Medical Policy

Blue Cross Blue Shield Blue Care Network of Michigan

Nonprofit corporations and independent licensees of the Blue Cross and Blue Shield Association

***Current Policy Effective Date: 5/1/25**
(See policy history boxes for previous effective dates)

Title: Virtual Colonoscopy/CT Colonography

Description/Background

Computed tomography colonography (CTC), also known as virtual colonoscopy, is an imaging modality that has been investigated as an alternative to conventional endoscopic ("optical") colonoscopy. It has been most widely studied as an alternative screening technique for colon cancer, and for the diagnosis of colorectal cancer (CRC) in people with related symptoms and for other colorectal conditions.

Computed tomography colonography (CTC), also known as “virtual colonoscopy,” is an imaging technique of the colon involving thin-section helical CT to generate high-resolution 2-dimensional axial images of the colon. Three-dimensional images, which resemble the endoluminal images obtained with conventional endoscopic colonoscopy, are then reconstructed offline. CTC has been investigated as an alternative to conventional endoscopic (“optical”) colonoscopy, specifically as an alternative screening technique for colon cancer. While CTC requires a full bowel preparation, similar to conventional colonoscopy, no sedation is required, and the examination is less time-consuming. However, the technique involves gas insufflation of the intestine, which may be uncomfortable to the patient, and training and credentialing of readers may be needed to achieve optimal performance.

Medical Policy Statement

Virtual colonoscopy (computed tomography colonoscopy) for specified patient populations have been established. It may be considered a useful diagnostic option for selected indications.

Inclusionary and Exclusionary Guidelines

Inclusions:
- For individuals for whom a conventional colonoscopy is indicated but who are unable to undergo conventional colonoscopy for medical reasons; or
- In individuals with an incomplete conventional colonoscopy because of colonic stenosis or obstruction.

Exclusions:
- Individual preference for virtual colonoscopy vs. conventional colonoscopy

CPT/HCPCS Level II Codes *(Note: The inclusion of a code in this list is not a guarantee of coverage. Please refer to the medical policy statement to determine the status of a given procedure)*

Established codes:

74261 74262

Other codes (investigational, not medically necessary, etc.):

74263

Rationale

Both computed tomography colonography (CTC) and standard optical colonoscopy can be used for the evaluation of a number of disorders of the colon and rectum, most notably colon cancer and colon cancer precursors, but also conditions such as inflammatory bowel disease and diverticulitis/diverticulosis. CTC has been most extensively studied as part of a colon cancer screening strategy.

Evidence reviews assess whether a medical test is clinically useful. A useful test provides information to make a clinical management decision that improves the net health outcome. That is, the balance of benefits and harms is better when the test is used to manage the condition than when another test or no test is used to manage the condition.

The first step in assessing a medical test is to formulate the clinical context and purpose of the test. The test must be technically reliable, clinically valid, and clinically useful for that purpose. Evidence reviews assess the evidence on whether a test is clinically valid and clinically useful. Technical reliability is outside the scope of these reviews, and credible information on technical reliability is available from other sources.

Colon Cancer Screening

Clinical Context and Test Purpose
Diseases of the colon and rectum for which computed tomography colonography (CTC) may be considered as a diagnostic or screening tool include colorectal cancer (CRC) and precancerous conditions, diverticulosis and diverticulitis, and inflammatory bowel disease. The most widely studied use of CTC is as an alternative screening technique for colon cancer.

The purpose of CTC in individuals who are asymptomatic and undergoing CRC screening to prevent morbidity by detecting early colon cancers and detecting and removing cancer precursors such as polyps. The detection of cancer and removal of polyps ultimately requires an optical colonoscopy. CTC is an imaging procedure that can identify cancers or polyps. The effectiveness and efficiency of CTC depends on its ability to identify cancer or polyps accurately, so that all or most patients who have such lesions are appropriately referred for optical colonoscopy for diagnosis and treatment.

The following **PICO** was used to select literature to inform this review.

Populations
The relevant population of interest are individuals who are asymptomatic and eligible for CRC screening.

Interventions
The test being considered is CTC. CTC is performed in an outpatient setting or in a hospital or an imaging facility. Results of CTC are assessed by a radiologist.

Comparators
The following tests are currently being used to make decisions about managing patients who are asymptomatic and undergoing CRC screening: optical colonoscopy, sigmoidoscopy, and fecal occult blood test (FOBT).

Outcomes
The outcomes of interest are disease-specific morbidity and mortality. Beneficial outcomes relate to true positive testing, which leads to detection of disease that would be otherwise missed. Harmful outcomes result from false-negative testing, which may delay diagnosis and management of CRC.

Study Selection Criteria
For the evaluation of clinical validity of the CTC test, studies that meet the following eligibility criteria were considered:

- Reported on the accuracy of the technology
- Included a suitable reference standard
- Patient clinical characteristics were described
- Patient selection criteria were described.

Clinically Valid
A test must detect the presence or absence of a condition, the risk of developing a condition in the future, or treatment response (beneficial or adverse).

Systematic Reviews
The diagnostic characteristics of CTC as a colon cancer screening test have been investigated in many studies in which patients who are referred for optical colonoscopy agree to first undergo a CTC. Using a second look unblinded colonoscopy aided by the results of the CTC as the reference standard, the diagnostic characteristics of CTC and the blinded colonoscopy can be calculated and compared. The sensitivity of CTC is a function of the size of the polyp; sensitivity is poorer for smaller polyps.

Lin et al (2016) published a systematic review and meta-analysis of literature on CRC screening, conducted for the U.S. Preventive Services Task Force (USPSTF).[1] The investigators identified 9 prospective diagnostic accuracy studies on CTC (total N=6497). Seven studies involved CTC with bowel preparation and 2 involved CTC without bowel preparation. Five studies, including both without bowel preparation, were rated by USPSTF as good quality and the remaining 4 were considered fair quality. In 4 studies of CTC with bowel preparation, the sensitivity to detect adenomas 6 mm or larger ranged from 73% to 98%, and the specificity ranged from 89% to 91%. The sensitivity of CTC to detect adenomas 10 mm or larger (7 studies) ranged from 67% to 94% and the specificity ranged from 96% to 98%. Four (n=481) of the 9 studies also provided data on colonoscopy. The sensitivity for adenomas 6 mm or larger ranged from 75% to 93%, and the sensitivity to detect adenomas 10 mm and larger ranged from 89% to 98%.

