WEO

The voice of world endoscopy

Adapting A Personalized Screening Program Using Past Screening Results

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Disclosures

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Risk

Risk factors

(smoking, APC gene)

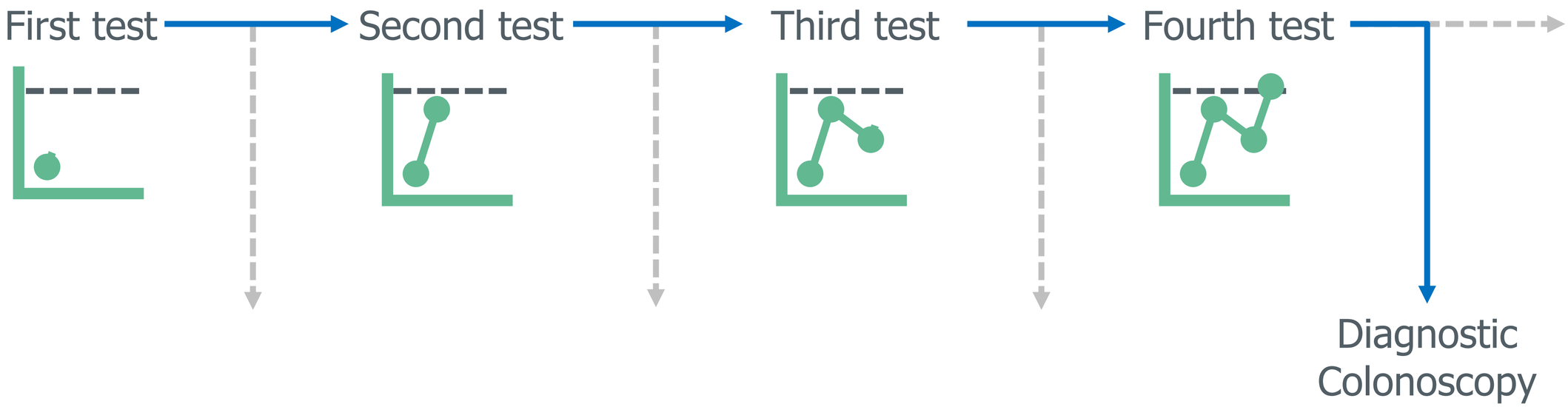
Risk indicators

(age, sex, family hx)

