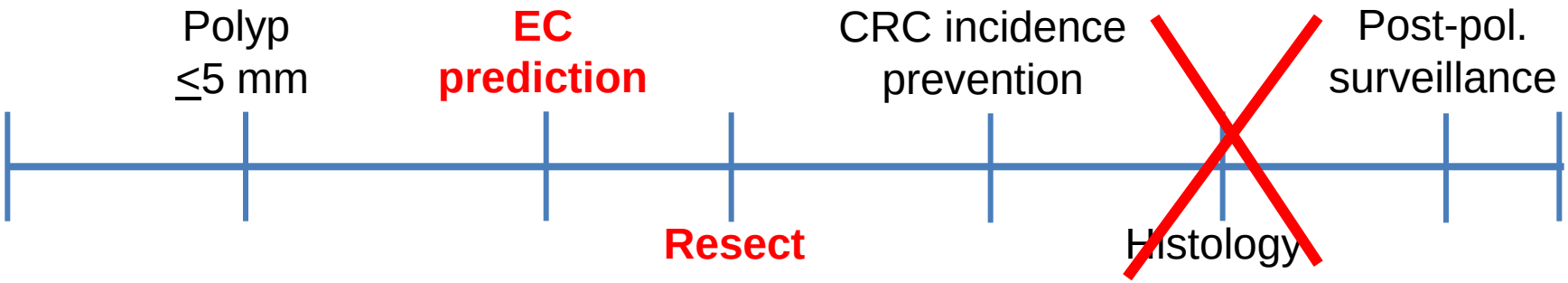




NICE Criterion	Type 1
Color	Same or lighter than background
Vessels	None, or isolated lacy vessels across the lesion
Surface pattern	Dark or white spots , absence of pattern
Likely pathology	**Non-adenomatous**

Proposed strategies

1) Characterize (with EC), Resect and Discard

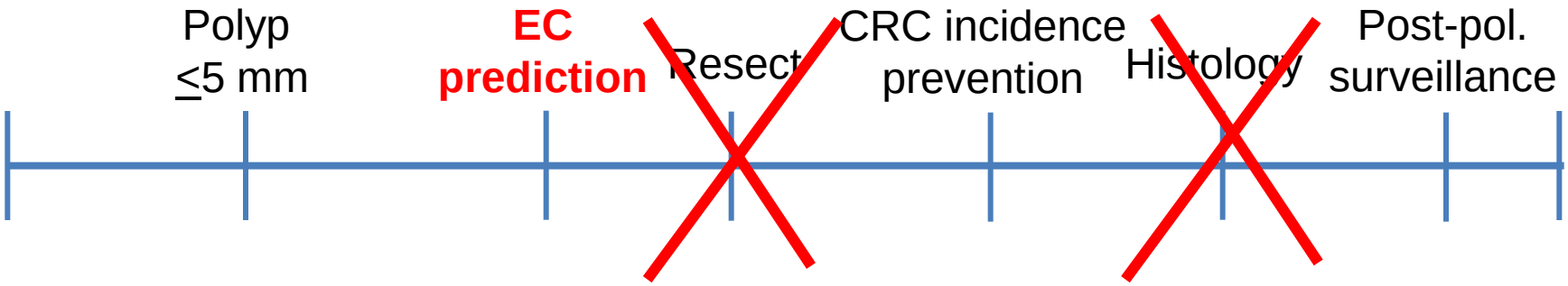


For all ≤5 mm proximal polyps

and distal adenomatous

Proposed strategies

2) Characterize (with EC), Not Resect and Discard



Only for non-neoplastic rectosigmoid ≤5 mm

Characterize (with EC), Resect and Discard

Why do we need post-polypectomy histological analysis?

To differentiate between:

1) Adenoma

a) **Advanced**
b) **Non-advanced**

2) Non-adenoma

a) **Hyperplastic**
b) **Non-hyperplastic serrated**

Characterize (with EC), Resect and Discard

Why do we need post-polypectomy histological analysis?