In addition, the Lin et al (2016) systematic review evaluated evidence on harms and extracolonic findings associated with CTC. Eleven fair or good quality prospective studies (total N=10,272) suggested little or no risk of serious adverse effects such as perforation. In contrast, Lin et al estimated that, with optical colonoscopy, the risk of perforation was 4 in 10,000 procedures (95% confidence interval [CI], 2 to 5 in 10,000) and the risk of major bleeding was 8 in 10,000 procedures (95% CI, 5 to 14 in 10,000). Radiation exposure is a potential harm of CTC, and many of the studies did not report the extent of radiation exposure. Using data from 4 studies, Lin estimated that the radiation dose of a full-screening CTC examination was about 4.5 to 7 mSv. However, in more recent studies (i.e., published in 2004 to 2008), the estimated radiation dose was lower, about 1 to 5 mSv. Among studies reporting this outcome, extracolonic findings occurred in 27% to 69% of CTC examinations. Approximately 1% to 11% underwent diagnostic evaluation and 3% required treatment. Extracolonic cancers occurred in about 0.5% of individuals undergoing CTC examinations.

Martin-Lopez et al (2014) published a meta-analysis that included 9 studies of colorectal cancer screening, excluding studies that were conducted for the diagnosis of colorectal cancer or in elderly, high-risk, or symptomatic patients.[2] The patient level pooled sensitivity and specificity of CTC were 66.8% (95% CI, 62.7% to 70.8%) and 80.3% (95% CI, 77.7% to 82.8%), respectively. For colonoscopy, the pooled sensitivity was 92.5% (95% CI, 89.0% to 95%) and pooled specificity was 73.2% (95% CI, 67.7% to 78.1%). In the subgroup with larger lesions, the diagnostic accuracy of the 2 approaches was more similar. For lesions 10 mm or larger, CTC had a pooled sensitivity of 91.2% (95% CI, 86.5% to 94.6%) and a specificity of 87.3% (95% CI, 86.2% to 88.3%). The pooled sensitivity of colonoscopy for lesions 10 mm or larger was 92.9% (95% CI, 86.0% to 97.1%) and the specificity was 91.3% (95% CI, 89.9% to 92.5%)

Randomized Controlled Trials

Sali et al (2022) compared CTC (n=5242) and 3 rounds of fecal immunochemical testing (n=9739) in patients aged 54 to 65 years who had never been previously screened for CRC.[3] Each fecal immunochemical test was separated by 2 years. Rates of participation in the screening intervention were similar between CTC (26.7%) and patients who had all 3 rounds of fecal immunochemical testing (33.4%). The primary outcome was the detection rate for advanced neoplasia. Advanced CRC was detected more commonly with fecal immunochemical testing than CTC (2.0% vs. 1.4%; p=.0094) in the modified intent to treat population. The detection rate was higher in the CTC group than the fecal immunochemical testing group (5.2% vs. 3.1%; p=.0002) in the per protocol population. Referral for workup

colonoscopy was less common among patients who underwent CTC than fecal immunochemical testing in the intention to treat population (2.7% vs. 7.5%; p<.0001).

Regge et al (2017) reported on an RCT in which 5412 individuals were randomized to CTC (n=2674) or flexible sigmoidoscopy (n=2738).[4] The detection rate for advanced adenomas did not differ significantly between groups (p=0.52). Detection rates were 133 (5.1%) in the CTC group and 127 (4.7%) in the flexible sigmoidoscopy group. Ten CRCs were identified in the CTC group and 9 in the flexible sigmoidoscopy group. No serious adverse events were reported.

Other large randomized controlled trials (RCTs) have compared the diagnostic accuracy of CTC to a different method of CRC screening. In the IJspeert et al (2016) study, 8844 individuals were invited to be screened and 2258 (26%) agreed to participate.[5] This included 982 (34%) of 2920 randomized to CTC and 1276 (22%) of 5924 randomized to standard colonoscopy. The analysis focused on detection of high-risk sessile serrated polyps (SSPs). SSPs were detected significantly more often in colonoscopy examinations (n=55 [4.3%]) than in CTC examinations (n=8 [0.8%]). For the outcome of all SSPs (high and low risk), significantly more were detected with colonoscopy (n=83 [6.5%]) than with CTC (n=21 [2.1%]; p<.001). Adverse events were not discussed.

Sali et al (2016) compared reduced cathartic preparation CTC, full cathartic preparation CTC, fecal immunochemical test, and optical colonoscopy as primary screening tests for CRC.[6] The study invited 16,087 patients for a screening test, and 6,116 patients underwent a test. Patients with a positive fecal immunochemical test and patients with a colonic mass or a polyp larger than 6 mm on CTC underwent optical colonoscopy. The detection rates per participant for advanced neoplasia were 5.2% for the CTC groups (pooled data) versus 1.7% for the fecal immunochemical test (relative risk [RR], 3.08; 95% CI, 2.19 to 4.32; p<.001). The detection rates were similar between the 2 CTC groups: 5.5% for the reduced cathartic preparation and 4.9% for the full cathartic preparation (RR, 1.12; 95% CI, 0.67 to 1.88; p=.65). The overall detection rates per participant for advanced neoplasia were 1.7% for the fecal immunochemical test, 5.5% for the reduced cathartic preparation CTC, 4.9% for the full cathartic preparation CTC, and 7.2% for optical colonoscopy.

Weinberg et al (2018) compared CTC versus optical colonoscopy in 231 patients undergoing screening at 1 year post curative surgery for CRC.[7] All patients underwent CTC followed by optical colonoscopy. Compared with optical colonoscopy, CTC had a sensitivity of 44% (95% CI, 30.2% to 57.8%) and specificity of 85.8% (95% CI, 89.7% to 97%) for detecting lesions (all types) 6 mm or larger and a sensitivity of 76.9% (95% CI, 54% to 99.8%) and specificity of 89% (95% CI, 84.8% to 93.1%) for detection lesions (all types) 10 mm or larger. For serrated adenomas, CTC had a sensitivity of 60% (95% CI, 29.6% to 90.4%) and specificity of 76% (95% CI, 70.4% to 81.6%) for sizes 6 mm or larger and a sensitivity of 75% (95% CI, 32.6% to 100%) and specificity of 75.3% (95% CI, 69.7% to 80.9%) for sizes 10 mm or larger. The results with CTC were significantly different from the null hypothesis of 90% for sensitivities to detect all lesions or serrated adenomas 6 mm or larger and for specificities for serrated adenomas of all sizes (p<.05 for all comparisons).

