

CORSO INTERREGIONALE A.I.G.O.

LA NUOVA GASTROENTEROLOGIA

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MARCHE
TOSCANA

RIMINI

18-19 MARZO 2022



**A.I. nelle lesioni del colon:
l'interesse del **paziente****

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UOC di Gastroenterologia ed Endoscopia Digestiva
ASST CREMA

INTELLIGENZA ARTIFICIALE

Collected training data

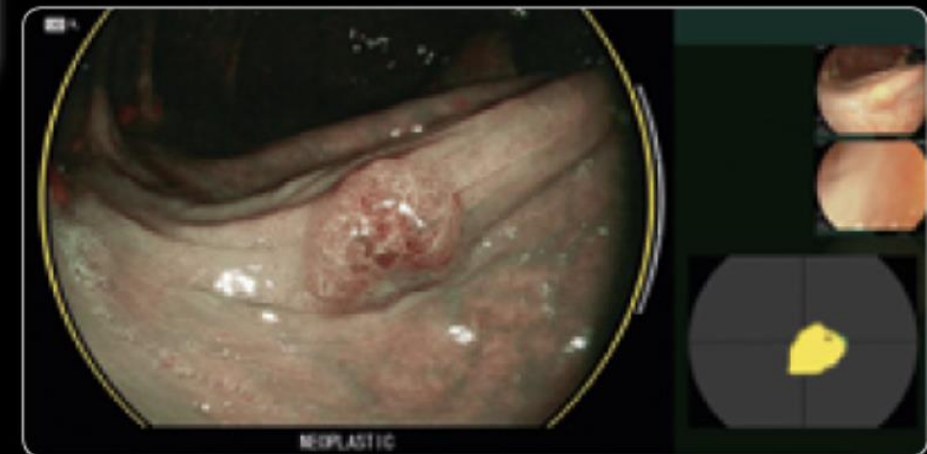
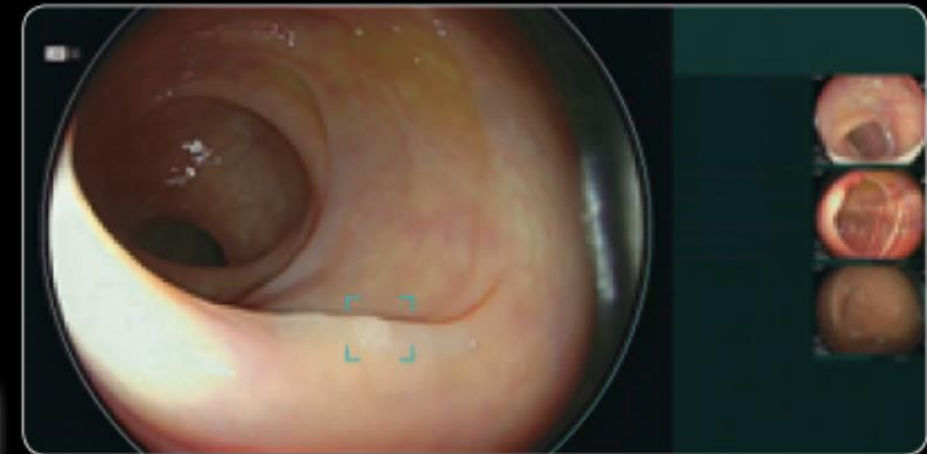


Deep learning

REILI Medical AI Technology

CADEYE

Detection & marking of polyps by CADEYE



Characterisation of polyps by CADEYE



Surface Morphology

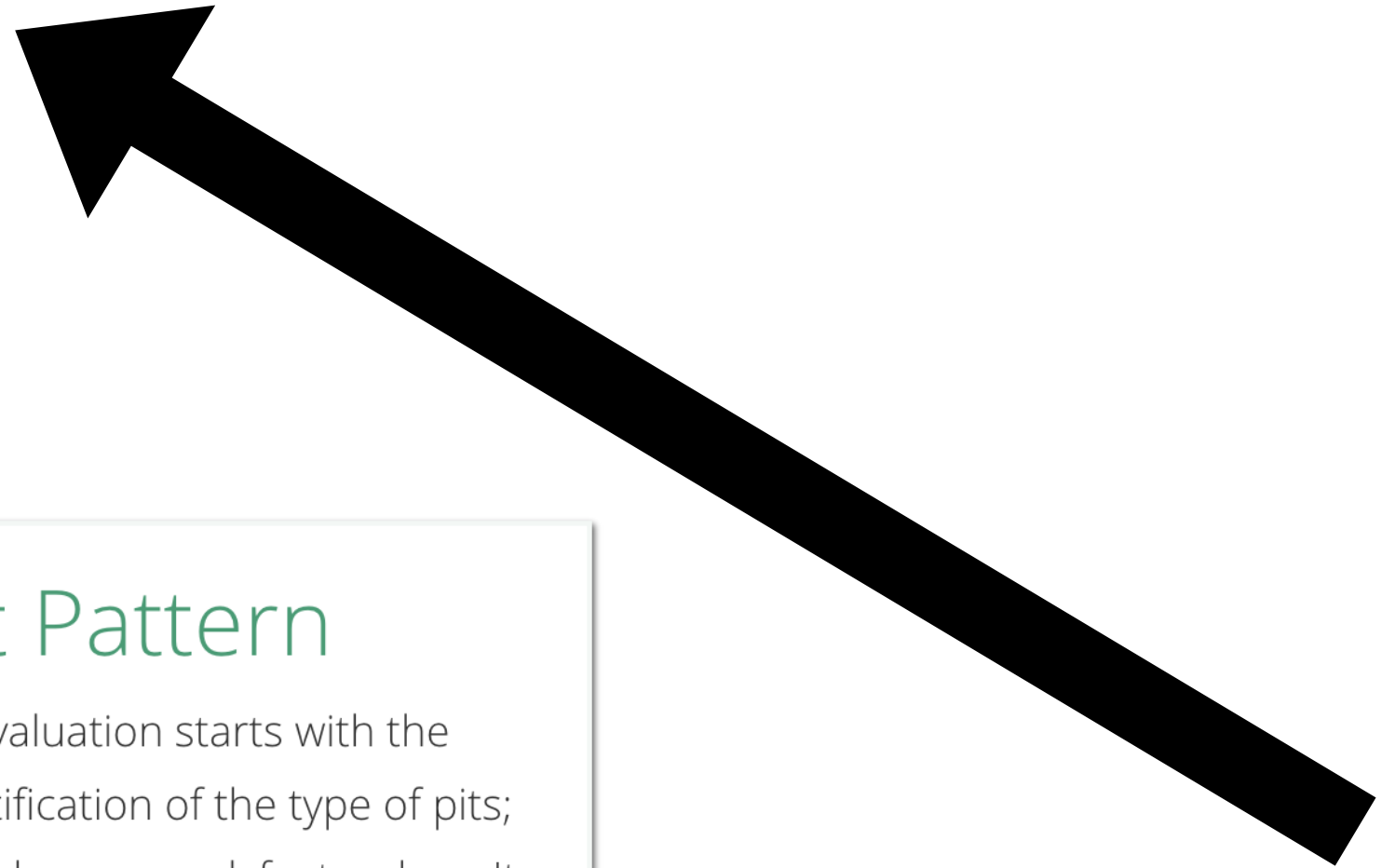
This applies to the overall surface appearance of the polyp and not the pit pattern. The surface can be regular or irregular with no, a true or a pseudo depression.

Pit Pattern

Pit evaluation starts with the identification of the type of pits; round, nonround, featureless. It also evaluates the distribution of pits, as homogenous or heterogenous.

Vessel Pattern

Vessel pattern evaluation starts with presence or absence of vessels. When vessels present, they are categorised as lacy, pericryptal or irregular.



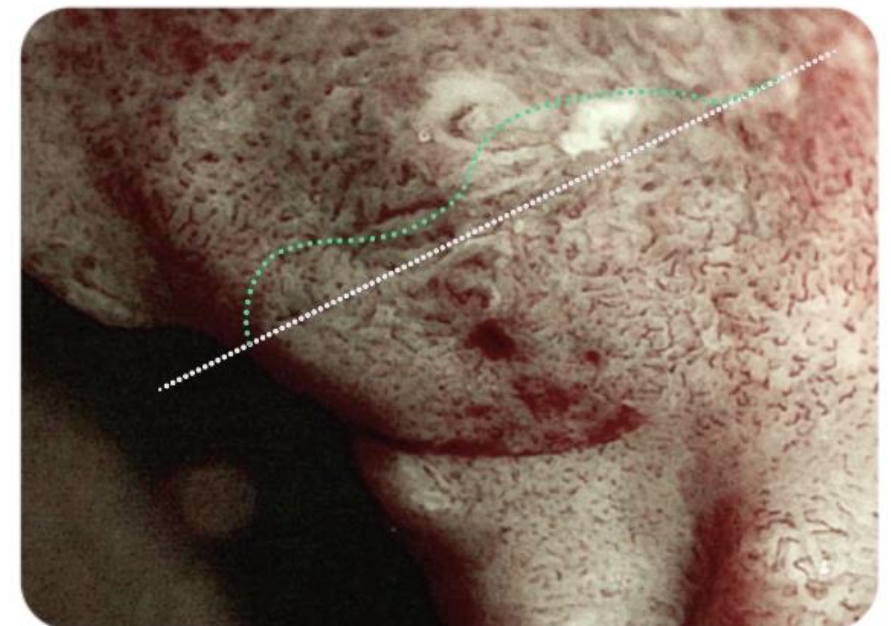
Surface Morphology

This applies to the overall surface appearance of the polyp and not the pit pattern. The surface can be regular or irregular with no, a true or a pseudo depression.

presence of true depression



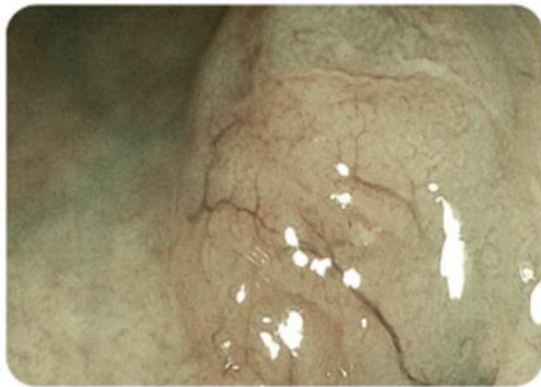
presence of pseudo-depression



Vessel Pattern

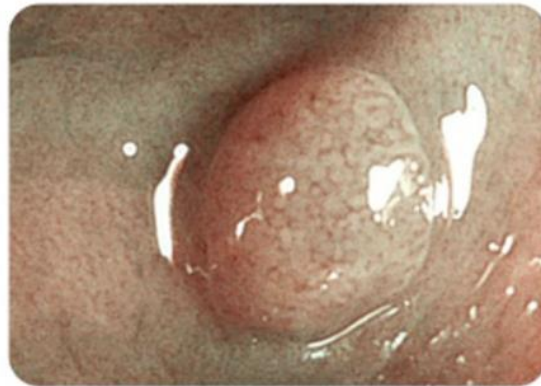
Vessel pattern evaluation starts with presence or absence of vessels. When vessels present, they are categorised as lacy, pericryptal or irregular.

