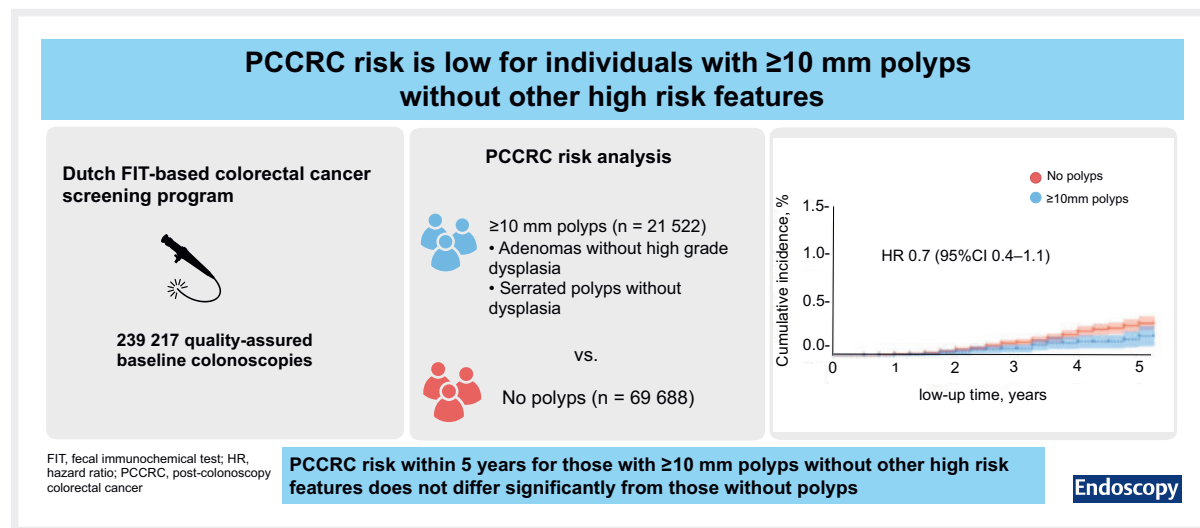


# Individuals with polyps $\geq 10$ mm without other high risk features have a similarly low post-colonoscopy colorectal cancer risk to those with no polyps

## GRAPHICAL ABSTRACT



## Authors

Nanette S. van Roermund<sup>1,2,3</sup>, Monique E. van Leerdam<sup>4,5</sup>, Manon C.W. Spaander<sup>6</sup> , Evelien Dekker<sup>1,2,3</sup> , Joep E. G. Ijspeert<sup>4</sup>

## Institutions

- 1 Gastroenterology and Hepatology, Amsterdam UMC, University of Amsterdam, Amsterdam, Netherlands
- 2 Amsterdam Gastroenterology Endocrinology Metabolism, Amsterdam, Netherlands
- 3 Cancer Center Amsterdam, Amsterdam University Medical Centres, Amsterdam, Netherlands
- 4 Gastrointestinal Oncology, The Netherlands Cancer Institute - Antoni van Leeuwenhoek Hospital, Amsterdam, Netherlands
- 5 Gastroenterology and Hepatology, Leiden University Medical Center, Leiden, Netherlands
- 6 Gastroenterology and Hepatology, Erasmus MC University Medical Center Rotterdam, Rotterdam, Netherlands

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## Corresponding author

Joep E. G. Ijspeert, MD, PhD, Department of Gastrointestinal Oncology, Netherlands Cancer Institute-Antoni van Leeuwenhoek Hospital, Plesmanlaan 121, Amsterdam 1066 CX, The Netherlands  
j.ijspeert@nki.nl

## ABSTRACT

**Background** Current post-polypectomy guidelines recommend a 3-year surveillance colonoscopy for individuals with polyps  $\geq 10$  mm as the sole high risk feature, although the necessity of such strict surveillance, particularly for polyps of 10–20 mm, remains uncertain. We aimed to compare post-colonoscopy colorectal cancer (PCCRC) risk between these individuals and those without polyps at baseline colonoscopy.

**Methods** Data of quality-assured baseline colonoscopies in the Dutch fecal immunochemical test (FIT)-based CRC screening program (2014–2020) were used. According to the guidelines prevailing at that time, a subset of individuals with  $\geq 10$ -mm adenomas without high grade dysplasia or serrated polyps  $\geq 10$  mm without dysplasia were advised 5-year surveillance. For these individuals, PCCRC risk within 5 years was assessed and compared with the risk of polyp-free individuals using multilevel Cox regression analysis.

