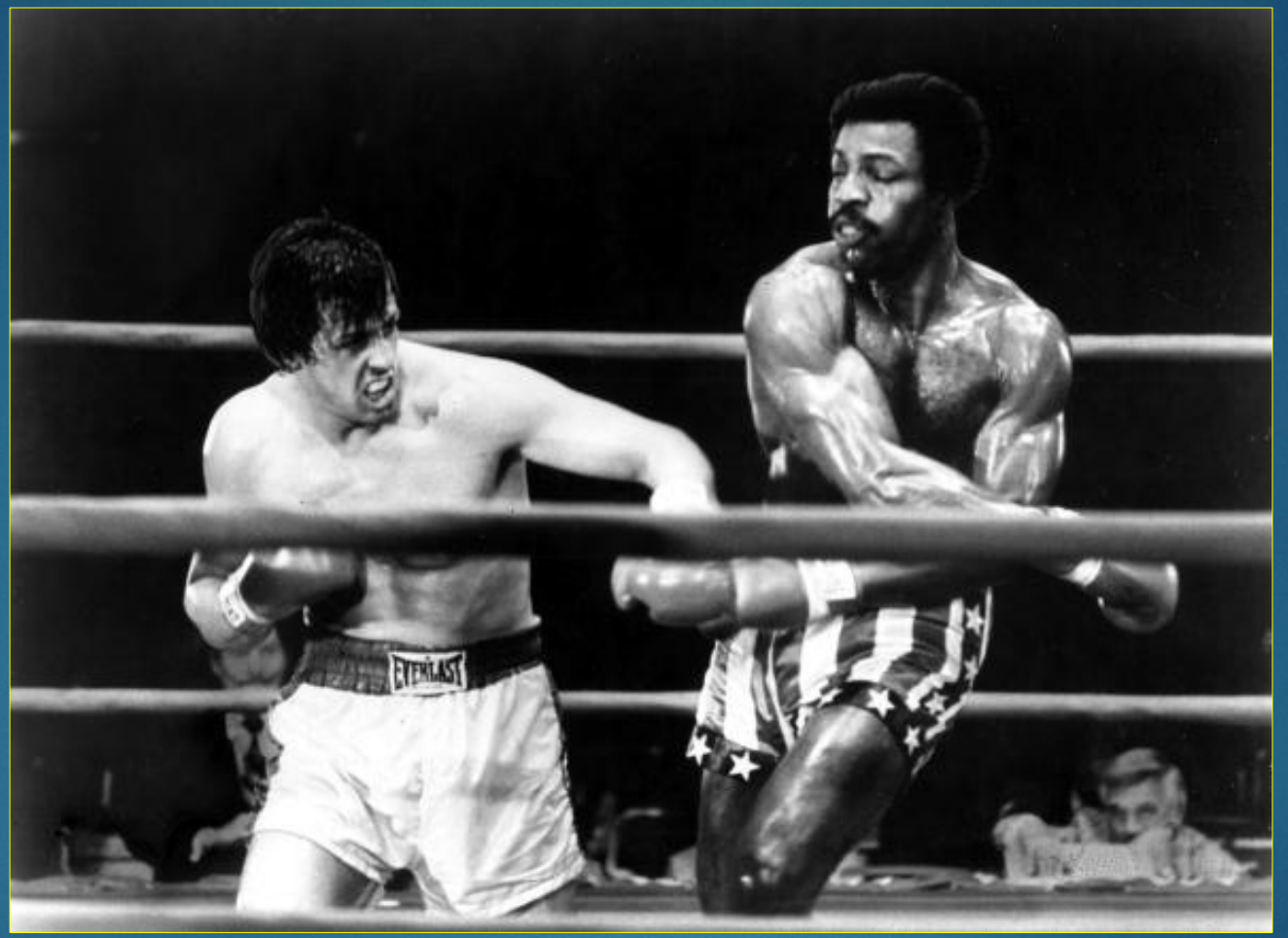
Endoscopic match: intelligenza artificiale, serve davvero?

