

A Clinician's Guide: Tips on Fecal Occult Blood Testing

Questions from our Primary
Care advisors:

- "How effective is routine screening for fecal occult blood?"
- "Which methods for fecal occult blood testing are most accurate?"
- "What steps can be taken to avoid false negative/positive results?"



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CASE REPORT

A 52-year-old white female was seen for her annual pelvic exam and Pap smear. She had stopped menstruating one year previously, had a history of rectal fissures, and recently noted occasional blood streaking of the stool which she attributed to her earlier problems with rectal fissures. A barium enema fifteen years previously was interpreted as a "spastic colon." There was no history of melena and no family history of cancer.

The physical examination was unremarkable. The uterus was slightly enlarged but normal in contour, the cervix was parous, and there was good vaginal support. Rectovaginal examination was also normal. A guaiac test on stool from the rectal exam was trace positive; the Pap smear was Class I. The rectal exam revealed no evidence of fissure or hemorrhoids.

- Assessment: Healthy menopausal female with a positive fecal

occult blood test.

- Plan: Since the stool examination was without dietary preparation and there was some question of blood being transferred on the glove from the vaginal exam, three Hemoccult slides (six tests) were given to the patient for obtaining samples from three successive bowel movements.

Two of the six tests were trace positive and the patient was scheduled for a flexible fiberoptic sigmoidoscopy, at which time a single polyp 1 cm in diameter was observed at 10 cm. The exam was otherwise normal. The patient was referred for colonoscopy; the polyp was removed by snare technique and the base cauterized. A second polyp 1.5 cm in diameter was found in the transverse colon and also removed. The pathology report revealed both to be hyperplastic polyps. The patient has remained asymptomatic on follow-up and repeat fecal occult blood tests have been negative. —RER

Points to Remember
Reading time:
3 minutes 45 seconds

The routine screening of patients at average risk for colorectal cancer should begin at age 40 while that of high risk patients should begin at age 20. As with carcinoma of the cervix, there is an induction time of 5 to 10 years before colorectal cancer becomes clinically apparent and it is during this time that detection provides the greatest

benefit. Since it is believed that almost all colorectal cancers develop from adenomas, the objective is to identify and remove the adenomas, especially those larger than 1 cm in diameter.

While there may be gross bleeding with advanced cancer, the bleeding from early cancers and adenomas is intermittent, and often so slight

that it cannot be identified visually. However, most bleeding colorectal lesions in asymptomatic patients *can* be detected by the fecal occult blood test. In fact, this simple test will detect 90% of all colorectal lesions that bleed, although a single such test is not a very effective method of screening because of the intermittent quality of the bleeding. To obtain reliable results, therefore, it is necessary to test six specimens, two from each of three *consecutive* bowel movements. A positive result in *any one* of the six specimens warrants the same degree of investigation as if two or more were positive.

Which Test to Use

A variety of methods for fecal occult blood testing are currently available using reagents that interact with the peroxidase activity of hemoglobin. These include guaiac, benzidine, ortho-tolidine, and ortho-dianisidine, and they differ chiefly in sensitivity. Benzidine is the most sensitive and as a result has a high incidence of false positives. The normal individual loses 2.0 to 2.5 ml of blood into the gastrointestinal tract daily. The ideal test, then, is one that turns positive when there is blood loss greater than 5 to 10 ml per day. There are a number of commercial preparations that are currently available (see box on page 38), but our major experience has been with Hematest,[®] a hospital test which has an ortho-tolidine base, and Hemoccult[®], which uses guaiac-impregnated filter