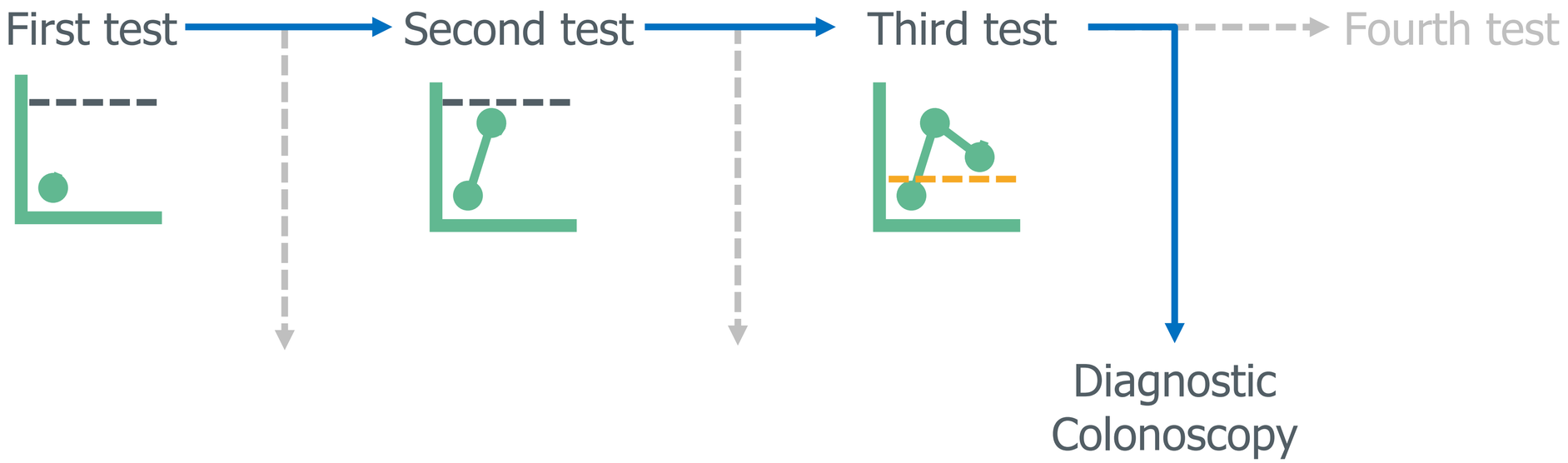
test results

Risk information

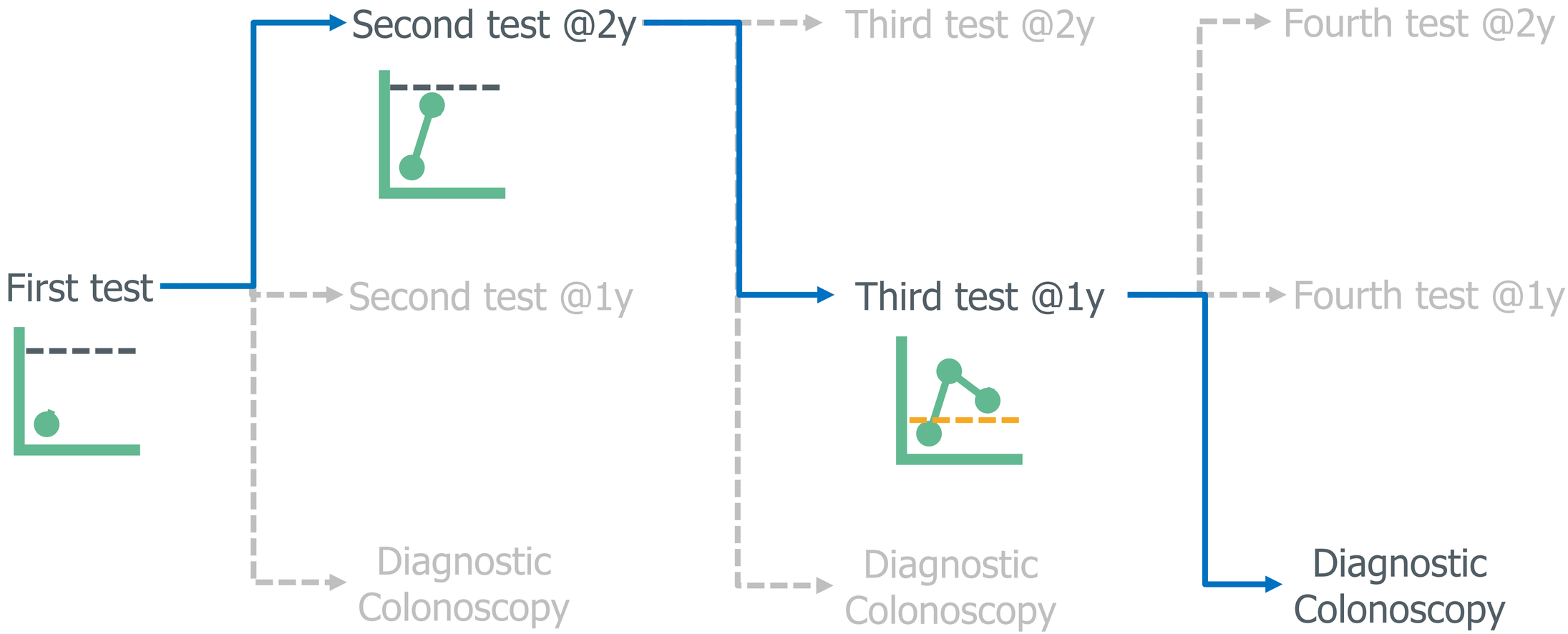
Ruling screening paradigm



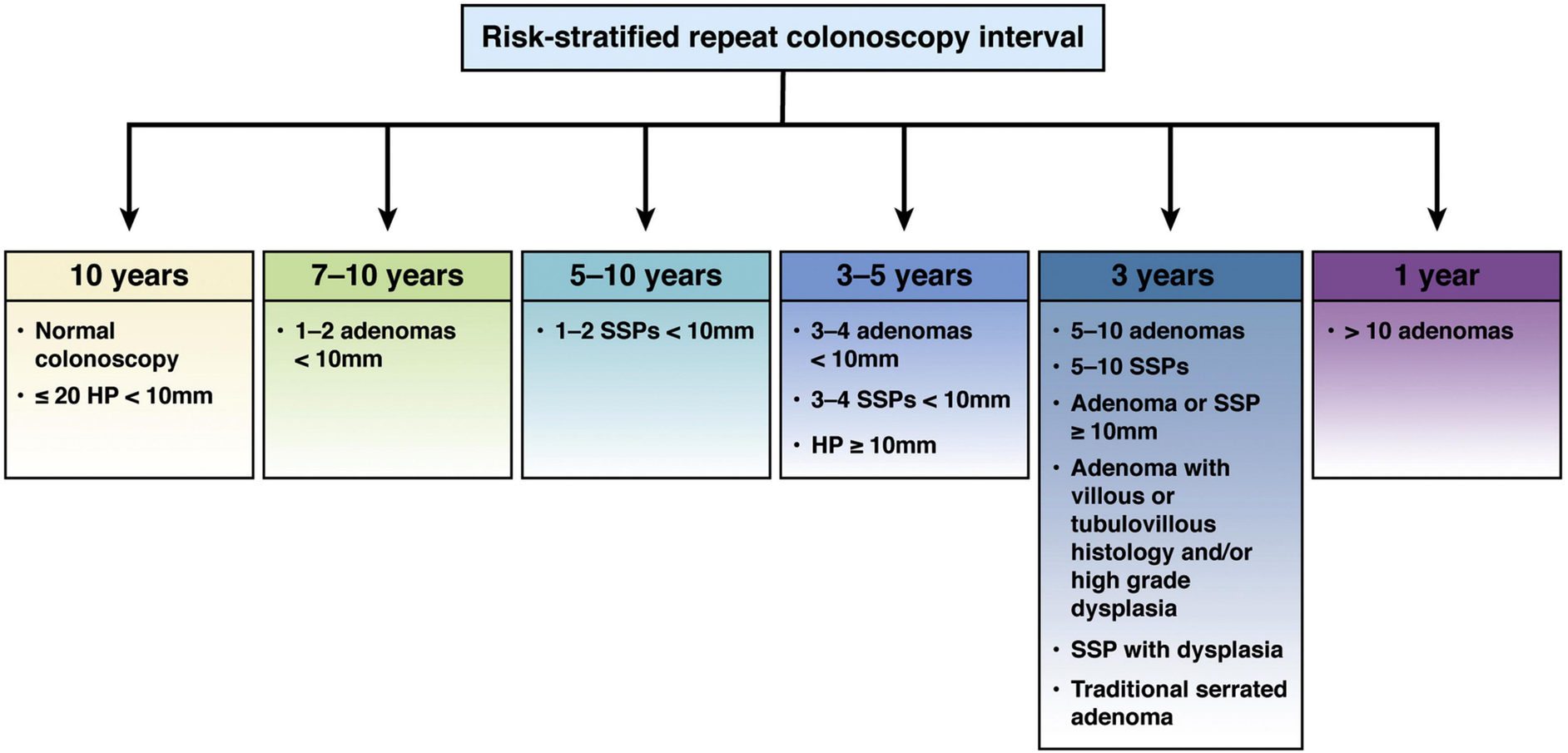
Adaptive screening



