

## CT colonography: Friend or foe of practicing endoscopists

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### Abstract

**AIM:** To investigate the perceived impact of computed tomographic colonography (CTC) on endoscopists' current and future practice.

**METHODS:** A 21-question survey was mailed to 1570 randomly chosen American Society for Gastrointestinal Endoscopy (ASGE) members. Participants reported socio-demographics, colonoscopy volume, percentage of colonoscopies performed for screening, and likelihood of integration of CTC into their practice.

**RESULTS:** A total of 367 ASGE members (23%) returned the questionnaire. Respondents were predominantly male (> 90%) and white (83%) with an average age of 49 years. Most respondents (58%) had no plans to incorporate CTC into daily practice and only 7% had already incorporated CTC into daily practice. Private practice respondents were the least likely to incorporate this modality into their daily practice ( $P = 0.047$ ). Forty-three percent of participants were willing to take courses on CTC reading, particularly those with the highest volume of colonoscopy ( $P = 0.049$ ). Forty

percent of participants were unsure of CTC's impact on future colonoscopy volume while 21% and 18% projected a decreased and increased volume, respectively. The estimated impact of CTC volume varied significantly by age ( $P = 0.002$ ). Respondents > 60 years felt that CTC would increase colonoscopy, whereas those < 40 years thought CTC would ultimately decrease colonoscopy.

**CONCLUSION:** Practicing endoscopists are not enthusiastic about the incorporation of CTC into their daily practice and are unsure of its future impact on their practice.

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**Key words:** Computed tomographic colonography; Virtual colonoscopy; Endoscopy; Colonoscopy; Screening; Colorectal cancer

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### INTRODUCTION

Colorectal cancer (CRC) screening compliance remains suboptimal for all accepted modalities. In 2004, the Behavioral Risk Factor Surveillance System demonstrated that 57% of the US population adheres to current CRC guidelines<sup>[1]</sup>. A follow-up CDC report further demonstrated that approximately 41 million people over the age of 50 were noncompliant with CRC screening<sup>[2]</sup>. Computed tomographic colonography (CTC), is a non-invasive technology used for CRC screening which may improve compliance. Data supporting the use of CTC

as a primary screening modality stems primarily from a multi-center trial of 1233 average risk patients by Pickhardt *et al.*<sup>[3]</sup> This study demonstrated a sensitivity of 96% for adenomas at least 10 mm in diameter, 92.2% for adenomas at least 8 mm in diameter and 79.6% for polyps at least 6 mm in diameter. Three other large CTC studies have been less convincing, reporting a sensitivity for 10 mm polyps ranging from 55%-64%<sup>[4-6]</sup>. Regardless, in the most recent published CRC screening guidelines, computed tomographic colonography (CTC) has been identified as one of the recommended modalities to be offered first to patients for CRC prevention along with colonoscopy, barium enema and flexible sigmoidoscopy<sup>[7]</sup>.

At this time, there are no published data regarding the opinions of endoscopists on this technology. Given their central role in CRC screening, their views have enormous implications on the efforts of policymakers and payers. The objectives of our study were to survey endoscopists regarding varying aspects on the use of CTC, and to assess predictors regarding its use.

## MATERIALS AND METHODS

This study was undertaken with the approval of the Institutional Review Board of the University of Michigan. The American Society for Gastrointestinal Endoscopy (ASGE) membership directory was utilized to obtain potential participants. The eligible population consisted of physicians aged 75 and younger with an active license of which 6213 individuals met these eligibility criteria. The eligible population was selected using a systematic, stratified random sampling approach, yielding 1570 potential respondents.

### Survey methods

The survey was mailed to all 1570 potential respondents in the spring and summer of 2006. To enhance participation, a personalized cover letter, close-ended questions and first class stamps on the mailing and return envelopes were used. The survey instrument was composed of 21 questions based on an extensive literature review using the following search terms: colonography, colography, CT colonoscopy, CT pneumocolon, virtual colonoscopy, virtual endoscopy, and virtual colonoscopy. In order to establish content validity, the results of this literature search were used to develop a draft questionnaire which was then reviewed by the gastroenterology clinical research group at the University of Michigan, followed by a revision of the survey instrument. The survey instrument was composed of questions created in a close-ended fashion to maximize response rates and avoid ambiguity. Data regarding personal and practice demographics were ascertained, including gender, race/ethnicity, practice type, community size, years in practice, percentage of practice devoted to screening colonoscopies and monthly colonoscopy volume. Present use of CTC was assessed by its availability and insurance cover-

age and recent use by practitioners. Inquiry into the future use of CTC included assessing active plans to incorporate CTC into daily practice or taking a CTC reading course as well as assessing the perceived impact of CTC on their practice volume and the amenability of their practice to allow same day colonoscopy after a positive CTC. Other solicited questions addressed the perceived value of CTC, the size of polyp that should be reported, and patient characteristics that would make participants more likely to order CTC.