lacy



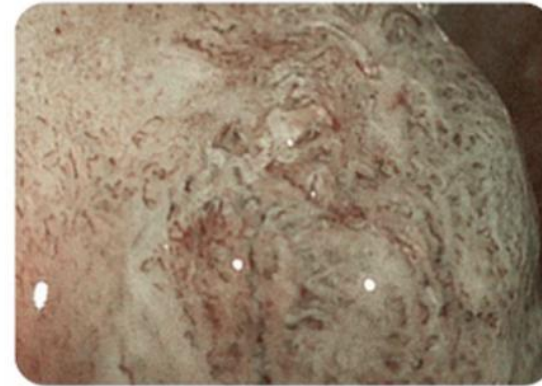
lacy vessels (histological report: hyperplastic)

continuous pericryptal



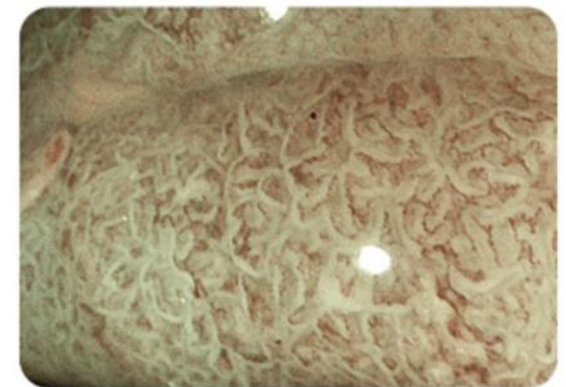
continuous pericryptal vessels (histological report: adenoma; lgd)

non-continuous pericryptal



non-continuous pericryptal vessels (histological report: adenoma; hgd)

irregular

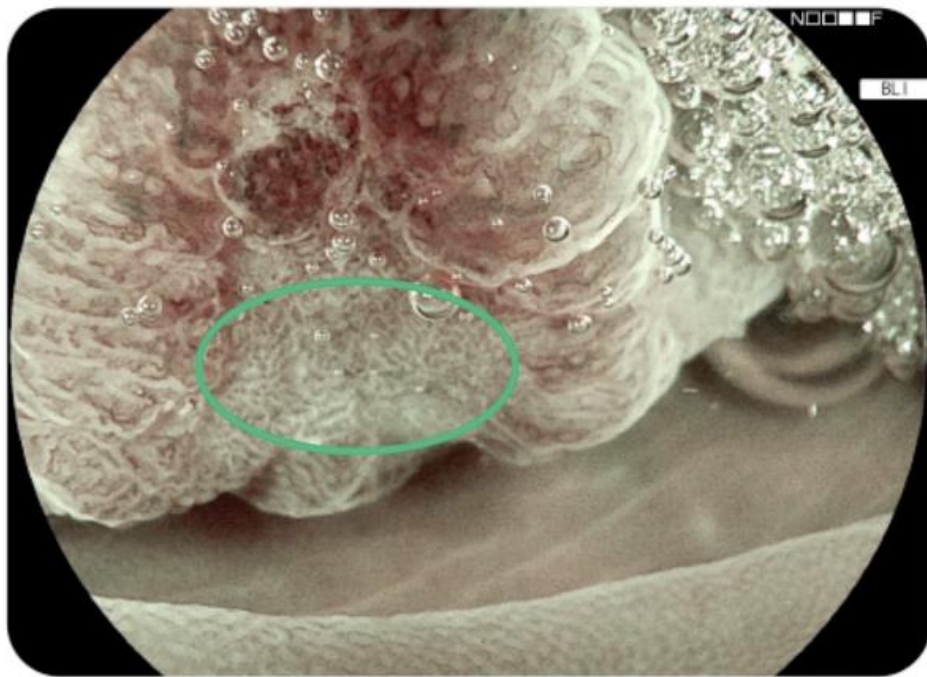


irregular vessels (histological report: cancer)

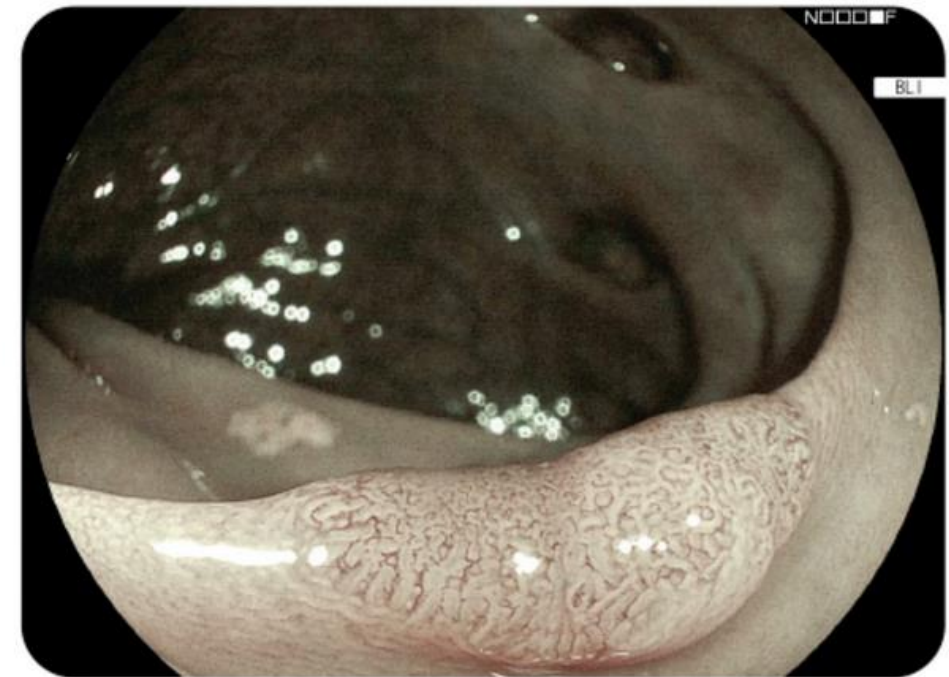
Pit Pattern

Pit evaluation starts with the identification of the type of pits; round, nonround, featureless. It also evaluates the distribution of pits, as homogenous or heterogenous.

Yes, there is a focal loss.



No, there is no focal loss.



BASIC CLASSIFICATION

Adenoma

Non-Adenoma

Major Criteria

- Pit type: non-round
- Vessel type: pericryptal (non-continuous)

Major Criteria

- Pits visibility: yes, clear pits
- Pit Type: round dark
- Vessel Type: no vessels or lacy

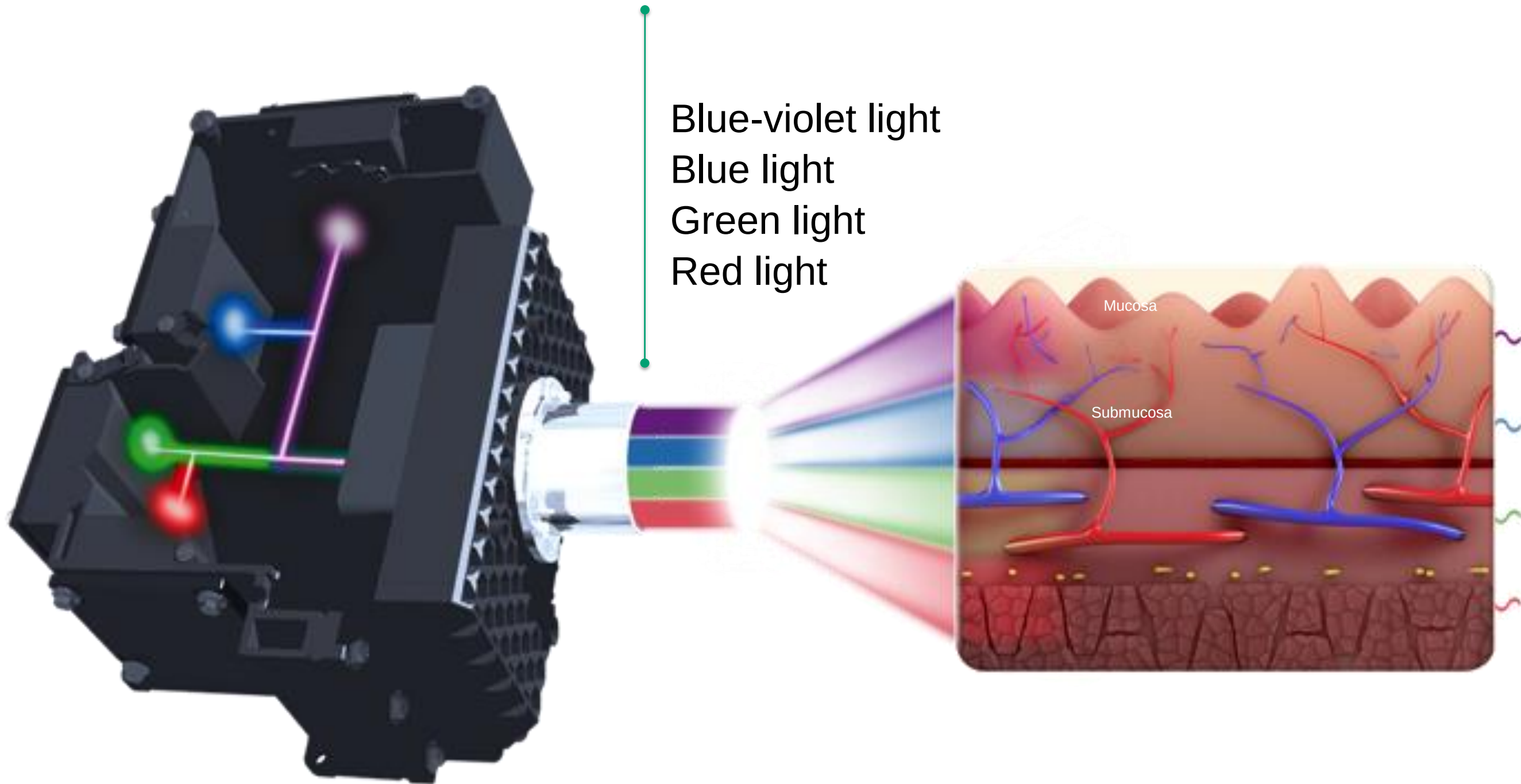
Minor Criteria

- Surface: irregular
- Pit distribution: heterogenous (irregular in size and combination)

Minor Criteria

- Mucus: yes
- Surface: regular
- Pit Distribution: homogenous
- Vessel Type: continuous pericryptal