Adaptive screening



Adaptive colonoscopy

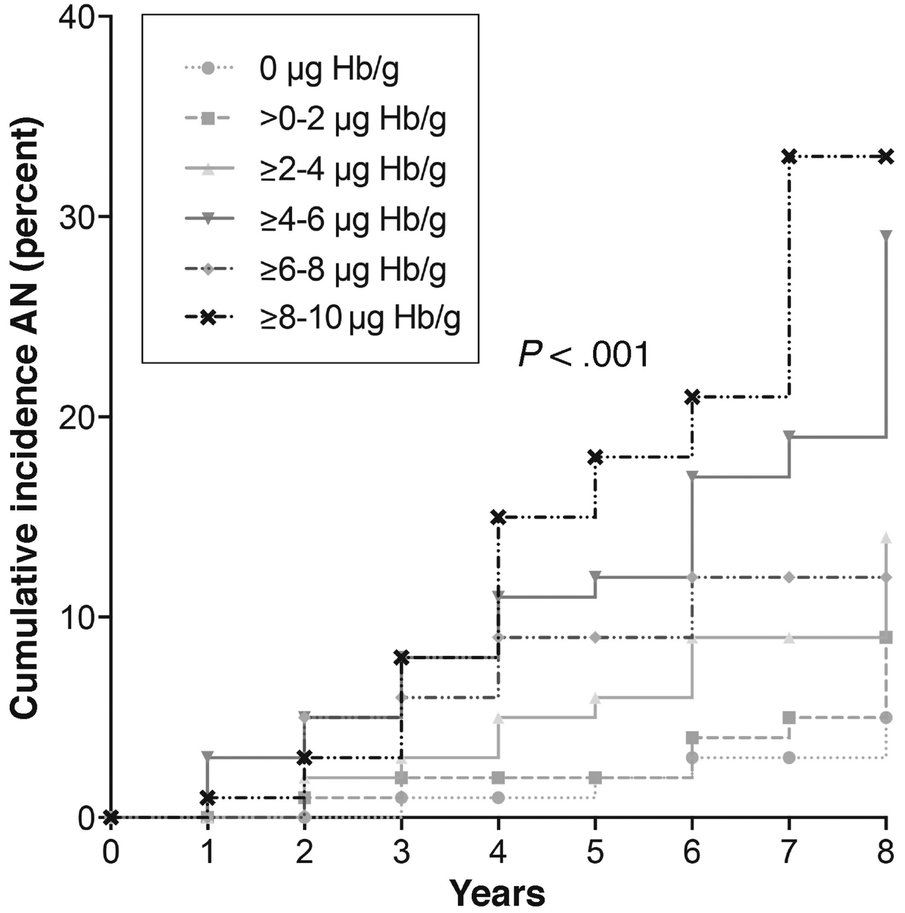


Gupta S. et al. Recommendations for Follow-Up After Colonoscopy and Polypectomy. *Gastroenterology*, 2020.

