IMPORTANT REMINDER

Medical Policies are developed to provide guidance for members and providers regarding coverage in accordance with contract terms. Benefit determinations are based in all cases on the applicable contract language. To the extent there may be any conflict between the Medical Policy and contract language, the contract language takes precedence.

PLEASE NOTE: Contracts exclude from coverage, among other things, services or procedures that are considered investigational or cosmetic. Providers may bill members for services or procedures that are considered investigational or cosmetic. Providers are encouraged to inform members before rendering such services that the members are likely to be financially responsible for the cost of these services.

DESCRIPTION

Computed tomography colonography (CTC), also known as “virtual colonoscopy,” is an imaging modality that uses thin-section helical CT to generate high-resolution 2-dimensional images of the colon. From these images, three-dimensional pictures may then be reconstructed which resemble the images obtained with conventional endoscopic (“optical”) colonoscopy.

Diseases of the colon and rectum for which CT colonography may be considered as a diagnostic or screening tool include colorectal cancer and precancerous conditions, diverticulosis and diverticulitis, and inflammatory bowel disease. However, CTC has been primarily investigated as an alternative screening technique to colonoscopy for colorectal cancer (CRC). While CTC requires a full bowel preparation, similar to conventional colonoscopy, no sedation is required. However, the technique involves gas insufflation of the intestine, which may be uncomfortable to the patient.

MEDICAL POLICY CRITERIA

I. Computed tomography (CT) colonography may be considered medically necessary for patients who meet one of the following criteria:
A. A conventional colonoscopy is indicated but the patient is unable to undergo conventional colonoscopy for medical reasons (e.g., continuous anticoagulation therapy or high anesthesia risk); or

B. Conventional colonoscopy was incomplete because of colonic stenosis, obstruction, or significant anatomical abnormality.

II. Except as noted in the criteria above, CT colonography is considered not medically necessary.

SCIENTIFIC EVIDENCE[^1]

Conventional endoscopic colonoscopy is the standard of care diagnostic and screening technique for colon cancer and other gastrointestinal disorders, such as diverticulitis and ulcerative colitis. Suspicious lesions of any size can be removed immediately and evaluated for the presence of colorectal cancer (CRC) or dysplasia.[^2-4]

In order to demonstrate its efficacy, computed tomography colonography (CTC) needs to be compared to the standard of care, conventional colonoscopy, in randomized controlled trials.

Literature Appraisal

Technology Assessment

A 2009 BlueCross and BlueShield Association (BCBSA) Technology Evaluation Center (TEC) Assessment evaluated the scientific literature comparing the effectiveness of CTC to that of conventional colonoscopy.[^4] This assessment concluded:

Based primarily on the results from 2 large trials in asymptomatic patient populations,[^5,6] CTC sensitivity for the detection of lesions 10 mm or larger approaches the sensitivity of conventional colonoscopy.

However, the diagnostic performance of CTC was highly dependent on the technology and techniques used. If these practices (e.g., use of the most current CT scanners, stool tagging techniques, and highly trained radiologists) can be replicated in the community, then it is likely that improved health outcomes can be achieved outside the investigational setting.

Systematic Reviews

In 2014, Plumb et al. published findings from a systematic review and meta-analysis of studies evaluating the performance of CT colonography for the diagnosis of colon cancer among subjects with positive fecal occult blood test (FOBT).[^7] FOBT is a recommended screening technique for colorectal cancer; positive tests are typically followed up with colonoscopy. In this meta-analysis, the authors included only studies that used CT colonography in the evaluation of patients who had had a positive FOBT and compared colonography results to a reference test; either conventional colonoscopy, segmental unblinded colonoscopy, or surgery with subsequent histopathology. Five articles were included in the authors’ analysis, representing 622 patients. Pooled per-patient sensitivity and specificity
for adenomas greater than or equal to 6 mm or colorectal cancer were 88.8% (95% CI 83.6% to 92.5%) and 75.4% (95% CI 58.6% to 86.8%), respectively.