■ Multilight™ Technology

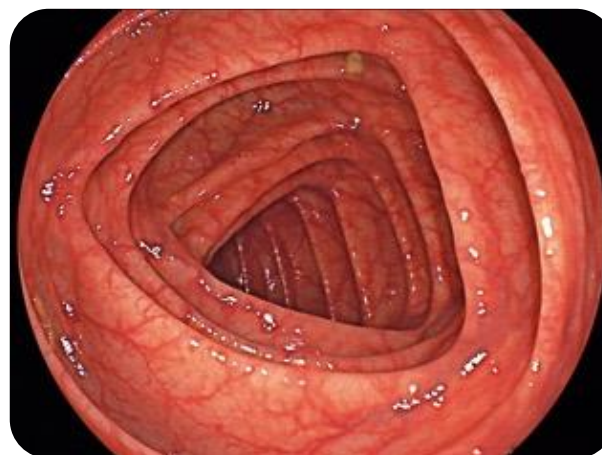
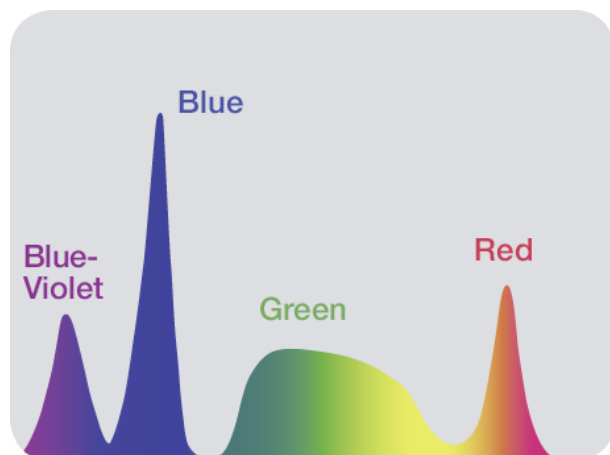
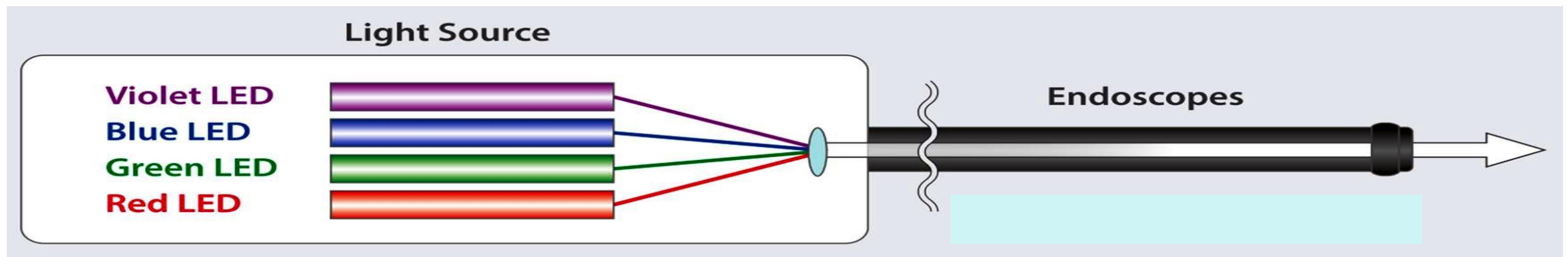


Blue-violet light
Blue light
Green light
Red light

Mucosa

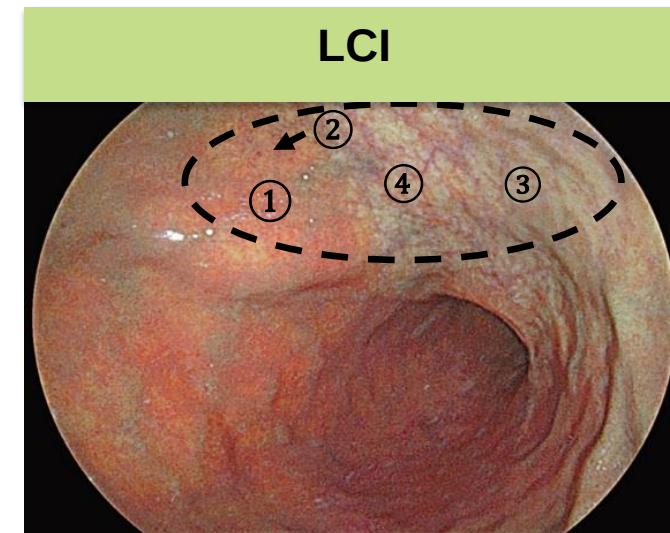
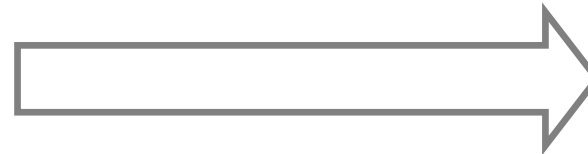
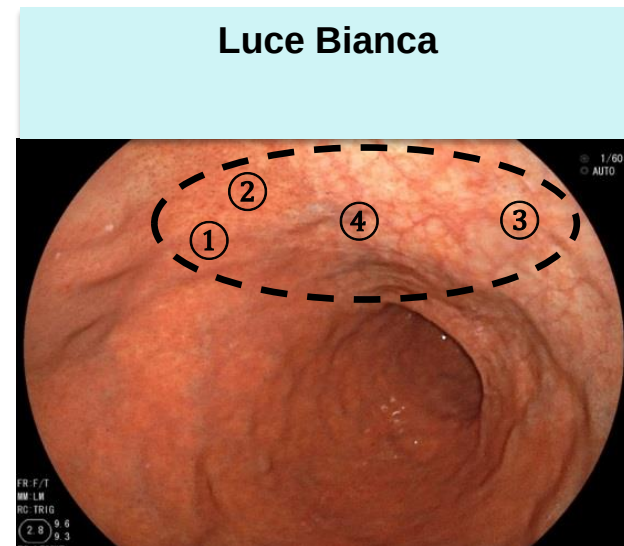
Submucosa

■ Luce Bianca

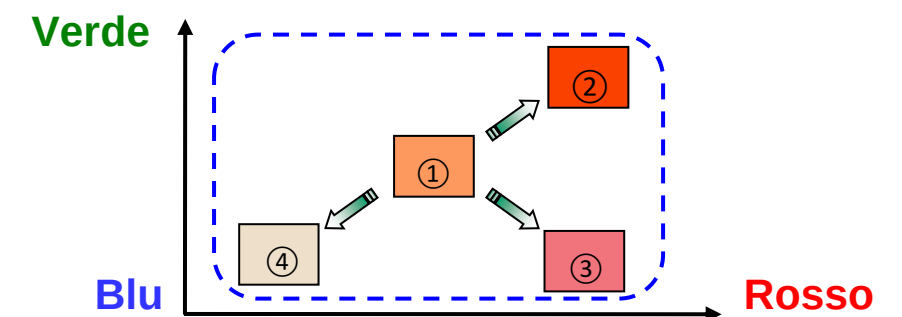
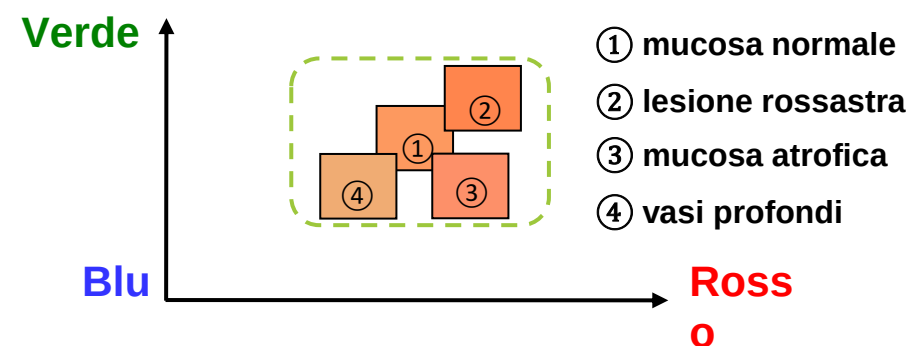


Focus: luce più naturale e migliore visibilità delle strutture

■ Linked Color Imaging (LCI)