Adaptive qualitative screening

After X number of negative tests, extend the interval from Y to Y^{+} years..

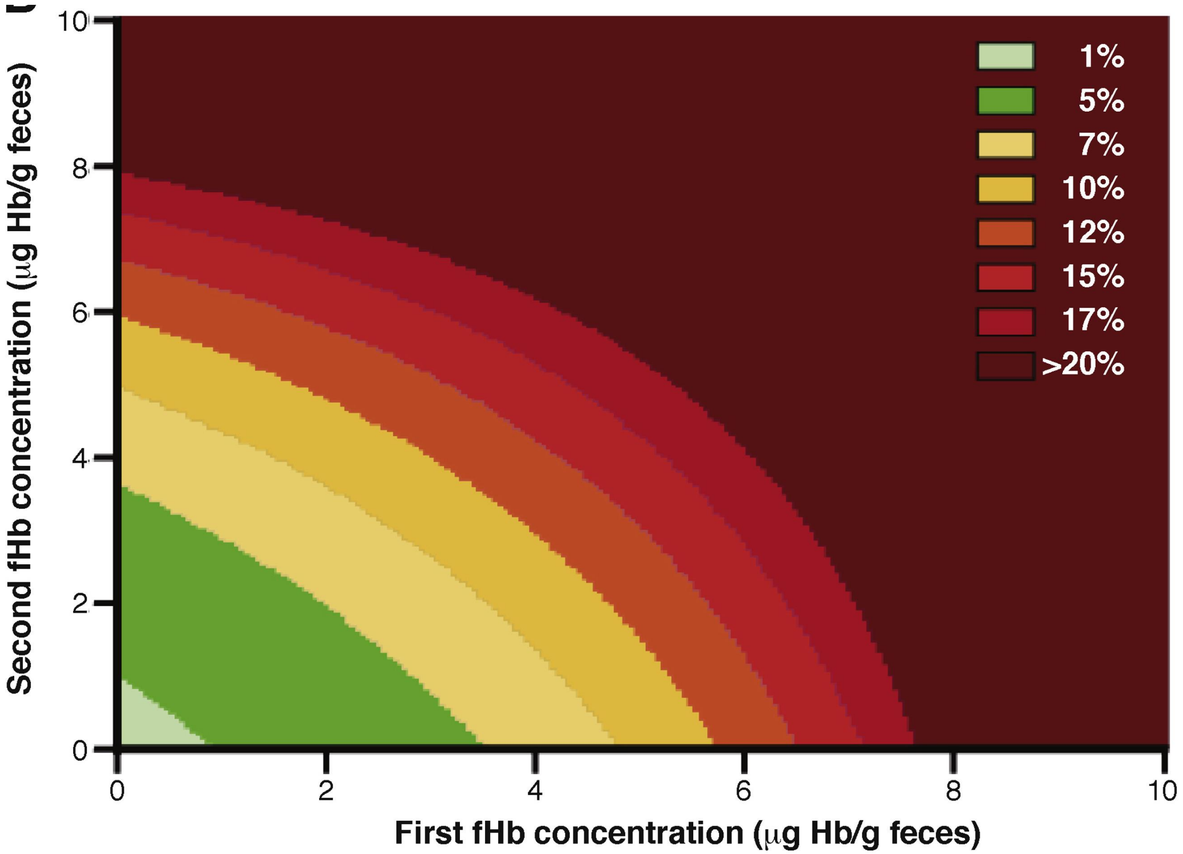
Rationale for adaptive quantitative screening



Patient risk can be differentiated based on past negative FIT concentrations

Grobbee EJ. et al. Association Between Concentrations of Hemoglobin Determined by Fecal Immunochemical Tests and Long-term Development of Advanced Colorectal Neoplasia. *Gastroenterology*, 2017.

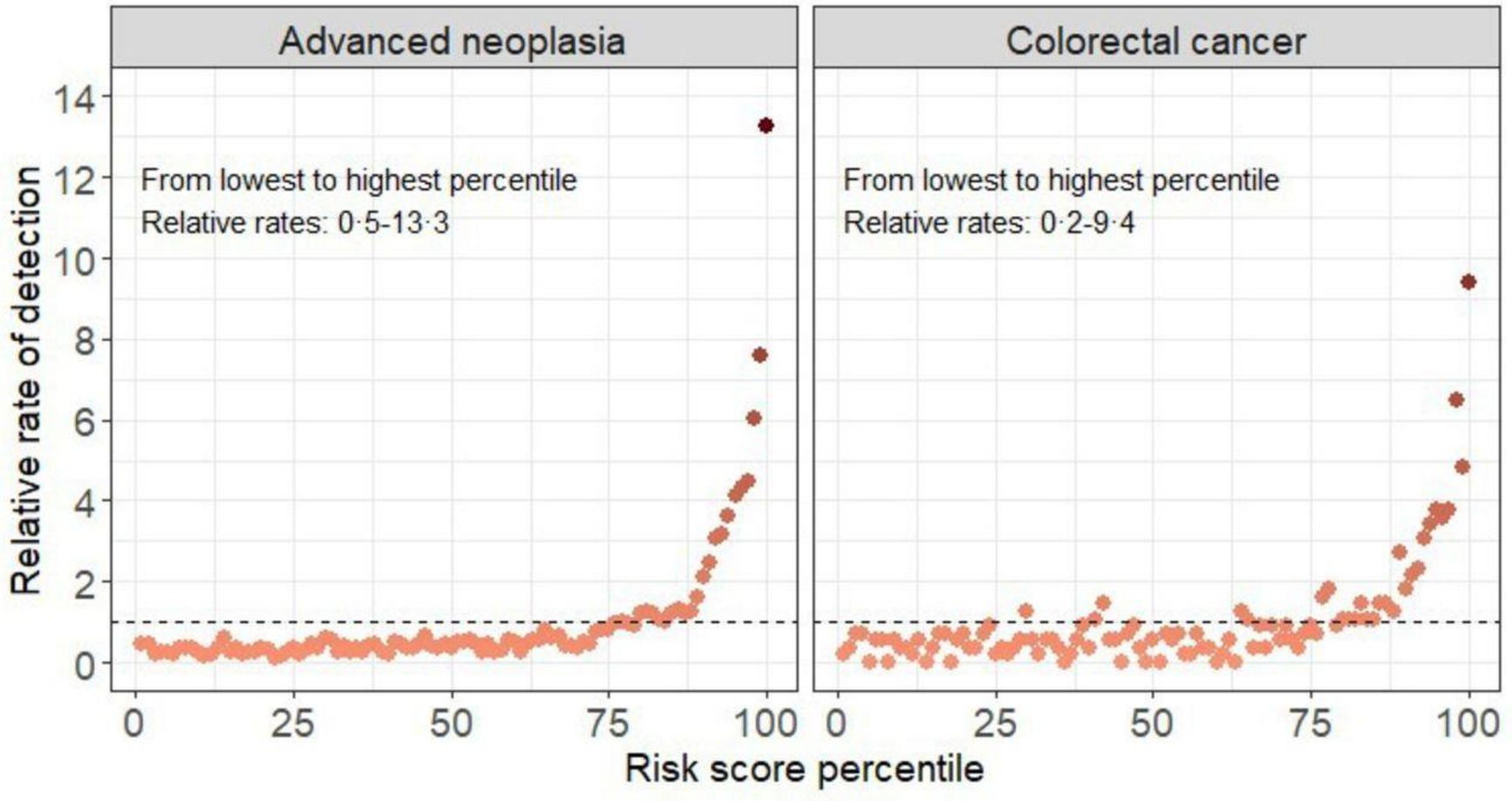
Rationale for adaptive quantitative screening