**Results** Of all individuals with high risk polyps, 79% had polyps  $\geq 10$  mm and 46% had polyps 10–20 mm as the sole high risk feature. In total 21 522 individuals with  $\geq 10$ -mm polyps and 69 688 individuals without polyps were included in comparative analyses. PCCRC incidence per 10 000 person-years of follow-up was 3.07 (95%CI 1.76–4.38) for individuals with  $\geq 10$ -mm polyps and 5.02 (95%CI 4.08–5.97) for individuals without polyps. Risk of PCCRC was comparable between the two groups (hazard ratio 0.67, 95%CI 0.42–1.07).

**Conclusions** PCCRC risk 5 years after baseline colonoscopy for individuals with polyps  $\geq 10$  mm without other high risk features is not significantly different from individuals without polyps at baseline. Lengthening surveillance intervals would affect 79% of high risk individuals with  $\geq 10$ -mm polyps as their sole high risk feature, and 46% if limited to those with polyps of 10–20 mm.

## Introduction

Colonoscopy with removal of both adenomas and serrated polyps reduces colorectal cancer (CRC) incidence [1]. Post-polypectomy colonoscopy surveillance aims to further decrease the risk of CRC [2]. With the global implementation of CRC screening programs and the aging population, the demand for surveillance colonoscopies continues to rise. As colonoscopies are both burdensome and costly, it is crucial to minimize unnecessary procedures, while ensuring that individuals at high risk of developing advanced neoplasia receive appropriate surveillance.

The European Society of Gastrointestinal Endoscopy (ESGE) post-polypectomy guideline classifies individuals as being at high risk if they have polyps measuring  $\geq 10$  mm, adenomas with high grade dysplasia (HGD), multiple low risk adenomas ( $\geq 5$  adenomas), or serrated polyps with dysplasia, and recommend a strict surveillance interval of 3 years for these individuals [2]. There is however ongoing debate about which characteristics of a removed polyp determine an increased risk of post-colonoscopy CRC (PCCRC) for that specific individual. Polyp size, in particular, remains a major point of discussion, with some advocating for less stringent surveillance in individuals who have  $\geq 10$ -mm polyps without other risk factors [3, 4]. This is reflected in the British Society of Gastroenterology (BSG) post-polypectomy guideline, which differs from the ESGE guideline and recommends surveillance after 3 years following the resection of a  $\geq 10$ -mm polyp in combination with one other premalignant polyp [5]. Additionally, studies suggest that adenomas  $< 20$  mm without HGD appear to have a lower CRC risk compared with those  $\geq 20$  mm or with HGD [3, 4]. This paradigm is also discussed in the post-polypectomy surveillance guideline of the ESGE [2].

To enable a size cutoff of 10 or 20 mm for strict 3-year colonoscopy surveillance to be advocated, studies are needed that

evaluate the CRC risk in individuals with  $\geq 10$ -mm polyps without other high risk features. Therefore, we aimed to compare the risk of PCCRC within 5 years for individuals with  $\geq 10$ -mm polyps without other high risk features with that of individuals with no polyps detected at baseline colonoscopy.

## Methods

### Study design and population

This population-based study used prospectively collected data of the Dutch fecal immunochemical test (FIT)-based CRC screening program, spanning from the program's implementation in January 2014 to December 2020. Baseline colonoscopy data from the Dutch Colorectal Cancer Organization were linked, using Dutch citizen numbers, to cancer data obtained from the Dutch Cancer Registry and to pathology data from the national pathology database, known as PALGA. A comprehensive explanation of this link has been provided in a previous article [6].

To perform within the Dutch CRC screening program, endoscopists and pathologists are obliged to meet specific quality standards. A detailed description of the quality assurance program for endoscopists within the screening program is available in a previous publication [7]. Among other requirements, endoscopists must perform  $\geq 200$  colonoscopies and  $\geq 50$  polypectomies per year, achieve a cecal intubation rate of  $\geq 95\%$ , ensure the removal and retrieval of  $\geq 90\%$  of detected polyps, and maintain an adenoma detection rate (ADR) of  $\geq 40\%$  in their FIT-positive colonoscopies.

### The Dutch post-polypectomy guideline

From 2013 to 2022, the Dutch post-polypectomy guideline differed from the current ESGE post-polypectomy guideline. During this period, risk assessment was based on the total number

of polyps, polyp size, and the presence of villous histology or proximal location leading to an adenoma score (Table 1s, see online-only Supplementary material) [8]. Within the risk assessment framework, an adenoma score of 1 or 2 led to a recommendation of 5-year follow-up interval. Consequently, a substantial number of individuals with adenomas  $\geq 10$  mm without HGD or serrated polyps  $\geq 10$  mm without dysplasia received 5-year surveillance advice rather than the currently recommended 3-year interval.

### Study outcome definitions

The main outcome of this study was the relative risk of PCCRC within 5 years following a complete colonoscopy in individuals with  $\geq 10$ -mm polyps without other high risk features as compared with individuals who did not have polyps removed at baseline colonoscopy. Additionally, the influence of endoscopist's ADR on PCCRC risk within 5 years for individuals with  $\geq 10$ -mm polyps without other high risk features was assessed.