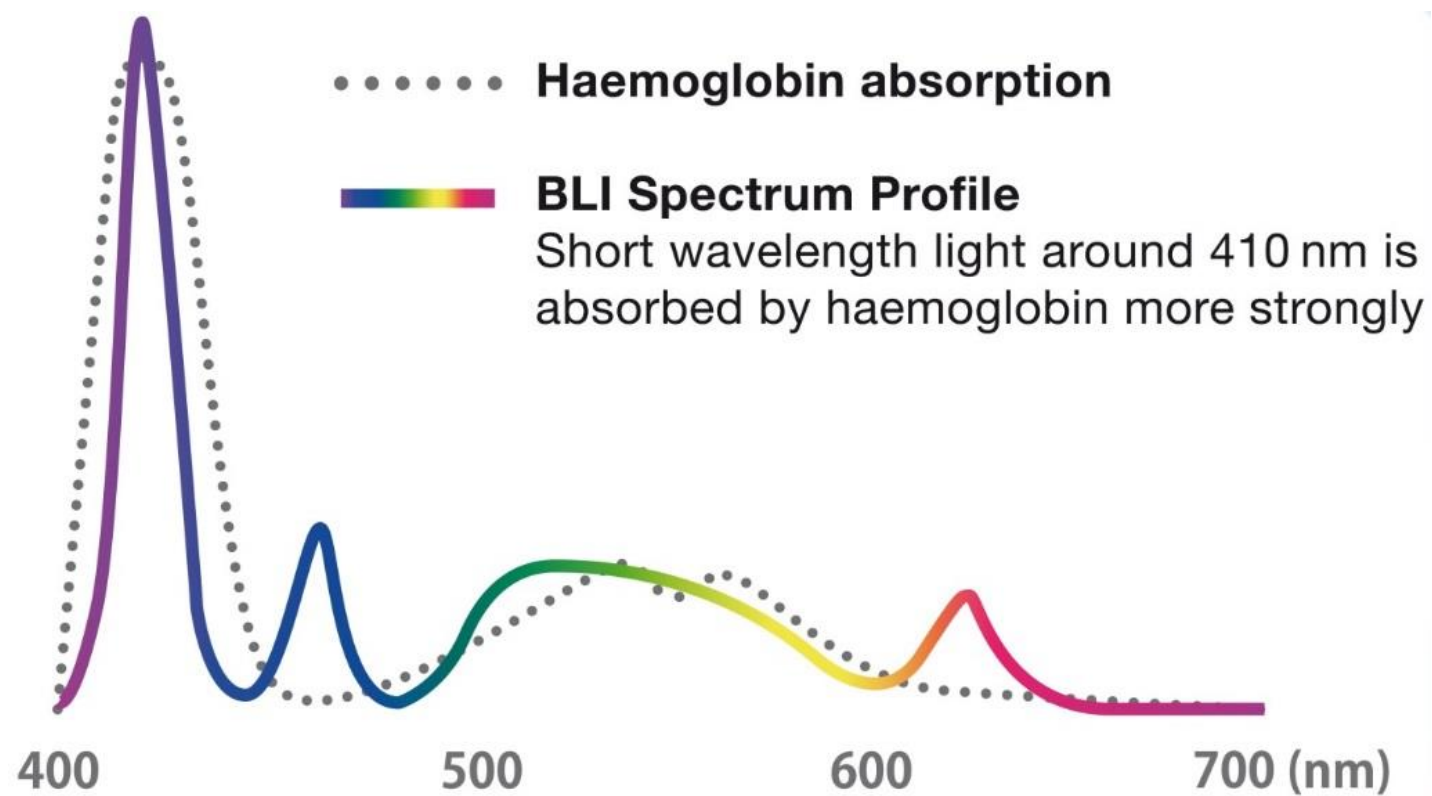
Espansione dei colori



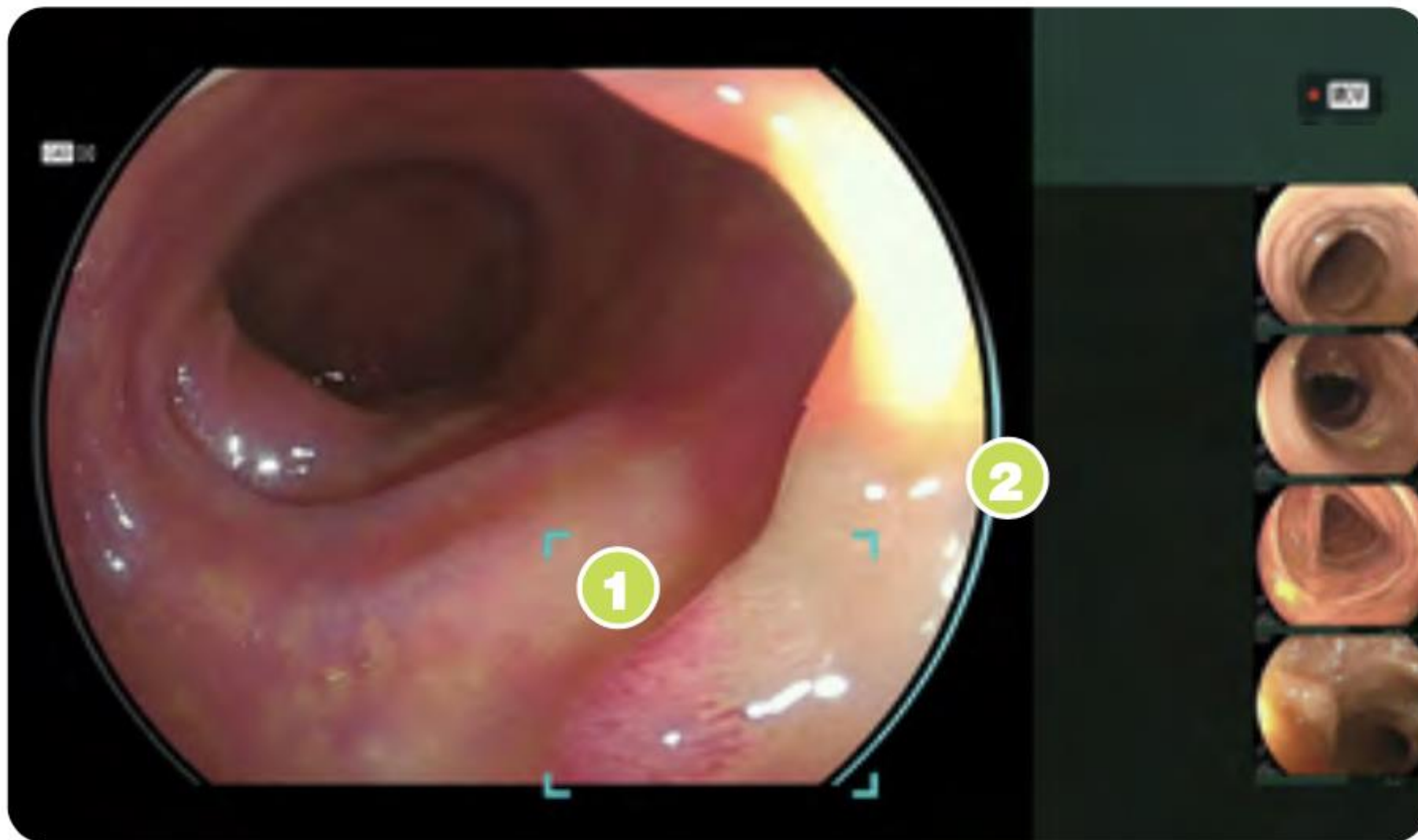
Focus: modalità di illuminazione che enfatizza le piccole differenze nelle aree rosse della mucosa

■ Blue Light Imaging (BLI)

L'illuminazione BLI sfrutta la quantità di illuminazione emessa dal LED a 410nm

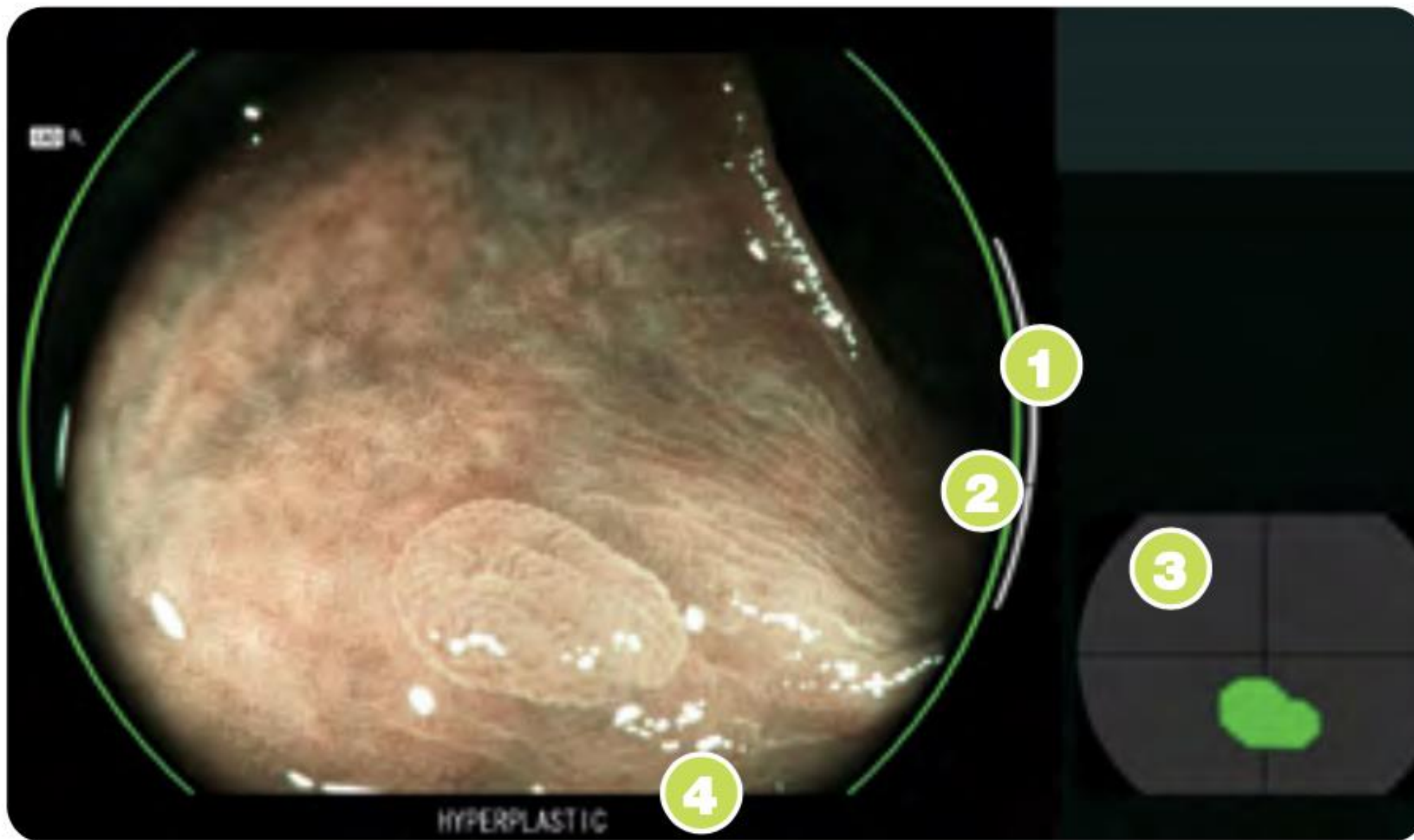


Focus: dettagli della superficie della mucosa



DETECTION SOUND

Sound signal when a suspicious polyp is detected. Volume can be defined for each user.



