

# Fecal occult blood testing

*People in Ontario are unaware of it and not ready for it*

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## ABSTRACT

**OBJECTIVE** To determine factors that influence awareness of, and readiness to undergo, fecal occult blood testing (FOBT) for colorectal cancer (CRC) screening.

**DESIGN** Validated survey designed to ascertain respondents' stages of decision making regarding CRC screening using FOBT.

**SETTING** Ontario.

**PARTICIPANTS** A total of 1013 people 50 years old and older drawn from all regions of the province using a random-digit dialing telephone protocol.

**MAIN OUTCOME MEASURES** Awareness of FOBT and readiness to undergo it for screening for CRC.

**RESULTS** Response rate was 69%. Results indicated that 54% of women and 45% of men had "heard of" FOBT, and 26% of women and 17% of men had heard of it but were still "not considering" FOBT screening. Only 17% of all respondents had "decided to have" FOBT screening. Demographic factors associated with having heard of FOBT were female sex, completion of college or higher education, and being married or living as married. Demographic factors associated with active consideration of FOBT among those who reported awareness of it were male sex and being married or living as married.

**CONCLUSION** Many people seemed uninformed about FOBT and not ready to undertake this type of screening. Results of this survey could help guide strategies and develop programs to make eligible people aware of CRC screening using FOBT and to motivate them to undergo testing.

## EDITOR'S KEY POINTS

- Fecal occult blood testing (FOBT) is a way to screen for colorectal cancer (CRC). Early detection of CRC allows early treatment that can substantially reduce mortality due to the disease.
- Results of this survey showed that about half the 1013 respondents had never heard of FOBT. Among those who had heard of it, 26% of women and 17% of men were not considering undergoing screening. Only 17% of respondents were ready to go ahead with screening.
- The rates of awareness of and willingness to undergo FOBT found in this study might actually underestimate the true rates. The overall response rate to the survey was 69%. It is possible that nonrespondents were less interested in their health status or health surveys in general than respondents were. It is clear that there is a need to educate people about CRC screening with FOBT.

\*Full text is available in English at [www.cfp.ca](http://www.cfp.ca).

This article has been peer reviewed.

Can Fam Physician 2009;55:176-7.e1-4

# Recherche de sang occulte dans les selles

*Les Ontariens sont mal informés et peu enclins à agir*

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## RÉSUMÉ

**OBJECTIF** Déterminer les facteurs qui influencent la connaissance du dépistage du cancer colo-rectal (CCR) par la recherche de sang occulte dans les selles (RSOS) et la propension à subir ce test.

**TYPE D'ÉTUDE** Enquête validée destinée à établir les étapes de la prise de décision chez les répondants concernant le dépistage du CCR par la RSOS.

**CONTEXTE** Ontario.

**PARTICIPANTS** Un total de 1013 sujets de 50 ans et plus, recrutés dans toutes les régions de la province par appels téléphoniques au hasard.

**PRINCIPAUX PARAMÈTRES À L'ÉTUDE** Connaissance du test de RSOS et propension à le subir pour dépister le CCR.

**RÉSULTATS** Le taux de réponse était de 69 %. Les résultats indiquaient que 54 % des femmes et 45 % des hommes avaient entendu parler de la RSOS; parmi ces personnes, 26 % des femmes et 17 % des hommes n'avaient pas encore envisagé de le subir. Seulement 17 % des répondants avaient décidé de subir ce dépistage. Les caractéristiques démographiques correspondant à ceux qui avaient entendu parler de la RSOS étaient: sexe féminin, études collégiales ou supérieures complétées et être marié ou conjoint de fait. Les facteurs démographiques correspondant à ceux qui disaient connaître le dépistage par la RSOS et envisager sérieusement de le subir étaient: sexe masculin, être marié ou conjoint de fait.

**CONCLUSION** Plusieurs personnes semblaient ne pas connaître la RSOS et ne pas être prêtes à subir ce type de dépistage. Les résultats de cette étude pourraient servir à orienter des stratégies et à développer des programmes pour faire connaître le dépistage du CCR par la RSOS aux sujets admissibles et pour les motiver à le subir.