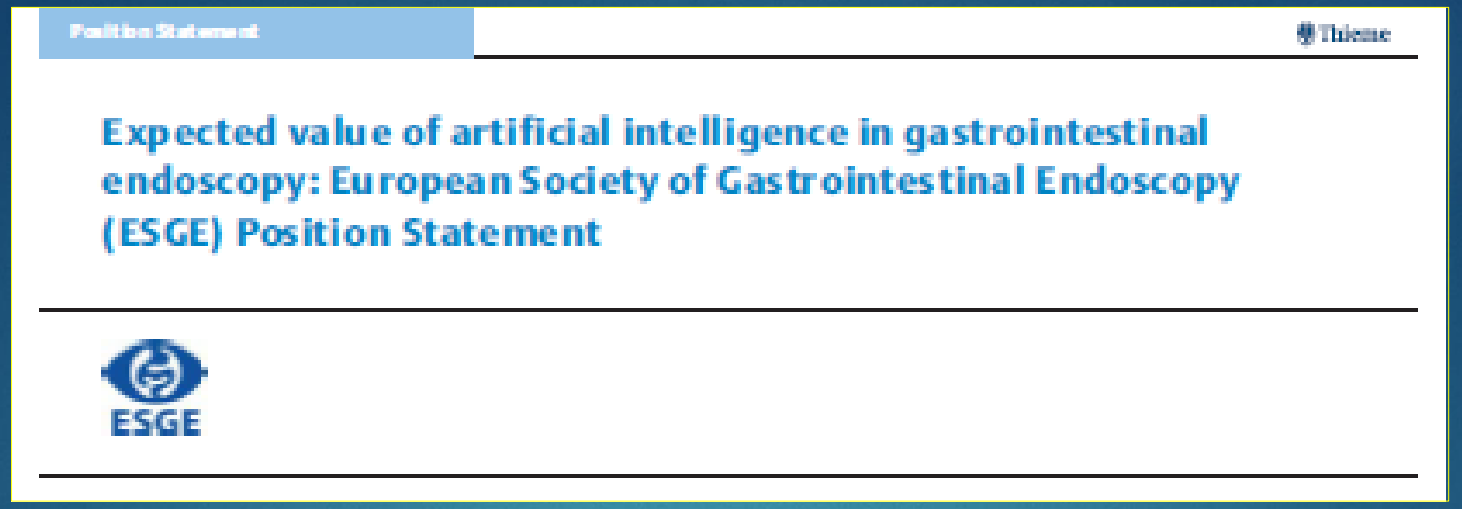


ALESSANDRO PEZZOLI

UOC DI GASTROENTEROLOGIA

AULSS5 POLESANA

Rovigo 17/5/2023



- "Because of the rapid completion and supply of AI systems by technology manufacturers, we may expect immediate implementation of AI by the endoscopy community before conclusive scientific evidence on its impact is available"

- "This expected value is also affected by the possible harms of AI, such as the consequences of false-positive results, or AI-related deskilling of endoscopists"

- " The general assumption is that AI implementation may standardize the quality metrics in community endoscopy, and thus, clinical rather than technical validation is preferentially addressed"