Clinically Useful
A test is clinically useful if the use of the results informs management decisions that improve the net health outcome of care. The net health outcome can be improved if patients receive correct therapy, or more effective therapy, or avoid unnecessary therapy, or avoid unnecessary testing.

Direct Evidence
Direct evidence of clinical utility is provided by studies that have compared health outcomes for patients managed with and without the test. Because these are intervention studies, the preferred evidence would be from RCTs.

No RCTs comparing outcomes for patients undergoing CTC screening with patients who did not undergo CTC screening were identified.

Chain of Evidence
Indirect evidence on clinical utility rests on clinical validity. If the evidence is insufficient to demonstrate test performance, no inferences can be made about clinical utility.

A chain of evidence involves evaluating: (1) evidence that CTC is accurate and (2) evidence that CTC identifies appropriate patients with CRC who would not otherwise be screened. The clinical validity of CTC for screening for CRC has been demonstrated in systematic reviews and meta-analysis studies as well as several large RCTs. While modeling studies have reported that optical colonoscopy is likely more beneficial than CTC,[8-14] higher participation with CTC may ameliorate otherwise lower improvement in net health outcome compared with optical colonoscopy.

Compliance with recommendations for optical colonoscopy is suboptimal. As reported by Steele et al (2013), the screening rate is about 60% (in the prior 10 years) among people ages 50 to 75.[15] CTC has been proposed as an alternative colon cancer screening technique that may improve patient compliance compared with optical colonoscopy. A literature survey of studies that attempted to determine whether the availability of CTC would improve population screening rates found survey studies, patient satisfaction studies, and focus group studies. It is unclear how such studies provide a sufficient base of evidence to demonstrate that population adherence to colon cancer screening would improve through CTC.

Stoop et al (2012) published an RCT that evaluated the impact of CTC on colon cancer screening rates.[16] This trial was performed in the Netherlands, and members of the general population ages 50 to 75 years were randomized to an invitation for CTC or optical colonoscopy. The CTC protocol included a noncathartic preparation, consisting of iodinated contrast agent given the day before the exam and 1.5 hours before the exam, in conjunction with a low fiber diet. The participation rate in the CTC group was 34% (982/2920) compared with a rate of 22% (1276/5924) in the optical colonoscopy group ($p<0.001$). The diagnostic yield per-patient of advanced polyps was higher in the optical colonoscopy group, at 8.7 of 100 participants compared with 6.1 of 100 participants for CTC ($p=0.02$). However, the diagnostic yield of advanced neoplasia per invitee was similar, at 2.1 of 100 invitees for CTC and 1.9 of 100 invitees for optical colonoscopy ($p=0.56$). The data would suggest that the increased participation rates with CTC offset the advantages of optical colonoscopy and that overall outcomes would likely be similar between strategies. It is not known whether the different preparation regimens affected participation rates.

Zhu et al (2020) published a meta-analysis of 5 RCTs, including the trial by Stoop et al, exploring participation rates between CTC and colonoscopy.[17] The meta-analysis contained data on 15,974 invitees to participate in a screening test. The participation rate was 28.8% with CTC versus 20.8% with colonoscopy (RR, 1.26; 95% CI, 0.98 to 1.63; p=.070). The subgroup analyses revealed a higher participation rate for the reduced or no cathartic preparation CTC compared with colonoscopy (RR, 1.70; 95% CI, 1.40 to 2.07; p<.001).

Section Summary: Colon Cancer Screening
There is some variability in the diagnostic accuracy of CTC in the literature; this is likely due to the improvement in technical performance over time. Most studies have reported that the diagnostic accuracy for CTC is high and in the same range as optical colonoscopy for polyps greater than 10 mm.

No long-term comparative studies that directly report on outcomes of CTC versus optical colonoscopy. The determination of comparative outcomes of CTC and optical colonoscopy is complex, due to the differing patterns of follow-up associated with each strategy.

A meta-analysis of 5 key randomized trials revealed similar participation rates with CTC versus colonoscopy, but reduced or no cathartic preparation CTC may improve participation rates. The improved screening rate may offset, or even outweigh, any benefit of optical colonoscopy on outcomes. However, similar screening rates may not be achieved with a cathartic preparation.

Colon Cancer Diagnosis

Clinical Context and Therapy Purpose
The purpose of CTC in individuals who have positive CRC screening or signs and symptoms of CRC is to identify disease.

CTC has not generally been employed as a test to identify the disease in individuals with positive cancer screening tests or symptoms because, compared with screening settings, the expected probability of disease is much higher. Findings on CTC require confirmation with colonoscopy; thus it would be inappropriate to use a noninvasive test if the probability of needing a confirmatory invasive test is high.

The following **PICO** was used to select literature to inform this review.

Populations
The relevant populations of interest are individuals with positive CRC screening tests or signs or symptoms of CRC.

Interventions
The test being considered is CTC.

Comparators
The following tests are currently being used to make decisions about individuals who have positive CRC screening or signs and symptoms of CRC: optical colonoscopy and standard care without a colonoscopy.

Outcomes
The outcomes of interest are disease-specific morbidity and mortality. Beneficial outcomes relate to true positive testing, which leads to detection of disease that would be otherwise missed. Harmful outcomes result from false-negative testing, which may delay diagnosis and management of CRC.

Study Selection Criteria
The principles followed to select methodologically credible studies for this section are outlined in the first indication above.

Clinically Valid
A test must detect the presence or absence of a condition, the risk of developing a condition in the future, or treatment response (beneficial or adverse).

Review of Evidence

Systematic Reviews
Several studies have evaluated the role of CTC in the diagnosis of colon cancer in patients who have had symptoms or positive findings on other screening modalities (e.g., fecal occult blood testing [FOBT]). In 2014, Plumb et al published findings from a systematic review and meta-analysis of studies evaluating the performance of CTC for the diagnosis of colon cancer among subjects with positive FOBT.[18] 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 CTC in the evaluation of patients who had had a positive FOBT and compared colonography results with a reference test, either conventional colonoscopy, segmental unblinded colonoscopy, or surgery with subsequent histopathology. Five articles were included in the authors' analysis, representing 4 studies with 622 patients. Pooled per-patient sensitivity and specificity for adenomas 6 mm or larger or colorectal cancer were 88.8% (95% CI, 83.6% to 92.5%) and 75.4% (95% CI, 58.6% to 86.8%), respectively.