To differentiate between:

	Planned post-polypectomy surveillance
1) Adenoma	
a) Advanced	3 yrs.
b) Non-advanced	5-10 yrs.
2) Non-adenoma	
a) Hyperplastic	10 yrs.
b) Non-hyperplastic serrated	5 yrs.

[Liebermann et al, 2012]

Characterize (with EC), Resect and Discard

When passing from histology to EC…

	Planned
1) Adenoma	5-10 yrs.
a) Advanced	3 yrs.
b) Non-advanced	5-10 yrs.
2) Non-adenoma	10 yrs.
a) Hyperplastic	10 yrs.
b) Non-hyperplastic serrated	5 yrs.

BUT….

Characterize (with EC), Resect and Discard

-Only 0.9% of ≤5 mm polyps are advanced.

-No higher risk for metachronous advanced neoplasia after removal of ≤5 mm sessile serrated lesions.

Characterize (with EC), Resect and Discard

- EC-mis-classification implications:

	Planned	Prescribed
1) False negative=Adenoma as non-aden.	5-10 yrs.	10 yrs.

►Marginal risk by delayed surveillance

2) False positive=non-aden. as adenoma	10 yrs.	5-10 yrs.

►Anticipated surveillance in FALSE POSITIVES

►Useless duplication of the endoscopic test at 5 years.

Characterize (with EC), Resect and Discard

Author	Setting	N° polyps	Endoscopist	EC-Sensit.	EC-Specificity
Kuiper [79]	High	238	Experienced	87%	63%
Chiu [36]	Artificial	180	Experienced	84%	71%
Rastogi [63]	Screening/surveillance	123	Experienced	97%	86%
				86%	97%
Sikka [38]	Artificial	80	Inexperienced	95%	90%
Rogart [64]	Unselected	265	Inexperienced	80%	81%
Rex [19]	Unselected	451	Experienced	96%	92%
Tischendorf [56]	Artificial	100	Experienced	92%	89%
Buchner [65]	Unselected	119	Experienced	77%	71%
Ignjatovic [18]	High	278	Exp. And Inexp.	94%	89%
Henry [66]	Unselected	126	Experienced	93%	88%
Ignjatovic [67]	Artificial	630	Exp. And Inexp.	87%	84%
Ignjatovic ç [58]	Artificial	80	Experienced.	74%	56%
			Inexperienced	61%	32%
Rastogi [68]	Screening/surveillance	-	Experienced	90%	68%
Gupta [20]	Screening/surveillance	1,254	Experienced	94%	72%
Hewett [69]	Unselected	236	Experienced	98%	69%
Kuiper [70]	Unselected	108	Experienced	77%	79%
Hewett [29]	Screening/surveillance	235	Experienced	94%	98%
Paggi [72]	Unselected	511	Experienced	95%	66%
Longcroft-Wheaton [37]	Unselected	150	Experienced	83%§	82%§
				93%§§	81%§§
Ladabaum [71]	Unselected	2,596	Inexperienced	91%	40%

Characterize (with EC), Resect and Discard

ORIGINAL ARTICLE

Narrow band imaging to differentiate neoplastic and non-neoplastic colorectal polyps in real time: a meta-analysis of diagnostic operating characteristics

Sarah K McGill,[1] Evangelos Evangelou,[2] John P A Ioannidis,[3] Roy M Soetikno,[1] Tonya Kaltenbach[1]