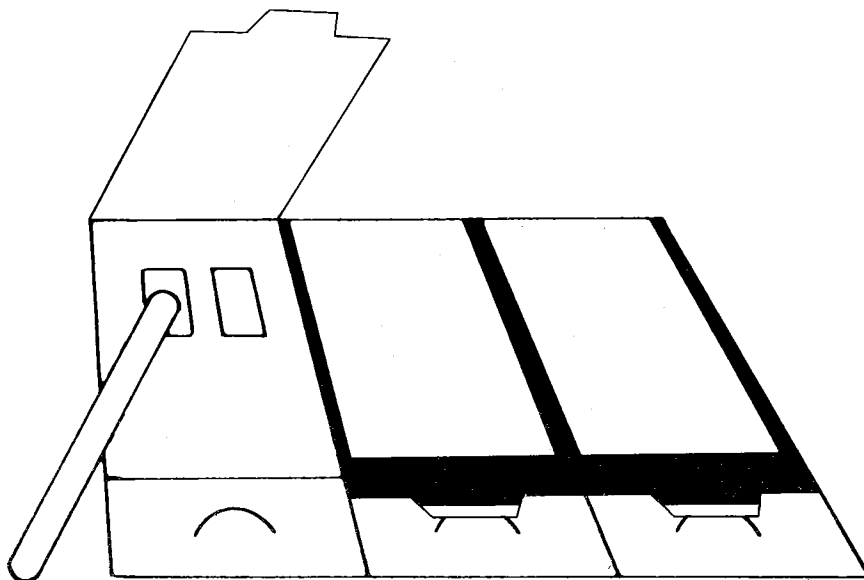


Figure 1: The Hemoccult Test Kit—Each Hemoccult card, like most of the other fecal occult blood tests, has a flap on the front under which there are two rectangular cutouts backed by guaiac-impregnated filter paper. Using a wooden applicator, the patient applies stool specimens to each of the cutouts.

paper. In our practice, the Hemoccult test is the most popular and in our experience has the lowest percentage of false positive results (1 to 2%), whereas Hematest, because of its high sensitivity, has been reported to have a 27 to 76% false positive rate.³ The Hemoccult begins to turn positive in the presence of about 2 to 4 ml of additional hemoglobin per 100 grams of stool, about twice the normal daily fecal blood loss in an adult.

The Hemoccult card for testing each stool has a flap on the front under which there are two rectangular cutouts backed by guaiac-impregnated

filter paper. The patient should apply specimens from different portions of the same stool to each cutout (Figure 1), using only thin smears of the stool specimen. On the reverse side of each slide is another flap; when you (or the lab) receive the specimens from the patient, open the flap and apply two drops of the developer (a stabilized solution of hydrogen peroxide and denatured ethyl alcohol) to the filter paper covering each stool specimen (Figure 2). This creates a guaiac/peroxidase reaction that turns the filter paper blue within 30 to 60 seconds if occult blood is present in the

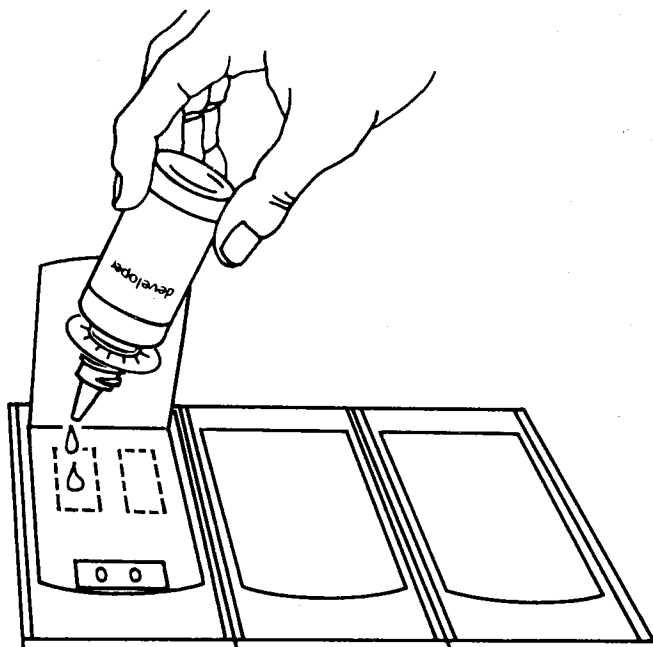


Figure 2: Obtaining the Results—After applying different portions of the same stool to each cutout, the patient closes the flap and returns the test cards to you. You then open the flap on the reverse side of each slide and apply two drops of developer to the filter paper covering each stool specimen, as shown here. The filter paper will turn blue within 30 to 60 seconds if occult blood is present.