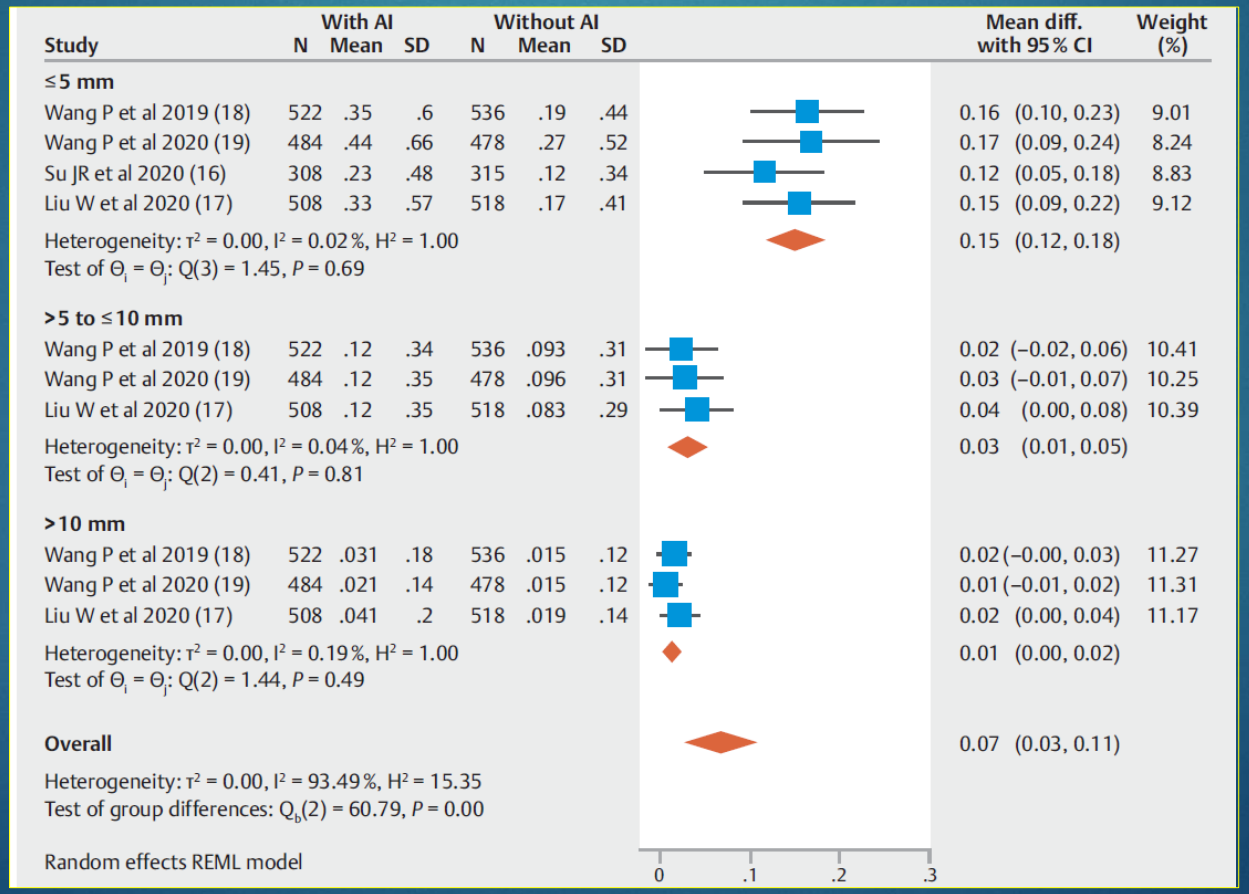
Helmut M et al. Endoscopy 2022; 54: 1211–1231

Thieme

Artificial intelligence for polyp detection during colonoscopy: a systematic review and meta-analysis

Authors

Ishita Barua[*,1], Daniela Guerrero Vinsard[*,2,3], Henriette C. Jodal[1], Magnus Løberg[1], Mette Kalager[1], Øyvind Holme[1], Masashi Misawa[4], Michael Bretthauer[1], Yuichi Mori[1,4]



Endoscopy 2021; 53: 277–284

SYSTEMATIC REVIEW AND META-ANALYSIS

Performance of artificial intelligence in colonoscopy for adenoma and polyp detection: a systematic review and meta-analysis

Cesare Hassan, MD, PhD, Marco,[1,*] Marco Spadaccini, MD,[2,3,*] Andrea Iannone, MD, PhD,[4] Roberta Maselli, MD, PhD,[2] Manol Jovani, MD,[5,6] Viveksandeep Thoguluva Chandrasekar, MD,[7] Giulio Antonelli, MD,[1] Honggang Yu, MD,[8] Miguel Areia, MD, PhD,[9] Mario Dinis-Ribeiro, MD,[10] Pradeep Bhandari, MD,[11] Prateek Sharma, MD, PhD,[7] Douglas K. Rex, MD,[12] Thomas Rösch, MD, PhD,[13] Michael Wallace, MD, PhD,[14] Alessandro Repici, MD[2,3]