Bai et al (2020) performed a meta-analysis comparing diagnostic accuracy of CTC versus colonoscopy in patients at high risk for CRC.[19] The meta-analysis included 14 published articles with 3578 patients, who had symptoms suggestive of CRC or a family history of CRC, positive findings on FOBT, and CTC followed by colonoscopy. The reference standard for the lesion size was colonoscopy that utilized open biopsy forceps or histological evaluation. For detecting polyps 6 mm or larger with CTC, the results revealed a pooled sensitivity of 87% (95% CI, 83% to 90%) and specificity of 90% (95% CI, 86% to 93%). For detecting polyps 10 mm or larger with CTC, the results showed a pooled sensitivity of 91% (95% CI, 86% to 94%) and specificity of 98% (95% CI, 95% to 99%).

Retrospective Studies
Simons et al (2013) evaluated the false-negative rate and sensitivity of CTC for CRC among patients who presented with symptoms of CRC.[20] The authors included 1855 consecutive patients who underwent CTC at a single center. These data were linked to a comprehensive population-based cancer registry to determine if patients were diagnosed with CRC in the 2 years after their CTC. Fifty-three patients were diagnosed with CRC, of whom 40 patients had suspected CRC, 5 diagnosed with large polyps that appeared malignant on histology, and 5 diagnosed with an indeterminate mass on CTC. Two patients who developed cancer had not

been diagnosed on CTC, and 1 patient who developed cancer had had an incomplete colonography. The overall sensitivity of CTC was 94.3% (95% CI, 88% to 100%).

Plumb et al (2014) published findings of a retrospective study comparing results from CTC and optical colonoscopy in patients evaluated at a single center who were indicated for CRC diagnostic assessment because of a positive FOBT.[21] This study was not included in the Plumb 2014 systematic review (described above). Based on the institutional protocol, optical colonoscopy was preferred for individuals with positive FOBT, but CTC substituted if the subject was unable to safely complete colonoscopic bowel preparation, was too frail or immobile to undergo colonoscopy (although potentially fit for necessary treatment), had another contraindication to colonoscopy, or had an incomplete colonoscopy. The study analyzed 2731 FOBT-positive patients screened with CTC as their first screening test. Of these, 1027 (37.6%) had CRC or polyps suspected (95% CI, 33.8% to 41.4%), and 911 underwent confirmatory testing. One hundred twenty-four (4.5%) were found to have CRC and 533 (19.5%) were found to have polyps, for an overall CRC- or polyp-detection rate of 24.1% (95% CI, 21.5% to 24.1%). The positive predictive value for CRC or polyps was 72.1% (95% CI, 66.6% to 77.6%). Colonoscopy data were available for 72,817 FOBT-positive patients who underwent colonoscopy as an initial screening test, among whom 9.0% had CRC and 50.6% had polyps. The authors attributed the difference in CRC and polyp rates between the groups to underlying differences in risk between those referred for CTC and potential biases in the interpretation of screening guidelines.

Sha et al (2020) compared the diagnostic performance of CTC versus colonoscopy for CRC at 2 hospitals in China.[22] The study enrolled 318 patients presenting with symptoms suggestive of CRC - abdominal pain, rectal bleeding, and/or change in bowel habits- and undergoing both CTC and colonoscopy. From the screened patients, 77 patients with polyps 10 mm and larger, or smaller than 10 mm but suspicious, underwent surgery and surgical pathology. Based on the surgical pathology, sensitivities were 96.1% for CTC and 83.1% for colonoscopy. The accuracies were 92.6% for CTC versus 92% for colonoscopy for polyps 10 mm or larger, and 95.9% for CTC versus 83.7% for colonoscopy for polyps smaller than 10 mm.

Clinically Useful
A test is clinically useful if the use of the results informs management decisions that improve the net health outcome of care. The net health outcome can be improved if patients receive correct therapy, or more effective therapy, or avoid unnecessary therapy, or avoid unnecessary testing.

Direct Evidence
Direct evidence of clinical utility is provided by studies that have compared health outcomes for patients managed with and without the test. Because these are intervention studies, the preferred evidence would be from RCTs.

Several studies have evaluated the role of CTC for patients with symptoms suggestive of CRC. In 2013, Atkin et al reported results from an unblinded RCT comparing colonoscopy and CTC in the evaluation of patients with symptoms suggestive of CRC.[23] Given the challenges of conducting a trial that would be adequately powered to detect small differences between CTC and colonoscopy in CRC and large polyp detection, the authors used rates of the need for additional evaluation after CTC as a primary outcome, on the assumption that such rates would strongly affect the evaluation of the benefits and costs of the procedure. The study

randomly allocated patients ages 55 or older with symptoms suggestive of CRC in a 2:1 fashion to colonoscopy or CTC. Both colonoscopy and CTC procedures were conducted with a full bowel preparation. The trial's primary outcome was the proportion of patients who had additional colonic investigation, defined as any subsequent examination of the colon until diagnosis (usually histologic confirmation of a cancer or polyp) or until a patient was referred back to his or her physician. Additional diagnostic evaluation of the colon was required in 160 (30.0%) of 533 of those assigned to CTC compared with 86 (8.2%) of 1047 of those assigned to colonoscopy (p<.001). The overall detection rate for CRC or large polyps did not differ between the groups (relative risk, 0.95; 95% CI, 0.70 to 1.27; p=.69).

Chain of Evidence
Indirect evidence on clinical utility rests on clinical validity. If the evidence is insufficient to demonstrate test performance, no inferences can be made about clinical utility.

Because the clinical validity of CTC for colon cancer diagnosis has not been established, a chain of evidence supporting the clinical utility of CTC for this population cannot be constructed.

Section Summary: Colon Cancer Diagnosis
There are a relatively small number of studies of CTC for diagnosis of CRC in patients with a positive screening test or with symptoms of CRC. A systematic review of CTC studies in patients with a positive FOBT identified only 4 studies and found a reasonably high sensitivity for detecting adenomas 6 mm or larger but a relative low specificity. An RCT comparing CTC with colonoscopy in symptomatic patients found a significantly greater need for additional evaluation after CTC compared with colonoscopy. Because the prevalence of disease is much higher in patients with positive screening tests or symptoms of CRC, going directly to colonoscopy is usually the preferred clinical strategy. Additional studies are needed to determine with certainty the diagnostic accuracy of CTC for diagnosis of CRC; however, for patients unable to undergo a colonoscopy, based on the available evidence, CTC may be a reasonable option.