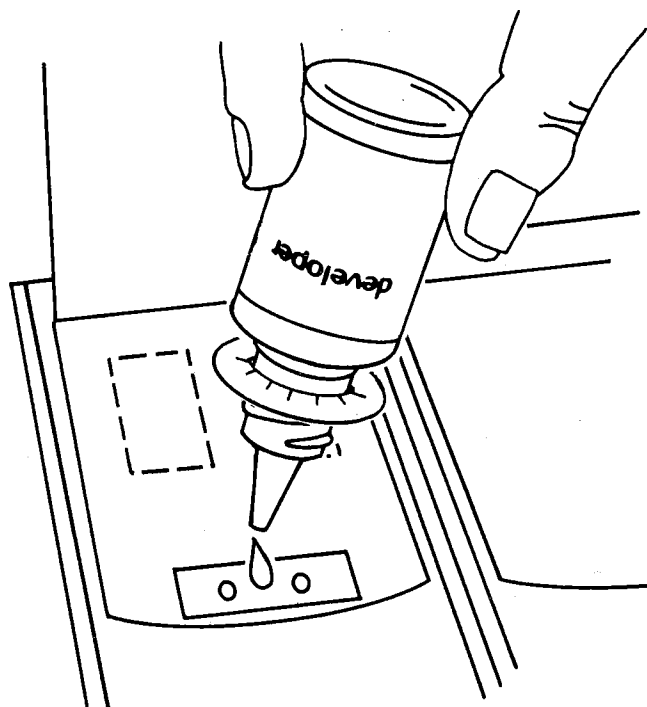


Figure 3: A Performance-Test Window—The newer Hemoccult test packets contain a control window, as do most of the other products. After you develop each stool specimen, apply a single drop of developer between the two white dots within the red rectangle. If the slide is operating correctly, the “positive” dot will turn blue and the “negative” dot will remain white.

stool specimen. Any trace of blue on or at the edge of any of the six specimens is a positive indication of occult blood. Remember that proper testing consists of three cards, one for each of three consecutive testing days or bowel movements (a total of six tests).

Because specimens may lose their reactivity and produce a false negative result if they become dehydrated, they should not be exposed to excessive heat nor should more than four days elapse before the test is performed. If the tests are mailed to your office, they should be received and processed no later than four days

after the third set of specimens has been collected.

The newer Hemoccult tests (and most of the other products) also contain a performance-test window that serves as a control. Beneath the flap on the developing side of the slide, there is a red rectangle with two white dots. After you develop each stool specimen, apply a single drop of developer between the two dots and read the results within 30 seconds (Figure 3). If the slide is operating correctly, the “positive” dot will turn blue and the “negative” dot will remain white. If this reaction does not occur, discard the slide and re-

test the developing solution on a fresh slide; if there is a problem, it is almost always with the slide rather than with the developing solution.

Avoiding False Negative/Positive Results

There are several points that should be noted to avoid false negative/positive results in a fecal occult blood test:

1. Fecal occult blood test slides remain stable for four years, although some bluing of the paper can occur from air pollutants. The developer does not have to be stored in any special way and is unlikely to deteriorate.

The Article Condensed: Points to Remember About Fecal Occult Blood Tests

- **Screening for colorectal cancer in average risk patients should begin at age 40, while in high risk patients it should start at age 20.** The bleeding from early cancers and adenomas is so slight that it usually cannot be identified visually, but a fecal occult blood test can detect 90% of these lesions. To obtain reliable results, it is necessary to test six specimens, two from each of three *consecutive* bowel movements; a positive result in even just *one* of the six specimens should be investigated.