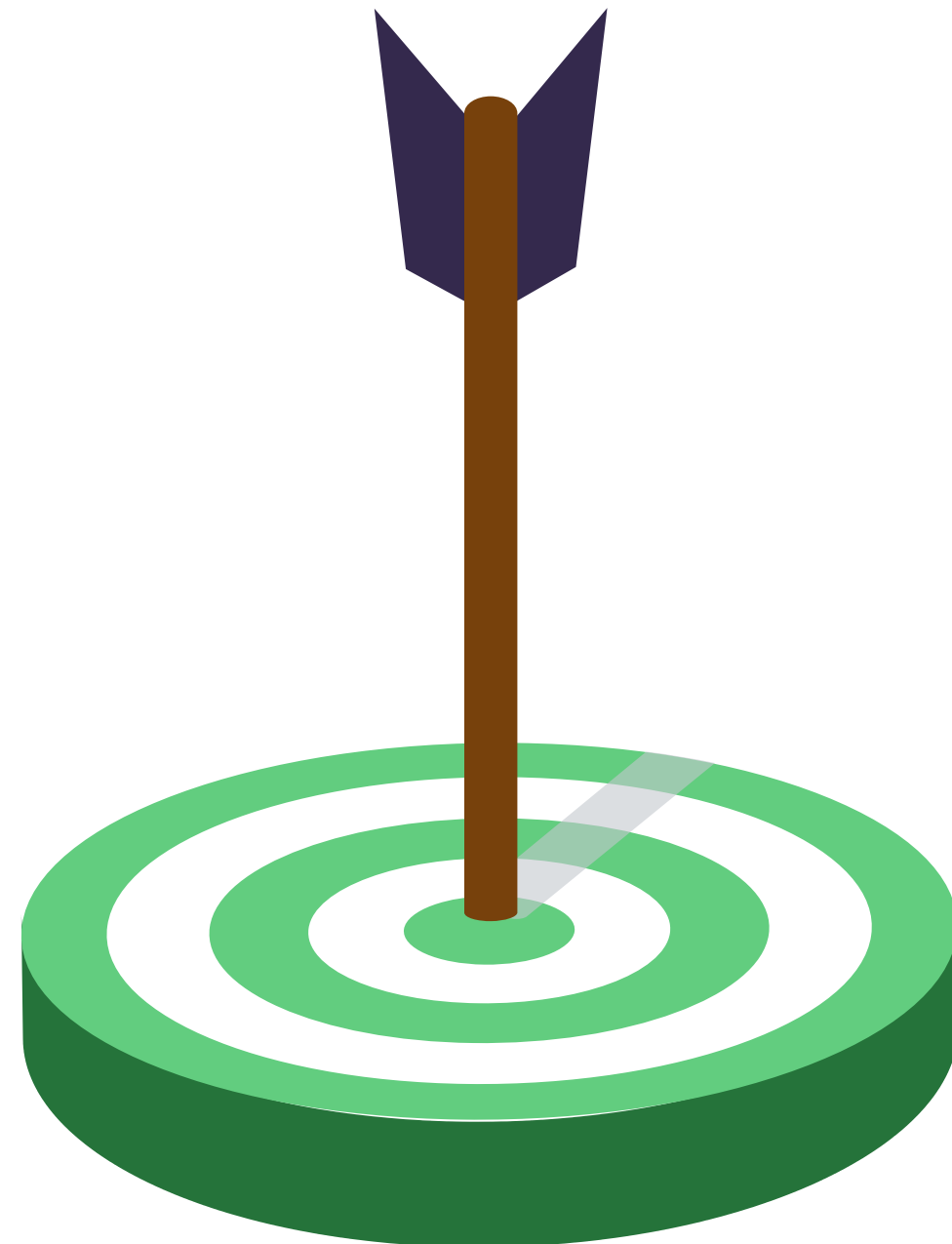
4

CHARACTERISATION RESULT

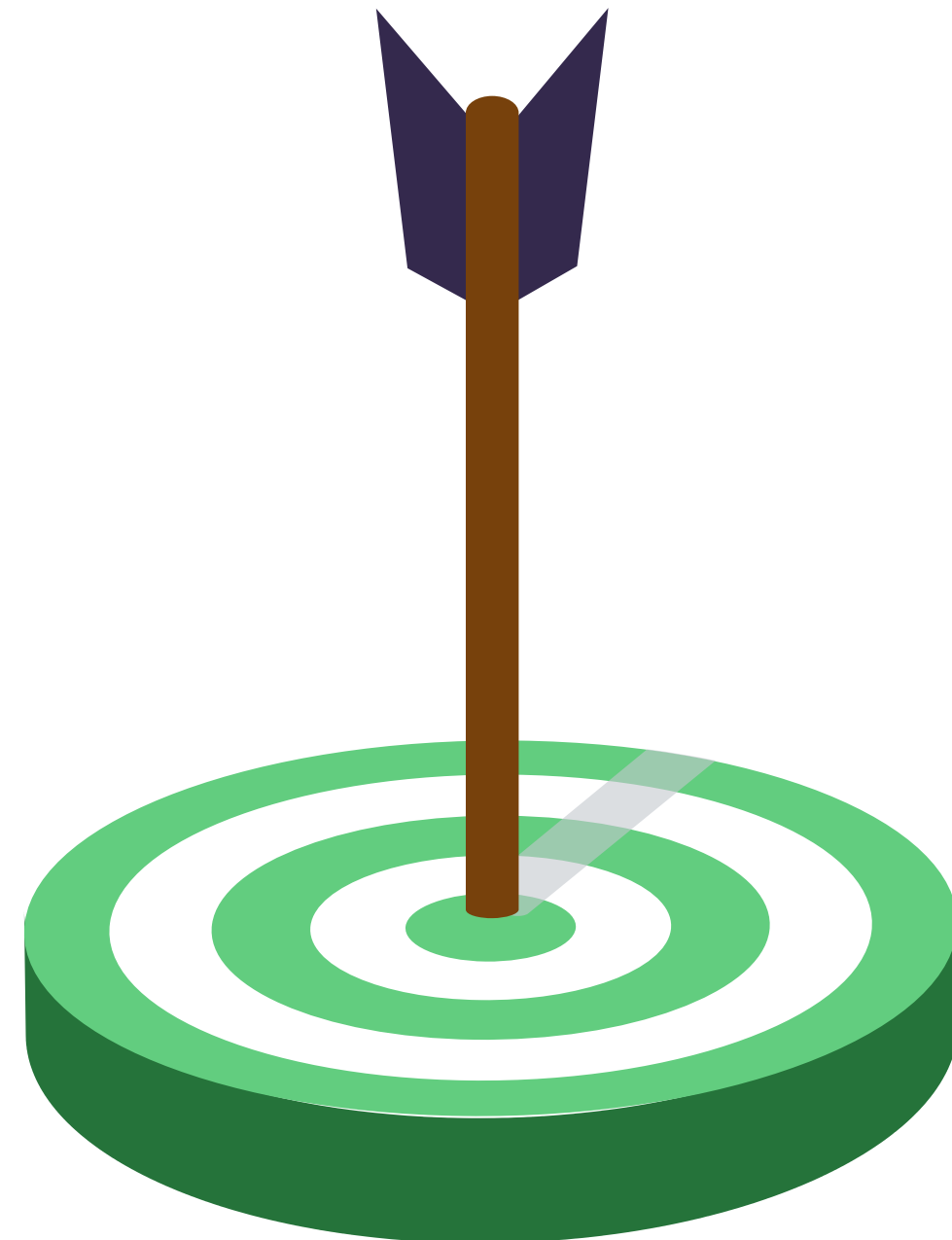
HYPERPLASTIC: hyperplastic polyps & SSL

NEOPLASTIC: adenoma and cancer

utilità per il paziente o per il medico



utilità per il paziente o per il medico





CADEYE – Modalità Detection

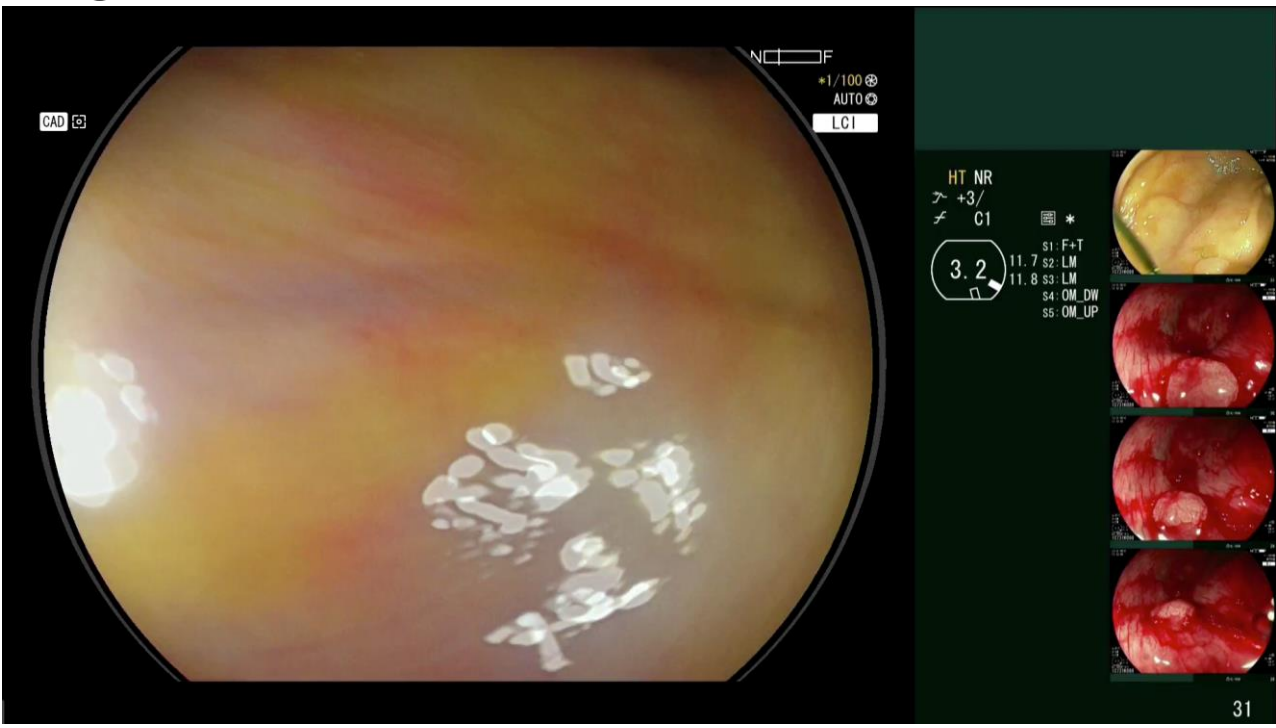
Detection
off

CADEYE

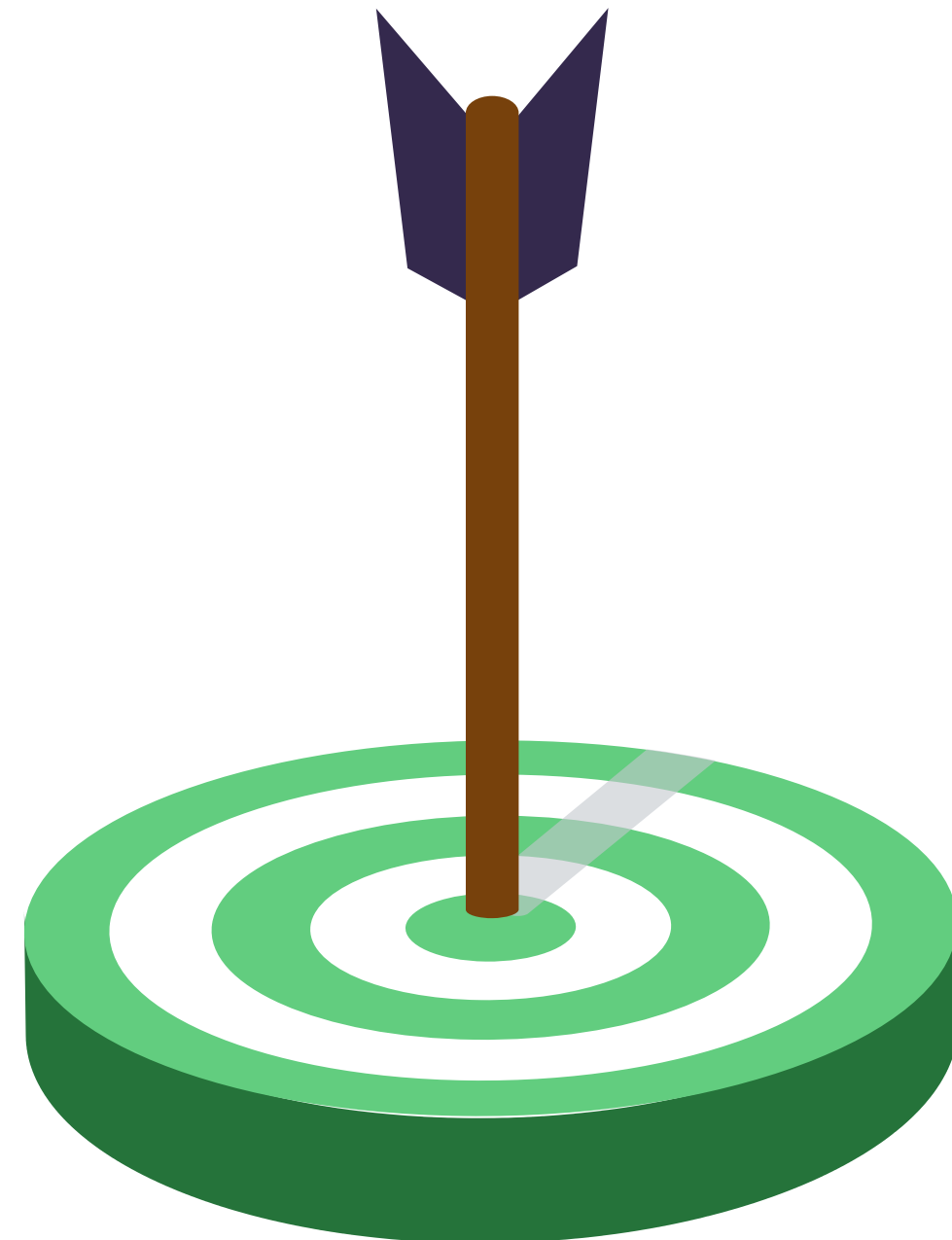
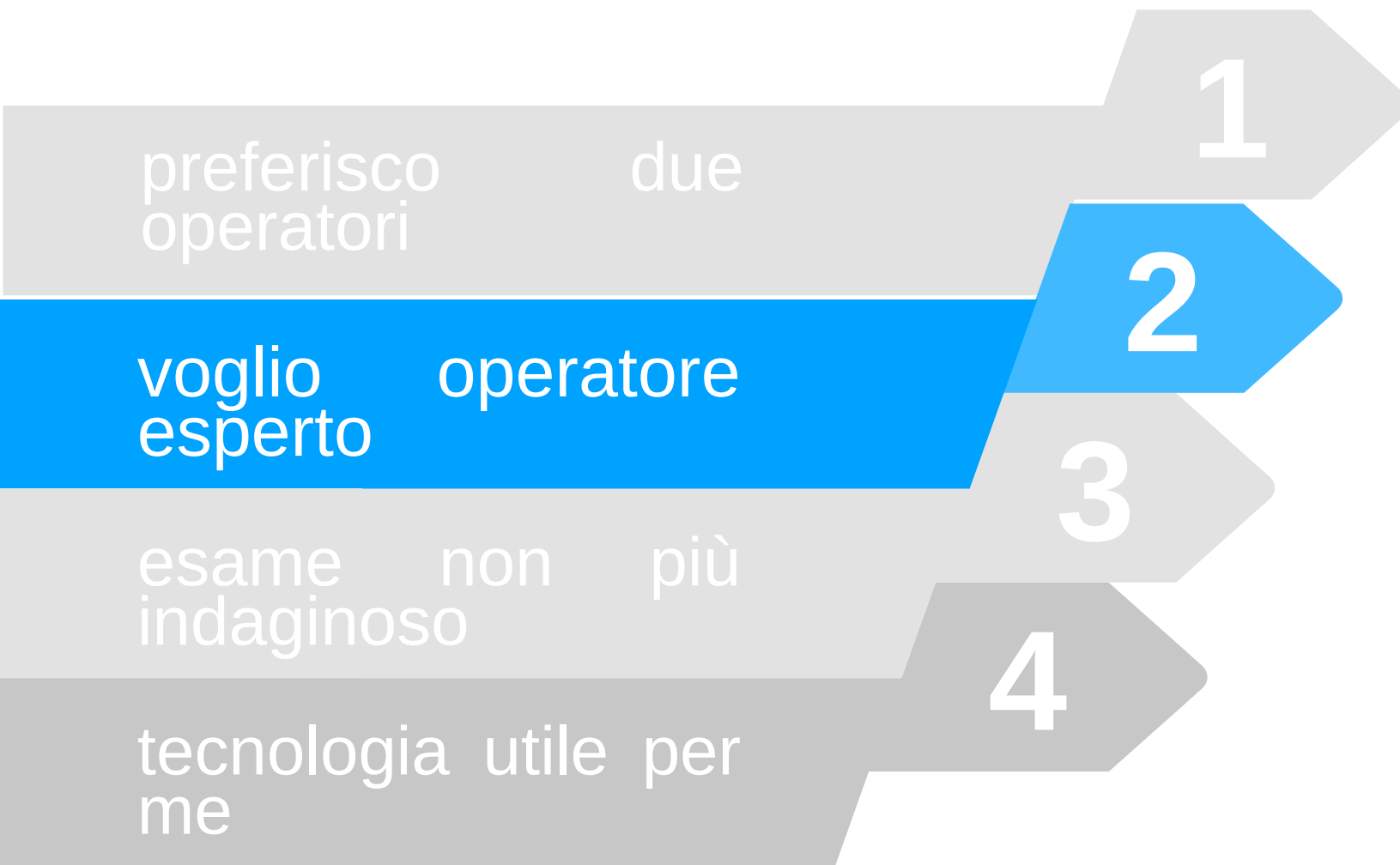