SUMMARY OF EVIDENCE
For individuals who are asymptomatic and undergoing colorectal cancer (CRC) screening who receive computed tomography colonography (CTC), the evidence includes diagnostic accuracy studies, systematic reviews of diagnostic accuracy studies, and modeling studies on clinical utility. Relevant outcomes are overall survival, disease-specific survival, test accuracy and validity, and treatment-related morbidity. The available evidence supports the conclusion that the diagnostic accuracy of CTC is in the same range as optical colonoscopy, with a moderate-to-high sensitivity and a high specificity for the detection of larger polyps and CRC. As a result, screening with CTC may provide similar diagnostic results to screening using conventional optical colonoscopy. Most modeling studies have reported that the overall health outcome benefits of a strategy that uses optical colonoscopy likely exceed the benefits of a strategy using CTC. However, these analyses assume equal participation rates in screening between the 2 strategies. Participation in screening may be higher with CTC than with optical colonoscopy, and this may ameliorate or offset any improved outcomes associated with optical colonoscopy. The evidence is sufficient to determine qualitatively that the technology results in a meaningful improvement in the net health outcome.

For individuals who have positive CRC screening tests or signs or symptoms of CRC who receive CTC, the evidence includes a randomized controlled trial (RCT), diagnostic accuracy studies, and a systematic review of diagnostic accuracy studies. Relevant outcomes are overall survival, disease-specific survival, test accuracy and validity, and treatment-related morbidity. Using CTC on patients with suspected disease might be an inefficient testing strategy because CTC findings need to be confirmed with conventional colonoscopy. There are a small number of studies on CTC for diagnosis of CRC in patients with a positive screening test or with symptoms of CRC, and thus the diagnostic accuracy cannot be determined with certainty. Studies of patients with a positive fecal occult blood test have suggested a reasonably high sensitivity for detection of adenomas 6 mm or larger but a relatively low specificity. There are fewer studies of patients with CRC symptoms; 1 RCT found that significantly more patients required additional evaluation after CTC than after conventional colonoscopy. The evidence is insufficient to determine the effects of the technology on health outcomes.

Ongoing and Unpublished Clinical Trials

No ongoing clinical trials were identified.

SUPPLEMENTAL INFORMATION

PRACTICE GUIDELINES AND CONSENSUS STATEMENTS

American College of Physicians

In 2023, the American College of Physicians updated its guidelines for colorectal cancer (CRC) screening.[24] The American College of Physicians recommends 1 of the following 3 strategies for screening in asymptomatic average-risk adults aged 50-75 years:

- High-sensitivity guaiac-based fecal occult blood test or fecal immunochemical test every 2 years.
- Fecal immunochemical test every 2 years plus flexible sigmoidoscopy every 10 years.
- Colonoscopy every 10 years.

The guideline stated that computed tomography colonography (CTC) may result in incidental extracolonic findings that are potentially important and required follow-up in 3.4% to 26.9% of screening examinations. Positive findings on CTC require follow-up with colonoscopy, which limits the utility of CTC as a direct visualization test.

American Cancer Society

In 2018, the American Cancer Society (ACS) updated its guidelines on colorectal cancer (CRC) screening (see Table 1).[25] ACS made the following recommendations on colon cancer screening:

“The ACS recommends that adults aged 45 years and older with an average risk of colorectal cancer undergo regular screening with either a high-sensitivity stool-based test or a structural (visual) examination, depending on patient preference and test availability.…The recommendation to begin screening at age 45 years is a qualified recommendation. The recommendation for regular screening in adults aged 50 years and older is a strong recommendation.”

CTC was listed as an option for CRC screening (see Table 1) and was acknowledged to have comparable sensitivity and specificity to a colonoscopy. Stated limitations associated with CTC included exposure to low-dose radiation as well as complications of a full bowel preparation, including rare cases of bowel perforation. It remains unclear whether incidental detection of extracolonic findings during CTC provides net benefit or harm to patients.

Table 1. American Cancer Society Guidelines on Colorectal Cancer Screening Options

Colorectal Cancer Screening Guidelines
Stool-based test
Fecal immunochemical test every 1 y
High-sensitivity, guaiac-based fecal occult blood test every 1 y
Multitarget stool DNA test every 3 y
Structural test
Colonoscopy every 10 y
Computer tomography colonography every 5 y

American College of Gastroenterology

In 2017, the American College of Gastroenterology published recommendations of the U.S. Multi-Society Task Force of Colorectal Cancer made up of expert gastroenterologists from the American College of Gastroenterology, the American Gastroenterological Association, and the American Society for Gastrointestinal Endoscopy.[26] The panel recommended CRC screening beginning at age 50 years with adjustments based on race and family history using a ranked-tiered CRC screening approach in Table 2. Considerations for recommending the tiered system of current CRC screening tests included performance, cost, patient acceptance, and the lack of randomized trial results that directly compare the effects of different tests on CRC incidence or mortality.

Table 2. American College of Gastroenterology Colorectal Cancer Screening Tier Strategy

Tier	Recommendation
Tier 1	• Colonoscopy every 10 y • Annual fecal immunochemical test
Tier 2	• Computed tomography colonography every 5 y • Fecal immunochemical test-fecal DNA every 3 y • Flexible sigmoidoscopy every 10 y (or every 5 y)
Tier 3	• Capsule colonoscopy every 5 y
Available tests not currently recommended	• Septin 9

In 2021, the American College of Gastroenterology released updated CRC screening guidelines.[27] The guidelines recommend CRC screening in average risk individuals between 50 to 75 years of age (strong recommendation; moderate quality of evidence) and suggest CRC screening in average risk individuals between 45 to 49 years of age (conditional recommendation; very low quality of evidence) to reduce the incidence of advanced adenoma, CRC, and mortality from CRC. The guideline recommends “colonoscopy and fecal immunochemical testing as the primary screening modalities for CRC screening” (strong recommendation; low quality of evidence). Flexible sigmoidoscopy, multitarget stool DNA testing, CTC, or colon capsule are suggested for consideration for individuals unable or unwilling to undergo a colonoscopy or fecal immunochemical testing (conditional recommendation; very low quality of evidence). The guidelines recommend that fecal immunochemical testing should be performed every year and colonoscopy every 10 years (strong recommendation; low quality of evidence) and suggest that a multitarget stool DNA test be performed every 3 years, flexible sigmoidoscopy every 5 to 10 years, CTC every 5 years, and colon capsule every 5 years (conditional recommendation; very low quality of evidence).