Study characteristics	No. of studies (no. of polyps)	Summary estimates (95% CI)	
		Sens	Spec
All	28 (6280)	91.0 (87.6 to 93.5)	82.6 (79.0 to 85.7)
Published manuscripts	18 (3212)	91.7 (87.1 to 97.4)	84.5 (80.4 to 87.9)
High-confidence predictions[20–22 31 38–41]	8 (2146)	93.8 (90.1 to 96.2)	83.3 (77.1 to 88.1)
Polyps ≤5 mm[19 21 22 30 38 39]	7 (1942)	86.3 (78.4 to 91.7)	84.1 (75.5 to 90.1)
High-confidence predictions for polyps ≤5 mm[21 22 38–40]	5 (1350)	93.4 (87.4 to 96.7)	84.0 (76.6 to 89.3)
Exera	20 (5148)	89.4 (85.0 to 92.6)	81.6 (77.3 to 85.2)
Lucera	8 (1132)	94.0 (88.7 to 96.9)	86.0 (81.1 to 89.8)

Characterize (with EC), Resect and Discard

-Looking for a benchmark…

Communication from the ASGE Standards of Practice Committee

PRESERVATION AND INCORPORATION OF VALUABLE ENDOSCOPIC INNOVATIONS

ASGE

The American Society for Gastrointestinal Endoscopy PIVI (Preservation and Incorporation of Valuable Endoscopic Innovations) on real-time endoscopic assessment of the histology of diminutive colorectal polyps

1. In order for colorectal polyps ≤5 mm in size to be resected and discarded without pathologic assessment, endoscopic technology (when used with high confidence*) used to determine histology of polyps ≤5 mm in size, when combined with the histopathologic assessment of polyps >5 mm in size, should provide a ≥ 90% agreement in assignment of post-polypectomy surveillance intervals when compared to decisions based on pathology assessment of all identified polyps†.

Characterize (with EC), Resect and Discard

Author	**N° pts.**	**Experienced**	High/low confid.	**1° PIVI**
Rex et al.[19]	136	Experienced	Yes	**Yes**
Ignjatovic et al.[18]	130	Exp./Inexp.	Yes	**Yes**
Kuiper et al.[70]	308	Inexperienced	Yes	**No**
Paggi et al.[72]	286	Experienced	Yes	**No**
Ladabaum et al.[71]	1,673	Inexperienced	Yes	**No**
Repici et al.	212	Experienced	Yes	**Yes**

Characterize (with EC), Resect and Discard

1° PIVI - YES

ORIGINAL ARTICLE

Accuracy of narrow-band imaging in predicting colonoscopy surveillance intervals and histology of distal diminutive polyps: results from a multicenter, prospective trial

Alessandro Repici, MD,[1] Cesare Hassan, MD,[1] Franco Radaelli, MD,[2] Piero Occhipinti, MD,[3] Claudio De Angelis, MD,[4] Fabio Romeo, MD,[1] Silvia Paggi, MD,[2] Silvia Saenone, MD,[3] Fabio Cisarò, MD,[4] Manon Spaander, MD,[5] Prateek Sharma,[6] Ernst J Kuipers, MD, PhD[5]

Milan, Italy

Background: In vivo prediction of colorectal polyp histology by narrow-band imaging (NBI) could potentially avoid post-polypectomy histopathology examination of diminutive lesions, thereby reducing costs and risk.

Objective: To assess the accuracy of high-confidence NBI optical diagnosis for surveillance intervals and histology of distal diminutive polyps according to American Society for Gastrointestinal Endoscopy (ASGE) criteria.

Design: Prospective, multicenter study.

Setting: Five endoscopic centers.

Patients: Consecutive patients undergoing colonoscopy in 5 centers were included.

Intervention: Participating endoscopists were required to pass a before-study qualifying examination. Histology of polyps ≤5 mm were <10 mm was predicted at NBI and assigned a high confidence or low confidence.

Main ...≤5 mm in predicting surveillance intervals and histology in the rectosigmoid colon. NPV for adenomatous histology in the rectosigmoid colon were compared with the ASGE thresholds (90% agreement, 90% NPV).