- **Which Test to Use:** There are a number of preparations currently available (see box on page 38) and they differ mainly in sensitivity. Since the normal individual loses 2.0 to 2.5 ml of blood into the GI tract daily, the ideal test is one that turns positive when the blood loss is more

than 5 to 10 ml per day. The author's experience has been chiefly with Hematest (a hospital test) and Hemoccult. The Hemoccult turns positive in the presence of about 2 to 4 ml of additional hemoglobin per 100 grams of stool, about twice the normal daily fecal blood loss in an adult. Hemoccult has a low percentage of false positive results. Hematest is reported to have a 27 to 76% false positive rate.

The Hemoccult testing card has a flap on the front under which there are two cutouts backed by guaiac-impregnated filter paper. With the applicator supplied, the patient should apply thin smears of specimens from different portions of the same stool to each cutout and allow to dry. The physician can then open the flap on the reverse side and apply two

drops of developer to the filter paper covering each stool specimen. If occult blood is present, the filter paper will turn blue within 30 to 60 seconds. Remember that proper testing consists of three cards, one for each of three consecutive bowel movements (or six tests). Specimens should not be exposed to excessive heat nor should more than four days elapse before the test is completed.

The newer Hemoccult test also contains a performance-test window, as do most of the other products. It serves as a control so you will know if the slide is operating correctly.

- **Avoiding False Negative/Positive Results:** These points should be noted to avoid false negative/positive results:

1. Fecal occult blood test

2. Before obtaining stool samples for the fecal occult blood test, patients should avoid ingesting high doses of Vitamin C (ascorbic acid) because it interacts with the guaiac to produce a false negative reaction.

3. Women should not be tested during or immediately following a menstrual period.

4. Foods containing blood or high amounts of peroxidase eaten prior to the test may produce a false positive result. To increase the accuracy of the test, therefore, patients should refrain from eating such foods as red meat (because of its hemoglobin content), and veg-

etables such as turnips and horseradish (because of their high peroxidase content) for 48 hours prior to obtaining the specimen. The patient should also avoid ingesting gastric irritants such as aspirin-containing compounds, antibiotics, and anti-inflammatory drugs that may cause bleeding from normal mucosa. Some physicians do, however, recommend that patients eat fruit, raw vegetables, cereal, or other foods containing roughage in an effort to stimulate lesions to bleed.

5. Bleeding from the upper gastrointestinal tract can result in a negative fecal occult

blood test if stool transit time is prolonged. As blood traverses the gut, it is broken down and upon reaching the colon will have decreased peroxidase activity that may not be sufficient to trigger a positive test. An increased transit time (slow movement of stool through the bowel) will thus decrease the peroxidase activity of hemoglobin and may give a false negative reaction, depending upon the level of bleeding in the gut.

It is hoped that new tests will be available within the next few years that are specific for human hemoglobin, and thus avoid the problem of

slides remain stable for four years. The developer does not have to be stored in any special way.

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3. Women should not be tested during or immediately following a menstrual period.

4. Foods containing blood, such as red meat, or high amounts of peroxidase, such as turnips and horseradish, should not be eaten for 48 hours prior to obtaining the specimen. The patient should also avoid aspirin-containing compounds, antibiotics, and anti-inflammatory drugs.

5. Bleeding from the upper GI tract can result in a negative fecal occult blood test if stool transit time is prolonged. If there is slow movement of the stool through the bowel, the peroxidase activity of

hemoglobin will be decreased and may give a false negative reaction.

• **Additional Diagnostic Modalities:** Other diagnostic tests that should be performed on the patient at risk of colorectal cancer include:

Digital rectal examination
Proctosigmoidoscopy
Barium enema
Colonoscopy

A sigmoidoscopy is recommended in all individuals over the age of 40, or age 20 if there is a family history of familial polyposis or colorectal cancer. There are two recommendations as to frequency: Annually for two years and, if both are negative, then every three to five years; or once at age 40, followed by annual fecal occult blood tests and digital examinations.

