

Review: Computed tomographic colonography has high specificity but low-to-moderate sensitivity for detecting colorectal polyps

Mulhall BP, Veerappan GR, Jackson JL. Meta-analysis: computed tomographic colonography. *Ann Intern Med.* 2005;142:635-50.

Clinical impact ratings: GIM/FP/GP ★★★★★☆☆ Gastroenterology ★★★★★☆☆

QUESTION

In persons at risk, how accurate is computed tomographic colonography (CTC) for detecting colorectal adenomatous polyps?

METHODS

Data sources: MEDLINE, EMBASE/Excerpta Medica, and the Cochrane Controlled Trials Register (all from 1975 to February 2005).

Study selection and assessment: Prospective studies (published in English) that compared (in an independent and blinded fashion) results of CTC with findings on colonoscopy or during surgery in adult patients who were scheduled to receive CTC after a full bowel preparation and either complete colonoscopy or surgery. Studies were also required to have used at least a single-detector CT scanner with colon insufflation by air or carbon dioxide, scan intervals ≤ 5 mm, and scan interpretation using both 2- and 3-dimensional views.

Outcomes: Sensitivity, specificity, and positive and negative likelihood ratios.

MAIN RESULTS

33 studies ($n = 6393$; mean age 62 y, 64% men, 74% at high risk for colorectal cancer)

met the selection criteria. Reference standards included conventional colonoscopy, segmental unblinded colonoscopy (after each colon segment is examined, the results of CTC are revealed to the endoscopist and discrepant segments are reexamined), optimized colonoscopy (in which videotapes of the endoscopy are reviewed and compared with discrepant CTC findings), and surgical findings or results of double-contrast barium enema. Pooled sensitivities and specificities on a per-patient basis were combined and weighted according to sample size. Sensitivity of CT colonography was heterogeneous but increased progressively as polyp size increased (Table). Characteristics of the CTC scanner

(e.g., width of collimation, type of detector, and mode of imaging) explained some of the heterogeneity. Specificity was higher than sensitivity and more homogeneous (Table).

CONCLUSION

In persons at risk, computed tomographic colonography has high specificity but low-to-moderate sensitivity for detecting colorectal adenomatous polyps.

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Diagnostic characteristics of computed tomographic colonography for detecting colorectal polyps*

Adenomatous polyp size	Sensitivity (95% CI)†	Specificity (CI)†	+LR	-LR
All sizes combined	70% (53 to 87)	86% (84 to 88)	5.00	0.35
Polyps < 6 mm	48% (25 to 70)	91% (89 to 95)	5.33	0.57
Polyps 6 to 9 mm	70% (55 to 84)	93% (91 to 95)	10.00	0.32
Polyps > 9 mm	85% (79 to 91)	97% (96 to 97)	28.33	0.15

*Diagnostic terms defined in Glossary; LRs calculated from data in article.

†Sensitivities and specificities were weighted by study sample size.

COMMENTARY

Unlike many other malignant tumors, colorectal cancer is preventable by detection and removal of precancerous adenomas. Fecal occult blood testing and probably sigmoidoscopy reduce colorectal cancer mortality (1). Colonoscopy has also been shown to lower the incidence of colorectal cancer in patients with adenomatous polyps. Despite their proven value, however, these tests are adopted by < 50% of the eligible population, with at least part of the reason being the perceived invasiveness or inconvenience of endoscopic procedures. In this context, a rapid, non-invasive, painless way to image the entire colonic lining would clearly be an attractive alternative if proven to be as accurate as the current gold standard of colonoscopy.

In the meta-analysis by Mulhall and colleagues, the sensitivity of CTC was clearly unacceptable. However, the analysis was limited by the heterogeneity of the studies across many variables, including patient risk status, method of colonoscopic analysis, mode of imaging and reconstruction, and type of scanner and software used. Such variation is to be expected given that this technology is very young and rapidly evolving. Thus, it is premature to derive any conclusions about its eventual use. With time, the gap between CTC and colonoscopy will narrow as the technology improves. Even then, large trials with

several years of follow-up will be needed to show that CTC has the ability to prevent death from colorectal cancer.

It is also realistic to predict that issues of cost-effectiveness will determine the rate and extent of adoption of CTC (1). Currently, this technique costs about \$3600 more per life-year saved than conventional colonoscopy (2), a figure that will also change with the evolving technology. Nevertheless, CTC is one of the most promising new technologies for mass screening for colorectal cancer and is already an attractive option for patients who are at increased risk for complications from colonoscopy, those who refuse colonoscopy, and those in whom colonoscopy is not successful.

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