The risk compounds across multiple rounds

Grobbee EJ. et al. Association Between Concentrations of Hemoglobin Determined by Fecal Immunochemical Tests and Long-term Development of Advanced Colorectal Neoplasia. *Gastroenterology*, 2017.

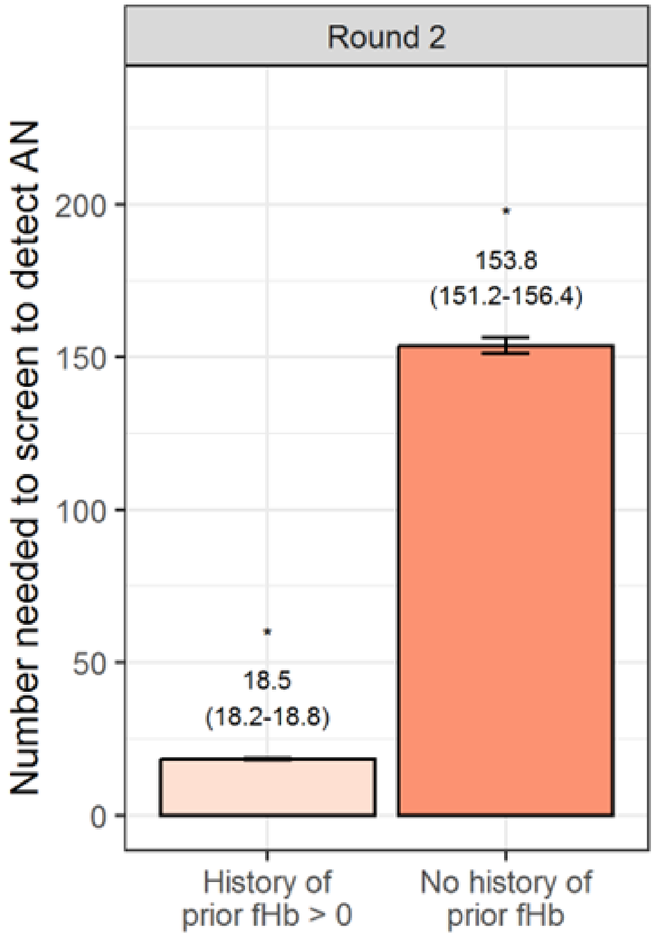
Rationale for adaptive quantitative screening



Models using these data find most people have lower risk, while few are at high risk

Meester RGS, et al. Faecal occult blood loss accurately predicts future detection of colorectal cancer. *Gut*, 2023.

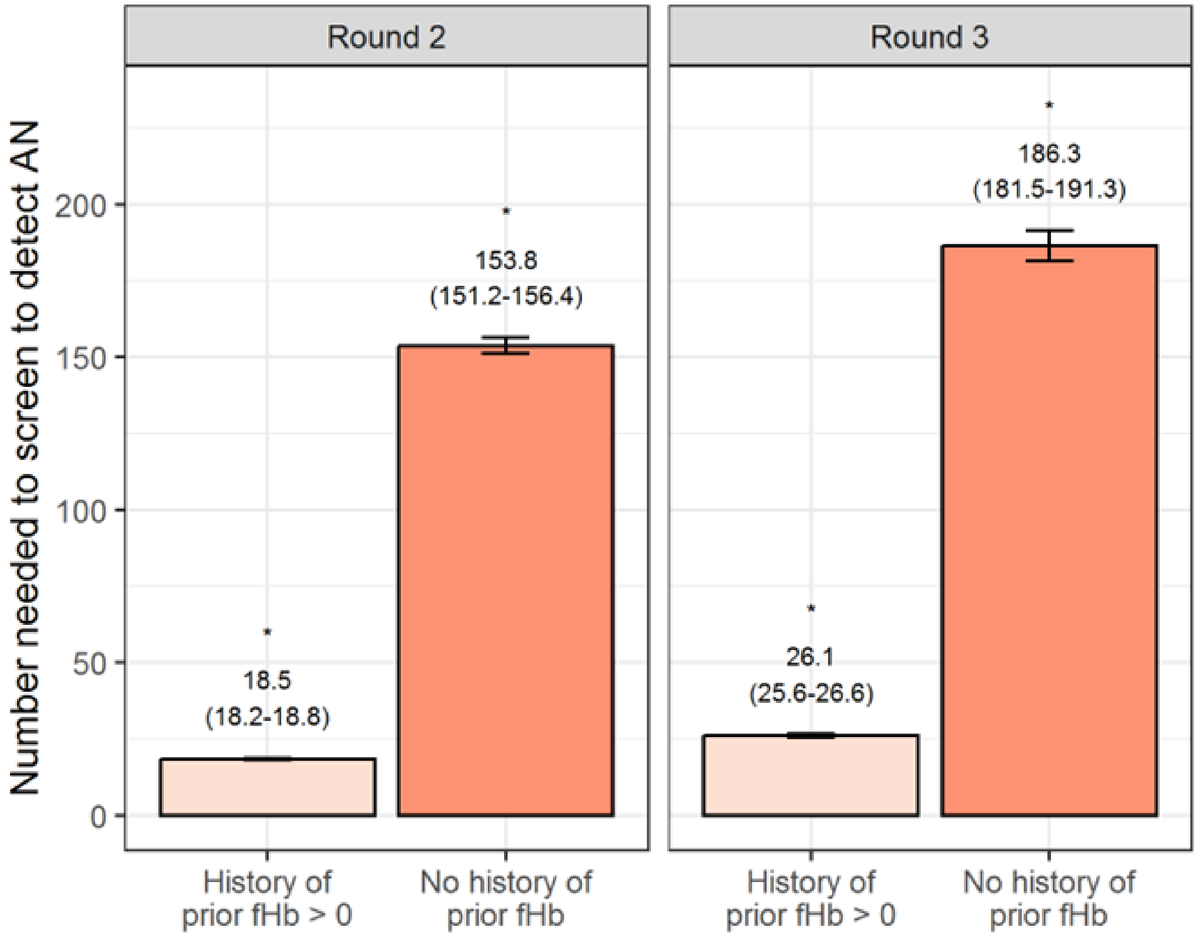
Rationale for adapative quantitative screening



The burden-benefit ratio (NNS) of FIT screening is >8x higher for patients without vs. with prior fHb…

Toes-Zoutendijk ET, et al. Manuscript in review.