Detection
on

CADEYE



utilità per il paziente o per il medico



anche in caso della miglior colonscopia del mondo....

il cancro intervallare coloretale: 3-9%

Sanduleanu S et al, Gut 2015 Singh S et al, Am J Gastroenterol 2014

**3% di riduzione di rischio di cancro
per ogni 1% di aumento dell'ADR**

Corley DA, NEJM 2014

Tziatzios G et al GIE 2020

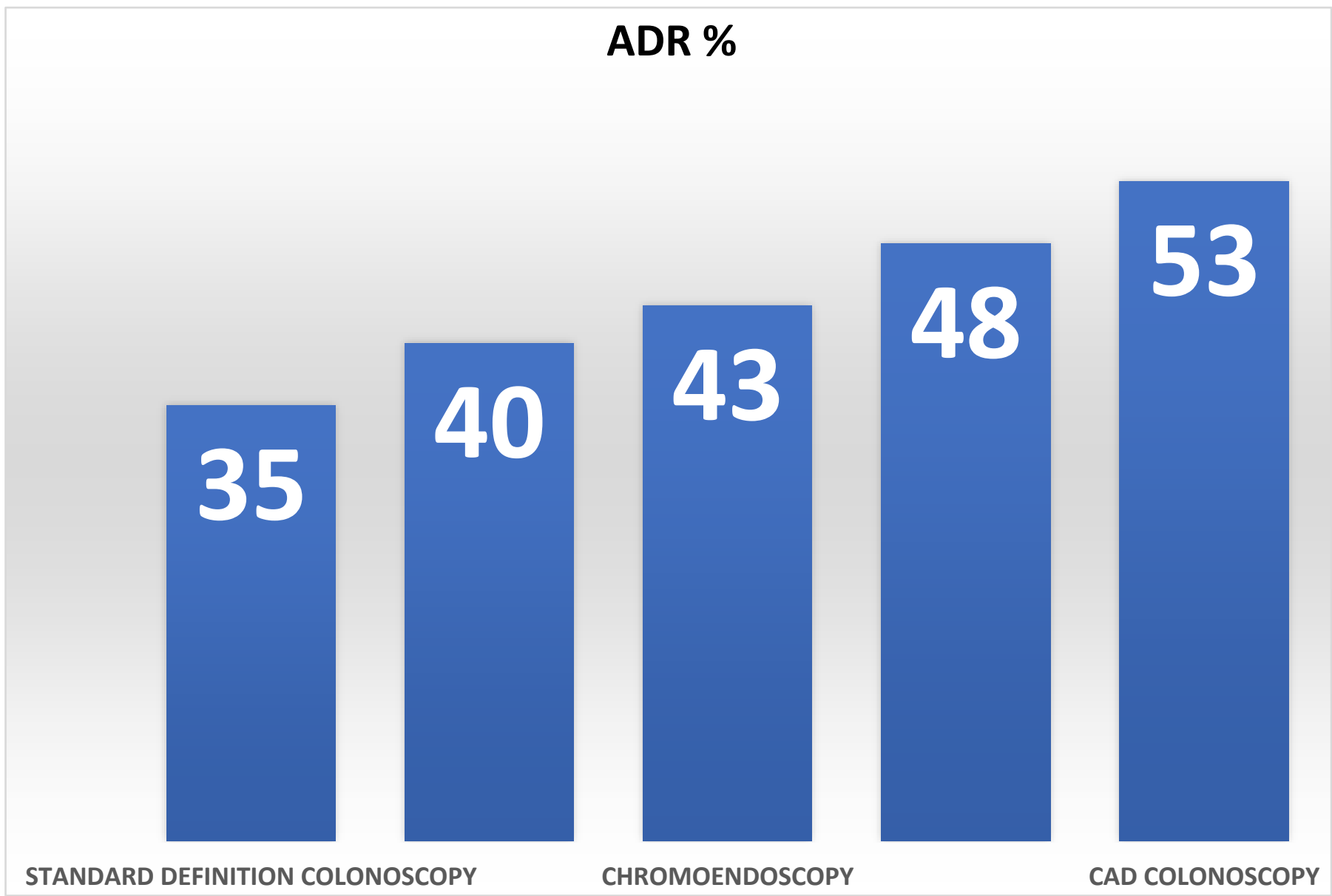
Facciorusso A et al, J Gastroenterol Hepatol 2021

Facciorusso A et al, J Gastrointest Liver Dis 2021

Spadaccini M et al, Lancet Gastroenterol Hepatol 2021

Repici A et al Endoscopy 2021

Zorzi M et al, Endoscopy 2021



chi beneficia di
un
miglioramento
dell'ADR?

Che tipo di assicurazione desidera il paziente.....?

- endoscopisti esperti e non esperti (<2000 colonoscopie) in 685 e 660 paz consecutivi
- colonoscopie HD con e senza A.I. (CAdE)
- ADR calcolati nei 2 gruppi
- ADR maggiore nel gruppo CAdE rispetto al controllo: **54% vs 40%** e **53% vs 44%**; $p < 0.01$
- stesso risultato per adenoma per colonoscopia e in lesioni piccole e distali

Con l'A. I., l'esperienza dell'operatore sembra avere un ruolo minore nell'ADR

Repici A et al Gastroenterology 2020 , Endoscopy 2021



AI & screening CCR

Efficacy of a Computer Aided Detection (CADe) system in a FIT-based organized colorectal cancer screening program: a randomized controlled trial

	AI	NON AI	p
ADR	53,6%	45,3	0,0019
APC	1,126	0,904	0,028

**ADR aumentata in modo assoluto
indipendentemente dalla baseline
ed anche dall'esperienza
dell'operatore**

I risultati dell'A.I. dipendono dalle caratteristiche dei polipi?

