

# Screening for colon cancer: A test for occult blood

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**BACKGROUND:** The relevance of the problem of colorectal cancer (CRC) is evident because of extremely high morbidity and mortality rates, associated with this disease. CRC is mostly diagnosed only at very advanced stages. The reduction of mortality can be achieved by the popularization of screening-methods for early identification of CRC and adenomatous polyps of the colon, which are proved to be precancerous condition. Fecal occult blood test is a well-known method of screening for CRC. The advantages of this method when compared, for example, with colonoscopy are its simplicity and cost-effectiveness.

Two techniques are usually used for detection of occult blood in the stool: Hemoccult (Guaiac) test and immunochemical test for hemoglobin. There is no consensus among researchers regarding the validity of these tests for the diagnosis of colorectal cancer. For example, J.S. Mandel (1996) notes 60% sensitivity of Guaiac-test for the detection of the early forms of colorectal cancer, while O.I. Kit (2014) suggests that it is not higher than 30%. There are also various opinions about specificity of these two tests.

**OBJECTIVE:** To review the literature on the validity of the fecal occult blood tests for the diagnosis of CRC.

**METHODS:** We looked for articles (electronic versions) available for free in the full-text versions, published from June 1, 1990 to December 31, 2014 in Russian or English. The following databases were used for search: E-LIBRARY; Cochrane; MEDLINE; EMBASE; Google search. Only original research papers were analyzed. Literature reviews or systematic reviews were not taken for analyses. Selection criteria: 1) use of Guaiac and/or immunochemical fecal occult blood test as screening-tests for the detection of colorectal cancer and/or colon polyps (1 cm or more in diameter) in people older than 45 years; 2) comparing of results with the results of colonoscopy (colonoscopy is counted by majority of the authors as a “gold standard” for the diagnosis of CRC and adenomatous polyps).

Articles were selected independently by five researchers. The final decision on the inclusion/exclusion was taken collegially by all five researchers. Extracting data (two-by-two-tables were used) and recalculation of original studies were performed independently by three experts and then rechecked by two other experts. The data were statistically processed using Excel 2010 and RevMan.

**RESULTS:** Initial keyword search returned 803 000 results, of which 449 sources were selected. After reading the abstracts, 29 articles that met inclusion criteria were kept. 10 other articles were excluded after that because they did not contain enough data for extraction or did not contain a control group. At the final step 19 articles were used for meta-analysis.

Forest plot and Rock curve, which were developed with inclusion of the data from all studies, showed heterogeneity of the data. Additional analyzes were performed in subgroups with different diagnoses and various tests.

The sensitivity of the Guaiac test for the diagnosis of colorectal cancer varied from 0.13 to 1.00, and specificity - from 0.69 to 0.99. The sensitivity of the immunochemical test for the diagnosis of CRC ranged from 0.42 to 0.94 with specificity ranging from 0.40 to 1.00.

The sensitivity of the Guaiac test for the diagnosis of the colon polyps was between 0.05 and 0.69, and its specificity - from 0.67 to 0.98. The sensitivity of the immunochemical test for the diagnosis of polyps was from 0.24 to 0.75, and its specificity - from 0.40 to 0.97.

Bivariate analysis of the validity of Guaiac test and immunochemical method for the diagnosis of colorectal cancer showed better results for the immunochemical test compared to Guaiac test. The tests showed very similar results when used for the diagnosis of polyposis. Bivariate analysis, comparing the validity of tests for the diagnosis of colorectal cancer versus polyposis demonstrated better results for CRC.

Multivariate analysis of the validity of the Guaiac and immunochemical tests for the diagnosis of colorectal cancer and polyps also showed better results for detection of colorectal cancer compared with the polyps for both tests. At the same time the highest validity for the diagnosis of CRC was demonstrated for immunochemical analysis.

## **CONCLUSIONS**

1. The sensitivity of the Guaiac test for occult blood in stool is lower than its specificity.
2. Broad dispersion of the validity characteristics of the fecal occult blood tests was observed.
3. The validity of tests for occult blood was higher when they were used for detection of colorectal cancer than of colon polyposis.
4. The highest validity rate has been demonstrated for the immunochemical test when it was used for colon cancer screening.

Keywords: Screening, colon cancer, occult blood