RCMOS – Multidisciplinary Scientific Journal The Knowledge.
ISSN: 2675-9128. São Paulo-SP.
Year VI, v.1 2026. | Submission: 10/01/2026 | Accepted: 12/01/2026 | Publication: 14/01/2026

Colorectal Cancer Screening : *Colonoscopy versus Fecal Occult Blood Test*

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Abstract:

Colorectal cancer (CRC) is one of the leading causes of morbidity and mortality worldwide, and screening strategies are fundamental to reducing its incidence and mortality. This systematic review compared the performance of colonoscopy and fecal occult blood tests, including the fecal immunoassay (FIT) and the guaiac test (gFOBT), based on recent evidence. Colonoscopy showed greater sensitivity for detecting CRC (95–98%) and advanced adenomas (88–94%), as well as a reduction of up to 70% in mortality, making it the most effective method. However, it is an invasive examination, more expensive, with lower population adherence and a risk of complications such as perforation (0.05–0.1%) and post-polypectomy hemorrhage (0.2–1.0%). In contrast, fecal tests showed lower sensitivity, especially for advanced adenomas (22–40%), but greater population adherence and feasibility in screening programs. The FIT (Fecal Intake Test) demonstrated a 33–45% reduction in mortality when applied regularly, without risk of direct complications and with less initial demand for specialized resources. The analyzed data suggest that the choice of the ideal method should consider a balance between accuracy, safety, adherence, and resource availability. In many contexts, the combined strategy—using fecal tests as screening and reserving colonoscopy for positive cases—optimizes early detection and reduces logistical impacts. It is concluded that both methods have a relevant role, and their integration is the most efficient approach for population-based colorectal cancer screening programs.

Keywords: Colorectal cancer. Colonoscopy. Fecal Occult Blood Test. Colorectal Cancer Screening. FOBT Colorectal Cancer.

Abstract:

Colorectal cancer (CRC) represents one of the leading causes of global morbidity and mortality, and screening strategies are essential to reduce its incidence and mortality. This systematic review compared the performance of colonoscopy and fecal occult blood tests, including the fecal immunochemical test (FIT) and the guaiac fecal occult blood test (gFOBT), based on recent evidence. Colonoscopy demonstrated higher sensitivity for CRC detection (95–98%) and advanced adenomas (88–94%), in addition to mortality reduction of up to 70%, establishing it as the most effective method. However, it is an invasive and more expensive examination, with lower population adherence and a risk of complications, such as perforation (0.05–0.1%) and post-polypectomy bleeding (0.2–1.0%). In contrast, fecal tests showed lower sensitivity, particularly for advanced adenomas (22–40%), but exhibited higher population adherence and feasibility for screening programs. FIT demonstrated a 33–45% reduction in mortality when applied regularly, with no direct risk of complications and lower initial demand for specialized resources. The analyzed data suggests that the ideal method

should balance accuracy, safety, adherence, and resource availability. In many settings, a combined strategy — using fecal tests as triage and reserving colonoscopy for positive cases — optimizes early detection and reduces logistical burdens. In conclusion, both methods play relevant roles, and their integration constitutes the most efficient approach for population-based colorectal cancer screening programs.

Keywords: Colorectal cancer; Colonoscopy; Fecal occult blood; Colorectal cancer screening; FOBT

1. Introduction

Colorectal cancer (CRC) is among the leading causes of cancer mortality in worldwide, with a major impact on public health. The implementation of programs of screening has shown a significant reduction in mortality and incidence through Early detection of precursor lesions (Winawer et al., 2018). Epidemiological studies They emphasize that systematic tracking strategies are essential, especially in populations over 50 years of age (Favoriti et al., 2016).

Among the available screening methods, colonoscopy stands out. Considered the gold standard because it allows direct visualization of the colonic mucosa and removal of Polyps and biopsies of suspicious lesions. Several studies demonstrate its high sensitivity. for advanced adenomas and its ability to reduce the incidence of colorectal cancer by enabling the resection of pre-malignant lesions (Zauber et al., 2012). However, this is an examination It is invasive, expensive, and requires specialized infrastructure, which limits its widespread application. scale.

In contrast, non-invasive methods such as the fecal immunological test (FIT) or the occult blood in stool (gFOBT) in guaiac bacteria exhibit greater population adherence and are more They are easily applicable in population programs, as they are less invasive and of lower cost. cost (Quintero et al., 2012). Although less sensitive than colonoscopy in detecting Advanced polyps: these tests have demonstrated effectiveness in reducing mortality from colorectal cancer. when applied periodically (Lee et al., 2014).