Two meta-analyses were reported in 2011. One analysis of five studies with a total of 4,086 participants reported that CT colonography has a high sensitivity for adenomas ≥10mm, but lower sensitivity for adenomas ≥6mm.[8] The other included 49 studies (N=11,151 patients); the sensitivity of CT colonography for CRC was 96.1% (95% CI, 93.8 to 97.7%).[9]

The Centers for Medicare and Medicaid Services published an evidence-based decision memo (2009) that stated, “The evidence is inadequate to conclude that CT colonography is an appropriate colorectal cancer screening test…”[2] This review noted the following uncertainties:

“CT colonography using at least 8 to 16 slice CT scanners has sensitivity and specificity that are comparable to optical colonoscopy for polyps ≥ 10mm. For polyps 6-9mm, the evidence is suggestive but less convincing given the lower sensitivity and specificity. CT colonography does not appear to have the ability to reliably detect small polyps < 6mm.

Since CT colonography cannot reliably detect polyps < 6mm, the impact of these polyps in the intervening screening interval is important but unknown at this point…Further research on the natural history of polyps < 6mm and nonpolypoid lesions and their health outcomes is needed.

The value of an intermediate screening test such as CT colonography that does not have therapeutic options may well be reduced or negated if there is a high rate of referral to optical colonoscopy leading to duplicative tests.

Since extracolonic findings are common, evidence based standards and guidelines on reporting, monitoring and subsequent evaluation of these findings are needed…Since individuals undergoing screening are asymptomatic by definition, the potential impact of extracolonic findings on health outcomes needs to be determined prior to general use of this modality.”

The 2008 Agency for Healthcare Research and Quality (AHRQ) systematic review of tests used for colorectal cancer screening concluded the following with regard to CTC technology:[10]

The published reports on CTC screening suggested at least comparable sensitivity to colonoscopy for CRC and large adenomas (10mm or larger).

For smaller polyps (6mm or larger), published data were inconsistent, with some studies suggesting either reduced sensitivity or sensitivity that may be dependent upon the CT technology used and the expertise of the individual reader.

Published specificity estimates for CTC were consistently high for large polyps (≥96%), but appeared lower and more variable (80-94%) for smaller polyps (6mm or larger). Approximately 40% of patients had extracolonic findings; however, the net impact of these findings was uncertain in terms of added benefits or harms.

A 2011 meta-analysis of CTC diagnostic performance included 33 prospective studies in 6,393 adult patients.[11] Heterogeneity was addressed through statistical analysis and by performing stratified analyses of confounding variables. This study reported that the sensitivity of CTC varied, but improved as polyp size increased:
Sensitivities ranged from 48% for detection of polyps smaller than 6 mm, to 70% for polyps 6 to 9 mm, to 85% for polyps larger than 9 mm.

In contrast, specificity was more consistent (92% for polyps smaller than 6 mm, 93% for polyps 6 to 9 mm, and 97% for polyps larger than 9 mm).

In a subanalysis, characteristics of the CT scanner technology explained only some of the variation between studies.

Randomized Controlled Trial (RCT)

In 2013, Atkin et al. reported results from an RCT comparing colonoscopy and CT colonography in the evaluation of patients with symptoms suggestive of colorectal cancer. The study randomly allocated patients aged 55 or older with symptoms suggestive of colorectal cancer in a 2:1 fashion to either colonoscopy or CT colonography. The study was not blinded. Both colonoscopy and CT colonography procedures were conducted with a full bowel preparation. The study’s primary outcome was the proportion of patients who had additional colonic investigation, defined as any subsequent examination of the colon until diagnosis (usually histological confirmation of a cancer or polyp) or until a patient was referred back to his or her family doctor. Additional diagnostic evaluation of the colon was required in 160/533 (30.0%) of those assigned to CT colonography, compared to 86/1047 (8.2%) of those assigned to colonoscopy (p<0.0001). The overall detection rate for colorectal cancer or large polyps did not differ between the groups (relative risk [RR] 0.95; 95% CI 0.70 to 1.27; p=0.69). The authors concluded that the high referral rate for additional procedures could potentially be mitigated with wider implementation of CT colonography, radiologist training, and standardized protocols.