High risk polyp features were defined in agreement with the 2020 ESGE post-polypectomy guideline [2] and included adenomas with HGD, five or more low risk adenomas, traditional serrated adenomas, sessile serrated lesions with dysplasia, and polyps  $\geq 10$  mm. In this study, individuals with  $\geq 10$ -mm polyps without other high risk features were defined as being those in whom size was the only high risk factor. The cutoff of  $\geq 10$  mm for polyp size was based on the endoscopist's visual estimation.

PCCRC was defined according to the definition of the World Endoscopy Organization, as a cancer diagnosed  $\geq 6$  months after a baseline colonoscopy in which no CRC was diagnosed. This study included all PCCRCs within a 5-year surveillance period, covering both interval PCCRCs and non-interval PCCRCs. ADR was defined as the proportion of baseline colonoscopies in which at least one adenoma was detected. Endoscopists were categorized into three equal groups based on their individual ADR (high, medium, and low).

### Inclusion and exclusion criteria

Two groups of individuals were included for analyses: (a) all individuals in which no polyp or cancer was diagnosed and/or removed during baseline colonoscopy; (b) all individuals in whom  $\geq 10$ -mm polyps without high risk polyp features other than size (i. e. an adenoma with high grade dysplasia or a serrated polyp with dysplasia) were resected and who were advised to undergo a surveillance colonoscopy after 5 years.

To ensure high quality baseline colonoscopies, we excluded colonoscopies where cecal intubation was not achieved, bowel preparation was deemed insufficient (Boston Bowel Preparation Score  $< 6$ ), the examination was incomplete, or resected polyps were sent for pathologic evaluation but pathology data were missing. To ensure accurate calculation of ADR, colonoscopies performed by endoscopists who conducted  $< 75$  procedures during the study period were also excluded.

To assess PCCRC risk, colonoscopies were further excluded if colonoscopy surveillance advice had been given to undergo a follow-up colonoscopy before the 5-year interval (e. g. personal recommendation from the endoscopist that deviated from the national protocol, early evaluation of the polypectomy scar for

completeness), if the individual was referred for further endoscopic treatment of polyps, or if cancer was diagnosed within 6 months after the baseline colonoscopy.

### Statistical analyses

Descriptive analyses of baseline characteristics are presented as counts and proportions, along with the median and interquartile range (IQR). For PCCRC risk analysis, individuals were censored upon diagnosis of PCCRC, after 60 months of follow-up, or at the end of study follow-up (December 2020), whichever occurred first. To evaluate the relative risk of PCCRC within 5 years in individuals with  $\geq 10$ -mm polyps as compared with individuals without polyps, we conducted a shared frailty Cox proportional hazard regression analysis, calculating the corresponding hazard ratios (HRs) with 95% CIs. Individual endoscopist was included as a random effect to account for within-endoscopist clustering. Models were adjusted for age and sex as potential confounders. A Kaplan–Meier curve was plotted to illustrate the relative risk over time.

PCCRC incidence within individuals with  $\geq 10$ -mm polyps and for those without polyps was presented as the number of CRCs per 10 000 person-years of follow-up, along with 95% CI. To assess whether the PCCRC hazard remained constant over time, we plotted a  $\log(-\log(\text{survival}))$  plot and assumed that a straight line on this plot would indicate a constant hazard.

