

## Patients' Preferences for Primary Colorectal Cancer Screening: A Survey of the National Colorectal Cancer Screening Program in Korea

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**Background/Aims:** The adoption of colonoscopy as a primary colorectal cancer (CRC) screening technique has been argued for in Korea, without evidence of patient preferences. This study aimed to investigate patients' preferences for the primary CRC screening test for the National Cancer Screening Program (NCSP). **Methods:** Between June and August 2016, 414 individuals aged  $\geq 50$  years who participated in the NCSP were prospectively invited to complete a questionnaire regarding their preferences for the primary CRC screening test and the reasons for their selection. **Results:** Among the 396 respondents who completed the questionnaire, 124 individuals (31.3%) preferred the fecal immunochemical test (FIT), whereas 272 individuals (68.7%) preferred colonoscopy. Elderly participants preferred the FIT ( $p < 0.001$ ), whereas participants with a higher education level ( $p = 0.030$ ), a higher income level ( $p = 0.009$ ), or individuals with a family member ( $p = 0.028$ ) or acquaintance ( $p = 0.013$ ) with a history of CRC preferred colonoscopy. Only 12.9% of participants had a bad experience with a previous FIT; however, 39.3% of participants had a bad experience with a previous colonoscopy. **Conclusions:** Colonoscopy was preferred to FIT in a 2.2:1 ratio as the primary CRC screening test for the NCSP. Patients' preference for colonoscopy should be considered for the NCSP in Korea. (*Gut Liver* 2017;11:821-827)

**Key Words:** Colorectal neoplasms; Fecal occult blood test;

Colonoscopy; Screening; Preference

### INTRODUCTION

The incidence of colorectal cancer (CRC) has increased rapidly in Western and Asian countries.<sup>1</sup> Many countries have started CRC screening programs; however, screening modalities and strategies differ among countries.<sup>2-4</sup> In Korea, the National Cancer Screening Program (NCSP) provides a single annual fecal immunochemical test (FIT) for adults aged  $\geq 50$  years, and secondary confirmatory colonoscopy for those with positive FIT results.<sup>5,6</sup> The efficacy of a FIT-based screening program may ultimately depend on FIT and colonoscopy participation rates. However, the CRC screening rate in Korea<sup>7</sup> has remained lower than those for other cancers, similar to other countries.<sup>8,9</sup> Several Western countries such as Australia, Germany, Poland, Switzerland, and the United States use colonoscopy as a primary CRC screening test.<sup>7</sup> Therefore, the adoption of colonoscopy as a primary CRC screening method has been argued in Korea, but without evidence of patient preferences.

Information about CRC screening preferences will be used to plan a primary colonoscopy screening strategy as well as to identify deficits in the current colonoscopic resources in the NCSP. However, some studies have reported variations in patient preferences for FIT<sup>10-14</sup> and colonoscopy<sup>12-18</sup> as a primary CRC screening test. Information about CRC screening preference is essential for checking the availability of national resources to

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deliver a primary screening program. Until now, however, no data have been available about patient CRC screening method preferences under the NCSP in Korea. Here we conducted a survey to assess patient preferences about CRC screening methods in the NCSP.

## MATERIALS AND METHODS

### 1. Patients

Between June and August 2016, 1,093 asymptomatic subjects aged  $\geq 50$  years, who participated in the NCSP, were invited to complete a questionnaire. The survey items were designed to investigate the patient's preferences regarding FIT versus colonoscopy as a primary CRC screening method. The questionnaire included questions about sex, age, education, marital status, religion, occupation, income level, drinking, smoking, comorbid disease, history of colectomy, family history of CRC in  $\geq$  first-degree relatives at any age, knowledge of CRC warning symptoms, previous participation in the NCSP, previous experience with FIT or colonoscopy, and preference as well as reason for the preference of FIT or colonoscopy as the primary CRC screening test. Comorbid disease included hypertension, type II diabetes mellitus, cardiovascular disease, chronic renal disease, cerebrovascular disease or any malignancy. Respondents who did not complete the questionnaire were excluded from the analysis. All responses were anonymous, and all respondents voluntarily participated. This study was approved by the Institu-

tional Review Board of Kyung Hee University Hospital at Gangdong (KHNMC IRB number: 2016-05-027).

