

Fecal occult-blood screening reduced the incidence of colorectal cancer

Mandel JS, Church TR, Bond JH, et al. The effect of fecal occult-blood screening on the incidence of colorectal cancer. *N Engl J Med*. 2000 Nov 30;343:1603-7.

QUESTION

Does fecal occult-blood screening reduce the incidence of colorectal cancer?

DESIGN

Randomized {allocation concealed*}†, unblinded,* controlled trial with 18-year follow-up.

SETTING

Minnesota, United States.

PARTICIPANTS

46 551 participants who were 50 to 80 years of age (52% women) and did not have a previous diagnosis of colorectal cancer. Follow-up for vital status was 91% at 18 years.

INTERVENTION

Participants were allocated to annual screening ($n = 15532$), biennial screening ($n = 15550$), or usual care ($n = 15363$). For each screening, which was done from 1976 to 1982 and from 1986 to 1992, participants

prepared 2 guaiac-impregnated paper slides for each of 3 consecutive stools. The mean rate of compliance was 75% in the annual-screening group and 78% in the biennial-screening group. Participants with ≥ 1 positive slide had a diagnostic evaluation, which included history taking, physical examination, single-column barium enema (discontinued in 1978), rigid proctosigmoidoscopy (discontinued in 1982), urinalysis, complete blood count, routine blood chemistry tests, upper gastrointestinal radiographic series (discontinued in 1982), chest radiography, electrocardiography, and colonoscopy.

MAIN OUTCOME MEASURE

Incidence of colorectal cancer.

MAIN RESULTS

1359 new cases of colorectal cancer were diagnosed: 417 in the annual-screening group, 435 in the biennial-screening group, and 507 in the usual-care group. The ratios

of the cumulative incidence rates in the screening groups relative to the usual-care group were 0.80 (95% CI 0.70 to 0.90) for annual screening and 0.83 (CI 0.73 to 0.94) for biennial screening. The predictive values for colorectal cancer for positive test results ranged from 0.87% (CI 0.59% to 1.29%) for a single test in the annual-screening group to 6.13% (CI 4.56% to 8.20%) in the biennial-screening group.

CONCLUSION

Annual or biennial fecal occult-blood screening reduced the incidence of colorectal cancer.

Sources of funding: National Cancer Institute and Centers for Disease Control and Prevention.

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*See Glossary.

†Information provided by author.

COMMENTARY

Three large randomized trials have convincingly shown that fecal occult-blood testing can reduce mortality from colorectal cancer, presumably by detecting cancers in surgically curable stages (1–4). The study by Mandel and colleagues is the first definitive proof that screening can also decrease the incidence of colorectal cancer.

The authors enrolled 46 551 patients between 1975 and 1978 and randomly allocated them to annual or biennial fecal occult-blood screening or to a control group. The screened groups developed about 20% fewer cancers; the reduction in incidence was similar in the annual- and biennial-screening groups. The study also found that although persons who had more positive test results were more likely to have either a colorectal cancer or a large adenoma, the predictive value of a positive test result was $< 8\%$ in the annual-screening group. Fecal occult-blood testing was an imperfect test.

This study is important. It tells us for the first time that fecal occult-blood screening can decrease both the incidence of cancer and the mortality rate. The incidence reduction is relatively modest. After 18 years of follow-up, the cumulative incidence of cancer was 39 per 1000 persons in the control group compared with 32 per 1000 persons in the annual-screening group. Admittedly, the results probably underestimate the potential reduction in cancer incidence because compliance with screening was not complete and some participants in the control group were screened. The study was designed to evaluate the benefits of screening but not the costs.

It is logical to conclude that the reduction in incidence resulted from removal of adenomas by colonoscopy, which validates the hypothesis that carcinomas arise from adenomas. This study therefore provides indirect scientific support for the benefits of colonoscopy to prevent colorectal cancer.

The good news for clinicians and patients is that fecal occult-blood screening prevents colorectal cancer. Conscientious application of this screening test could save lives.

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