Nonrandomized Studies

In 2014, Fini et al. reported results from a study on the diagnostic accuracy of CT colonography for clinically relevant colorectal lesions, defined as polyps or masses greater than or equal to 6 mm among first degree relatives of patients with colorectal cancer. CT colonography was undertaken following a non-cathartic bowel preparation among 344 patients, with optical colonoscopy undertaken on the following day. Sensitivity and specificity for lesions greater than or equal to 6 mm were 77% (95% confidence interval [CI] 59% to 95%) and 99% (95% CI 97% to 100%), respectively.

The diagnostic accuracy of CT colonography compared to colonoscopy was recently assessed in a study by Zalis et al. in 2012. A laxative-free bowel preparation technique for CT colonography was used in 605 patients aged 50 to 85 years with average to moderate colon cancer risk. Sensitivity and specificity were calculated on a per-patient basis and authors reported that for adenomas 10mm or larger 91% (95% confidence interval [CI] 71% to 99%) and 85% (95% CI 82% to 88%), respectively. The sensitivity of CT colonography was similar but slightly lower than colonoscopy. For smaller adenomas, the sensitivity of CT colonography was lower than colonoscopy.

The remaining evidence on CTC diagnostic performance is not reliable for one or more of the following reasons:

High-risk subjects were included (e.g., symptomatic patients, patients referred for additional testing, or those with a family history of cancer). These subjects are not representative of a screening population and may create selection bias.
Study populations sizes were too small, which limits the ability to rule out the role of chance as an explanation of findings and does not permit conclusions for a test that is intended to be used in a large screening population.[4,15,21]

Estimates of sensitivity were based on a per polyp (rather than per patient) basis. These estimates may result in misleading calculations of sensitivity, and they do not reflect how the test would be used in the clinical setting.[4,15]

Older CTC machinery or screening techniques were used, which is not reflective of the current technology. These studies may not accurately reflect the best diagnostic performance of CTC.[4] In addition, variability in performance of older scanners or imaging techniques limits comparisons between studies and may introduce performance bias.

CTC and conventional colonoscopy were compared in separate patient populations. These studies do not allow calculation of sensitivity and specificity between the two tests in the same patient population and only give an estimate of the diagnostic yield of each test.[4,22,23]

Cost-effectiveness

In 2012, Hanly and colleagues published a systematic review of cost-effectiveness studies of CT colonography and concluded that CT colonography is cost-effective compared to no screening.[24] They could not reach a conclusion regarding a comparison to colonoscopy, due to differences in study parameters and assumptions. It was noted that early studies demonstrated that colonoscopy was both more effective and less expensive than CTC; however, more recent studies have had variable results, dependent on the threshold for colonoscopy referral and whether the costs and effects of acting upon extra-colonic findings seen on CT colonography are addressed.

A 2009 BCSBA TEC Special Report evaluated 7 studies appraising the cost-effectiveness of CTC compared with conventional colonoscopy. This report determined that in general, conventional colonoscopy was the more effective screening test. CTC was generally more expensive and in many analyses less effective as a screening strategy than colonoscopy.[25] Subsequent to the BCBSA TEC Report, several cost-effectiveness analyses of colon cancer screening techniques also reported that CT colonography is not cost-effective compared with the established screening options.[26,27]

Clinical Practice Guidelines

Much of the evidence supporting colorectal cancer screening is indirect and consensus groups reviewing the same evidence have come to differing conclusions regarding the evidence on CTC for colon cancer screening.[4,28]

Evidence-based Guidelines

U.S. Preventive Services Task Force

The 2016 U.S. Preventive Services Task Force (USPSTF) recommendation statement on screening for colorectal cancer determined the evidence was insufficient to evaluate the potential harms of extracolonic findings, which are common, when performing CT colonography.[29] CTC can result in overdiagnosis and overtreatment following extracolonic findings, which occur in 40 to 70 percent of screening examinations. Since the 2008 USPSTF review, seven new studies examined the potential
harm associated with CT colonography, however high quality evidence from which conclusions can be
drawn remains lacking. The USPSTF found no studies demonstrating any screening method was more
effective than others.