American College of Radiology

The American College of Radiology (2018) updated its 2014 appropriateness criteria on imaging tests for CRC screening.[28,29] While CTC was not recommended for screening of patients at high risk for CRC, was appropriate for screening in the following populations:

- Average-risk individual, >50 years old
- Moderate-risk individual with a first-degree family history of cancer or adenoma
- Average-, moderate-, or high-risk individual with incomplete colonoscopy.
- CTC was also appropriate for CRC detection in moderate-risk individuals, and in average-risk individuals after positive fecal screening tests (fecal occult blood test or fecal immunochemical test).

American Gastroenterological Association

In 2023, the American Gastroenterological Association (AGA) issued a practice update on the risk stratification for CRC screening and post-polypectomy surveillance. [30] The AGA states that "screening options for individuals at average risk for CRC should include colonoscopy, fecal immunochemical test (FIT), flexible sigmoidoscopy plus FIT, multitarget stool DNA-FIT, and computed tomography (CT) colonography, based on availability and individual preference".

National Comprehensive Cancer Network

Per the National Comprehensive Cancer Network (NCCN) guideline on colorectal cancer screening (v1.2024), colonoscopy is "the most complete screening procedure and is considered the current gold standard for assessing the severity of detecting neoplasia for other screening modalities. The general consensus is that a 10-year interval is appropriate for most average risk individuals who had a high-quality normal colonoscopy..."[31,] Regarding CTC, the NCCN guideline states that CTC "is evolving as a promising technique for CRC screening. CT colonography has the advantages of being noninvasive and not requiring sedation. The risk of test-related complications is also very low....CT colonography may be cost-effective when compared to colonoscopy. However, a positive finding requires a colonoscopy, and extracolonic findings - which are present in up to 16% of patients - pose a dilemma. These findings require further investigations and have a potential for both benefit and harm. At the present time, data to determine the clinical impact of these incidental findings are insufficient."

U.S. Preventive Services Task Force Recommendations
In 2021, the U.S. Preventive Services Task Force (USPSTF) updated its recommendations on CRC screening.[32] The recommendations included the following:

Adults 45 to 49 years old:
"The USPSTF recommends screening for CRC in adults aged 45 to 49 years." (Grade B)

Adults 50 to 75 years old:
"The USPSTF recommends screening for colorectal cancer in all adults aged 50 to 75 years (Grade A)

Adults 76-85 years old:
"The USPSTF recommends that clinicians selectively offer screening for CRC in adults aged 76 to 85 years. Evidence indicates that the net benefit of screening all persons in this age group is small. In determining whether this service is appropriate in individual cases, patients and clinicians should consider the patient's overall health, prior screening history, and preferences."

Regarding evidence of efficacy for CTC, the USPSTF stated:
- "Evidence available that CT colonography has reasonable accuracy to detect CRC and adenomas;
- No direct evidence evaluating effect of CT colonography on CRC mortality;
- Limited evidence about the potential benefits or harms of possible evaluation and treatment of incidental extracolonic findings, which are common. Extracolonic findings detected in 1.3% to 11.4% of examinations; <3% required medical or surgical treatment."

The USPSTF also noted that "more studies evaluating the direct effectiveness of screening with CT colonography on CRC mortality are needed, as well as more studies that report on long-term consequences of identifying extracolonic findings on CRC screening."

Government Regulations
National:
CAG-00396N
On May 12, 2009, the Centers for Medicare and Medicaid Services published a decision memo for CT colonography screening that states "The evidence is inadequate to conclude that CT colonography is an appropriate colorectal cancer screening test under §1861(pp)(1) of the Social Security Act. CT colonography for colorectal cancer screening remains noncovered."[33]

Local:
WPS Medicare Legacy Part B, "CT Colonography (Virtual Colonoscopy [VC]) (L30300)."
For services performed on or after 10/01/2015: Retired.

Coverage Indications, Limitations, and/or Medical Necessity
Indications
1. CT colonography also known as "Virtual Colonoscopy" (VC) utilizes helical computed tomography of the abdomen and pelvis to visualize the colon lumen, along with 2D or 3D reconstruction. The test requires colonic preparation similar to that required for flexible

colonoscopy, and air insufflation to achieve colonic distention. Both 2D and 3D evaluation of a colon adequately distended and cleansed of stool should be performed using software and hardware designed for 2D and 3D evaluation.

2. CT colonography is indicated in those patients in whom a *diagnostic* (performed for signs/symptoms of disease) optical colonoscopy (OC) of the entire colon is incomplete. Failure to complete the OC may be secondary to conditions such as, but not limited to, an obstructing neoplasm, stricture, tortuosity, spasm, redundant colon, diverticulitis, extrinsic compression or aberrant anatomy/scarring from prior surgery.
3. CT colonography is indicated when utilized in pre-operative cancer staging and the determination of colonic wall invasion.
4. If during the course of a screening OC a condition is found, or a complication is encountered which results in the conversion of the screening OC into a diagnostic OC, and the diagnostic OC cannot be completed because of complicating conditions (see #2 above), VC would be covered.
5. CT colonography is also indicated for the evaluation of a submucosal abnormality detected on colonoscopy or other imaging study.
6. CT colonography is indicated in patients with serious coagulopathies and anticoagulated patients in whom it would be hazardous to discontinue anticoagulation therapy.
7. In patients with a history of previous incomplete OC and/or serious complication during OC, the reason for such incomplete and/or complicated OC being a condition which is unlikely to improve (extreme tortuosity, abdominal adhesions, etc.), CT colonography is covered as an alternative to *diagnostic* (not screening) OC.
8. In patients with previously documented, usually by barium enema, conditions which make OC unsafe (extreme tortuosity, etc.), CT colonography is covered as an alternative to *diagnostic* (not screening) OC.