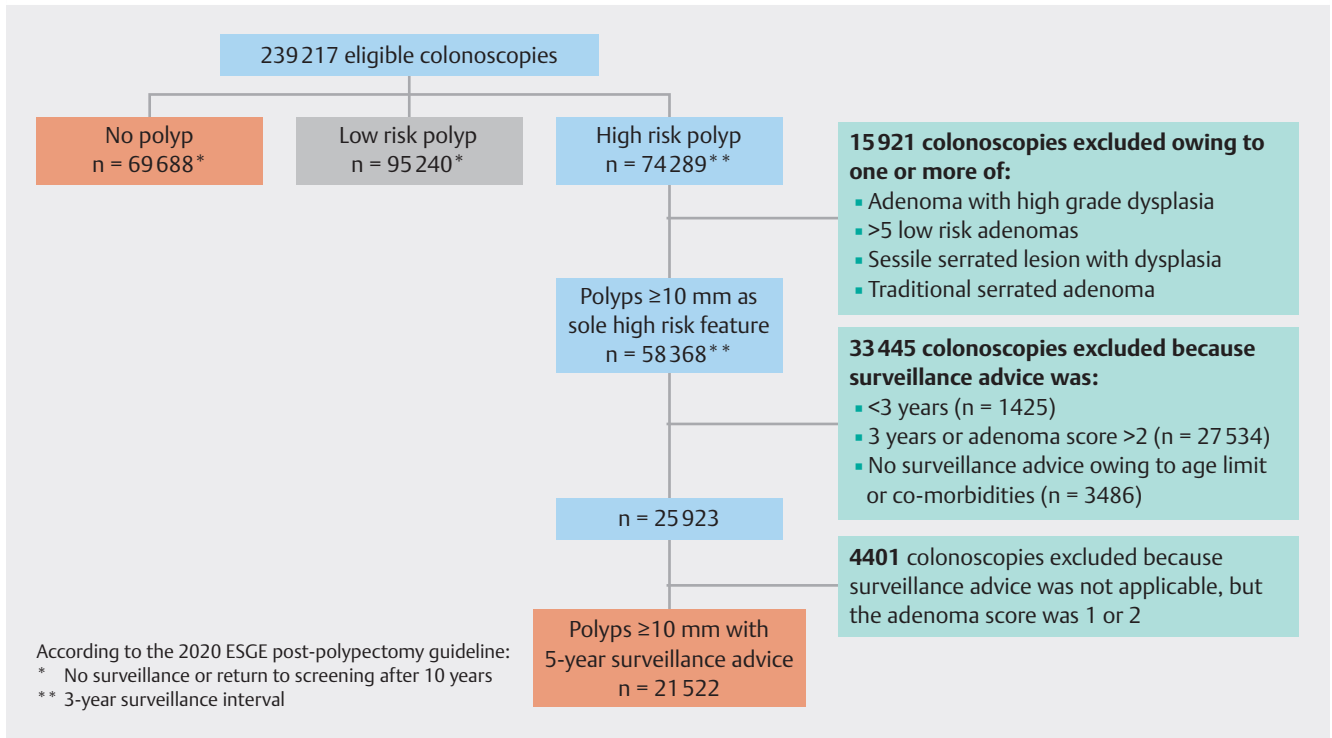
The influence of endoscopists' ADRs on PCCRC risk within 5 years in individuals with  $\geq 10$ -mm polyps was evaluated by conducting a shared frailty Cox proportional hazard regression analysis under the same conditions as described above, wherein ADR was included as the independent categorical variable (high, medium, low). A Kaplan–Meier curve was plotted to illustrate the results of endoscopists with a high or medium ADR versus endoscopists with a low ADR. The appropriateness of the proportional hazards assumption for ADR was evaluated by analyzing the plots of the Schoenfeld residuals. All analyses were done using SPSS and R studio, and a  $P$  value of  $< 0.05$  was considered statistically significant.

### Sensitivity analyses

The BSG guideline differs from the ESGE guideline, recommending 3-year surveillance after resection of two or more premalignant polyps (excluding hyperplastic polyps  $< 5$  mm in the rectum) including at least one polyp of  $\geq 10$  mm [5]. To assess PCCRC risk in this group, additional analyses were performed for individuals with one  $\geq 10$ -mm polyp plus one nonadvanced polyp and for those with a single  $\geq 10$ -mm polyp. PCCRC risk was also evaluated for individuals with  $\geq 10$ -mm polyps without other high risk features who were recommended surveillance within 1 year or at 3 years. Lastly, individuals were stratified by polyp type:  $\geq 10$ -mm serrated polyps versus adenomas.

### Ethical approval

This study was conducted in accordance with the Dutch Population Screening Act. Returning the FIT is considered to be consent for the use of pseudonymized data of all screening colonoscopies. The Dutch Act on Medical Research Involving Human Subjects was not applicable, as neither individuals nor



► **Fig. 1** Inclusion process for individuals with polyps ≥10mm without other high risk features.

endoscopists underwent interventions beyond standard of care. To protect the privacy of participating endoscopists and individuals, the dataset was first pseudonymized before being sent to our research group for analysis.

## Results

During the study period, a total of 329 104 colonoscopies for FIT-positive participants in the national CRC screening program were performed, of which 239 217 colonoscopies were eligible for PCCRC risk analysis (**Fig. 1s**). Among all eligible colonoscopies, 74 289 individuals had at least one high risk polyp, while 69 688 individuals had no polyps removed during baseline colonoscopy (**► Fig. 1**). The median (IQR) age of individuals with high risk polyps and of those with no polyps was 68 (63–72) years. Among individuals with high risk polyps, 64% were men, while 49% of those without polyps at baseline were men.

Among all individuals with high risk polyps, 58 368 individuals (78.6%) had at least one ≥10-mm polyp as the sole high risk feature. Among these 58 368 individuals, 33 815 individuals (57.9%) had the largest polyp measured between 10–20 mm in size, while 24 265 individuals had at least one polyp measuring ≥20 mm (41.6%); the size of the largest polyp was unknown for 0.5% of individuals.

