

Tests for occult blood

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SUMMARY. Cancer of the large bowel is an important cause of morbidity and mortality. The barium enema is still the most reliable diagnostic tool, but the selection of the proper candidates for this moderately expensive and time-consuming examination presents a real problem. To wait for significant symptoms of change in bowel habits, such as unexplained anaemia, is hazardous. Testing for occult blood has fallen into disuse in most general practices. This paper discusses some of the available techniques for this procedure which I suggest offer a worthwhile aid to examination of patients with possible alimentary neoplasm.

Choice of test

Chemistry

Tests for occult blood are based on the ability of haemoglobin or its derivatives to exercise a peroxidase-like activity, and to aid the oxidation of phenolic compounds by hydrogen-peroxide—yielding a blue dye. Ideally a test should be sensitive enough to detect occult bleeding, but not sensitive enough to react to diet. Haemoglobin and muscle peroxidase activity persist after boiling, whereas the vegetable and fish peroxidase are destroyed by boiling. A meat-free, high residue diet helps to detect any bleeding tendency and boiling of the faecal sample, although unaesthetic, should increase the discrimination of the tests. However, dietary preparation and the subsequent boiling of specimens is not practical in general practice—at least at the first consultation.

Gross blood in the faeces generally reflects the loss of at least 50 mls from the alimentary tract on a single occasion. These tests should provide positive readings at the upper limit of normal bleeding.

Criteria

Family doctors need a method which is:

- (1) Sensitive enough to detect clinically significant bleeding,
- (2) Not influenced by ordinary diet or commonly used medicines,
- (3) Simple to perform with stable reagents,
- (4) Reasonably inoffensive and hygienic in use and not requiring boiling,
- (5) Safe to the tester, using non-carcinogenic reagents,
- (6) Cheap,
- (7) Able to give a quick result while the doctor still has one hand gloved.

Any test which is complicated or time-consuming will not be done often and so will not be used as a routine (Needham and Simpson, 1952).

Use of carcinogenic substances

Various chromogenic compounds have been used: the greatest attention has been given to the guaiac, benzidine, phenolphthalein and orthotolidine tests (Irons and Kirsner, 1965). Some of these, notably, benzidine, are proven carcinogens. Diagnostic tablets containing orthotolidine, such as 'Hematest' and 'Occultest' have been withdrawn by Ames Company to avoid unnecessary fears and confusion among users, although there is no known evidence of orthotolidine being carcinogenic in man.

Recommended routine method

'Hemastix' reagent strip (Ames Company) is a cellulose strip, one end of which is impregnated with an organic peroxide and orthotolidine. The tips of two 'Hemastix' strips are dipped

briefly into distilled water, one as a control and the finger stall or applicator with the faeces is applied to the other. After exactly 30 seconds the strips are examined through the reverse side for a blue colour. It is necessary to carry out a blank with each batch of tests using distilled water, since on occasions a slight greenish colouration is produced with distilled water using some batches of 'Hemastix' (Lehmann and Kitchin, 1971).

The test is convenient, cheap, and can be used by the left hand while the right is still gloved. It gives a quick answer (table 1). The sub-committee of the Department of Health's Central Pathology Committee considered that all available diagnostic reagent strips should be regarded as entirely safe and not needing to be handled with gloves or forceps (Department of Health and Social Security, 1957). This test is recommended for routine use, accepting the admitted problems of false positives due to excessive sensitivity and false negatives due to irregular bleeding patterns and the uneven distribution of haemoglobin breakdown products in the stool.

TABLE 1
Costs

	<i>Number</i>	<i>Price</i>	<i>Cost per single test (p)</i>	<i>Time</i>
'Hemastix'	50	0.73	1.46 (2.92)	30 sec.
'Hemocult'	100	5.00	5	30 sec.
'Okokit'	500	6.80	1.36	7½ min.
'Peroheme 40'	150	2.78	1.85	2 min.

Other products

Other products available are 'Okokit' (Hughes and Hughes Limited) and 'Peroheme 40' (BDH Chemicals Limited). 'Okokit' provides test papers, tablets, and diluent. The test takes seven and a half minutes to perform. Neither reagent is identified which is unsatisfactory, but they are stated to contain no substance listed in the carcinogenic substances regulations 1967. The test is cheap (table 1), but not as convenient as 'Hemastix'. It is used by several laboratories in my area (table 2).

TABLE 2
METHODS USED IN LOCAL LABORATORIES

Tests	<i>Hospitals</i>					
	1	2	3	4	5	6
<i>Diphenylamine</i> (Woodman 1970)	X					
'Hematest' (Ames Company)		X				
'Hemocult' (Smith, Kline and French Laboratories Ltd)			X			
'Okokit' (Hughes and Hughes Limited)		X		X	X	X
<i>Orthotolidine</i> (Kohn and O'Kelly, 1955)			X			

Two hospitals are still using methods and reagents ('Hematest' and Orthotolidine) which do not conform to the Chester Beatty Institute (1966) and Department of Health and Social Security (1974) recommendations.