### 2. Questionnaires for preference

The questionnaire regarding primary CRC screening test preference was designed to elicit the patient's preference for the primary CRC screening method and the reasons therein. Patients were asked which screening strategy they would prefer, if given a choice in the future (Supplementary Material 1). The questionnaire asked patients about (1) experience with and opinions about the NCSP; and (2) preference and reason for the preference of a particular primary CRC screening test. The questionnaire was based on a literature review<sup>19-21</sup> and semi-structured discussions with the "Committee of Endoscopy Quality Improvement in the Korean Society of Gastrointestinal Endoscopy." To help participants choose an appropriate primary CRC screening test, an information sheet was provided to participants with reliable, accurate, and unbiased information about the advantages and disadvantages of FIT versus colonoscopy to enable patients to answer the study questionnaire as accurately and reliably as possible. The questionnaire was confirmed as reliable and valid by four gastroenterology fellows who were not involved in this study, and answers from this group were used to revise the survey questionnaire. Reported completion times were 10 to 15 minutes. The questions were dichotomous (yes/no) or multiple choice.

**Table 1.** Respondents' Demographic Characteristics and Baseline Clinical Information According to the Preferred CRC Screening Method Preference

Clinical data	Preference for FIT (n=124)	Preference for colonoscopy (n=272)	p-value
Age, yr	66.17 $\pm$ 8.09	63.17 $\pm$ 7.25	0.208
Male sex	39 (31.5)	100 (36.8)	0.304
Past/current smoker	14 (11.4)	42 (15.5)	0.278
Alcohol drinking	19 (15.4)	70 (25.8)	0.022
Education (university or above)	29 (23.8)	91 (34.9)	0.029
Marital status (married)	113 (91.1)	252 (93.3)	0.436
Religion (yes)	84 (67.7)	175 (64.3)	0.509
Employment			0.139
Full-/part-time	33 (26.6)	92 (34.1)	
Not working/homemaker	91 (73.4)	178 (65.9)	
Income (dollars/mo)			0.013
<1,818	75 (65.2)	141 (54.2)	
1,818-4,545	37 (32.2)	90 (34.6)	
>4,545	3 (2.6)	29 (11.2)	
Comorbid disease (yes)	63 (50.8)	126 (46.3)	0.408
Previous colectomy (yes)	2 (1.6)	17 (6.3)	0.043
Family history of CRC	6 (4.8)	33 (12.2)	0.023
Acquaintances with CRC (yes)	18 (14.6)	71 (26.1)	0.012

Data are presented as mean $\pm$ SD or number (%).

CRC, colorectal cancer; FIT, fecal immunochemical test.

**Table 2.** Factors Influencing Patients' Preference for a CRC Screening Method

Variable	OR (95% CI)		p-value
	FIT preference	Colonoscopy preference	
Age group, yr			0.001
50–59	Reference	Reference	
60–69	1.582 (0.926–2.703)	0.632 (0.370–1.080)	0.094
≥70	3.037 (1.671–5.519)	0.329 (0.181–0.598)	<0.001
Sex			
Male	Reference	Reference	
Female	1.267 (0.806–1.992)	0.789 (0.502–1.240)	0.305
Smoker			
No	Reference	Reference	
Yes	0.700 (0.367–1.337)	1.428 (0.748–2.726)	0.280
Alcohol drinking			
No	Reference	Reference	
Yes	0.525 (0.300–0.918)	1.906 (1.089–3.336)	0.024
Education			
High school or less	Reference	Reference	
University or more	0.583 (0.357–0.949)	1.717 (1.053–2.798)	0.030
Marital status			
Married	Reference	Reference	
Unmarried	0.734 (0.336–1.604)	1.363 (0.623–2.980)	0.438
Religion			
No	Reference	Reference	
Yes	1.164 (0.742–1.827)	0.859 (0.547–1.349)	0.509
Full-/part-time employment			
No	Reference	Reference	
Yes	1.425 (0.890–2.283)	0.702 (0.438–1.124)	0.140
Income (dollars/mo)			0.025
<1,818	Reference	Reference	
1,818–4,545	0.773 (0.481–1.242)	1.294 (0.805–2.079)	0.287
>4,545	0.194 (0.057–0.660)	5.142 (1.516–17.438)	0.009
Comorbid disease			
No	Reference	Reference	
Yes	1.197 (0.782–1.831)	0.836 (0.546–1.278)	0.408
Previous colectomy			
No	Reference	Reference	
Yes	0.243 (0.055–1.069)	4.115 (0.936–18.096)	0.061
Family history of CRC			
No	Reference	Reference	
Yes	0.367 (0.149–0.900)	2.727 (1.112–6.690)	0.028
Acquaintances with CRC			
No	Reference	Reference	
Yes	0.485 (0.275–0.857)	2.061 (1.167–3.638)	0.013

CRC, colorectal cancer; OR, odds ratio; CI, confidence interval; FIT, fecal immunochemical test.