Results: A total of 278 patients (mean age, 63 years; 58% male) were enrolled. At colonoscopy, 574 (97.3%) polyps <10 mm (429 ≤5 mm, 60% adenomatous) were retrieved for histologic analysis. Sensitivity, specificity, positive and negative predictive values, and accuracy of high-confidence NBI predictions for adenomatous histology in lesions ≤5 mm were 90%, 88%, 89%, 80%, and 86%, respectively. High-confidence characterization of polyps ≤5 mm predicted the correct surveillance interval in 92% to 99% of cases, according to the American and European guidelines. NPV of high-confidence NBI for adenomatous histology for the rectosigmoid location [illegible] mm was 9...

Limitations: ...

Conclusion: High-confidence prediction of histology for polyps ≤5 mm appears to be sufficiently accurate to avoid post-polypectomy histologic examination of the resected lesions as well as to allow rectosigmoid hyperplastic polyps to be left in place without resection. (Clinical trial registration number: NCT01675752.)
(Gastrointest Endosc 2013;xx:xxx.)

- **Experienced**
- **Sensitivity 90%**
- **Specificity 89%**

1° PIVI - NO

Real-Time Optical Biopsy of Colon Polyps With Narrow Band Imaging in Community Practice Does Not Yet Meet Key Thresholds for Clinical Decisions

URI LADABAUM,[1,2] ANN FIORITTO,[3] AYA MITANI,[2,4] MANISHA DESAI,[2,4] JANE P. KIM,[2,4] DOUGLAS K. REX,[5] THOMAS IMPERIALE,[5] and NARESH GUNARATNAM[3]

[1]Division of Gastroenterology and Hepatology, [2]Department of Medicine, and [4]Quantitative Sciences Unit, Stanford University School of Medicine, Stanford, California; [3]Huron Gastroenterology Associates, Ann Arbor, Michigan; and [5]Divison of Gastroenterology, Indiana University, Indianapolis, Indiana

BACKGROUND & AIMS: Accurate optical analysis of colorectal polyps (optical biopsy) could prevent unnecessary polypectomies or allow a "resect and discard" strategy with surveillance intervals determined based on the results of the optical biopsy; this could be less expensive than histopathologic analysis of polyps. We prospectively evaluated real-time optical biopsy analysis of polyps with narrow band imaging (NBI) by community-based gastroenterologists. **METHODS:** We first analyzed a computer-ized ... gastroenterologists (n = 12) that included real-time optical analysis of polyps in vivo, comparison of optical biopsy predictions to histopathologic analysis, and ongoing feedback on performance. **RESULTS:** Twelve of 13 subjects identified adenomas with >90% accuracy at the end of the computer study, and 3 of 12 subjects did so with accuracy ≥90% in the in vivo study. Learning curves showed considerable variation among ... confidence ... tified with mean (95% confidence interval [CI]) accuracy, sensitivity, specificity, and negative predictive values of 81% (73%–89%), 85% (74%–96%), 78% (66%–92%), and 91% (86%–97%), respectively. The adjusted odds ratio for high confidence as a predictor of accuracy was 1.8 (95% CI, 1.3–2.5). The agreement between surveillance recommendations informed by high-confidence NBI analysis of diminutive ... 88% ... **CONCLUSIONS:** ... evaluation ... optical biopsy analysis of polyps with NBI, only 25% of gastroenterologists assessed polyps with ≥90% accuracy. The negative predictive value for identification of adenomas, but not the surveillance interval agreement, met the American Society for Gastrointestinal Endoscopy–recommended thresholds for optical biopsy. Better results in community practice must be

Accurate endoscopic determination of the histology of colorectal polyps could prevent unnecessary polypectomies or allow a strategy in which all diminutive polyps are resected but "optical biopsy" informs surveillance recommendations, which could substantially decrease the costs related to histopathologic assessment of polyps. The American Society for Gastrointestinal Endoscopy (ASGE) Preservation and Incorporation of Valuable Endoscopic Innovations (PIVI) statement on this topic proposes that ... colorectal ... surveillance ... decisions based on pathologic assessment of all polyps and that, in order to not resect suspected diminutive rectosigmoid hyperplastic polyps, there should be ≥90% negative predictive value for adenomatous histology.[1] These thresholds reflect expert opinion informed by the reported degree of agreement on polyp histology between pathologists.[1]