Of the 58 368 individuals with polyps ≥10 mm, 27 534 received a 3-year surveillance recommendation from the endoscopist. Only 937 individuals with ≥10-mm polyps were assigned a surveillance interval of ≤1 year. A total of 21 522 individuals with ≥10-mm polyps were assigned a 5-year surveillance interval (in line with the then-applicable Dutch guideline), and were includ-

ed in the analysis (**► Fig. 1**). Of these 21 522 individuals, 19 816 (92.1%) had an adenoma of ≥10 mm, 2104 (9.8%) a serrated polyp of ≥10 mm, and 398 (1.8%) had both a serrated polyp of ≥10 mm and an adenoma of ≥10 mm. Among these 21 522 individuals, the median size of the largest polyp was 18 mm (IQR 15–20 mm), 57% of ≥10-mm polyps measured 10–20 mm, 25% measured 21–25 mm, and 18% were >25 mm.

Among the included 21 522 individuals with ≥10-mm polyps, 21 PCCRCs were detected within 5 years following the baseline colonoscopy. In the 69 688 included individuals with no polyps at baseline colonoscopy, 108 PCCRCs were detected within 5 years (**► Table 1**). Compared with individuals with no polyps, the presence of ≥10-mm polyps was not associated with a higher risk of developing PCCRC within 5 years (HR 0.67, 95%CI 0.42–1.07).

For individuals with polyps ≥10 mm, the cumulative incidence of PCCRC was 3.07 (95%CI 1.76–4.38) per 10 000 patient-years of follow-up. The absolute risk of developing PCCRC in these individuals was 0.07% within 3 years and 0.20% within 5 years (**► Fig. 2**). For individuals with no polyps, the cumulative incidence of PCCRC was 5.02 (95%CI 4.08–5.97) per 10 000 patient-years. These individuals had an absolute risk of developing PCCRC of 0.14% within 3 years and 0.34% within 5 years. The log(-log(survival)) plot displayed a straight line for both groups, suggesting a constant hazard over time (**Fig. 2s**).

Among endoscopists participating with the Dutch CRC screening program, the median ADR was 66.3% (IQR 61.4%–69.9%). Endoscopists with a low ADR had an ADR of <63%, endoscopists with a medium ADR had a detection rate between 63% and 68.7%, and endoscopists with a high ADR had a detec-

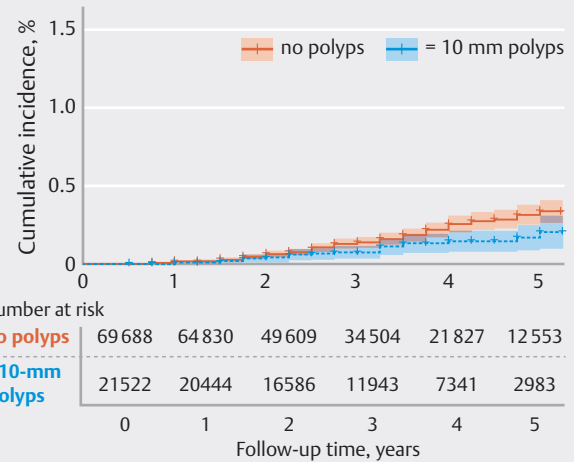
► **Table 1** Cancer characteristics in polyp-free individuals versus individuals with polyps of  $\geq 10$  mm without other high risk features.

	No polyps n=69688	Polyps $\geq 10$ mm n=21522
Time from colonoscopy to cancer diagnosis, median (IQR), months	33 (24–45)	30 (21–39)
All PCCRCs diagnosed, n	108	21
▪ Stage, advanced, n (%)	72 (67)	12 (57)
PCCRCs diagnosed within 3 years, n	65	12
▪ Stage, advanced, n (%)	41 (63)	9 (75)
PCCRCs diagnosed at 3–5 years, n	43	9
▪ Stage, advanced, n (%)	31 (72)	3 (33)

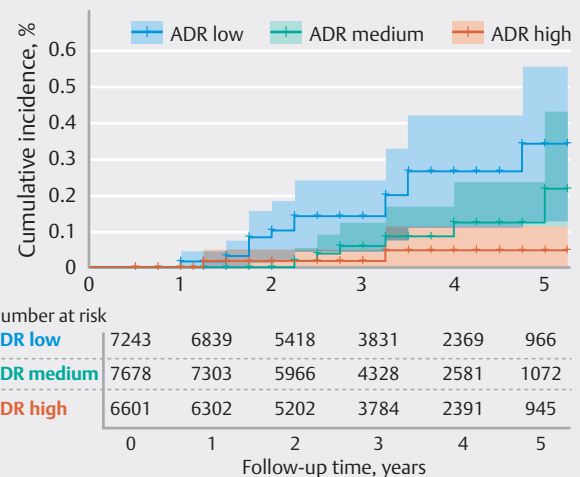
IQR, interquartile range.