## POINTS DE REPÈRE DU RÉDACTEUR

- La recherche de sang occulte dans les selles (RSOS) est une façon de dépister le cancer colo-rectal (CCR). La détection précoce du CCR permet un traitement rapide qui peut réduire sensiblement la mortalité due à cette affection.
- Les résultats de cette étude montrent qu'environ la moitié des 1013 répondants n'avaient jamais entendu parler de la RSOS. Parmi ceux qui en avaient entendu parler, 26 % des femmes et 17 % des hommes n'envisageaient pas de subir ce dépistage. Seulement 17 % des répondants étaient disposés à subir le dépistage.
- Les taux de connaissance de la RSOS et de volonté de subir ce test observés dans cette étude pourraient sous-estimer les taux réels. Le taux global de réponse à cette enquête était de 69 %. Les non-répondants pouvaient être moins intéressés à leur état de santé ou aux enquêtes sur la santé en général que les répondants. La nécessité d'informer les gens au sujet du dépistage du CCR par la RSOS demeure toutefois évidente.

\*Le texte intégral est accessible en anglais à [www.cfp.ca](http://www.cfp.ca).

Cet article a fait l'objet d'une révision par des pairs.

*Can Fam Physician* 2009;55:176-7.e1-4

In the fall of 2004, the province of Ontario launched a pilot study of colorectal cancer (CRC) screening to evaluate fecal occult blood testing (FOBT) as the initial test in the process. Fecal occult blood testing would be followed by colonoscopy for those receiving positive FOBT results. The primary goals of the study were to assess the likely use of the test and the positive test rates if a province-wide, population-based program were to be launched; to assess various approaches to promoting screening, mainly through primary care physicians and regional public health units; and to evaluate how receptive the public would be to testing. One part of the pilot study was an assessment of people's awareness of FOBT and CRC screening generally and of their readiness to contemplate undergoing FOBT.

As the incidence and mortality rates of CRC among Canadians are among the highest in the world,<sup>1</sup> data from randomized controlled trials that show that CRC screening in the form of annual or biennial FOBT (followed by colonoscopy after positive results) reduces mortality from CRC by 13% to 33% are highly relevant.<sup>2</sup> Such evidence supports recommendations by the Canadian Task Force on Preventive Health Care that men and women 50 years and older at average risk of CRC receive FOBT or flexible sigmoidoscopy<sup>3</sup> to screen for CRC. According to recent Ontario data, about 9.3% of patients 50 to 59 years old followed for 6 years had FOBT screening; this percentage did not include those with a history of CRC, colonic polyps, or inflammatory bowel disease.<sup>4</sup> Although this might be an underestimation, it is considerably lower than the 23.5% of people in the United States' general population who reported having undergone FOBT during the previous year.<sup>5</sup> Despite the importance of CRC screening generally, and FOBT screening in particular, few population-based studies to date have assessed Canadians' attitudes toward CRC screening and FOBT. Data now available from colleagues in Alberta, however, suggest that awareness of FOBT among a randomly selected, screening-eligible sample obtained in the same year (2004) as our sample, is modest (only 49.2% of men and 67% of women were aware of FOBT).<sup>6</sup> Respondents' own reports of having had FOBT were similarly modest in number (9.8% of men and 14% of women). Also in this study,<sup>6</sup> few respondents were found to be up-to-date with CRC screening of any type (13% of men and 15.5% of women). Our use of a decision-stage approach in surveying attitudes toward FOBT in a random sample of screening-eligible adults provides another perspective on people's readiness to adopt regular FOBT screening, which has become an increasingly important public health concern.

### METHODS

To understand screening for CRC from patients' perspective, we surveyed people in Ontario who were 50 years

old and older in October 2004 using a random-digit dialing telephone protocol based on a sampling process performed by the Canada Survey Sample (CSS), a selection engine that generates random samples of residential telephone numbers. The CSS maintains a comprehensive list of all populated telephone exchanges across Canada and is updated regularly. The CSS randomly generated 4-digit suffixes for Ontario exchanges in proportion to the percentage population of the individual exchanges. As each suffix was generated, it was compared with the database of existing, known telephone numbers. If it matched a listed phone number, it was placed in the "valid number" file. If it did not, it was placed in the "orphan" file. The valid number file was used as the primary calling list and was supplemented with numbers from the orphan list. As was true for the randomization procedure described above, numbers were chosen from the orphan list in proportion to the percentage population living in the exchanges. Because a substantial number of not-in-service numbers were encountered, a slightly higher than normal ratio of respondents was sampled to ensure timely and efficient survey fieldwork.<sup>7,8</sup> Altogether, 1558 people were contacted by telephone to obtain a sample of 1013 participants for a response rate of 69%.