Narrow ... uses narrow band light ... high ... ture and vasculature. ... mation ... group proposed the NBI International Colorectal Endoscopic (NICE) classification to distinguish adenomas from hyperplastic polyps.[2] Experts have achieved very high performance levels in optical diagnosis of polyp histology with NBI.[3–5] Several studies suggest that nonexperts can learn optical diagnosis with NBI ex vivo.[6–9] It remains to be shown whether the high levels of performance achieved by experts can be replicated in vivo in routine clinical practice by community-based gastroenterologists. ... performance ... evaluation of real-time ... biopsy of colorectal polyps with NBI by community-based gastroenterologists. An initial ex vivo study phase tested the impact of a computerized self-learning module on participants' optical biopsy skills based on photographs. A subsequent in vivo study phase evaluated prospectively a practice-based learning program. The pri-

- **Non-experienced**
- **Sensitivity 88%**
- **Specificity 44%**

Characterize (with EC), Resect and Discard

-Who wins….

….takes it all!

NO 1° PIVI = NO R&D

Characterize (with EC), Resect and Discard

Planned post-polypectomy surveillance

USA

1) Adenoma

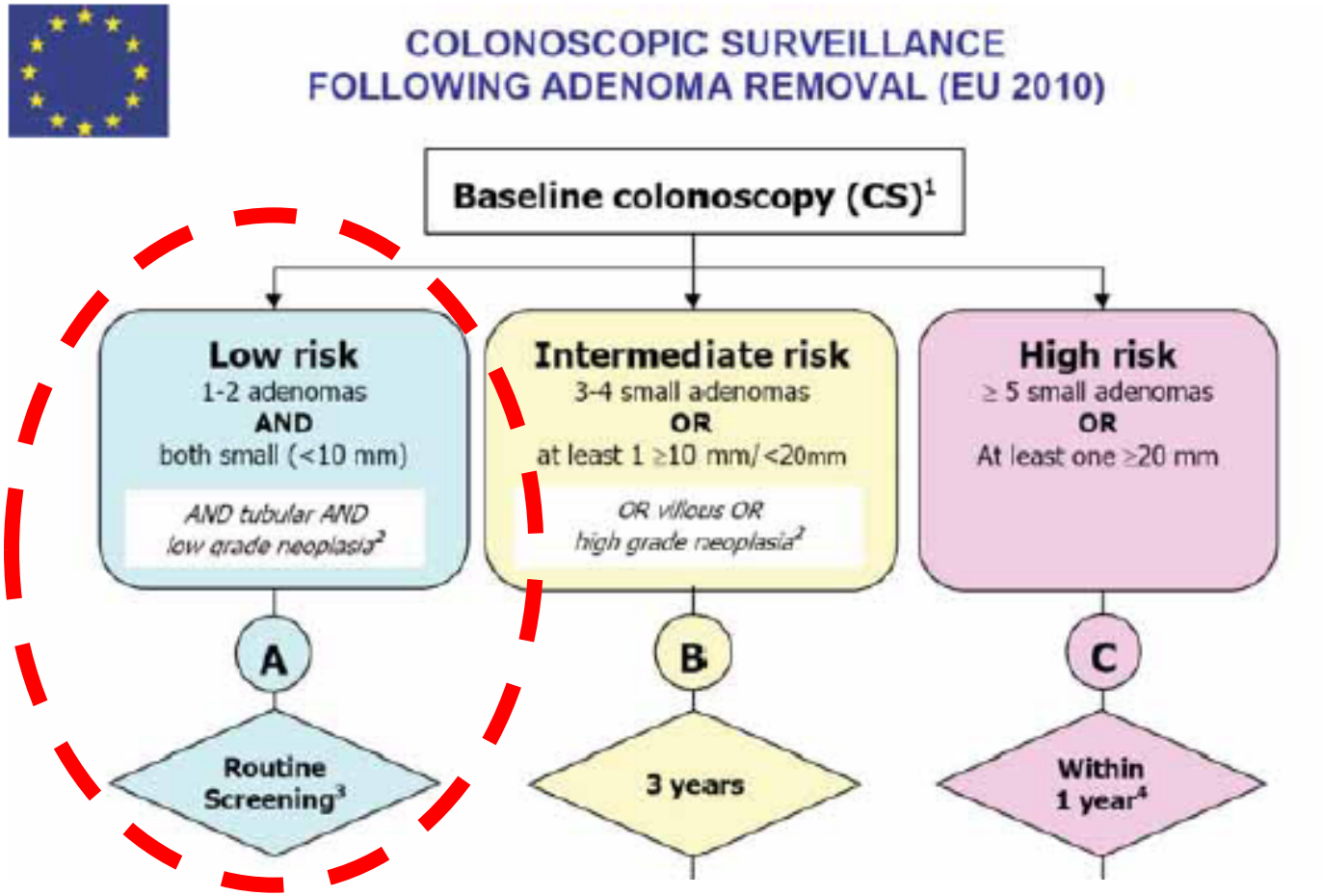
a) Advanced 3 yrs.