ADR e APC in base a grandezza, morfologia e sede

ADR maggiore nel gruppo CADe vs controllo **36.6% vs 25.2%**

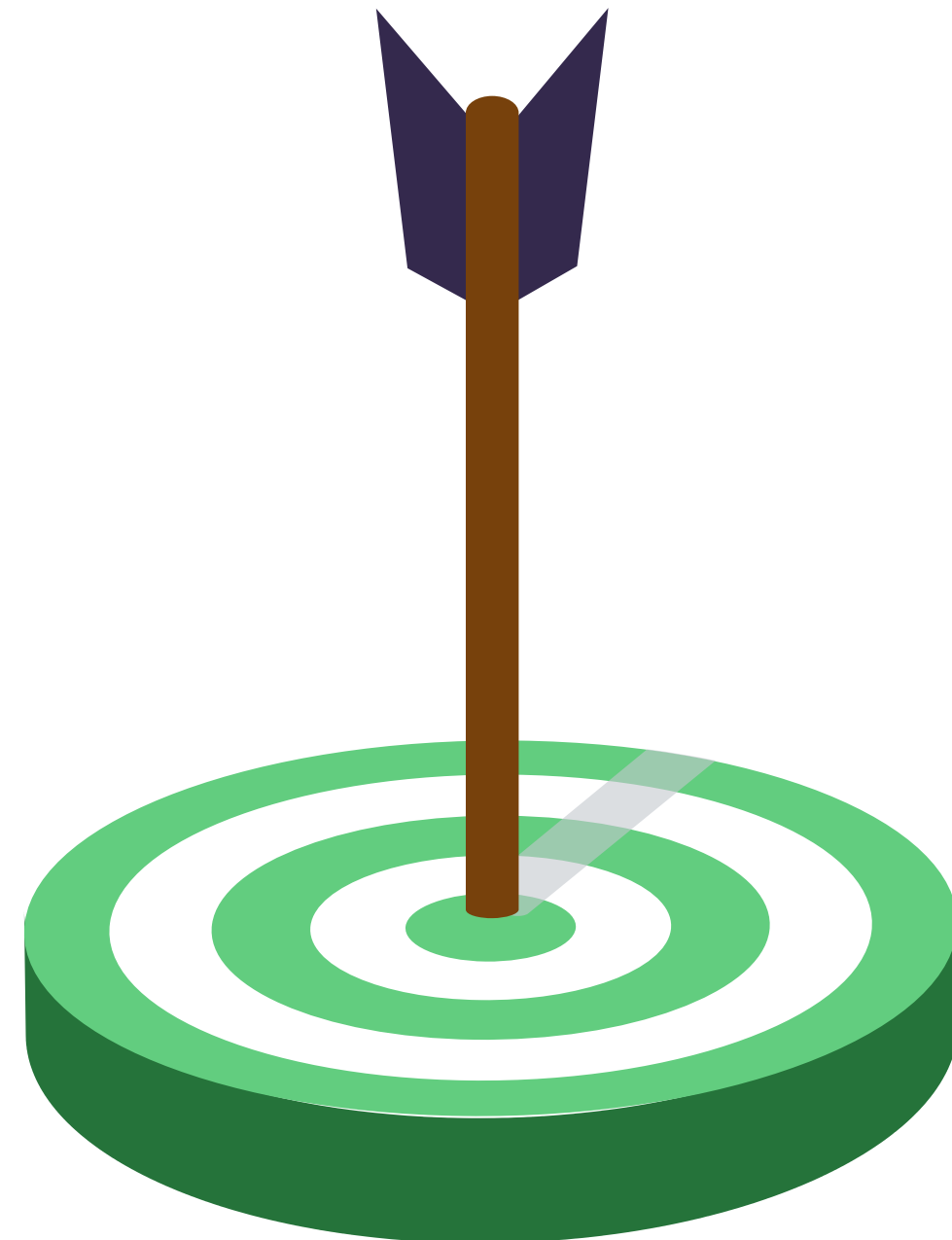
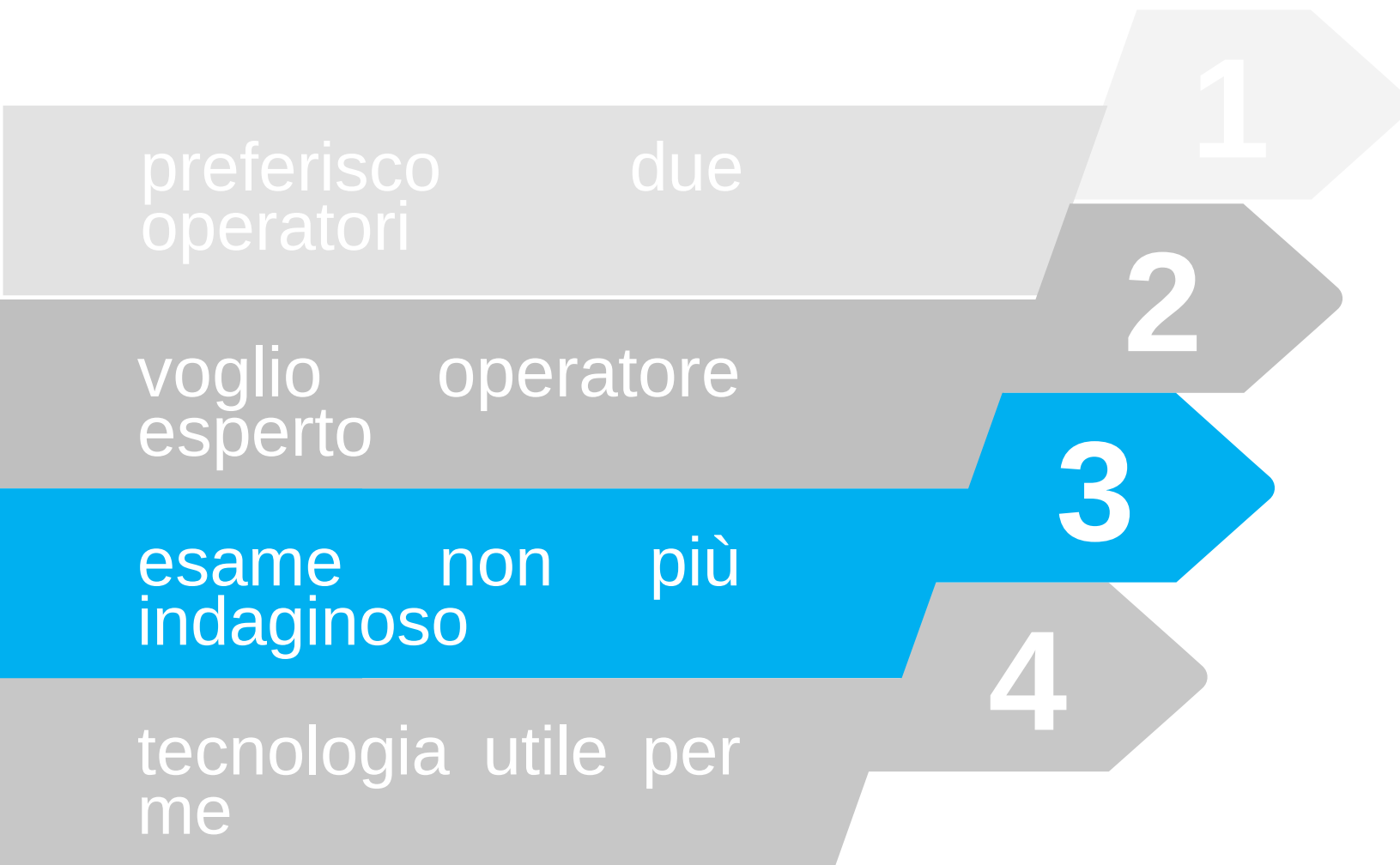
APC maggiore nel gruppo CADe vs controllo **0.58 vs 0.35**

APC maggiore per :

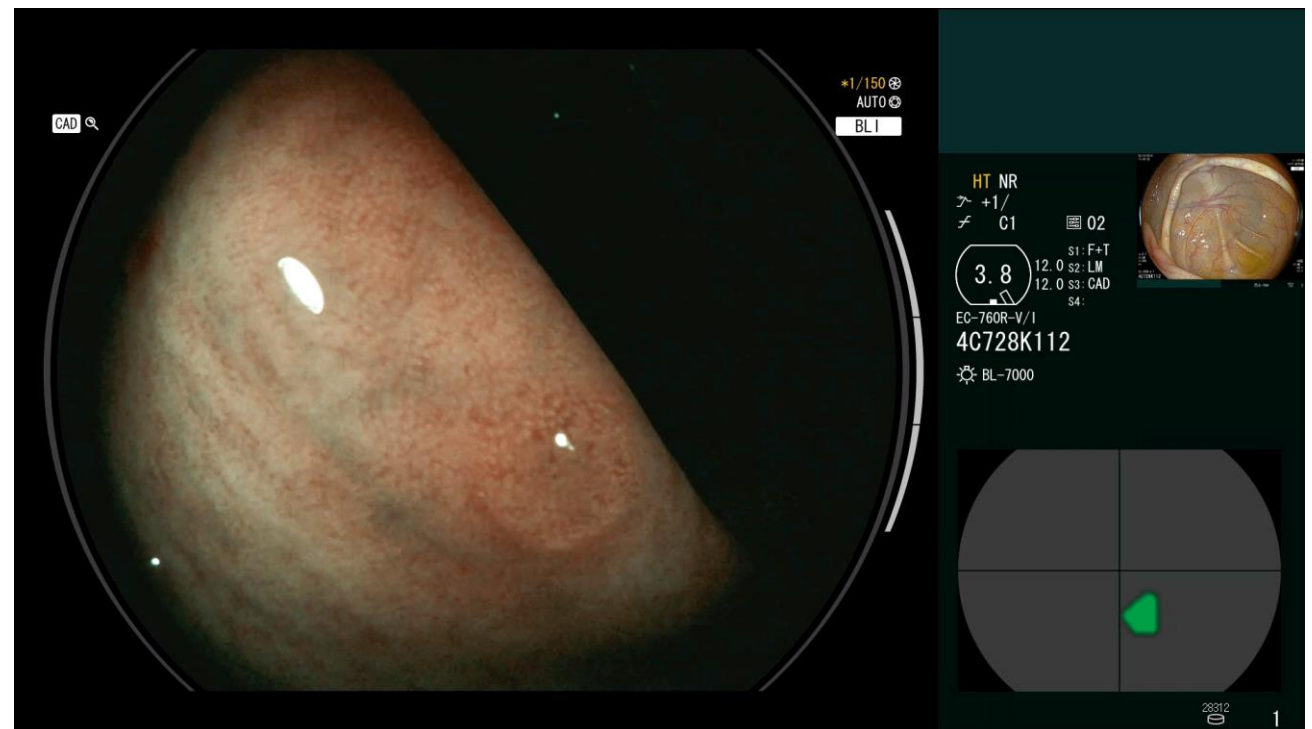
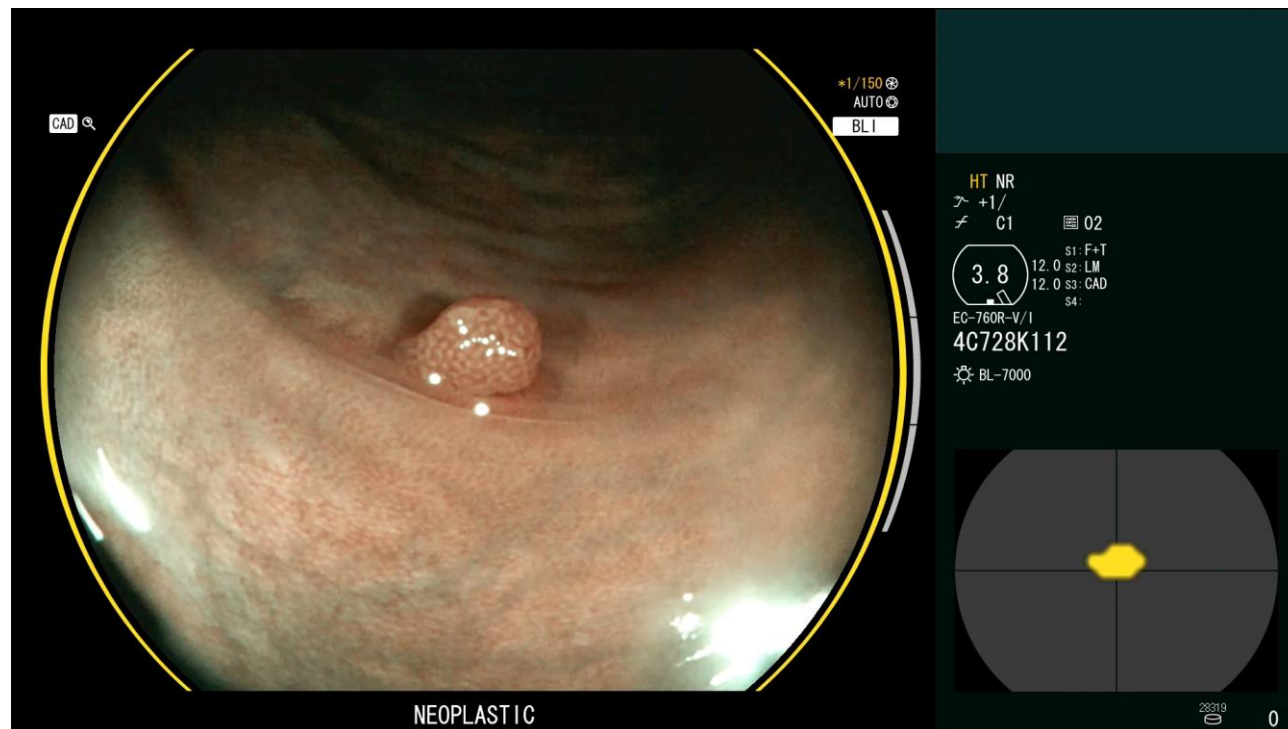
- ≤ 5 -mm RR, 1.69
- 6 - 9 mm RR, 1.44
- ≥ 10 -mm adenomi RR, 1.46
- sede prossimale RR, 1.59
- sede distale RR, 1.68
- non polipoide RR, 1.78
- polipoide RR, 1.54

l'effetto dell'A. I. sulla detective è indipendente dalle principali caratteristiche degli adenomi....

utilità per il paziente o per il medico



CADEYE – Modalità caratterizzazione



AI : troppo cara?