While demographic data were collected on each respondent, we had no way of ascertaining data on non-respondents other than the telephone number through which they were initially contacted. The survey originated from Cancer Care Ontario, a planning and research organization that advises the government on cancer care and informs health care providers on the status of cancer care in the province. Ethical approval for the studies was obtained from the Sunnybrook Health Sciences Centre in Toronto, Ont, and the University of Toronto.

### Survey instrument

The survey instrument, previously validated by colleagues in the United States,<sup>9,10</sup> was based on a questionnaire developed for a CRC intervention trial. Questions were designed to assess awareness of FOBT for CRC screening and readiness to be screened with FOBT. In our analyses, we were interested in describing respondents' stage of readiness in terms of whether they had or had not heard of this form of cancer screening (before being contacted for the survey); whether, if they had heard of FOBT, they were or were not actively considering undergoing screening with FOBT; and whether, if actively considering screening, they had decided to be screened with FOBT within the subsequent 12 months.

Beyond descriptive results, we were interested in determining whether specific demographic factors were associated with more advanced and less advanced stages of deciding to be screened, specifically considering sex (male or female); health (excellent, very good, or good compared with fair or poor); education (college graduation and above

compared with less than complete college education); and marital status (married or living as married compared with never married, divorced, separated, or widowed). The effect of these demographic factors on each of the stages mentioned above were considered in turn. The overall survey framework was based on the Preventive Health Model,<sup>9,11</sup> which has 5 core constructs: Personal Background Factor, such as age, sex, and race; Cognitive and Psychological Representations Factor, such as perceptions of potential health threats, ways of coping with these threats, and outcomes likely to result; Social Support and Influence Factor, such as subjects' perceptions of supportive people who provided encouragement and the extent to which subjects wished to meet their expectations; Behavioral Intention Factor, such as people's self-reported intention to engage in the recommended preventive measures; and Intervention Factor, which included behavioural prompts or interventions used to encourage people to seek preventive services. The Preventive Health Model has been used successfully to explain people's behaviour around CRC and prostate cancer screening and to guide development of interventions that have substantially increased rates of CRC screening.<sup>12-15</sup>

## Analysis

In an exploratory analysis, univariate comparisons between the explanatory variables and each of the screening-stage outcomes were performed first, with  $\chi^2$  tests used to assess independence. Following this, 3 multiple logistic regressions (1 for each of the 3 outcomes described) were undertaken with variables found to be significant at the univariate level. In the regression analyses undertaken, interaction terms were considered and included if significant. Some of the variables significant in the univariate analyses were no longer significant in the multivariate model because of associations between variables.

## RESULTS

Results of our telephone survey of the 1013 Ontario residents (69% response rate) suggest that, in the absence of corrective action, CRC screening rates are likely to remain low. In surveying Ontario residents 50 years old and older, we found 45% of women and 55% of men had never heard of FOBT, while 26% of women and 17% of men knew about it but were not considering getting screened. Only 17% of all respondents had decided to have FOBT screening (**Table 1**). Univariate exploratory analyses indicated that women were significantly more likely than men to have heard of FOBT, as were people who were married or living as married, and those who had completed college-level or higher education (**Table 2**). Among those who had heard of FOBT, men and married people were more likely to be actively

**Table 1. Results of a random survey of Ontario residents 50 years old and older regarding their knowledge of fecal occult blood testing (FOBT): N = 1013.**