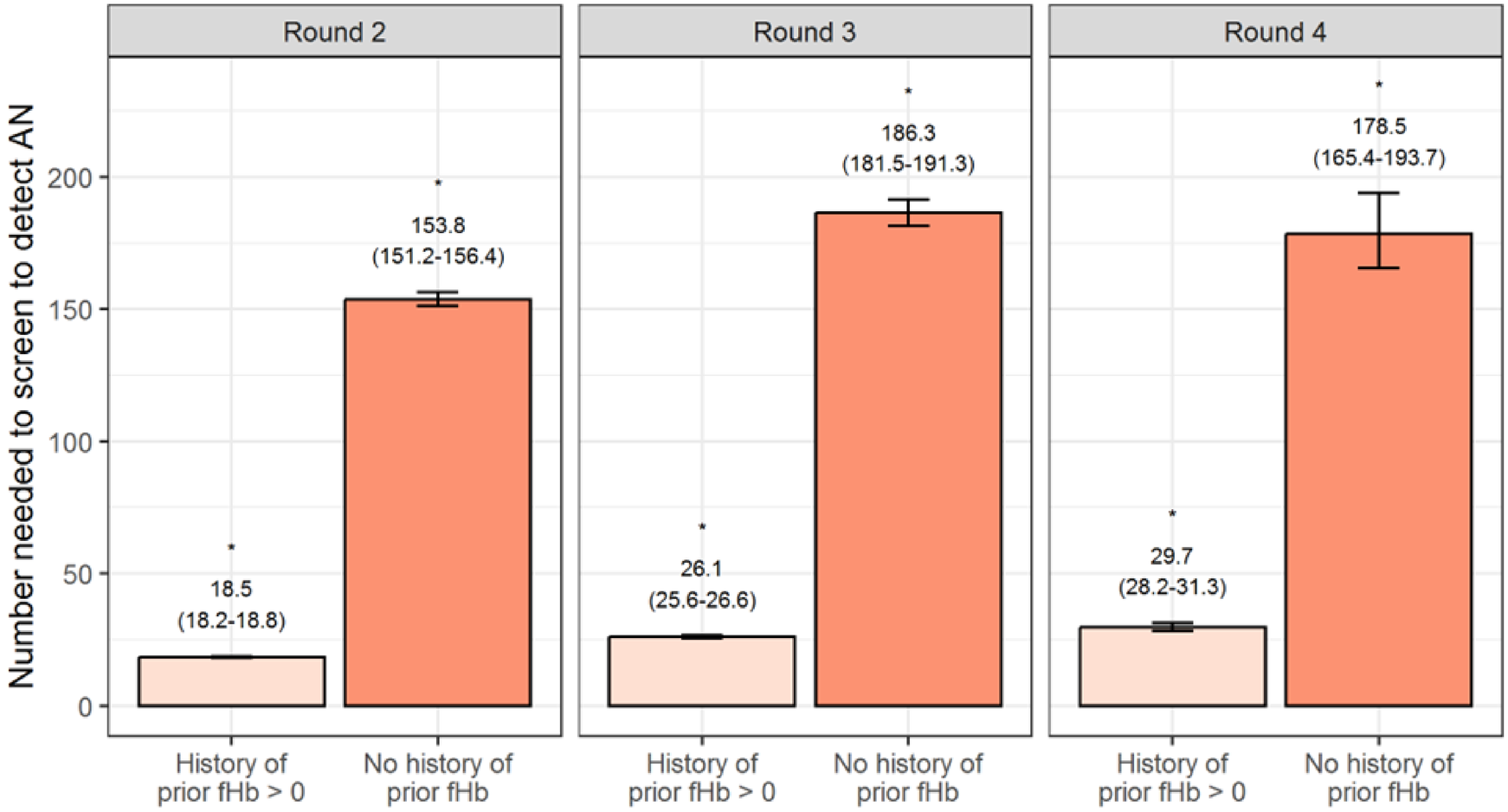
Rationale for adapative quantitative screening



… and the difference persists across screening rounds

Toes-Zoutendijk E, et al. Manuscript in review.

Rationale for adapative quantitative screening



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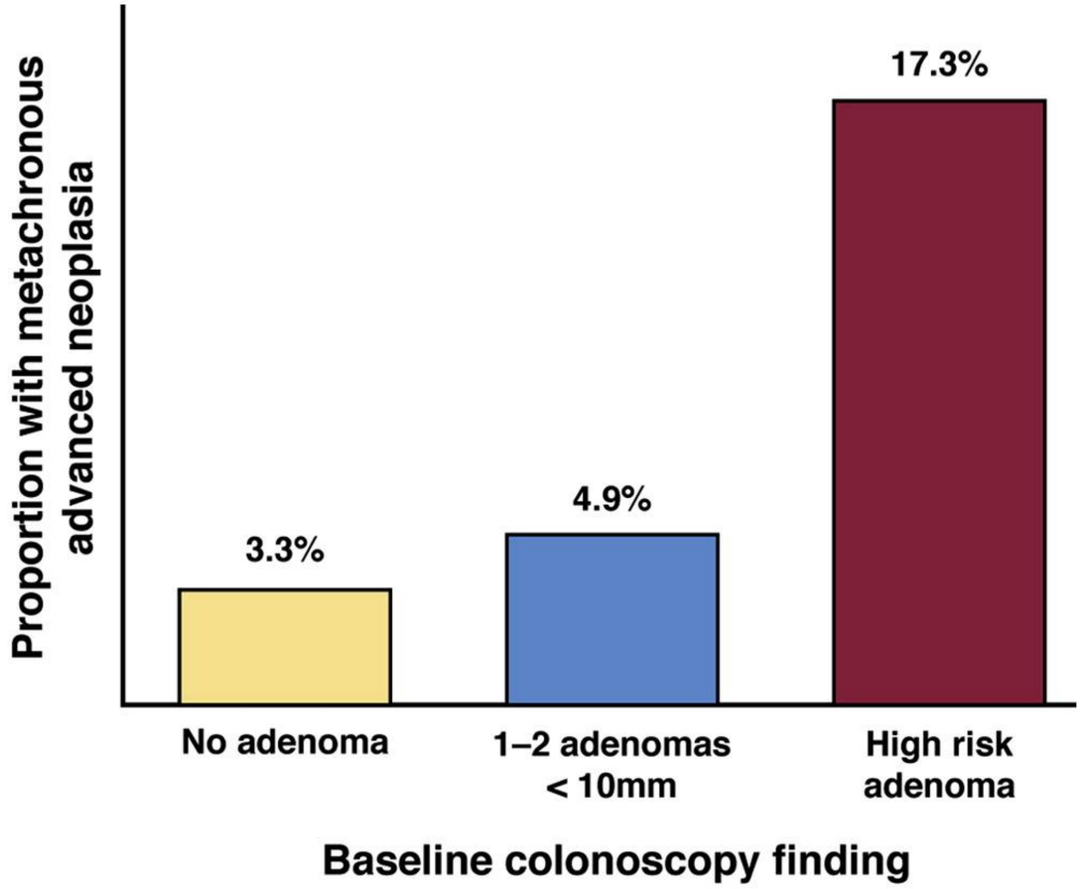
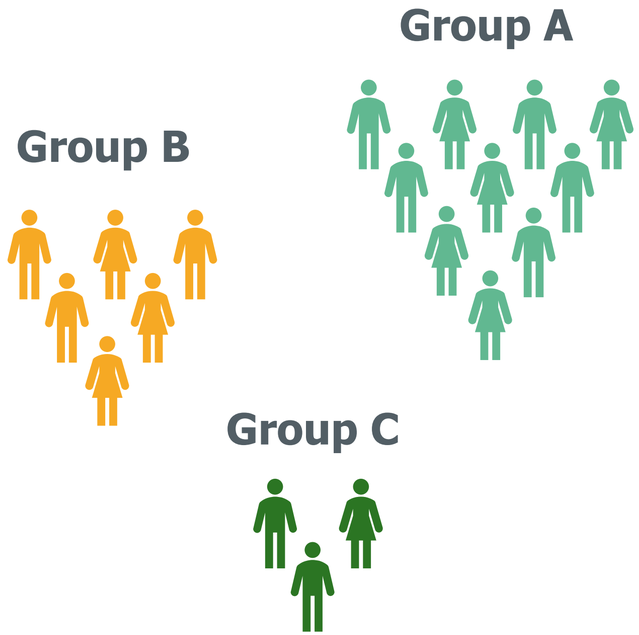