'Peroheme 40' consists of 50 absorbent papers and two reagents. Number 1 (the chromogen) is 2-6 dichlorophenolindophenol. It is sensitive to light and oxygen. Number 2 is three per cent hydrogen peroxide. The reading interval is two minutes. The test is in a convenient plastic box, but has to be stored in a refrigerator. This obviates its use in the doctor's bag.

Further examination—suspected cases

There are occasions when suspicion is aroused and further testing of faecal specimens is required. It is then worthwhile to advise three to four days meat-free, high residue diet (appendix) and to arrange testing of three separate successive stools and even of two portions of each stool (Greegor, 1971).

The aesthetic problems raised by faecal specimens in screw topped containers are considerable. Transport and testing alike are unpleasant. 'Hemocult' (Smith, Kline and French Laboratories Limited) uses special guaic impregnated paper. The test area is concealed under a labelled flap to protect the paper from direct sunlight or ultra-violet.

Directions to the patient read:

- (a) After bowel movement collect a very small stool specimen on tip of wooden applicator,
- (b) Apply a thin smear to the specimen inside the circle on the panel below,
- (c) Close cover; dispose of applicator. Return slide to physician with your name and date on cover. Caution: Do not leave slide in direct sunlight.

The slide can be subsequently exposed by lifting a perforated flap on the reverse side. Two drops of developing solution (three per cent hydrogen peroxide) are applied and in positive cases a blue colour will appear in 30 seconds. The stain is stable for up to four minutes and the slides themselves are stable indefinitely, and are clean and convenient. The slides can be ordered in cartons of 100 slides with 100 applicators and two bottles of developing solution (table 1). I recommend their use for further examination of suspected cases.

Conclusion

I believe that we should look for occult blood after every rectal examination, in the same way as a smear is taken every time the cervix uteri is exposed. The results of chemical tests for occult blood should be regarded as clinical signs to be interpreted with all the clinical evidence, which in disease can be variable, uncertain, and liable to biological variation.

I suggest 'Hemastix' for routine use by the doctor in the surgery and in the home. 'Hemocult' slides can be given to suspected cases for further testing. Some authorities (Ross *et al.*, 1964) have wondered if the chemical tests for occult blood should be retained in modern medicine, but colon carcinoma is too common to allow the luxury of discarding even a weak clue.

APPENDIX

Special Diagnostic Diet (Greegor, 1971)

An important part of your examination is the stool analysis. To increase its accuracy we request that you follow a special diet during the four days that you are collecting the stool specimens. *Be sure that you have been on this diet at least 24 hours before you collect the first stool specimen. Stay on this diet until all slides have been prepared.*

1. Eat NO meat or fish or chicken.
2. Eat plenty of vegetables—both raw and cooked.
3. Eat plenty of fruit—especially prunes, grapes, plums and apples.
4. Eat moderate amounts of peanuts and popcorn each day.
5. Use 'All-Bran' as your daily cereal.

OF COURSE—IF ANY OF THE ABOVE ARE KNOWN FROM PAST EXPERIENCE TO CAUSE SEVERE GASTRO-INTESTINAL SYMPTOMS IN YOUR CASE—PLEASE DO NOT EAT THEM.

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MEDICINE AND HEALTH—WHAT CONNECTION?

In most countries resources for the health services are allocated, increasingly and often overwhelmingly, to hospital-oriented medical care and drug-dependent therapy. The assumption that community health will thereby be improved remains questionable even in developed countries, and is insupportable in developing countries. Technical advances and specialisation in medical sciences are now counterproductive by pre-empting limited resources and obscuring basic needs. To re-establish proportionality, priority should be accorded to:

- (a) Application of proven preventive procedures for hazards of high prevalence, including excessive population growth;
- (b) Improvements in housing and sanitation,
- (c) Extension of primary care by medical and other staff specially trained in the early recognition and management of personal complaints and of family and community problems.

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PRE-SELECTING SPECIALISTS IN MEDICINE

Taking advantage of the fact that he was giving his last speech as deputy minister of National Health and Welfare, Dr Maurice LeClair told a group of family physicians that he was “disappointed in the slowness of the past four and a half years” since he had been in office, but was confident that change would come about in the health care system through greater involvement of family physicians in the political process.

Dr LeClair told his audience at the College of Family Physicians' annual scientific assembly in Winnipeg last month that “individuals desperately crave a doctor they can call their own—and they mean a family physician, they don't mean a specialist”. He foresaw a time when “specialists will consult and will stay away from family practice”, adding that “to get into most schools even at the present time you have to be good in four subjects: biology, physics, mathematics and chemistry. The type of person who is good at these subjects is not necessarily the type who makes a good doctor. Medical schools must stop preselecting specialists in medicine”.

Canadian Family Physician (1974), **20**, 10, 31.