<u>Limitations</u>

1. The screening colonoscopy benefit being under national (CMS) authority and, therefore, not under Carrier discretion, CT colonography is never covered, under the auspices of this LCD, when screening (in the absence of signs or symptoms of disease) OC is incomplete due to any of the above reasons.
2. CT colonography is never covered when used for screening (in the absence of signs or symptoms of disease) regardless of family history or other risk factors for the development of colonic disease.
3. CT colonography is never covered when used as an *elective alternative* to OC, for screening (in the *absence of signs or* symptoms of disease).
4. Since any CT colonography showing abnormal or suspicious findings would require a subsequent OC for diagnosis (e.g., biopsy) or for treatment (e.g., polypectomy), CT colonography is never covered when used as an *elective alternative* to OC, even though performed for signs or symptoms *of disease (diagnost*ic OC). (38)

(The above Medicare information is current as of the review date for this policy. However, the coverage issues and policies maintained by the Centers for Medicare & Medicare Services [CMS, formerly HCFA] are updated and/or revised periodically. Therefore, the most current CMS information may not be contained in this document. For the most current information, the reader should contact an official Medicare source.)

Related Policies

N/A

References

1. Lin JS, Piper MA, Perdue LA, et al. Screening for Colorectal Cancer: Updated Evidence Report and Systematic Review for the US Preventive Services Task Force. JAMA. Jun 21 2016; 315(23): 2576-94. PMID 27305422
2. Martin-Lopez JE, Beltran-Calvo C, Rodriguez-Lopez R, et al. Comparison of the accuracy of CT colonography and colonoscopy in the diagnosis of colorectal cancer. Colorectal Dis. Mar 2014; 16(3): O82-9. PMID 24299052
3. Sali L, Ventura L, Mascalchi M, et al. Single CT colonography versus three rounds of faecal immunochemical test for population-based screening of colorectal cancer (SAVE): a randomised controlled trial. Lancet Gastroenterol Hepatol. Nov 2022; 7(11): 1016-1023. PMID 36116454
4. Regge D, Iussich G, Segnan N, et al. Comparing CT colonography and flexible sigmoidoscopy: a randomised trial within a population-based screening programme. Gut. Aug 2017; 66(8): 1434-1440. PMID 27196588
5. IJspeert JE, Tutein Nolthenius CJ, Kuipers EJ, et al. CT-Colonography vs. Colonoscopy for Detection of High-Risk Sessile Serrated Polyps. Am J Gastroenterol. Apr 2016; 111(4): 516-22. PMID 27021193
6. Sali L, Mascalchi M, Falchini M, et al. Reduced and Full-Preparation CT Colonography, Fecal Immunochemical Test, and Colonoscopy for Population Screening of Colorectal Cancer: A Randomized Trial. J Natl Cancer Inst. Feb 2016; 108(2). PMID 26719225
7. Weinberg DS, Pickhardt PJ, Bruining DH, et al. Computed Tomography Colonography vs Colonoscopy for Colorectal Cancer Surveillance After Surgery. Gastroenterology. Mar 2018; 154(4): 927-934.e4. PMID 29174927
8. Blue Cross and Blue Shield Association Technology Evaluation Center (TEC). Special Report: Critical appraisal of CT colonography cost-effectiveness analyses. TEC Assessments. 2009;Volume 24:Tab 2.
9. Scherer R, Knudsen AB, Pearson SD. Health Technology Assessment: Computed Tomographic Colonography (CTC). Olympia, WA: Health Technology Assessment Program, Washington State Health Authority; 2008.
10. Zauber A, Knudsen AB, Rutter C, et al. Cost-effectiveness of CT colonography to screen for colorectal cancer. Rockville, MD: Agency for Healthcare Research and Quality; 2009.
11. Heitman SJ, Hilsden RJ, Au F, et al. Colorectal cancer screening for average-risk North Americans: an economic evaluation. PLoS Med. Nov 23 2010; 7(11): e1000370. PMID 21124887
12. Lansdorp-Vogelaar I, Knudsen AB, Brenner H. Cost-effectiveness of colorectal cancer screening. Epidemiol Rev. 2011; 33: 88-100. PMID 21633092
13. Hassan C, Pickhardt PJ, Pickhardt P, et al. Computed tomographic colonography to screen for colorectal cancer, extracolonic cancer, and aortic aneurysm: model simulation with cost-effectiveness analysis. Arch Intern Med. Apr 14 2008; 168(7): 696-705. PMID 18413551

14. Hanly P, Skally M, Fenlon H, et al. Cost-effectiveness of computed tomography colonography in colorectal cancer screening: a systematic review. Int J Technol Assess Health Care. Oct 2012; 28(4): 415-23. PMID 23006522
15. Steele CB, Rim SH, Joseph DA, et al. Colorectal cancer incidence and screening - United States, 2008 and 2010. MMWR Suppl. Nov 22 2013; 62(3): 53-60. PMID 24264490
16. Stoop EM, de Haan MC, de Wijkerslooth TR, et al. Participation and yield of colonoscopy versus non-cathartic CT colonography in population-based screening for colorectal cancer: a randomised controlled trial. Lancet Oncol. Jan 2012; 13(1): 55-64. PMID 22088831
17. Zhu H, Li F, Tao K, et al. Comparison of the participation rate between CT colonography and colonoscopy in screening population: a systematic review and meta-analysis of randomized controlled trials. Br J Radiol. Jan 2020; 93(1105): 20190240. PMID 31651188
18. Plumb AA, Halligan S, Pendse DA, et al. Sensitivity and specificity of CT colonography for the detection of colonic neoplasia after positive faecal occult blood testing: systematic review and meta-analysis. Eur Radiol. May 2014; 24(5): 1049-58. PMID 24519111
19. Bai W, Yu D, Zhu B, et al. Diagnostic accuracy of computed tomography colonography in patients at high risk for colorectal cancer: a meta-analysis. Colorectal Dis. Nov 2020; 22(11): 1528-1537. PMID 32277562
20. Simons PC, Van Steenbergen LN, De Witte MT, et al. Miss rate of colorectal cancer at CT colonography in average-risk symptomatic patients. Eur Radiol. Apr 2013; 23(4): 908-13. PMID 23085864
21. Plumb AA, Halligan S, Nickerson C, et al. Use of CT colonography in the English Bowel Cancer Screening Programme. Gut. Jun 2014; 63(6): 964-73. PMID 23955527
22. Sha J, Chen J, Lv X, et al. Computed tomography colonography versus colonoscopy for detection of colorectal cancer: a diagnostic performance study. BMC Med Imaging. May 18 2020; 20(1): 51. PMID 32423413
23. Atkin W, Dadswell E, Wooldrage K, et al. Computed tomographic colonography versus colonoscopy for investigation of patients with symptoms suggestive of colorectal cancer (SIGGAR): a multicentre randomised trial. Lancet. Apr 06 2013; 381(9873): 1194-202. PMID 23414650
24. Qaseem A, Crandall CJ, Mustafa RA, et al. Screening for Colorectal Cancer in Asymptomatic Average-Risk Adults: A Guidance Statement From the American College of Physicians. Ann Intern Med. Nov 05 2019; 171(9): 643-654. PMID 31683290
25. Wolf AMD, Fontham ETH, Church TR, et al. Colorectal cancer screening for average-risk adults: 2018 guideline update from the American Cancer Society. CA Cancer J Clin. Jul 2018; 68(4): 250-281. PMID 29846947
26. Rex DK, Boland CR, Dominitz JA, et al. Colorectal Cancer Screening: Recommendations for Physicians and Patients From the U.S. Multi-Society Task Force on Colorectal Cancer. Gastroenterology. Jul 2017; 153(1): 307-323. PMID 28600072
27. Shaukat A, Kahi CJ, Burke CA, et al. ACG Clinical Guidelines: Colorectal Cancer Screening 2021. Am J Gastroenterol. Mar 01 2021; 116(3): 458-479. PMID 33657038
28. Yee J, Kim DH, Rosen MP, et al. ACR Appropriateness Criteria colorectal cancer screening. J Am Coll Radiol. Jun 2014; 11(6): 543-51. PMID 24793959
29. Moreno C, Kim DH, Bartel TB, et al. ACR Appropriateness Criteria (R) Colorectal Cancer Screening. J Am Coll Radiol. May 2018; 15(5S): S56-S68. PMID 29724427