### Statistical analysis

All returned surveys were included in the analysis, regardless of the completeness of the survey. Descriptive statistics and multivariate analysis were used to demonstrate the survey findings. Demographic data were collected to discern any predictors of the likelihood for future CTC use. Age was analyzed as a continuous variable. Race/ethnicity was ascertained as: Caucasian, African-American, Asian, Hispanic, or American Indian. Practice type was categorized as: private practice, multi-specialty group, health maintenance organization (HMO), academic or other. The number of years in practice was categorized as: less than 5 years, 5-10 years, and greater than 10 years. The number of colonoscopies per month, and the percentage of screening colonoscopies performed were also collected as continuous variables.

Each potential predictor variable was first examined in relation to likelihood of future CTC use; bivariate analyses were performed using chi-square tests for categorical variables and Student's t-tests for continuous variables. Multivariable logistic regression analysis was subsequently performed to determine the adjusted odds ratios of variables that achieved bivariate statistical significance. All statistical analyses were done using Microsoft Excel<sup>®</sup> and STATA<sup>®</sup> version 9.0.

## RESULTS

The response rate for our mailings was 23%. A total of 279 ASGE members responded to our first mailing, with an additional 89 responses after the second mailing. The characteristics of the respondents are noted in Table 1.

### Colonoscopy/CTC use

Respondents performed a mean of 87 colonoscopies monthly with 48% devoted solely for CRC screening. Screening colonoscopy was covered by insurance for ninety-six percent of respondents. Seventy-five percent of respondents had CTC available to them, although only 12% of participants had CTC covered by insurance. Fifty-eight percent of participants had utilized CTC prior to our survey.

### Future use of CTC

Close to sixty percent (58%) had no intention of integrating CTC into daily practice. Only 7% had already incorporated this modality into their practice and the

Table 1 Study population characteristics

Characteristic	n (%)
Sex	
Male	335 (91)
Age (yr)	
mean (SD)	48.7 (11.2)
Race	
Caucasian	303 (83)
Asian	41 (11)
Other	25 (6)
Practice type	
Private	219 (60)
Multi-specialty	56 (15)
Academic	80 (22)
HMO	18 (4)
Other	16 (4)
MD type	
GI	337 (92)
Surgeon	30 (8)
Community size	
< 50 000	29 (8)
51 000-100 000	46 (12)
> 100 000	115 (31)
> 500 000	63 (17)
> 1 000 000	122 (33)
Years practicing	
< 5 yr	60 (16)
5-10 yr	68 (19)
> 10 yr	237 (65)
Colonoscopies per month, mean number (SD)	86.8 (71.0)
Percentage of screening colonoscopies, mean, (SD)	48 (23.3)

remaining 28% were unsure of their future plans. Private practice respondents were the least likely to incorporate this modality into their daily practice ( $P = 0.047$ ). Forty-three percent of participants were willing to take courses on CTC reading, particularly those practitioners with the highest volume of colonoscopy ( $P = 0.049$ ). Thirty nine percent of participants had no intention of learning to read CTC. Practitioners were split regarding the impact of CTC on future colonoscopy volume: 19% projected an increase in volume, 21% projected a decrease in volume, 21% projected no change and 39% were unsure of its impact on colonoscopy volume. The estimated impact of CTC volume did not vary by practice type or colonoscopy volume; however age was a significant correlate ( $P = 0.002$ ). Respondents > 60 years felt that CTC would increase colonoscopy, whereas gastroenterologists < 40 years thought CTC would ultimately decrease colonoscopy volume. Thirty one percent of respondents estimated that their endoscopy practice could accommodate colonoscopy on the same day following a positive CTC, while 39% felt they could not. Only 4% of practitioners already performed colonoscopy on the same day as a positive CTC and 25% were unsure if their practice could accommodate this request.