### 3. Statistical analysis

For the sample size estimation, we assumed that the 2-fold difference in the preference for CRC screening tools between colonoscopy and FIT would be sufficient for clinicians to recommend colonoscopy rather than FIT as a primary screening test. Based on these assumptions and 26.6% FIT participation rate of NCSP, 2014 in Korea, a minimum of 51 subjects were required for a power of 80% to detect a difference at  $p < 0.05$  level of significance.

Categorical variables are expressed as numbers (percentage), whereas continuous variables are expressed as mean  $\pm$  standard deviation. Factors influencing preference for CRC screening tests were evaluated using binary logistic regression with odds ratios and a 95% confidence interval. Two-tailed  $p$ -values  $< 0.05$  were considered statistically significant. Statistical analyses were performed using the SPSS version 18.0 for Windows (SPSS Inc., Chicago, IL, USA).

## RESULTS

Among 1,093 asymptomatic subjects aged  $\geq 50$  years who participated in the NCSP in our hospital, 414 answered this survey for a response rate of 37.9%. Overall, the survey results from 396 respondents were analyzed after the exclusion of 16 surveys because of incomplete answers ( $n=4$ ), duplicate answers ( $n=2$ ), participant age  $< 50$  ( $n=4$ ), or no preferred primary screening ( $n=8$ ). The complete overall response rate was 36.2%.

### 1. Characteristics of the survey respondents

The respondents included 139 men (35.1%) and 257 women (64.9%) with a mean age of  $64.1 \pm 7.6$  years. Table 1 shows the demographic characteristics and baseline clinical information of the respondents by CRC screening method preference: FIT

preference group versus colonoscopy preference group. In this study, colonoscopy was preferred to FIT at a ratio of 2.2 to 1 (68.7% vs 31.3%) as a primary CRC screening test in the NCSP. There was no intergroup difference in age or sex distribution. However, alcohol drinkers as well as participants with a higher education or income level, a previous colectomy history, a family history of CRC, or acquaintances with CRC preferred colonoscopy.

### 2. Factors influencing screening method preference and reasons

Elderly participants significantly preferred the FIT ( $p < 0.001$ ) with an age-dependent correlation (Table 2). However, sex did not influence preference. In contrast, participants who were alcohol drinkers ( $p=0.024$ ), had a higher education ( $p=0.030$ ) or income level ( $p=0.025$ ), had a family history of CRC ( $p=0.028$ ), or had acquaintances with CRC ( $p=0.013$ ) preferred colonoscopy. For the patients' preferences in Table 3, FIT was preferred for its convenience and simplicity (72.8%) as well as low cost (4.8%). In contrast, colonoscopy was preferred for its accuracy (79.4%) and ability to provide therapeutic options (15.8%).

### 3. Experience with and opinions about the NCSP

More than 90% of participants frequently participated in the NCSP (Table 4). Only 12.9% of participants had a bad experience with FIT, the major reasons for which were stool sampling (77.8%), and storage and transportation (20.0%). Conversely, 39.3% of participants had a bad experience with colonoscopy, primarily due to bowel preparation (68.9%) and the complicated examination process itself (25.5%).

## DISCUSSION

Primary colonoscopy screening may be superior considering its ability to remove the adenomatous polyp,<sup>22</sup> although FIT is a more efficient CRC screening method.<sup>4,23</sup> Choices for CRC screening options differ among countries.<sup>2-4</sup> Although some Western countries provide primary colonoscopy screening,<sup>7</sup> its adoption should be based on patient preference about screening methods, socioeconomic considerations, the current capacity to perform colonoscopy in each country, and its efficacy at preventing CRC. The planning of a primary colonoscopy screening strategy in Korea should be based on NCSP participant preference data. Our results indicate that colonoscopy was preferred to FIT at a ratio of 2.2 to 1 (68.7% vs 31.3%) as a primary CRC screening test by NCSP participants. Our study showed that elderly participants preferred FIT, whereas participants with higher education and income levels as well as those with family members or acquaintances with CRC preferred colonoscopy. The current study is the first to evaluate primary CRC screening method preferences in NCSP participants.

Four large randomized controlled trials are currently evalu-

**Table 3.** Reasons Why Patients Prefer the FIT versus Colonoscopy

Reason for choosing	Percent
FIT	
FIT is convenient and simple	72.8
FIT is safe	2.4
FIT is inexpensive	4.8
Colonoscopy is too complicated a process	12.8
Other	7.2
Colonoscopy	
Colonoscopy is accurate	79.4
Colonoscopy can provide therapeutic options	15.8
FIT is inconvenient	1.5
Colonoscopy is convenient	1.5
Other	1.8

FIT, fecal immunochemical test.