Rome, Rozzano, Bari, Italy; Baltimore, Maryland; Boston, Massachusetts; Kansas City, Missouri; Indianapolis, Indiana; Jacksonville, Florida, USA; Wuhan, China; Coimbra, Porto, Portugal; Portsmouth, UK; Hamburg, Germany

TABLE 2. Adenoma detection subgrouped according to size, location, and morphology

	Adenoma <5 mm			Adenoma 6-9 mm			Adenoma ≥10 mm		
Reference	Control	CAD	*P* value	Control	CAD	*P* value	Control	CAD	*P* value
Wang et al[11]	102 (63.8)	185 (70.6)	<.05	50 (31.6)	61 (23.3)	ns	8 (5.0)	16 (6.1)	ns
Wang et al[21]	128 (71)	211 (75)	<.05	46 (25)	60 (21)	ns	7 (4)	10 (4)	ns
Repici et al[10]	164 (74.5)	234 (73.1)	<.05	28 (12.7)	55 (17.2)	<.05	28 (12.7)	31 (9.7)	ns
Liu et al[23]	89 (62.7)	166 (66.4)	<.05	43 (30.3)	63 (25.2)	ns	10 (7.0)	21 (8.4)	ns
Su et al[22]	37 (66.1)	72 (63.7)	<.05	\	\	\	\	\	\

Values are n (%).
CAD, Computer-aided diagnosis; *ns*, not statistically significant; \, not available.

Nessuna differenza nel withdrawall time

GIE 2021:93; 77-85

Efficacy of a computer-aided detection system in a fecal immunochemical test-based organized colorectal cancer screening program: a randomized controlled trial (AIFIT study)

Authors
Emanuele Rondonotti[1], Dhanai Di Paolo[1,2], Erik Rosa Rizzotto[3], Costanza Alvisi[4], Elisabetta Buscarini[5], Marco Spadaccini[6,7], Giacomo Tamanini[1], Silvia Paggi[1], Arnaldo Amato[1], Giulia Scardino[1], Samanta Romeo[5], Saverio Alicante[5], Fabio Ancona[3], Ennio Guido[3], Vincenza Marzo[4], Fabio Chicco[4], Simona Agazzi[4], Cesare Rosa[4], Loredana Correale[6], Alessandro Repici[6,7], Cesare Hassan[6,7], Franco Radaelli[1], on behalf of the AIFIT Study Group

Endoscopy2022:54;1171-79

▶ **Table 2** Adenoma detection rate according to polyp features.

Outcome measure	CADe-assisted colonoscopy, n (%)	HD-WL colonoscopy, n (%)	RR, 95%CI
At least one diminutive (≤ 5 mm) adenoma	170 (42.0)	131 (33.2)	1.266 (1.056–1.517)
At least one small (6–9 mm) adenoma	64 (15.8)	53 (13.4)	1.178 (0.841–1.649)
At least one large (≥ 10 mm) adenoma	64 (15.8)	57 (14.4)	1.109 (0.799–1.539)
At least one polypoid adenoma	180 (44.4)	142 (35.9)	1.236 (1.042– 1.467)
At least one nonpolypoid adenoma	52 (12.8)	46 (11.6)	1.102 (0.760– 1.599)
At least one proximal adenoma	139 (34.3)	113 (28.6)	1.199 (0.976–1.474)
At least one distal adenoma	146 (36.0)	117 (29.6)	1.217 (0.997–1.486)

CADe, computer-aided detection; HD-WL, high definition white light; RR, relative risk.