STAGE OF AWARENESS OF FOBT	MEN (N = 498) N (%)	WOMEN (N = 515) N (%)
Never heard of FOBT	272 (55)	235 (46)
Have heard of FOBT but not currently considering FOBT	87 (17)	135 (26)
Have heard of FOBT but undecided about FOBT	52 (10)	58 (11)
Have heard of FOBT and decided to have FOBT	86 (17)	87 (17)

**Table 2. Univariate analyses for having heard of fecal occult blood testing**

VARIABLE	ESTIMATE	STANDARD ERROR	Z VALUE	PR (> Z )	P VALUE
<b>Sex</b>					<b>.0045</b>
• Intercept	0.1644	0.0887	1.85	0.0637	
• Male	-0.3676	0.1267	-2.90	0.0037	
<b>Health</b>					<b>.47</b>
• Intercept	-0.1352	0.1570	-0.86	0.3893	
• Good	0.1400	0.1716	0.82	0.4146	
<b>Marital status</b>					<b>.11</b>
• Intercept	0.0488	0.0781	0.62	0.5322	
• Single	-0.2323	0.1389	-1.67	0.0943	
<b>Education</b>					<b>.13</b>
• Intercept	-0.2659	0.0896	-2.97	0.0030	
• College	0.5123	0.1295	3.96	0.0001	

considering testing (**Table 3**). Among those actively considering FOBT, no factors were found to be associated with the decision to have the test (within the next 12 months) versus remaining undecided.

The multiple logistic regression model indicated that women with college-level or higher education were far more likely to have heard of FOBT than men or less-educated women were. Compared with men with a college-level education, the odds ratio of women with similar education knowing about FOBT was 2.20 (95% confidence interval 1.5 to 3.3) (**Table 4**). Among those who had heard of FOBT, some evidence indicated that men, married people, and healthy people were more likely to be considering FOBT than women, single people, and those in poor health were (**Table 4**). The marginally significant values found (*P* values were slightly above conventional .05 thresholds) should be considered in the context of the relatively small sample linked to the relatively modest proportion of subjects considering FOBT. As there was increased uncertainty about the estimated effect size, we believe the marginal *P* values derived should not be disregarded. The final comparison, the decision to have the

**Table 3. Univariate analyses for considering fecal occult blood testing conditional on having heard of it**

VARIABLE	ESTIMATE	STANDARD ERROR	Z VALUE	PR(> Z )	P VALUE
<b>Sex</b>					<b>.35</b>
• Intercept	-0.4175	0.1228	-3.40	0.0007	
• Male	0.3995	0.1819	2.20	0.0281	
<b>Health</b>					<b>.35</b>
• Intercept	-0.5960	0.2397	-2.49	0.0129	
• Good	0.4189	0.2590	1.62	0.1058	
<b>Marital status</b>					<b>.27</b>
• Intercept	-0.1311	0.1093	-1.20	0.2304	
• Single	-0.4455	0.2078	-2.14	0.0321	
<b>Education</b>					<b>.04</b>
• Intercept	-0.1274	0.1351	-0.94	0.3456	
• College	-0.2209	0.1845	-1.12	0.2313	

test versus being undecided, applied only to those who reported actively considering the test, yielded no significant effects in the multivariate comparison (Table 4). Once again the small number of those reporting active consideration (n=220) was a limitation on the analyses. Detailed results of the model fitting on the logit scale are shown, including a model for the third comparison despite the absence of any significant findings.

## DISCUSSION

Results of this survey suggest that many people have not heard of FOBT, and among those who have heard of it, many are still not considering screening. Our findings that 46% of women and 55% of men had never heard of FOBT are comparable to those of McGregor et al<sup>6</sup> in Alberta whose results indicated that 33% of women and 50.8% of men were unaware of FOBT. All these findings suggest that more effort should be put into raising awareness of screening for CRC.

College-educated women were more aware of FOBT and screening for CRC than any other group; they were 2.2 times more likely to be aware of FOBT than

college-educated men were. No evidence showed that level of education had an effect on men regarding awareness of FOBT or that being male or female had an effect on the awareness of people with less than college education.