30. Issaka RB, Chan AT, Gupta S. AGA Clinical Practice Update on Risk Stratification for Colorectal Cancer Screening and Post-Polypectomy Surveillance: Expert Review. Gastroenterology. Nov 2023; 165(5): 1280-1291. PMID 37737817
31. National Comprehensive Cancer Network. NCCN clinical practice guidelines in oncology. Colorectal cancer screening. Version 1.2024. Feb 27, 2024. https://www.nccn.org/professionals/physician_gls/pdf/colorectal_screening.pdf. Accessed December 30, 2024.
33. Centers for Medicare and Medicaid Services. Decision memo for screening computed tomography colonography (CTC) for colorectal cancer (CAG-00396N). 2009, May 12.
34. Blue Cross Blue Shield Association. Virtual Colonoscopy/CT Colonography. Medical Policy Reference Manual. Policy #6.01.32, Issue 9:2017, original policy date 8/15/01, last review date October 2024.

The articles reviewed in this research include those obtained in an Internet based literature search for relevant medical references through January 2, 2025, the date the research was completed.

Joint BCBSM/BCN Medical Policy History

Policy Effective Date	BCBSM Signature Date	BCN Signature Date	Comments
6/16/03	6/16/03	6/20/03	Joint medical policy established
9/5/04	9/5/04	9/31/04	Routine maintenance
9/7/05	9/7/05	8/26/05	Routine maintenance
11/1/06	9/14/06	9/18/06	Change medical policy statement to “established” for specific patient populations.
11/1/07	8/21/07	10/31/07	Routine maintenance
7/1/09	4/21/09	4/21/09	Routine maintenance; CMS criteria updated.
7/1/10	4/20/10	4/20/10	Code update; deleted 0066T and 0067T, replaced with 74261, 74262 and 74263
9/1/12	6/12/12	6/19/12	Reformatted policy to BCBSA mirror BCBSA policy.
9/1/13	6/19/13	6/26/13	Routine maintenance; title changed from “Virtual Colonoscopy (Computed Tomography Colonoscopy – CTC)” to “Virtual Colonoscopy/CT Colonography.”
5/1/15	2/17/15	2/27/15	Routine maintenance References 9, 11, 26-29, 31, and 36 added. Rationale section extensively reorganized.
7/1/16	4/19/16	4/19/16	Routine maintenance with updates in references and rationale.
5/1/17	2/21/17	2/21/17	Rationale section reorganized and updated along with references (added 2, 6, 7, removed 31, 32, and 34). No policy status change.
5/1/18	2/20/18	2/20/18	Routine policy maintenance, no change in policy status.
5/1/19	2/19/19		Routine policy maintenance, no change in policy status.
5/1/20	2/18/20		Routine policy maintenance. No change in policy status.

5/1/21	2/16/21		Routine policy maintenance. No change in policy status.
5/1/22	2/15/22		Routine policy maintenance, no change in policy status.
5/1/23	2/21/23		Updated rationale section added references # 16,18, and 21. No change in policy status. (ds)
5/1/24	2/20/24		Routine policy maintenance, no change in policy status. Vendor: Carelon (ky)
5/1/25	2/18/25		Routine policy maintenance, no change in policy status. Vendor: Carelon (ky)

Next Review Date: 1st Qtr. 2026

BLUE CARE NETWORK BENEFIT COVERAGE
POLICY: VIRTUAL COLONOSCOPY/CT COLONOGRAPHY

I. Coverage Determination:

Commercial HMO (includes Self-Funded groups unless otherwise specified)	Diagnostic CTC-Covered; criteria apply. Screening-Not covered.
BCNA (Medicare Advantage)	See government section
BCN65 (Medicare Complementary)	Coinsurance covered if primary Medicare covers the service.

II. Administrative Guidelines:

- The member's contract must be active at the time the service is rendered.
- Coverage is based on each member's certificate and is not guaranteed. Please consult the individual member's certificate for details. Additional information regarding coverage or benefits may also be obtained through customer or provider inquiry services at BCN.
- The service must be authorized by the member's PCP except for Self-Referral Option (SRO) members seeking Tier 2 coverage.
- Services must be performed by a BCN-contracted provider, if available, except for Self-Referral Option (SRO) members seeking Tier 2 coverage.
- Payment is based on BCN payment rules, individual certificate and certificate riders.
- Appropriate copayments will apply. Refer to certificate and applicable riders for detailed information.
- CPT - HCPCS codes are used for descriptive purposes only and are not a guarantee of coverage.