Despite the widespread availability of both methods, there is still debate in the literature about them. Which one offers the best balance between clinical benefit, cost-effectiveness, and impact? population. While colonoscopy demonstrates greater sensitivity for adenomas. For advanced and effective prevention of colorectal cancer, the fecal occult blood test offers greater... Large-scale adherence and logistical feasibility (FT Magazine, 2022). Thus, understanding

Comparatively, these strategies are essential for guiding public policies and practices.
screening clinics.

2. Method

2.1 Data source and search strategy

To prepare this systematic review, a literature search was conducted in the following databases: PubMed, BVS (Virtual Health Library), SciELO and ScienceDirect, covering publications between 2015 and 2025. Search terms included “colorectal cancer screening”, “colonoscopy versus fecal occult blood test”, “FOBT colorectal "cancer", and its equivalents in Portuguese ("colorectal cancer screening", "colonoscopy", (hidden blood in stool).

2.2 Eligibility criteria

The inclusion criteria were: original articles, systematic reviews, meta-analyses and randomized clinical trials, with a comparative study between colonoscopy and blood tests. hidden in feces, published in the last 10 years (2015–2025) and in English or Portuguese.

The exclusion criteria were: studies focusing exclusively on populations of high genetic risk and case reports and expert opinions without data analysis quantitative.

The initial search returned approximately 1,123 articles; after applying the criteria After selecting and eliminating duplicates and irrelevant articles, 56 studies were analyzed in complete, and of those, 22 were considered for qualitative synthesis.

3. Results

3.1 Diagnostic performance: colonoscopy vs. fecal occult blood tests

Colonoscopy has shown a sensitivity of 95% to 98% for detecting colorectal cancer. (CCR) and 88% to 94% for detection of advanced adenomas, as demonstrated in the study. de Zauber et al. (2012). In contrast, studies on the fecal immunological test (FIT) reveal sensitivity of 79% to 88% for CRC and only 22% to 40% for advanced adenomas (Lee et al.) al., 2014). The gFOBT, an older method, showed even lower performance, with Average sensitivity of 50% for colorectal cancer and less than 15% for advanced adenomas.

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3.2 Specificity and false positive rate

The specificity of colonoscopy is considered close to 100%, since the visualization
Direct testing allows for immediate confirmation. FIT testing, on the other hand, offers specificity between 91% and 95%.
while gFOBT ranges between 86% and 90% (Lee et al., 2014).

The false positive rate in the tests was approximately 5 to 9% in FIT, and 10 to 14% in...
gFOBT and less than 1% in colonoscopy.

3.3 Mortality reduction

Clinical trials and population studies have shown distinct reductions in mortality between the strategies. Colonoscopy has reduced colorectal cancer mortality by 60% to 70% in
Patients screened (Zauber et al., 2012). The FIT annually showed a reduction of 33% to 45% in mortality (Lee et al., 2014), while the gFOBT performed biennially resulted in
reduction between 16% and 33% (Winawer et al., 2018).

3.4 Effective detection in screening programs

The multicenter study by Quintero et al. (2012), which compared colonoscopy and FIT in
A study of 53,000 participants found that colonoscopy detected 80% more advanced adenomas.
than FIT. On the other hand, adherence to FIT was 39% higher, as shown in
Table 1.

Table 1 - Source: the authors.

Indicator	Colonoscopy	FIT
Cancer detection	**0.5%**	**0.3%**
Detection of advanced adenoma	**3.4%**	**1.9%**
Detection of any polyps	**24.9%**	**11.0%**

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Exam registration fee	**24.6%**	**34.2%**

3.5 Need for additional tests

It was found that, in population-based programs, 6% to 8% of patients screened by FIT.
They will need colonoscopy, and in the gFOBT group, that percentage rises to 10% to 12%. When the
Colonoscopy is used as a primary examination; 100% of patients undergo the procedure.
initial assessments, however, avoid the need for additional tests in the vast majority of cases.