Recommendation. Data published since 2006 endorse the assessment that patients with 1–2 tubular adenomas with low-grade dysplasia <10 mm represent a low-risk group. Three new studies suggest that this group may have only a small, nonsignificant increase in risk of advanced neoplasia within 5 years compared with individuals with no baseline neoplasia.

2) N

[Lieberman et al, 2012]

Characterize (with EC), Resect and Discard



Characterize (with EC), Resect and Discard

	Planned post-polypectomy surveillance	
	USA	**Europe**
1) Adenoma		
a) Advanced	3 yrs.	10 yrs.
b) Non-advanced	5-10 yrs.	
2) Non-adenoma		
a) Hyperplastic	10 yrs.	10 yrs.
b) Non-hyperplastic se	5 yrs.	

[Liebermann et al, 2012 , Atkin et al. 2012]

Characterize (with EC), Resect and Discard

USA GL ⟷ **Europe GL**

Author	1° PIVI	1° PIVI
Rex et al.[19]	Yes	Yes
Ignjatovic et al.[18]	Yes	Yes
Kuiper et al.[70]	No	Yes
Paggi et al.[72]	No	Yes
Ladabaum et al.[71]	No	Yes
Repici et al.	Yes	Yes

YES!

Characterize (with EC), Not Resect and Discard

-Looking for a benchmark…

Communication from the ASGE Standards of Practice Committee