tion rate of  $>68.7\%$ . The relative risk of PCCRC within 5 years for individuals with polyps  $\geq 10$  mm who were scoped by an endoscopist with a low ADR was higher compared with that of those scoped by an endoscopist with a high ADR (HR 5.85, 95%CI 1.28–26.55). The relative PCCRC risk of individuals with polyps  $\geq 10$  mm treated by endoscopists with a medium ADR demonstrated no significant difference compared with that of those treated by endoscopists with a low ADR (HR 2.66, 95%CI 0.53–13.42). PCCRC incidence was 0.93 (95%CI 0.66–2.22), 2.45 (95%CI 0.49–4.41), and 5.78 (95%CI 2.64–8.93) per 10 000 patient-years for those examined by endoscopists with high, medium, and low ADRs, respectively (► **Fig. 3**). Schoenfeld residuals indicated that the proportional hazards assumption for endoscopists' ADR on PCCRC risk was appropriate ( $P=0.63$ ) for individuals with  $\geq 10$ -mm polyps, suggesting a consistent effect of endoscopist quality on risk reduction over time (**Fig. 3s**).

Sensitivity analyses showed that PCCRC risk within individuals with one  $\geq 10$ -mm polyp plus one nonadvanced polyp did not significantly differ from the risk in those with a single  $\geq 10$ -mm polyp (HR 1.80, 95%CI 0.62–5.20). Furthermore, PCCRC risk within 5 years for individuals with one  $\geq 10$ -mm polyp plus one nonadvanced polyp did not differ significantly from that for those without polyps at baseline (HR 0.69, 95%CI 0.31–1.32). Similarly, no significant differences in PCCRC risk were observed for individuals with only adenomas or serrated polyps  $\geq 10$  mm compared with those without polyps (HR 0.57 [95%CI 0.34–1.01] and HR 1.85 [95%CI 0.68–5.01], respectively). Finally, individuals with  $\geq 10$ -mm polyps without other high risk features who were recommended surveillance within 1 year had a higher PCCRC risk compared with that for polyp-free individuals (HR 2.46, 95%CI 1.08–5.62), whereas those receiving a 3-year recommendation showed no significant difference (HR 1.02, 95%CI 0.73–1.44).



► **Fig. 2** Cumulative post-colonoscopy colorectal cancer (PCCRC) incidence within 5 years for individuals with  $\geq 10$ -mm polyps without other high risk features and individuals without polyps during baseline colonoscopy.



► **Fig. 3** Cumulative post-colonoscopy colorectal cancer (PCCRC) incidence within 5 years for individuals with  $\geq 10$ -mm polyps without other high risk features, stratified by endoscopist performance in terms of adenoma detection rate (ADR).

## Discussion

This population-based study in the setting of the Dutch FIT-based screening program showed that individuals with polyps  $\geq 10$  mm, but without other high risk features demonstrated a low risk of PCCRC within 5 years, with the risk in fact not being significantly different from that for individuals without any polyps removed at baseline colonoscopy. The incidence of PCCRC significantly decreased when baseline colonoscopy was performed by an endoscopist with a high ADR, compared with those scoped by endoscopists with low ADRs. Our findings question the current risk stratification and the necessity of

strict 3-year surveillance in individuals with polyps  $\geq 10$  mm without other high risk features, especially when the procedure is performed by endoscopists with a high ADR and the procedure meets high quality standards. Lengthening surveillance intervals would impact 79% of all individuals with high risk polyps if applied to individuals with polyps  $\geq 10$  mm as the sole high risk feature, and 46% of individuals with high risk features if applied to those with polyps of 10–20 mm as the sole high risk feature.

The findings of this study contradict the recommendations of current post-polypectomy guidelines, which are based on studies indicating an increased CRC risk in individuals with polyps  $\geq 10$  mm compared with those with no polyps or only polyps  $< 10$  mm [9, 10, 11, 12, 13]. The validity of these results, however, remains open to debate. Most studies have included polyp size as an independent variable in logistic regression analyses, alongside other features such as HGD in adenomas or the presence of dysplasia in serrated polyps; the risk associated with polyp size alone, without the presence of other high risk features, was not however evaluated [9, 10, 11, 14]. Given the known correlation between polyp size and other high risk features, this approach facilitates multicollinearity, which can complicate interpretation because it becomes challenging to determine the individual effect of each predictor on the dependent variable [15, 16, 17]. Furthermore, many studies rely on surrogate end points, such as advanced neoplasia, rather than directly assessing CRC incidence [12, 13, 18].