Most colorectal lesions occur in the mid-descending and sigmoid colon and will be detected by the 60-65 cm flexible sigmoidoscope. The recommendations concerning workup after a positive sigmoidoscopy also vary. Most investigators recommend either a double-contrast barium enema or colonoscopy, but some recommend both of these procedures. Although the double-contrast barium enema can detect lesions as small as 1 cm in diameter, 14 to 30% of cancers are still missed by this procedure. One study showed that 38 lesions were missed by barium enema, but only five were missed by colonoscopy. If colonoscopy is readily available, you may prefer it for screening patients with positive fecal occult blood tests.

—*Your Patient & Cancer, Dec 1983*

false positive tests from ingested materials.

Additional Diagnostic Modalities

Other diagnostic techniques that should be used in the patient at risk of colorectal cancer include:

- Digital rectal examination
- Proctosigmoidoscopy
- Barium enema
- Colonoscopy

A sigmoidoscopy is recommended in all individuals over the age of 40. However, it should be done around age 20 if there is a family history of familial polyposis or colorectal cancer. The frequency with

which sigmoidoscopy should be performed is controversial. Some recommend the procedure be done annually for two years and, if both are negative, then every three to five years; others recommend a sigmoidoscopy at age 40, and if it is negative, they feel that sigmoidoscopy is unnecessary and that early detection can best be accomplished by annual fecal occult blood tests and digital examinations.

Approximately one in eight patients who have a positive fecal occult blood test will have a cancer somewhere in the bowel, most of which are

at an early stage. The majority of colorectal lesions are usually found in the mid-descending and sigmoid colon and are detectable by the 65 cm flexible sigmoidoscope. Unfortunately, the controversy continues as to the appropriate workup in patients with a positive fecal occult blood test but a negative digital rectal examination and negative sigmoidoscopy. Most investigators recommend either a double-contrast barium enema or colonoscopy, but some recommend *both* of these procedures. The double-contrast barium enema involves the instillation of a small quantity of

Manufacturers and Costs of Office Fecal Occult Blood Tests

Product	Company	Approximate Cost to MD Per Test (Specimens from 3 stools)	Chemical Base*	How to Order
• ColoScreen	Helena Laboratories	\$.89	Guaiac	Call toll free 800-231-5663 800-392-3126 (Texas)
• Fe-Cult	Gamma Biologicals	\$.83	Guaiac	Call toll free 800-231-5655
• Hema-Chek	Ames Division, Miles Laboratories	\$.98	Guaiac	Physician and hospital supply distributors
• Hemoccult	SmithKline Diagnostics	\$1.23	Guaiac	Call toll free† 800-538-1581
• Occult-Alert (vials)	BetaMED Pharmaceuticals	\$2.70	Tetramethylbenzidine	Call toll free 800-BetaMED
• Stool Blood Test	Cenogenics Corp.	\$.66	Guaiac	Call collect for direct order or distributor information (908) 536-6457
• Detecatest (otc, direct to patient)	Fleet Pharmaceuticals	Approximately \$5.00 (price to consumer)	Guaiac	_____

*See text for information on sensitivity and false positive rates.

†In California, Alaska and Hawaii, call collect 408-732-6000

barium that is much higher in density than that used in a single column enema. A column of air is then introduced to push the barium through the colon and the patient is rotated so the mucosa is completely coated. Although this procedure can detect lesions as small as 1 cm in diameter, many studies have shown that from 14 to 30% of cancers are still missed. One particularly

interesting study was conducted by Macrae et al, in which patients received each of the following; Rigid sigmoidoscopy, flexible sigmoidoscopy, colonoscopy, and double-contrast barium enema. Macrae found that 38 lesions were missed by barium enema, but only five were missed by colonoscopy. If colonoscopy is readily available, you may prefer it to barium enema for

screening patients with positive fecal occult blood tests. ■

References

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2. Williams CB, Macrae FA, Bartram CI: A Prospective study of diagnostic methods in adenoma follow-up. Endoscopy 14:74-78, 1982.
3. Henry JB: Clinical Diagnosis and Management by Laboratory Methods. Philadelphia, WB Saunders Company, Sixteenth Edition, 1979.

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