Risk of CRC and small adenomas

- "An important clinical concept is the "advanced" adenoma, defined as a lesion 1 cm in size or having high-grade dysplasia or villous elements.3 Because nonadvanced adenomas have a very low prevalence of cancer and a long adenoma–cancer sequence, screening tests can remain useful if they target cancer and advanced adenomas and not small adenomas" (1)

- Diminutive colorectal polyps have a negligible risk of harboring cancer (2-3)

1 Rex D et al Gastroenterology 2017;153:307–323
2 Dekker E et al Endoscopy 2020:52;899-923
3 Pickhardt PJ Am J Roentgenol 2009;193:40-46

Gastroenterology 2021;160:1986–1996

Risk of Colorectal Cancer and Cancer Related Mortality After Detection of Low-risk or High-risk Adenomas, Compared With No Adenoma, at Index Colonoscopy: A Systematic Review and Meta-analysis

Abhiram Duvvuri,[1,*] **Viveksandeep Thoguluva Chandrasekar**,[1,*] Sachin Srinivasan,[1] Anvesh Narimiti,[2] ChandraShekhar Dasari,[3] Venkat Nutalapati,[1] Kevin F. Kennedy,[3] Marco Spadaccini,[4] Giulio Antonelli,[5] Madhav Desai,[3] Prashanth Vennalaganti,[3] Divyanshoo Kohli,[3] Michal F. Kaminski,[6] Alessandro Repici,[4] Cesare Hassan,[7] and Prateek Sharma[3]

Incidence of CRC
3,4/10.000/yrs no adenomas
4,5/10.000/yrs LRD

3a

Study or Subgroup	LRA Events	LRA Total	No adenoma Events	No adenoma Total	Weight	Odds Ratio M-H, Random, 95% CI	Year
Chung 2011	0	3020	0	5837		Not estimable	2011
Chiu 2015	0	4605	3	16285	0.8%	0.51 [0.03, 9.78]	2015
Wieszczy 2020	58	188406	309	1379608	85.4%	1.37 [1.04, 1.82]	2020
Lee 2020	6	26351	30	133848	8.7%	1.02 [0.42, 2.44]	2020
Liberman 2020	5	5590	7	9320	5.1%	1.19 [0.38, 3.75]	2020
Total (95% CI)		**227972**		**1544898**	**100.0%**	**1.32 [1.02, 1.71]**	
Total events	69						

Odds Ratio M-H, Random, 95% CI

Heterogeneity: Tau² = 0.00; Chi² = 0.8
Test for overall effect: Z = 2.09 (P = 0.0

4a

Study or Subgroup	LRA Events	LRA Total	No adenoma Events	No adenoma Total	Weight	Odds Ratio M-H, Random, 95% CI	Year
Click 2018	9	67440	13	119775	23.7%	1.23 [0.53, 2.88]	2018
Lee 2020	3	81237	22	348696	11.8%	0.59 [0.18, 1.96]	2020
Wieszczy 2020	17	188406	98	1379608	64.5%	1.27 [0.76, 2.13]	2020
Total (95% CI)		**337083**		**1848079**	**100.0%**	**1.15 [0.76, 1.74]**	
Total events	29		133				

Odds Ratio M-H, Random, 95% CI

Heterogeneity: Tau² = 0.00; Chi² = 1.38, df = 2 (P = 0.50); I² = 0%
Test for overall effect: Z = 0.66 (P = 0.51)

0.01 0.1 1 10 100
CRC-mort [No adenoma] CRC-mort [LRA]