Prior studies that separate polyp size from other high risk features have reported results more comparable with our study. Both a large Polish study [3] and an English study [4] demonstrated that only individuals with adenomas  $\geq 20$  mm and HGD had a significantly higher CRC incidence, compared with individuals with no polyps or the general population, and would therefore benefit from intensive surveillance. In the current study, the majority (57%) of individuals with large polyps had polyps measuring between 10–20 mm. The low PCCRC incidence in both this and previous studies suggest that, for individuals with polyps in the 10–20 mm range, the surveillance interval could be extended from 3 years to 5 years, provided no other high risk features are present. Of note, the primary goal of surveillance is not to detect PCCRC, but to prevent it through early detection of precursor lesions; however, if the risk of cancer within a certain extended surveillance period is low, it can be considered safe to lengthen the surveillance interval accordingly. In other words, we feel the surveillance colonoscopy could also be performed after 5 years and still enable removal of polyps and prevent cancer.

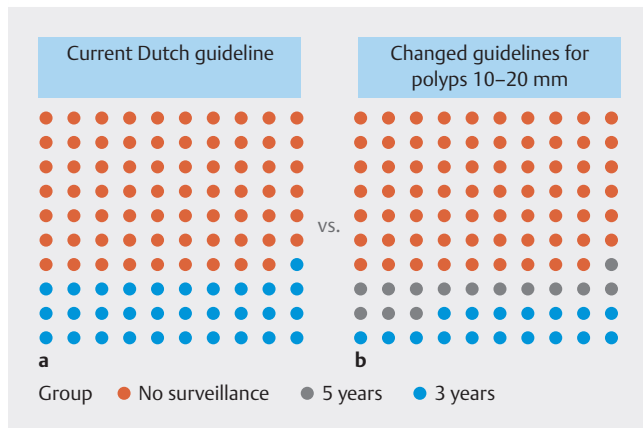
In our study, the PCCRC risk was low across both groups, with a stable hazard over time between 3 and 5 years, suggesting that an extension of the surveillance interval may be safely warranted. Intriguingly, although 43% of individuals with large polyps had polyps  $\geq 20$  mm, the PCCRC incidence within 5 years remained low in our findings. This would suggest that the size threshold for intensive surveillance could potentially be raised further. Unfortunately, categorization based on size in this study led to a small sample size and very low event rates, resulting in unreliable conclusions.

Of note, the BSG guideline recommends 3-year surveillance after the resection of two or more premalignant polyps, including at least one  $\geq 10$ -mm polyp. Although the risk estimate of PCCRC appeared nonsignificantly higher in individuals with two premalignant polyps compared with those with a single  $\geq 10$ -mm polyp, individuals with one  $\geq 10$ -mm polyp and one nonadvanced polyp did not demonstrate an increased PCCRC risk compared with those without polyps at baseline. Therefore, based on our findings, extending the surveillance interval from 3 years to 5 years for this group of individuals also appears justified, although further studies are needed to confirm these results.

Only patients for whom a 5-year surveillance interval was initially agreed upon were included for the main analysis in this study. Patients who were advised to undergo colonoscopy for scar assessment were excluded because, owing to the database design, we had no information on any findings or recommendations made after the baseline colonoscopy. Moreover, recurrence rates of piecemeal resected polyps referred for early surveillance are known to be substantial [19]. Therefore, within the Netherlands, assessment of the scar is advised for any nonpedunculated polyp  $> 20$  mm and for smaller polyps in which the endoscopist is uncertain about completeness of the polypectomy. This is reflected in our results, which show a higher PCCRC risk in individuals recommended for surveillance within 1 year compared with those without polyps. These individuals likely represent cases of piecemeal resection with uncertain completeness. For this reason, included patients who were recommended 5-year surveillance with a polyp  $\geq 20$  mm are likely to have a relatively high proportion of pedunculated polyps. A more cautious approach, advising only individuals with 10–20 mm polyps where complete resection was assured, therefore seems justified.

The external validity of the 5-year surveillance recommendation appears justified for individuals with polyps of 10–20 mm who underwent scar assessment and had no residual polyp tissue; however, conducting analyses to confirm this hypothesis was not possible, as our dataset was limited and did not include the results of subsequent colonoscopies. Ongoing prospective surveillance trials, such as the EPOS study [20], may provide stronger evidence to support this observation.

With the rise of global screening programs and an aging population, innovative and cost-effective strategies are needed to reduce unnecessary colonoscopies, while still providing optimal care for high risk individuals. To illustrate the impact of implementing an alternative risk-stratification strategy and extending surveillance intervals for individuals with polyps measuring 10–20 mm without other high risk features within the Dutch CRC screening program, 46% of those currently classified as high risk would be reclassified to a lower risk category, leading to a 5-year surveillance interval instead of a 3-year interval. This change in risk definition would affect 14% of the overall screening population, demonstrating a significant effect on colonoscopy capacity (► **Fig. 4**).