### Other pertinent CTC issues

Practitioners would be more inclined to order CTC in patients with previously failed colonoscopy (86%), had multiple co-morbidities (63%), had a previous pain-

ful/unpleasant colonoscopy experience, and those who had with a very large or very small body habitus (14%). When respondents were asked what polyp size should be reported for CTC, 66% of practitioners felt that all polyps, regardless of size, should be documented. The remaining respondents felt that polyps > 5 mm need to be reported on CTC, however, none of our respondents felt that only polyps > 10 mm should be reported. Seventy two percent of respondents felt that CTC was valuable in patients not willing to undergo colonoscopy for screening.

Thirty-four percent felt that CTC was valuable to identify patients without polyps (in average risk populations), whereas 17% felt it was valuable in identifying patients with polyps (in high-risk populations). However, more than one-fifth of respondents did not see any value in CTC, as colonoscopy is the gold standard. Finally, we asked participants to respond to the clinical scenario where a patient had a positive CTC for an 8 mm polyp, and the follow-up colonoscopy was negative, what follow-up test would they recommend and at what interval. The majority of respondents (71%) would have repeated a colonoscopy either at one year (31%), 5 years (40%) or 10 years (17%). Few would have repeated the CTC at one year (10%) or 5 years (1%).

## DISCUSSION

This research offers a cross section of opinions from endoscopists regarding CTC, a colon cancer screening modality that is likely to be more widely reimbursed within a few years. Unpublished data from an online survey conducted by the American Gastrointestinal Association (AGA) (AGA websource: [www.gastro.org](http://www.gastro.org)) demonstrated a comparable response rate to our survey (23%), however the AGA online survey results varied from our mailed survey significantly. The majority of our respondents (58%) were not planning on incorporating CTC into their practice and only 7% already had incorporated CTC. In contrast, one-third of the respondents from the AGA on-line survey were already performing or in the planning stages of utilizing CTC for their practice. The reasons for these different outcomes may reflect real opinion differences between the membership of the two societies (ASGE, AGA), or may reflect the different type of respondents to an online versus mailed survey.

The uneasiness of our respondents to embrace this technology may be secondary to the discordant results of CTC studies. Data from the previous largest four clinical trials prior to the American College of Radiology Imaging Network (ACRIN) trial for screening in asymptomatic individuals demonstrate a sensitivity rate varying from a low of 48% to a high of 94% for polyps > 1 cm<sup>[3-6]</sup>. The marked variations in sensitivity may be secondary on technical differences between the studies. Particularly, the Pickhardt study utilized solid stool tagging with barium and luminal opacification with gastrograffin along with software that electronically re-

moved the opacified residual colonic fluid from the CT images<sup>[3]</sup>. Data from the ACRIN trial in 2531 patients who underwent both CTC and optical colonoscopic examinations demonstrated that CTC failed to detect a lesion measuring 10 mm or more in diameter in 10% of patients. For adenomas 6 mm or more in diameter, the sensitivity was 0.78<sup>[8]</sup>.

Pending further studies, endoscopists may embrace CTC in the future. In our survey, 43% of respondents were willing to take courses on CTC reading, particularly those with the highest colonoscopy volumes, and 7% had already incorporated CTC into their daily practice. An argument for gastroenterologists to start reading CTC is that the 3D endoluminal “fly-through” portion is similar to the views encountered in optical colonoscopy. Therefore, gastroenterologists should be able to read this portion of CTC accurately<sup>[9]</sup>. In taking the lead on CTC, the AGA has published standards for gastroenterologists in performing and interpreting diagnostic CTC<sup>[10]</sup>.