Relative rates of AN are not that different from those we rely on for post-polypectomy surveillance

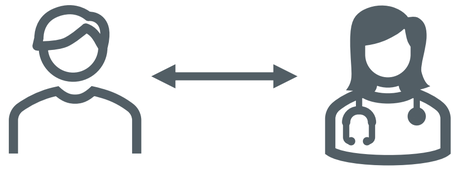
Gupta S. et al. Recommendations for Follow-Up After Colonoscopy and Polypectomy. *Gastroenterology*, 2020.

Adaptive screening decisions

How to group people?
← Retrospectively



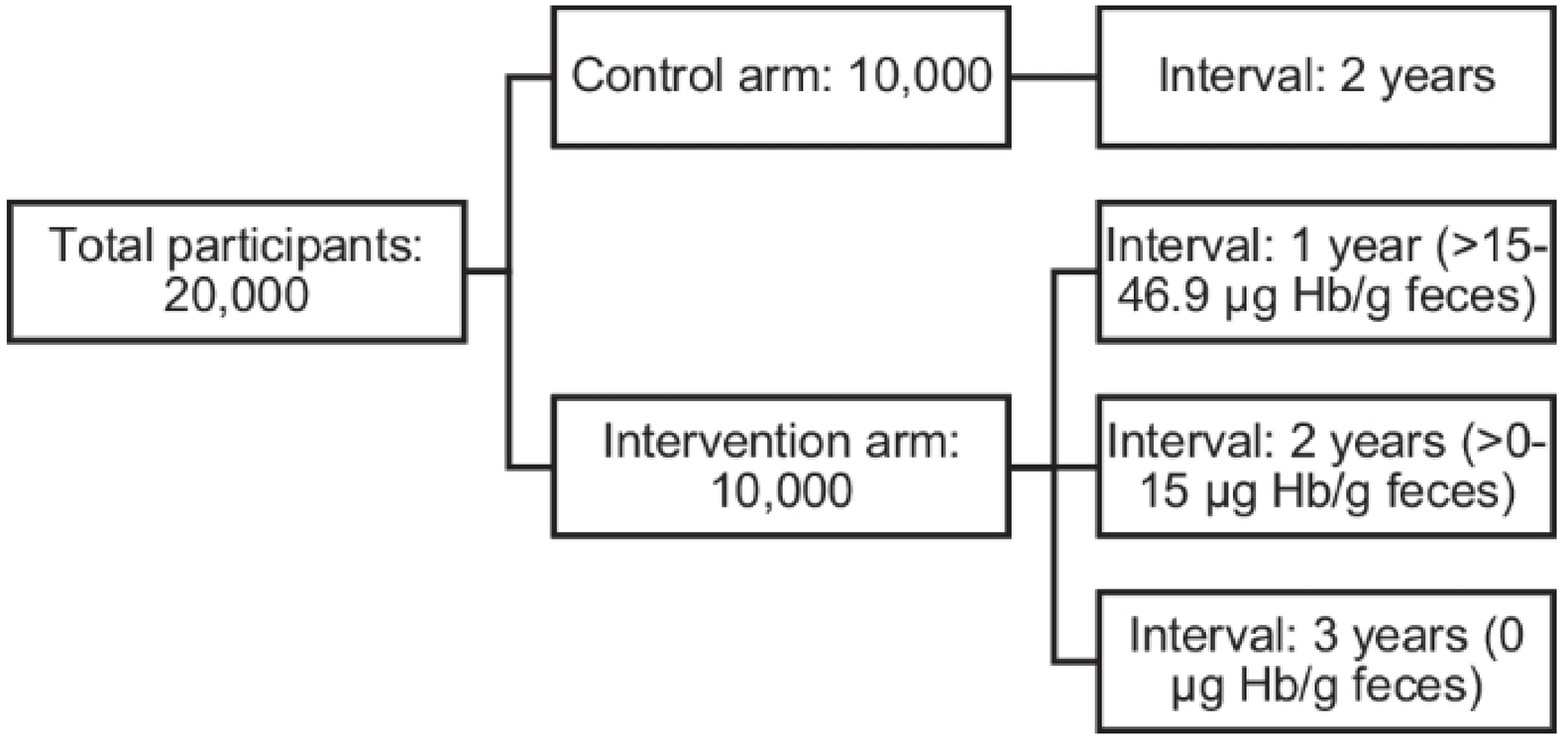
Two main decisions
At each encounter



How to treat people?
Prospectively →

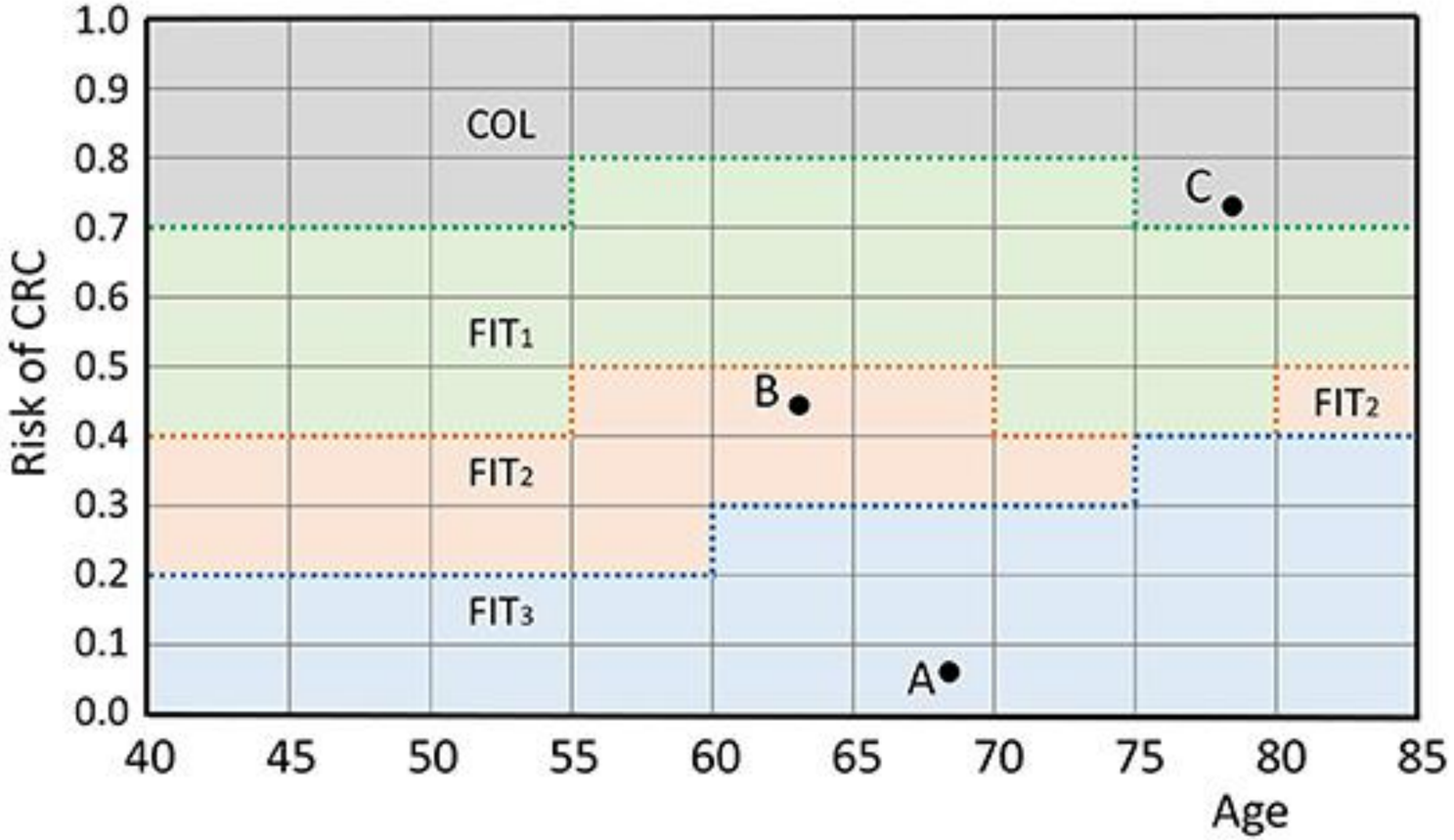
Group	A	B	C
Interval	∞	3	1
Test	-	T	TT
Cutoff	-	High	Low

Trial based on fecal Hb levels



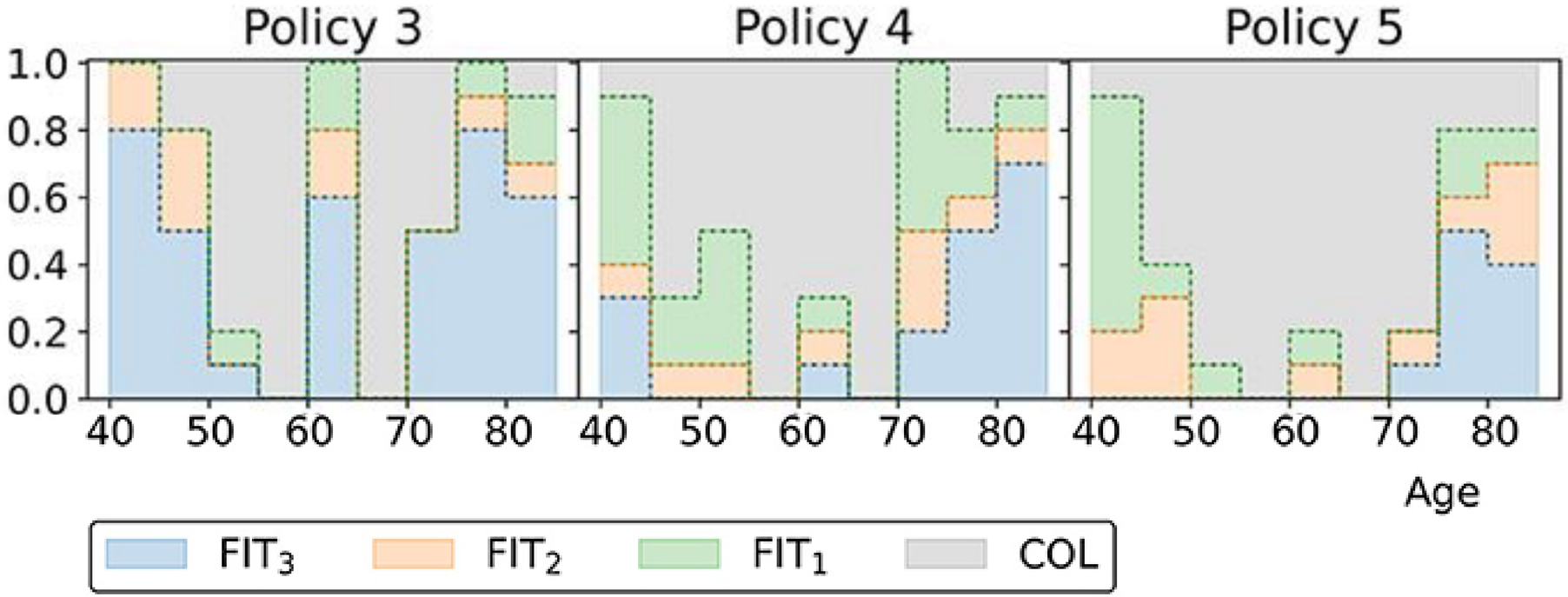
Breekveldt, ECH et al. Personalized colorectal cancer screening: study protocol of a mixed-methods study. *BMC Gastroenterology*, 2023.

Example policy based on risk



Van Duuren, LA et al. An Evolutionary Algorithm to Personalize Stool-Based Colorectal Cancer Screening. *Front. Physiology*, 2022.

Algorithm-optimized policy examples



+14% benefit at no additional cost *vs*. USPSTF

Van Duuren, LA et al. An Evolutionary Algorithm to Personalize Stool-Based Colorectal Cancer Screening. *Front. Physiology*, 2022.