**► Fig. 4** Illustration of effect of the alternative risk stratification for individuals with polyps of 10–20 mm without other high risk features in the Dutch screening program showing: **a** the current situation; **b** the alternative risk stratification. Red dots, individuals with no/low risk polyps (no surveillance); blue dots, individuals with high risk polyps (3-year surveillance); grey dots, individuals with polyps of 10–20 mm without other high risk features, potentially reclassified as lower risk (5-year surveillance).

In the Netherlands, individuals without polyps are currently advised to refrain from screening for 10 years, based on the post-polypectomy guidelines, which rely solely on polyp characteristics. However, as our results suggest that both individuals without polyps and those with  $\geq 10$ -mm polyps had similarly low risks, we raise the question as to whether relying solely on polyp characteristics to determine a risk profile is still appropriate. Numerous studies have emphasized the critical role of endoscopist quality in polyp detection to lower PCCRC risk [21, 22, 23, 24]. Only recently, we have demonstrated that the presence of high risk polyps was not associated with a change in PCCRC risk within 3 years, whereas being scoped by an endoscopist with a high ADR or proximal serrated polyp detection rate significantly reduced PCCRC risk [25].

Our current study confirms that the protective effect of being scoped by an endoscopist with a high ADR extends not only to PCCRC within 3 years, but also to a 5-year window. This highlights the importance of not relying solely on polyp characteristics, but also prioritizing strategies to enhance and maintain endoscopist quality in order to reduce PCCRC risk. Initiatives such as establishing a quality assurance program that benchmarks, monitors, and audits endoscopist performance through key quality indicators are essential in achieving this goal. In addition to this study, other research suggests that our current definition of “high risk,” based solely on morphologic appearance, may not be as accurate as previously thought. Molecularly defined high risk lesions may better identify those at greater risk of progression to CRC [26, 27]. Future studies should evaluate the most accurate risk profile for each individual, rather than focusing solely on risk factors that are potentially influenced by the endoscopist performing the examination.

Several limitations of this study have to be acknowledged. First, details about polyp morphology were lacking. Second, the relatively high PCCRC incidence in individuals without polyps at baseline in the Dutch CRC screening cohort may be due to the older age of participants in the program’s early years, potentially influencing the results. Third, we acknowledge that the endoscopists included in this study are highly qualified as a result of a strict accreditation process, which may limit the generalizability of our findings. Fourth, the cutoff of  $\geq 10$  mm was based on the endoscopists estimation, as accurate size assessment is challenging, which may have introduced bias. Lastly, the reliance on preselected data presents additional limitations. We lacked information on colonoscopies performed within the 5-year interval, which may have influenced our results, particularly in individuals with polyps  $\geq 10$  mm. However, if cancer had been diagnosed during a follow-up procedure at 5 years, PCCRC incidence would be expected to be higher in this group compared with those without polyps because a percentage of CRC would have been found in asymptomatic individuals, while our results did not show a significant difference.

In conclusion, the risk of PCCRC in individuals with  $\geq 10$ -mm polyps without other high risk features was low and did not differ significantly from that of individuals without polyps removed during baseline colonoscopy, and was significantly decreased when endoscopist’s quality was high (e.g. high ADR). These results challenge the current strict 3-year surveillance advice of current post-polypectomy guidelines, particularly for those patients with en bloc resected polyps of 10–20 mm who were scoped by an endoscopist with a high ADR.

### Contributors’ Statement

Nanette Sofie van Roermund: Data curation, Formal analysis, Methodology, Project administration, Software, Visualization, Writing - original draft, Writing - review & editing. Monique E van Leerdam: Conceptualization, Methodology, Visualization, Writing - review & editing. Manon C.W. Spaander: Conceptualization, Methodology, Visualization, Writing - review & editing. Evelien Dekker: Conceptualization, Investigation, Methodology, Resources, Supervision, Validation, Writing - review & editing. Joep Evert Godfried IJspeert: Conceptualization, Formal analysis, Investigation, Methodology, Software, Supervision, Validation, Visualization, Writing - review & editing.

### Conflict of Interest

M.C.W. Spaander has received research support from Sysmex, Sentinel, Norgine, and Medtronic, and is co-editor of *Endoscopy*. E. Dekker has provided consultancy to Olympus, Fujifilm, Ambu, InterVenn, Norgine, and Exact Sciences, and has received speaker’s fees from Olympus, Norgine, IPSEN/Mayoly, Fujifilm, Steris, and Pentax; she has endoscopic equipment on loan from Fujifilm. N.S. van Roermund, M.E. van Leerdam, and J.E.G. IJspeert declare that they have no conflict of interest.

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