Respondents were split on their opinions regarding the impact of CTC as a screening tool on colonoscopy volumes and the ability for their practice to accommodate colonoscopy for a positive CTC. The estimated impact of CTC volume varied significantly by practitioner age ( $P = 0.002$ ). Respondents  $> 60$  years felt that CTC would increase colonoscopy, whereas those  $< 40$  years thought CTC would ultimately decrease colonoscopy. If CTC were to increase adherence rate for CRC screening, this may easily increase colonoscopy volumes, as greater than 40% of the population has not undergone CRC screening. However, available data from the literature are diametrically opposed on this issue. Ladabaum *et al*<sup>[11]</sup> projected that colonoscopy demand would increase if screening uptake reached 75% with various mixes of strategies, including a substantial increase in the use of CTC, whereas, Ladabaum *et al*<sup>[11]</sup> and Hur *et al*<sup>[12]</sup> concluded that widespread use of CTC would decrease colonoscopy demand by assuming a relatively small increase in overall screening uptake (to 53%) and significant replacement of current strategies by CTC (two thirds of screening with CTC). There are no data to support the suggestion that the availability of CTC will increase adherence rate. Patients offered CTC as a primary screening modality in two different studies failed to show an increase in CRC screening<sup>[13,14]</sup>. In Madison, Wisconsin, where CTC is reimbursed by the majority of payers, almost 50% of the patients and/or primary care physicians have chosen CTC as their first-line screening tool. Authors from that same area reported no change in colonoscopy volumes although this may reflect a relative decrease since their colonoscopy numbers have not increased as they have continued to do elsewhere in the country<sup>[15]</sup>. How many patients and primary care physicians will choose CTC if it becomes widely reimbursable remains uncertain. Ultimately, the true impact of CTC on colonoscopy volume may be difficult to measure since the percentage of patients screened by colonoscopy continues to increase due to public and primary care physician awareness.

Lastly, our respondents felt CTC may have a role in patients with a previously failed colonoscopy, in patients with multiple co-morbidities and in those not willing to undergo colonoscopy for CRC screening. Incomplete examinations occur in 2%-5% of cases and traditionally, double contrast barium enema (DCBE) is ordered to evaluate the remaining colon<sup>[16]</sup>. Studies have shown comparable results between DCBE and CTC after a failed colonoscopy<sup>[17,18]</sup>. DCBE generally can be performed immediately after colonoscopy, although institutions may differ on the policy of performing the examination after endoscopic biopsy and polypectomy of small polyps<sup>[19]</sup>. However, more recently, a large retrospective study of 546 patients suggests that CTC can also be performed safely on the same day as an incomplete colonoscopy<sup>[20]</sup>. Participants also recognized the utility of CTC in patients that are unwilling to undergo colonoscopy for CRC screening. Since national CRC screening rates are still suboptimal, CTC may appeal to certain individuals and increase CRC screening compliance.

Our study has several potential limitations. First, the low response rate (23%) may limit the generalizability of our findings. However, our response rate is similar to the unpublished data from the AGA online survey on this topic. Demographic data on those who did not participate in our study were not available, so we can not ensure that those who responded did not differ significantly from non-responders. It is possible that our participants were more interested in the subject of the survey than those who did not participate. However, if this is the case, then our results should represent the views of well-informed endoscopists. Additionally, reporting bias may be present in these data since we are relying on self-reported data. Finally, despite the age of the data, given the delay in approval of CTC as a primary screening tool by Medicare, the results remain relevant.

In conclusion, practicing endoscopists are not enthusiastic about the incorporation of CTC into their daily practice. However, some endoscopists may be willing to take CTC reading courses and did value CTC in patients with previous failed colonoscopy or in those unwilling to undergo colonoscopy for CRC screening. Only time will tell, how this modality will affect the livelihood of practicing gastroenterologists.

## COMMENTS

### Background

Computed tomographic colonography (CTC) is a radiological exam for colorectal cancer screening that has been identified as one of the recommended modalities to be offered to patients for CRC prevention along with colonoscopy, barium enema and flexible sigmoidoscopy. CTC will likely impact endoscopists' practice patterns.

### Research frontiers

At this time, there are no published data regarding the opinions of endoscopists on this technology. Given their role in CRC screening, the views of endoscopists may have enormous implications on the efforts of policymakers and payers. The objectives of our study were to survey endoscopists regarding varying aspects on the use of CTC, and to assess predictors regarding its use.



## Applications

This survey study demonstrated that almost 60% of practicing endoscopists do not plan to incorporate CTC into their daily practice. However, some endoscopists may be willing to take CTC reading courses in the future. Additionally, endoscopists value CTC in patients with previous failed colonoscopy or in those unwilling to undergo colonoscopy for CRC screening.

## Terminology

Computed tomographic colonography is a radiological exam utilizing CT scan to view the entire colon

## Peer review

Overall this paper is interesting, and has clearly stated aims and reasonably valid conclusions. It is well organized with a good presentation and readability.

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