Consensus-based Guidelines

While these guidelines report outcomes of numerous studies, the authors did not provide a critical
analysis of the quality of the studies, and/or did not rate the strength of the evidence supporting their
recommendations:

A 2012 American College of Physicians (ACP) position statement for colorectal cancer
screening indicated the ACP, “recommends using a stool-based test, flexible sigmoidoscopy, or
optical colonoscopy as a screening test in patients who are at average risk. ACP recommends
using optical colonoscopy as a screening test in patients who are at high risk.”[30]

In 2012, the American College of Gastroenterology, along with the American
Gastroenterological Association Institute and the American Society for Gastrointestinal
Endoscopy, updated the 2006 guidelines on colonoscopy surveillance after polypectomy.[31] This
guideline makes the following statement on CT colonography and other newer colonic imaging
technologies: “The role of new endoscopic technologies has not been studied in surveillance
cohorts, although there are ongoing studies of CT colonography.... At this point, these
technologies technology do not have an impact on surveillance intervals.”

The 2009 American College of Gastroenterology Guidelines for colorectal cancer screening
recommended colonoscopy every 10 years, beginning at age 50, as the preferred CRC screening
strategy. However, these guidelines note that not all eligible persons are willing to undergo
colonoscopy for screening purposes and recommend, in these cases, patients be offered an
alternative CRC prevention test such as flexible sigmoidoscopy every 5 to 10 years, CTC every 5
years, or a cancer detection test such as fecal immunochemical test for blood.[3]

A 2008 joint position statement issued by the American Cancer Society, the U.S. Multi-Society
Task Force on Colorectal Cancer, and the American College of Radiology stated colon cancer
prevention is the primary goal of colorectal cancer screening and endorsed CT colonography
every 5 years as one screening option.[32,33]

The 2007 AGA Standards for Gastroenterologists Performing and Interpreting Diagnostic CTC
stated, “Based on currently available data, CT colonography is not endorsed as a primary
screening modality for CRC in asymptomatic adults.”[34]

A 2006 American Gastroenterological Association (AGA) position paper stated that peer-
reviewed published data suggest that CT colonography is only indicated as a diagnostic tool for
patients who have undergone incomplete colonoscopies for limited indications.[35]

The 2006 American Society for Gastrointestinal Endoscopy stated, “Virtual colonoscopy is an
evolving technique and is not currently recommended as the primary method of screening for
CRC.”[36]

Safety
A number of questions remain unanswered in the published scientific literature with respect to the safety of CTC:

- The lifetime cumulative radiation risk from use of CTC in addition to other medical diagnostic or screening tests is uncertain and needs further evaluation.\[^{2,4,29}\]

- The best interval for repeat CTC after negative CT colonography is unknown and needs to be established.\[^{2,3,6}\] Insufficient follow-up may lead to under treatment and too frequent follow-up may lead to unnecessary radiation exposure.

- The natural history of smaller adenomas, particularly those of different sizes (e.g. < 10mm) is unknown.\[^{29}\] It is not clear that leaving small polyps is safe; there are no long-term, adequately controlled studies on the subject.\[^{2,4,6,10,15}\]

- How to interpret and manage additional CT findings outside the colon (extracolonic findings) is not well defined.\[^{2,4,5,10,15}\] False positive findings may lead to unnecessary procedures. Interdisciplinary algorithms for management of these findings are needed.\[^{15,29}\]

**Summary**

Computed tomography colonography (CTC) has not been shown to be superior to colonoscopy as a screen for colorectal cancer or to diagnose other gastrointestinal disorders, such as diverticulitis and ulcerative colitis. Evidence suggests CTC is as sensitive as conventional colonoscopy for detecting lesions 10 mm or larger. However, for lesions less than 10 mm, the evidence is inconsistent and suggests CTC is less sensitive. If suspicious lesions are found on CTC, they cannot be immediately removed and evaluated. Patients must be referred for conventional colonoscopy for lesion removal. Therefore, except in patients who are unable to undergo conventional colonoscopy for medical reasons or for whom conventional colonoscopy was incomplete because of colonic stenosis, obstruction, or significant anatomical abnormality, CT colonography is considered not medically necessary.

**REFERENCES**

1. BlueCross BlueShield Association Medical Policy Reference Manual "Virtual Colonoscopy/CT Colonography." Policy No. 6.01.32


CROSS REFERENCES

Confocal Laser Endomicroscopy, Medicine, Policy No. 151

Computed Tomography to Detect Coronary Artery Calcifications, Radiology, Policy No. 06

Whole Body CT Screening, Radiology, Policy No. 40

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