**Table 4.** Respondents' Experiences with and Opinions about the NCSP

	Opinion	No. (%)
Experience of NCSP participation	Annually–frequently	357 (90.2)
	Often–infrequently	39 (9.8)
Experience of FIT participation		
Experience of FIT participation	None	56 (14.1)
Bad experience from FIT	Yes	44 (12.9)
Cause of bad experience from FIT	Stool sampling	35 (77.8)
	Stool storage and transportation	9 (20.0)
	Other	1 (2.2)
Experience of colonoscopy participation		
Experience of colonoscopy participation	None	134 (33.8)
Bad experience with colonoscopy	Yes	103 (39.3)
Cause of bad experience from colonoscopy	Complicated preparation process	73 (68.9)
	Complicated colonoscopy process itself	27 (25.5)
	High medical cost	3 (2.8)
	Other	3 (2.8)

NCSP, National Cancer Screening Program; FIT, fecal immunochemical test.

ating the completion rate of a primary colonoscopy screening program,<sup>24–27</sup> and the long-term results are expected in the next decade. In a randomized controlled trial comparing primary colonoscopy with biannual FIT in Spain, the participation rate was higher in FIT group than in colonoscopy group (34.2% vs 24.6%,  $p < 0.001$ ).<sup>24</sup> The different participation rates resulted in the same CRC detection rate in both groups. In a recent German population-based case-control study,<sup>28</sup> only 1.7% of the patients with CRC underwent screening colonoscopy versus 12% of the patients without CRC. In a meta-analysis of prospective CRC screening studies,<sup>29</sup> the overall participation rates for FIT and colonoscopy were 42% and 28%, respectively. In the United States, participation rates were higher for FIT group than colonoscopy group (58.8% vs 42.4%, respectively,  $p < 0.001$ ).<sup>23</sup> Our study result contrasted those of previous studies<sup>23,24,29,30</sup> in that colonoscopy was preferred to FIT; however, our findings may be cautiously interpreted as socioeconomic status, the capacity to perform colonoscopy, and perceived awareness of CRC may differ among countries. In Korea, the excellent accessibility and low cost of colonoscopy, and the availability of experienced colonoscopists may have influenced our results of a higher preference for colonoscopy. However, sufficient information should be provided to participants about the advantages and disadvantages of FIT versus colonoscopy to enable their informed decisions, as their choice may change after education. For example, in a CRC screening from Hong Kong,<sup>19</sup> patients initially chose colonoscopy over FIT (47.4% vs 21.8%, respectively); however, 27.1% of participants changed to FIT from colonoscopy and 8% changed to colonoscopy from FIT after the educational session. As a result, the final participation rate was higher in the FIT group than in the colonoscopy group (61% vs 39%, respec-

tively).

Considering the lower participation rate of CRC screening than those for other cancers,<sup>7–9</sup> strategies to increase participation rates are needed. Accordingly, the choice of screening modality may encourage individuals to participate, as we noted substantial variation in CRC screening method preference by age, family history of CRC, and socioeconomic status. Furthermore, a detailed information system, such as interviews, an online system, or leaflets should be provided to increase the participation rate through their informed decisions. Considering that only 12.9% of participants reported a previous bad experience with FIT and 39.3% experienced a bad experience with colonoscopy, sufficient information about the advantages and disadvantages of FIT and colonoscopy may be essential to increasing CRC screening participation rates. In a multi-criteria decision analysis, inconvenience, safety, and testing frequency were most significantly associated with intention to attend.<sup>30</sup>

This study had some limitations. First is the possibility of selection bias derived from its single-center design. In addition, there is likely some sampling bias in the participants since the complete overall response rate was only 36.2% and that all respondents are thought to be interested in the NCSP. Second, our study was based on a questionnaire rather than actual data from administrative or clinical trials. As demonstrated in a CRC screening program of Hong Kong,<sup>19</sup> a significant number of participants may change their initial opinion just before the actual CRC screening tests are performed. Therefore, an actual clinical trial on this issue is warranted in the future. However, this kind of study may incur large economic and resource burdens. Third, this survey tool was not verified for the reliability and validity. However, members of “Committee of Endoscopy

Quality Improvement in the Korean Society of Gastrointestinal Endoscopy” checked this survey tool as we failed to find any verified survey tools on this issue. Finally, previous history of colon polyp was not investigated in this study. As patients with experience of polypectomy may be more aware of importance of colon polyp removal, it would be better if they were excluded from this study.

In conclusion, colonoscopy was preferred to FIT at a ratio of 2.2 to 1 in NCSP participants in Korea. The demonstrated colonoscopy preference should be considered in the creation of a primary colonoscopy screening strategy in Korea. However, actual clinical trial data about this issue are needed.

## CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

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