Original article

Thieme

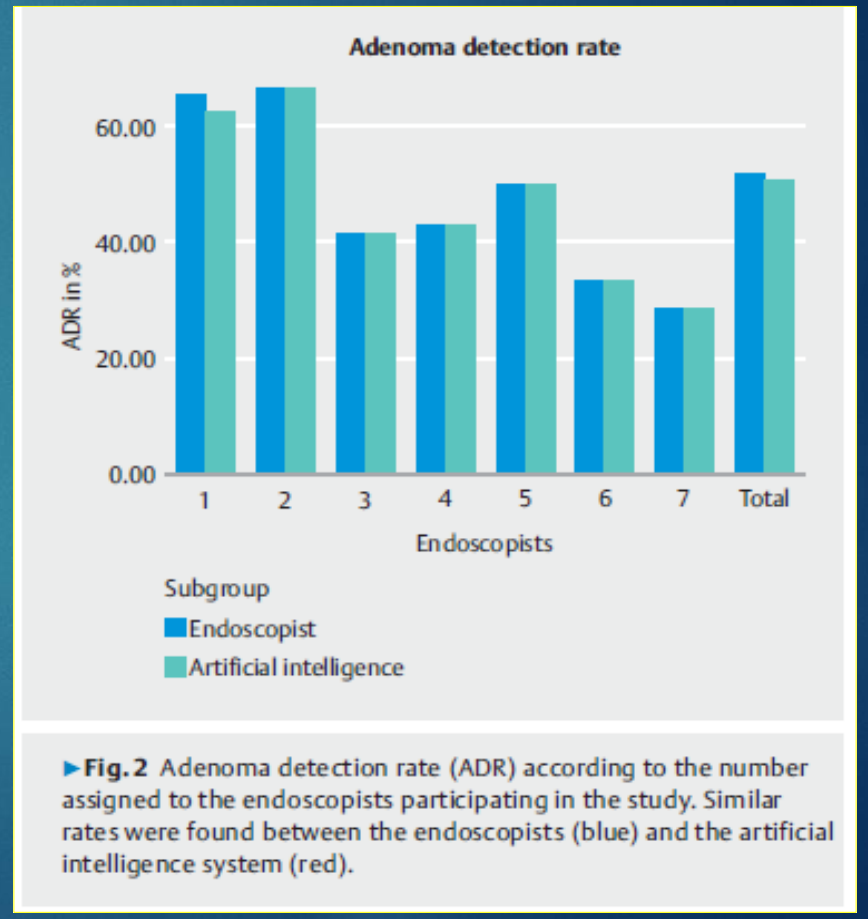
Diagnostic accuracy of a novel artificial intelligence system for adenoma detection in daily practice: a prospective non-randomized comparative study

Zippelius C et al Endoscopy 2022:54:465-72

AMR: AI 3% vs 2% per endoscopisti

PMR: AI 4.5% vs 5.5% per endoscopisti

ADR: AI 50.7% vs 52.0% per endoscopisti



►**Fig. 2** Adenoma detection rate (ADR) according to the number assigned to the endoscopists participating in the study. Similar rates were found between the endoscopists (blue) and the artificial intelligence system (red).

Artificial intelligence-assisted optical diagnosis for the resect-and-discard strategy in clinical practice: the Artificial intelligence BLI Characterization (ABC) study

Authors
Emanuele Rondonotti[1,*], Cesare Hassan[2,*], Giacomo Tamanini[1], Giulio Antonelli[2,3], Gianluca Andrisani[4], Giovanni Leonetti[2,5], Silvia Paggi[1], Arnaldo Amato[1], Giulia Scardino[1], Dhanai Di Paolo[1,6], Giovanna Mandelli[1], Nicoletta Lenoci[1], Natalia Terreni[1], Alida Andrealli[1], Roberta Maselli[7,8], Marco Spadaccini[7,8], Piera Alessia Galtieri[8], Loredana Correale[2], Alessandro Repici[7,8], Francesco Maria Di Matteo[4], Luciana Ambrosiani[9], Emanuela Filippi[9], Prateek Sharma[10,11], Franco Radaelli[1]

Endoscopy 2023:55;14-22

▶ **Table 2** Accuracy parameters (95%CIs) for optical diagnosis of diminutive rectosigmoid polyps at each step of the optical diagnosis process.