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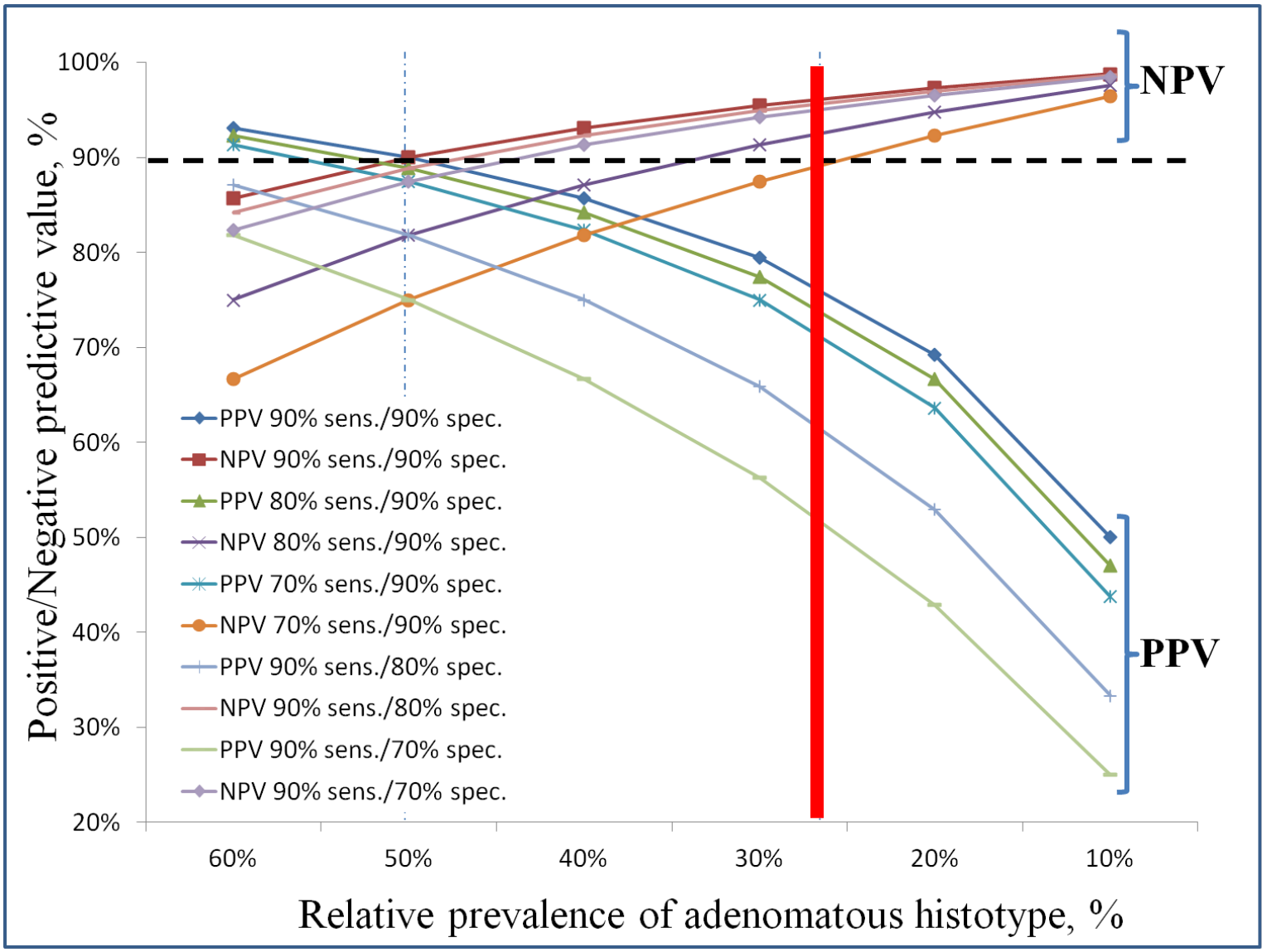
2. In order for a technology to be used to guide the decision to leave suspected rectosigmoid hyperplastic polyps ≤5 mm in size in place (without resection), the technology should provide ≥90% negative predictive value (when used with high confidence*) for adenomatous histology†.

Characterize (with EC), Not Resect and Discard

-Prevalence of disease and NPV



Characterize (with EC), Not Resect and Discard

Author	N° polyps	Experienced	High/low confidence	2° PIVI
Ignjatovic et al.[18]	278	Exp. and Inexp.	**Yes**	Yes
Gupta et al.[20]	1,254	Experienced	No	Yes
Hewett et al.[69]	236	Experienced	**Yes**	Yes
Hewett et al.[29]	235	Experienced	**Yes**	Yes
Ladabaum et al.[71]	2,596	Inexperienced	**Yes**	Yes
Repici et al.	204	Experienced	**Yes**	Yes

R&D: THE UNKNOWN KNOWNS

-Diminutive polyps generates a complex decision process, due to interaction between multiple histologies and available guidelines.

-Characterize/resect/discard feasible only with European GLs

-Characterize/not resect/discard already feasible, due to low prevalence rather than to high accuracy