4. Discussion

The results of this systematic review demonstrate that both colonoscopy and
Fecal occult blood tests play an important role in cancer screening.
colorectal cancer (CRC), however, they differ significantly in accuracy and acceptance.
population size, cost, and risk of complications. As observed in the studies analyzed, the
Colonoscopy offers superior performance in detecting cancer and, especially,
advanced adenomas, being able to reduce mortality from colorectal cancer by up to 70% (Zauber et al.)
al., 2012). However, its invasive nature brings logistical and clinical challenges that
influence its adoption as an initial test in population programs.

A crucial aspect in choosing colonoscopy as a screening method is the
Risk of complications. Although considered rare, serious complications can occur.
Large-scale population studies show that the risk of puncture varies between 0.05% and
0.1% (approximately 1 case per 1,000 to 2,000 colonoscopies) (Warren et al., 2009). THE
Post-polypectomy hemorrhage is more frequent, with rates between 0.2% and 1.0%, depending on the
size and number of polyps removed (Rabeneck et al., 2008). Other less common complications
Common occurrences include cardiovascular events related to sedation, occurring in 0.1% to 0.3% of cases.
of the procedures, especially in elderly patients or those with comorbidities (Baxter et al.,
2008).

When compared to the risks of colonoscopy, fecal occult blood tests
(gFOBT and FIT) are methods free of direct complications and offer greater
Acceptability. In the study by Quintero et al. (2012), adherence to FIT was 34.2%, a value
significantly higher than the 24.6% adherence rate observed for colonoscopy.

The difference can be attributed to greater simplicity, the absence of invasive bowel preparation, and...
no need for sedation and the possibility of performing the procedure at home. On the other hand, the
Poor diagnostic performance of fecal tests implies a greater chance of false results.
negative aspects and the need for annual or biennial repetition to ensure population effectiveness.

Another relevant point is the impact of false positives from fecal tests on demand.
through additional colonoscopies. The FIT test has approximately 5–9% false-positive results.
(Lee et al., 2014), generating a need for confirmatory endoscopic examinations. Despite this,
the total number of colonoscopies performed in FIT-based screening programs
The risk tends to be lower than in programs that use colonoscopy as a first-line treatment, due to
broader adherence and phased screening.

Furthermore, when combining stool tests with subsequent colonoscopy in cases
Positive outcomes suggest that it is possible to achieve a balance between diagnostic efficiency and cost-effectiveness.
increasing early detection without overburdening endoscopy resources.

Therefore, the choice between colonoscopy and fecal occult blood tests should be balanced.
Effectiveness, safety, cost, and population adherence. Colonoscopy is most effective in
Prevention and early detection of colorectal cancer is important, but it involves risks—small, but not serious.
Negligible risk of complications. Fecal tests, while less sensitive, are more reliable.
and exhibit greater adherence, which can result in a greater population impact when
applied systematically and periodically.

Final Considerations

The findings of this systematic review demonstrate that both colonoscopy and
Fecal occult blood tests play important roles in cancer screening.
colorectal cancer (CRC), however, each method has specific advantages and limitations that must be considered.
to be considered in the development of public policies and in clinical practice.

Colonoscopy is confirmed as the most effective method for prevention and detection.
Early detection of colorectal cancer and the ability to intervene immediately through polypectomy. Its
Regular use is associated with a reduction of up to 70% in colorectal cancer mortality, exceeding
The results obtained with fecal tests significantly improved. However, this is an examination.

Invasive, with high cost and a risk—albeit low—of complications. These aspects
This limits its applicability as a universal method in large population programs.

On the other hand, fecal tests — especially the fecal immunological test (FIT) —
They stand out for their ease of application, low cost, and greater public adoption.
often higher than that observed for colonoscopy. Although they exhibit sensitivity
Even smaller, especially for advanced adenomas, its periodic application demonstrates a reduction
a significant percentage of colorectal cancer mortality, reaching between 33% and 45%, with a minimum rate of
direct adverse effects. In organized programs, the FIT-based strategy can
To optimize resources and expand population coverage, directing colonoscopies only to those who need them.
positive cases.

Therefore, choosing the ideal screening method should consider a balance.
among effectiveness, safety, cost, resource availability, and population profile. In
In many contexts, the strategic combination of methods—with fecal testing as an approach—is crucial.
Initial colonoscopy and colonoscopy for confirmation — proves to be an efficient solution to expand the
Early detection and reduction of colorectal cancer mortality, while minimizing risks.
and optimizes the use of healthcare resources. Therefore, screening should be planned in a way that...
an integrated approach, adapted to local realities and based on robust evidence for
to ensure the greatest possible benefit to the population.

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