	Optical diagnosis process*		
	Endoscopist alone (step one)	AI alone (step two)	AI assisted (step three)
Sensitivity	88.6% (83.6%–92.2%)	81.9% (76.2%–86.5%)	88.6% (83.7%–91.4%)
Specificity	88.8% (84.5%–91.9%)	88.7% (84.4%–91.9%)	88.1% (83.9%–91.4%)
Positive predictive value	86.1% (80.8%–90.0%)	84.4% (78.8%–88.7%)	85.1% (79.8%–89.1%)
Negative predictive value	90.9% (86.8%–93.7%)	86.7% (82.3%–90.1%)	91.0% (87.1%–93.9%)
Accuracy	88.7% (85.7%–91.2%)	85.8% (82.5%–88.6%)	88.4% (85.3%–90.9%)

AI, artificial intelligence.
* No statistically significant differences were found on comparison of each accuracy parameter for the three steps of optical diagnosis ($P > 0.05$ for each comparison).

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DOI: 10.14309/ajg.0000000000002282

Real-World Validation of a Computer-Aided Diagnosis System for Prediction of Polyp Histology in Colonoscopy: A Prospective Multicenter Study

James Weiquan LI[1,2], M.D..; Clement Chun Ho WU[2,3],M.D.; Jonathan Wei Jie

Subgroup and Model	Sensitivity		Specificity		Accuracy		PPV		NPV	
	n (%)	95% CI	n (%)	95% CI	n (%)	95% CI	n (%)	95% CI	n (%)	95% CI
All Polyps (n=661)										
CADx	252/408 (61.8)*	56.9 to 66.5	221/253 (87.4)*	82.6 to 91.2	473/661 (71.6)*	68.0 to 75.0	252/284 (88.7)	84.5 to 92.2	221/377 (58.6)	53.5 to 63.6
Endoscopists	287/408 (70.3)	65.7 to 74.7	210/253 (83.0)	77.8 to 87.4	497/661 (75.2)	71.7 to 78.4	287/330 (87.0)	82.9 to 90.4	210/331 (63.4)	58.0 to 68.6
Polyp Size										
Diminutive (≤5mm) polyps (n=507)										
CADx	148/276 (53.6)*	47.5 to 59.6	206/231 (89.2)	84.4 to 92.9	354/507 (69.8)*	65.6 to 73.8	148/173 (85.5)	79.4 to 90.4	206/334 (61.7)	56.2 to 66.9
Endoscopists	173/276 (62.7)	56.7 to 68.4	200/231 (86.6)	81.5 to 90.7	373/507 (73.6)	69.5 to 77.4	173/204 (84.8)	79.1 to 89.4	200/303 (66.0)	60.4 to 71.3
Small (6-9mm) polyps (n=109)										
CADx	64/88 (72.7)*	62.2 to 81.7	14/21 (66.7)	43.0 to 85.4	78/109 (71.6)	62.1 to 79.8	64/71 (90.1)	80.7 to 95.9	14/38 (36.8)	21.8 to 54.0
Endoscopists	74/88 (84.1)	74.8 to 91.0	10/12 (47.6)	25.7 to 70.2	84/109 (77.1)	68.0 to 84.6	74/85 (87.1)	78.0 to 93.4	10/24 (41.7)	22.1 to 63.4
Large (≥10mm) polyps (n=45)										
CADx	40/44 (90.9)	78.3 to 97.5	1/1 (100)	2.5 to 100	41/45 (91.1)	78.8 to 97.5	40/40 (100)	91.2 to 100	1/5 (20)	0.5 to 71.6
Endoscopists	40/44 (90.9)	78.3 to 97.5	0/1 (0)	0 to 97.5	40/45 (88.9)	75.9 to 96.3	40/41 (97.6)	87.1 to 99.9	0/4 (0)	0 to 60.2

E-Videos

Thieme

Flat colorectal adenocarcinoma: a worrisome false negative of artificial intelligence-assisted colonoscopy

Endoscopy 2022;54;1122

Conclusions

- *AI icreases the ADR of small polyps*
- *The accuracy of AI in distinguiscing neoplastic from non-neoplastic polyps is still under study*
- *The endoscopist is still responsable for the incorporation of AI information into clinical practice*