In terms of demographic factors associated with active consideration of being screened among those aware of FOBT, evidence indicated that men, married people, and people in good health were more likely to consider FOBT than women, single people, and people in poor health were. Because only some people in the study were aware of FOBT, both the sample size and the statistical power of this analysis

were reduced. In the univariate analyses, sex and marital status were shown to be significant predictors of awareness of FOBT, although the full-sample model resulted in greater uncertainty around these estimates, as enriching the model with more explanatory variables can increase standard errors and lower power.<sup>16</sup> None of the variables were significant predictors of who, among those

**Table 4. Multivariate analyses for those who have heard of fecal occult blood testing (FOBT), those who are considering having FOBT, and those who have decided to have FOBT**


VARIABLE	ESTIMATE	STANDARD ERROR	Z VALUE	PR(> Z )
<b>Have heard of FOBT</b>				
• Intercept	-0.1278	0.2075	-0.62	0.5379
• Married status—single	-0.2204	0.1451	-1.52	0.1286
• Health—good	0.0836	0.1795	0.47	0.6415
• Sex—female, education less than college	-0.0511	0.1792	-0.29	0.7756
• Sex—male, education less than college	-0.2478	0.1896	-1.31	0.1912
• Sex—female, education college or more	0.7993	0.1955	4.09	0.0000
<b>Considering having FOBT</b>				
• Intercept	-0.6106	0.2956	-2.07	0.0389
• Sex—male	0.3673	0.1916	1.92	0.0552
• Education—college	-0.2783	0.1918	-1.45	0.1467
• Married status—single	-0.3938	0.2141	-1.84	0.0659
• Health—good	0.5260	0.2741	1.92	0.0545
<b>Decided to have FOBT</b>				
• Intercept	0.2342	0.4127	0.57	0.5704
• Sex—male	0.5319	0.3101	1.72	0.0863
• Education—college	0.4371	0.3118	1.40	0.1610
• Married status—single	-0.0984	0.3340	-0.29	0.7683
• Health—good	0.5340	0.3821	1.40	0.1623



actively contemplating FOBT screening, decided to have the test. The directions of the effects, however, were consistent with the other 2 models, while the power of the model was reduced owing to the small number of people actively considering FOBT within the data set.

We might presume that this responsive subset of the entire randomized sample targeted consisted of people more likely to be concerned about their health status and that the nonresponsive subset had a lower motivational level regarding issues addressed or health-oriented surveys generally. Studies have found that those who do not respond to health surveys tend to be from rural backgrounds, to be from fragmented families, to have had poorer-than-average performance at school, and to be more likely to have suffered from mental disorders.<sup>17</sup> Such people might be presumed to be even less informed than those who responded. If these assumptions are applied to the results we obtained, they suggest there might be even greater gaps between desirable levels of awareness and proactive consideration of screening in the total population than those we found in our sample. Nonetheless, the rates of awareness we found did not differ radically from the similarly modest rates found by colleagues in an Alberta study.<sup>6</sup> Future replication studies might help us discover more accurate rates.

## Conclusion

These data indicate a need to educate people about CRC screening with FOBT. To provide such education, we must understand the factors affecting attitudes and behaviour. For example, our study indicated that the attitudes of people eligible for screening are different if they are exposed to CRC screening vicariously through the treatment and screening of friends and relatives. In future surveys, it might be useful to design items specifically addressing such exposures and assess their associations with attitudes toward screening. Some of the authors of this article were awarded a grant as a Canadian Institutes of Health Research Team in Population-based Colorectal Cancer Screening and are initiating a 5-year study with 5 objectives: to evaluate methods of optimizing recruitment for CRC screening and participation; to conduct an economic evaluation of CRC screening; to evaluate CRC screening policy decisions in 2 provinces (Alberta and Ontario) and develop a tool kit to support evidence-informed policy making; to develop a platform to support translational research and rapid, efficient evaluation of novel CRC screening technologies; and to build research capacity by training and supporting new investigators. We hope that a new multidisciplinary scientific platform for CRC screening will be developed through these efforts. 

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## Contributors

**Drs Ritvo, Myers, Del Giudice, Pazsat, Cotterchio, Howlett, Mai, Brown, Sullivan,** and **Rabeneck** contributed to concept and design of the study; data gathering, analysis, and interpretation; and preparing the manuscript for submission.

## Competing interests

None declared

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