Discussion

- Adaptive personalized CRC screening is a worthy research frontier
- Past test results provide valuable information for adaptive programs
- More research is needed into

  1) How to identify optimal adaptive strategies (with relevant constraints)
  2) What their clinical and economic value could be
  3) How to implement them across settings

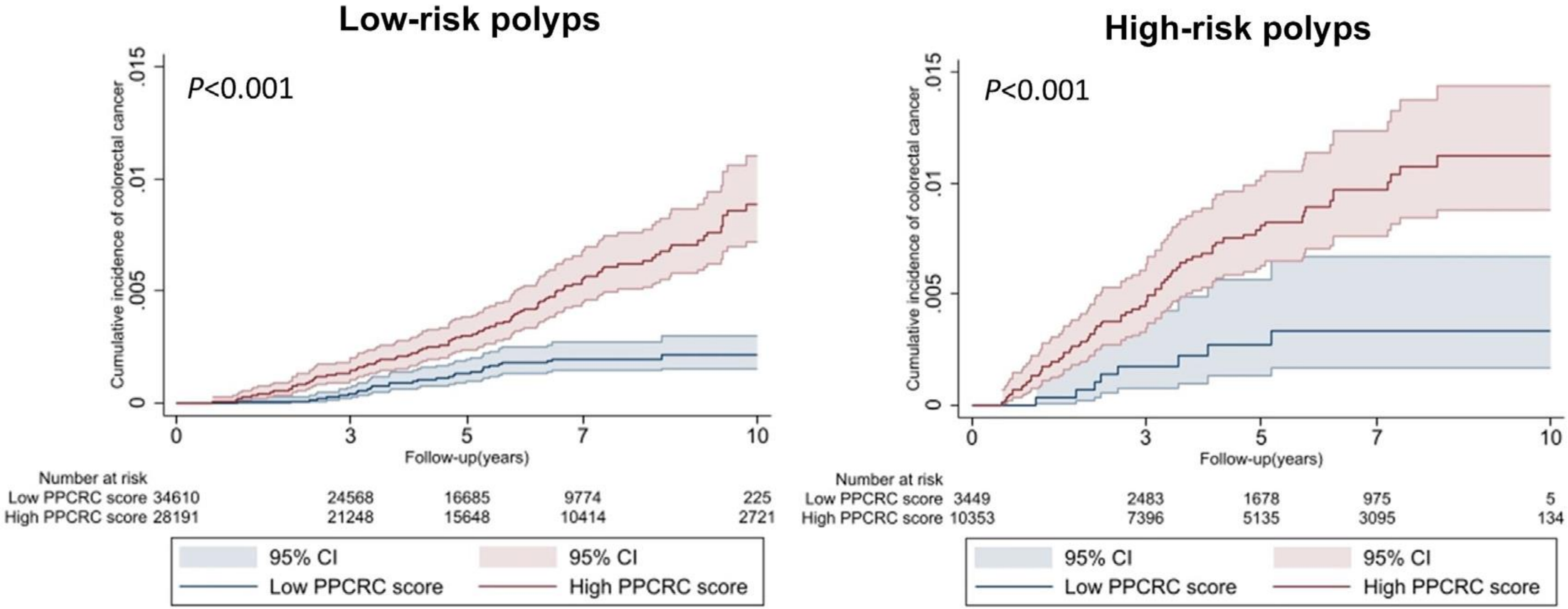
Progress is impossible without change

George Bernard Shaw

WEO

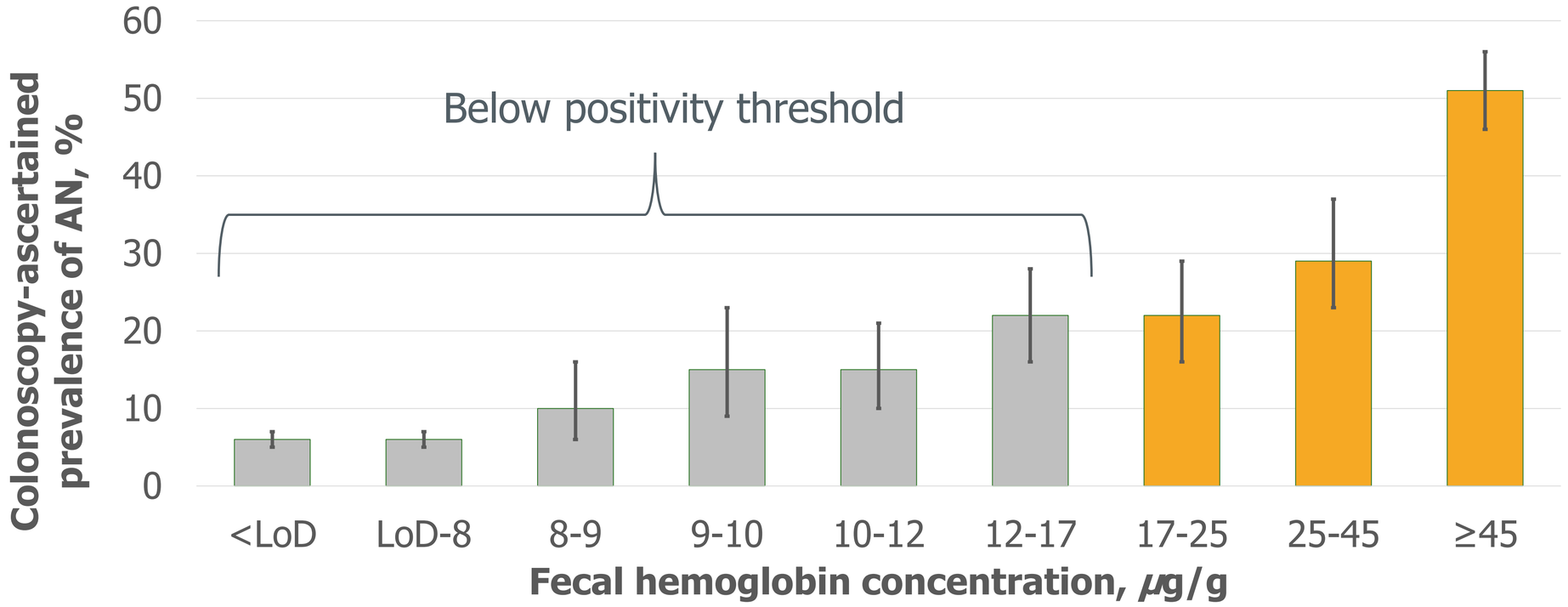
World Endoscopy Organization

Rationale for risk-adapted colonoscopy



Knudsen MD. et al. Development and validation of a risk prediction model for post-polypectomy colorectal cancer in the USA. *eClinMed*, 2023.

Rationale for quantitative screening test



Niedermaier T. et al. Colonoscopy-Ascertained Prevalence of Advanced Neoplasia According to Fecal Hemoglobin Concentration. *Ann Intern Med*, 2023.