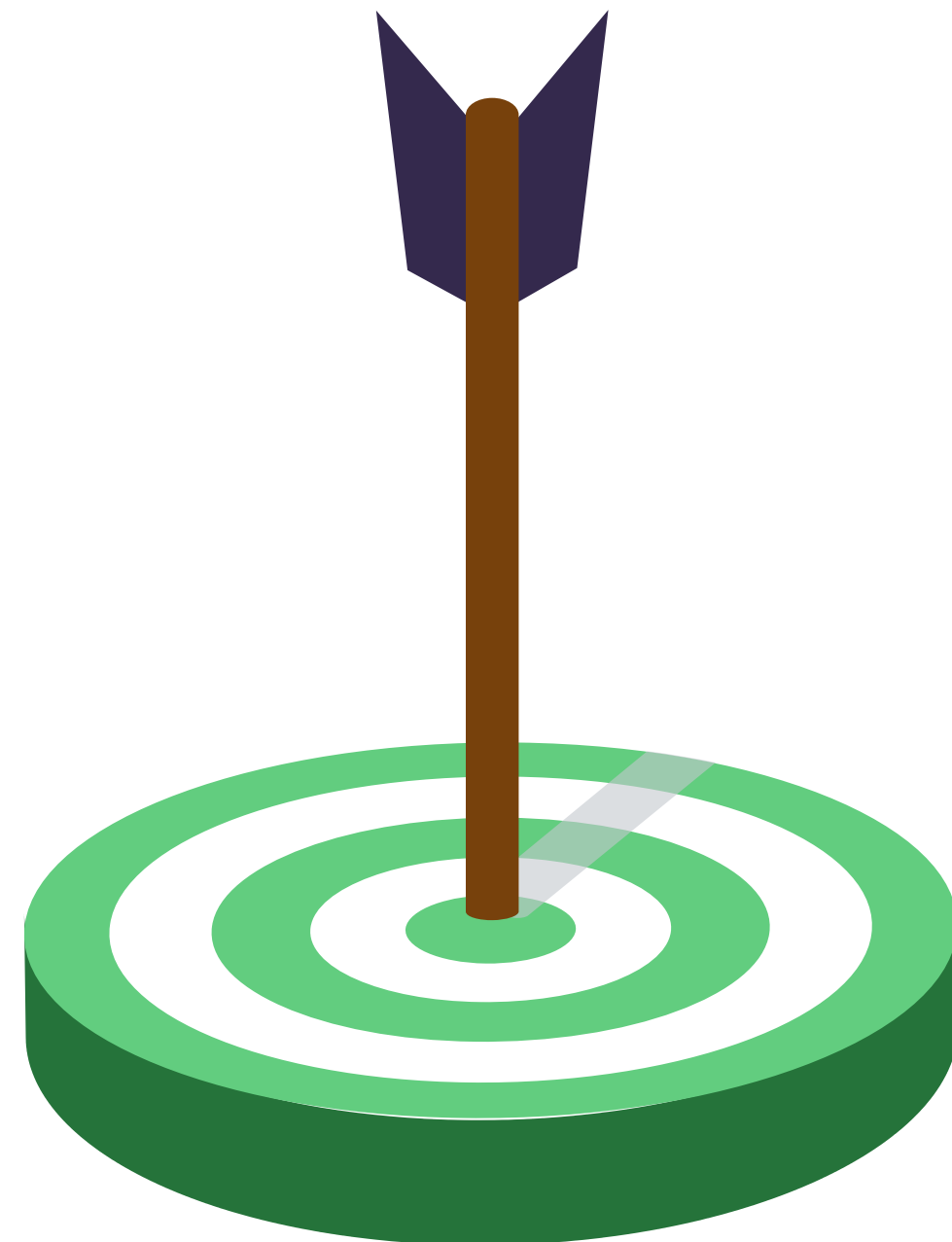
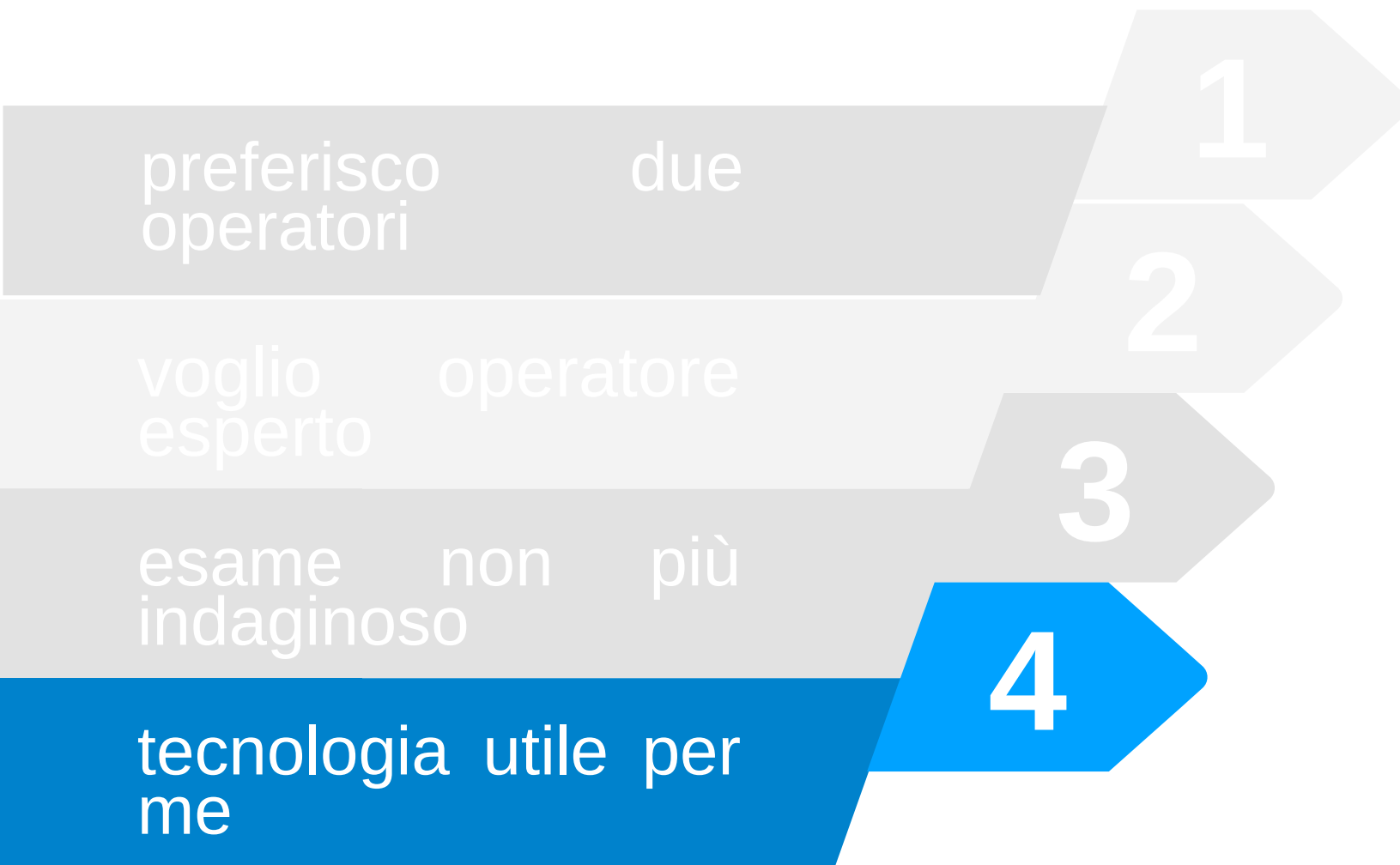
AI differenziazione neoplastica: 93% sensibilità 95% specificità 95% NPV

l'uso dell'AI per la diagnosi e la leave-strategy comporta una riduzione dei costi dell'endoscopia

Mori Y et al, Gastrointest Endosc 2020



utilità per il paziente o per il medico



CADEYE – Characterization Mode

Barra di stato

Mostra lo stato della decisione del CAD.
NON mostra il livello di CONFIDENZA
o il livello di PRECISIONE



Level 0
No risposta



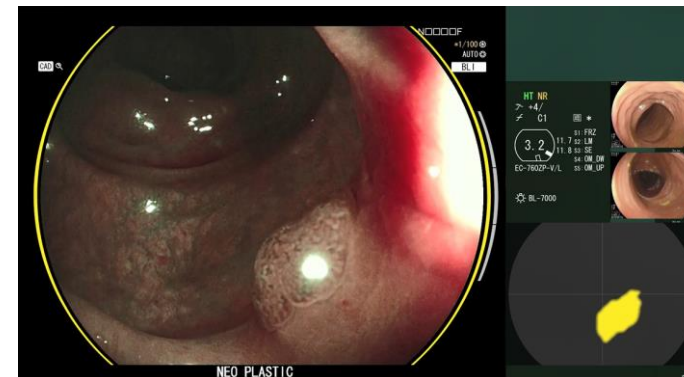
Level 1
Risultato
misto



Level 2
Due tipi di
risultati
separati

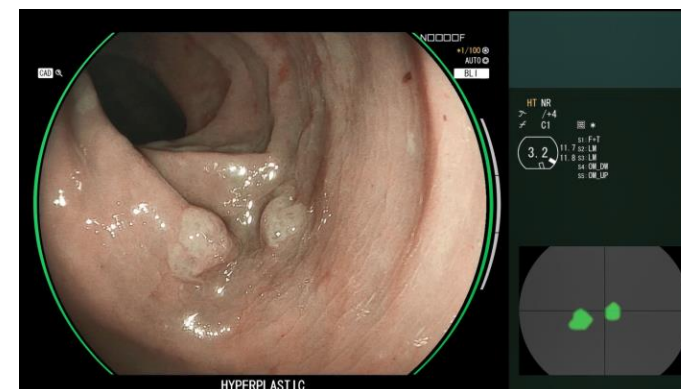
NEOPLASTICO

Il cerchio di assistenza visiva è in giallo.
«**Neoplastico**» = adenomi e cancro



IPERPLASTICO

Il cerchio di assistenza visiva è in verde.
«**Iperplastico**» = i iperplastici e gli
SSA/P.



Prospettive per il miglioramento futuro con l'A.I.

riconoscimento automatico del cieco

riconoscimento automatico del device utilizzato

riconoscimento automatico della preparazione colica

riconoscimento automatico delle dimensioni del polipo