



# Radiology Rounds

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## CT Colonography – An Alternative to Colonoscopy?

Colorectal cancer is the third leading cause of cancer deaths in both men and women and the likelihood of an individual developing it some point in his or her life is about 6%. However, early stage colorectal cancer can be successfully treated and the mortality benefit of screening for colorectal cancer is well established. Despite this, fewer than 40% of those for whom screening is recommended comply and only about 37% of colorectal cancers are detected while the disease is still localized.

Will CT colonography (CTC) be a way to improve the screening rate and reduce the mortality from this disease? A recent large prospective study has demonstrated that it is at least as effective as the current gold standard, optical colonoscopy, for detecting adenomatous polyps (Pickhardt, Choi et al. 2003). At this time, both procedures require preparatory bowel cleansing. However, colonography is a better tolerated procedure that does not require conscious sedation, which is necessary during the optical colonoscopy examination. For this reason alone, the availability of CT colonography may improve compliance. In addition, in the cases in which colonoscopy cannot, be completed due to stricture, obstruction, or the complex tortuosity of the colon, CT colonography has been established as the imaging technique of choice.

Perhaps the most important disadvantage of CT colonography is that any significant findings have to be followed up by optical colonoscopy for polyp removal. Hence, one may ask what the value of the CTC is when any positive lesion detected by the new exam will require further referral? It is estimated that six to nine percent of non-symptomatic patients over 50 years may be expected to have a polyp greater than 10 mm in size; lesions of this size range include



### Coronal reconstruction CT colonography image

The air filled colon appears dark. Arrow indicates 1.5 cm adenoma. Other soft tissue projections into the lumen of the colon are normal haustral folds.

the "advanced adenomas" that represent the primary target of screening. The currently practiced, though more conservative approach is that lesions somewhat less than 10 mm should also be resected, adding approximately another 10% of screening individuals who may be referred to colonoscopy. The value of colonography is in permitting the large fraction of the at-risk screening populace who do not have significant lesions to avoid the additional risk, discomfort, and expense associated with conventional colonoscopy.

## How Good is CT Colonography?

In studies that included more than 100 patients, comparing the detection rate colonography with that of colonoscopy, the reported per patient performance for detection of polyps equal to or greater than 10 mm ranged from 93-100% sensitivity and 80-100% specificity. The sensitivity per polyp in these studies ranged from 62-90% for polyps equal to or greater than 10 mm and 16-82% for 6-9 mm polyps. False positive results may occur because of retained stool, diverticular disease, misinterpretation of thick or complex haustral folds, and artifacts due to motion or metal (e.g. hip prostheses). Colonography does, however, have the potential advantage of identifying cancers that may not be adequately assessed by endoscopy, such as those that are located close to

In comparison, studies of back-to-back colonoscopies performed on individual patients have demonstrated miss rates of about 6% for adenomatous polyps equal to or greater than 10 mm (the size above which lesions are considered to have a significant risk of harboring malignancy) and 13% for polyps in the 0.6-0.9 mm range. These miss rates are comparable to results achieved with state of the art CT colonography, as interpreted by experienced readers.

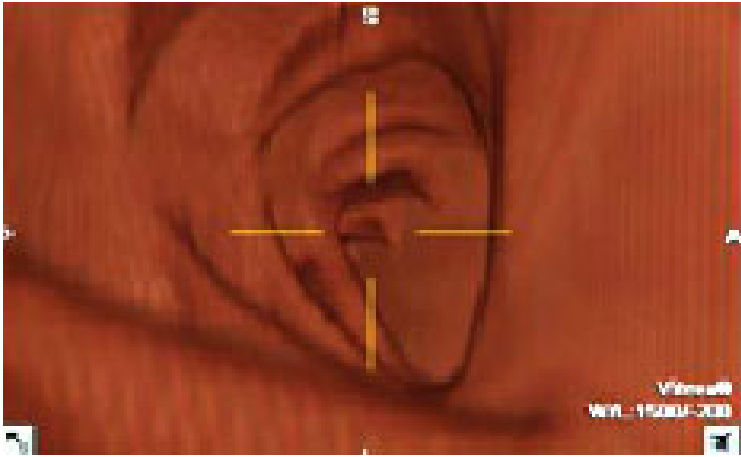
	<b>Colonoscopy</b>	<b>CT Colonography</b>
<b>Patient preparation</b>	Purgative bowel cleansing	Purgative bowel cleansing*
<b>Patient tolerance</b>	Need for conscious sedation	Minimal discomfort
<b>Radiation</b>	None	Low dose (approximately 20% less than barium enema)
<b>Complications</b>	0.3-1% perforation and bleeding	None reported
<b>Visualization</b>	Optical. Lesions identified by both color and shape.  View luminal surface of colon only. May be incomplete due to blockage or complex fold structure	Tomographic and 3D reconstruction with views from any angle. Lesion identified primarily by shape, making it harder to identify flat adenomas.  Occasionally find non-colonic pathology
<b>Localization</b>	Inferred from length of colonoscope inserted	Precise 3D localization within abdomen
<b>Lesion removal</b>	Can be done at time of procedure. Cancerous lesions are followed up by surgery.	Need subsequent colonoscopy/ surgery
<b>Cost</b>	\$900 – \$2000; covered by most insurance	\$500 - \$700; covered by insurance for symptomatic individuals

*\*Current research is evaluating a procedure that does not require bowel cleansing. Instead, the patient must ingest a contrast agent with meals and snacks for two days. Computer image processing subtracts bowel contents for radiologist to view apparent empty bowel. This technique is currently in clinical trial.*

## Preparation and Procedure

The present CT colonographic procedure requires purgative bowel cleansing with phospho-soda and Bisacodyl (Fleet Prep Kit 1) or polyethylene glycol electrolyte solution (NuLytely® or Go-Lytely®). Prior to the CT scan, an enema tip or catheter is placed in the rectum and the colon filled with air until the patient reports a full feeling. Few patients report any more than minimal discomfort. Both supine and prone CT images are acquired, which means that parts of the colon that are compressed in one position are open in the other. Current multi detector CT scanners can acquire all the image data in two breath holds, minimizing movement artifacts.

The whole procedure is complete within 15-20 minutes and, since there is no sedation, the patient is able to resume normal activities immediately, before the images are reviewed. The radiologist examines planar images of the entire length of the colon and computer reconstruction of 3D images are made to view any part of the bowel from an angle that the radiologist selects. The radiology report is sent to the referring physician the same day of the procedure.



**3D reconstruction image of normal colon.**

## Follow Up and Therapy

Unlike colonoscopy, CT colonography is not therapeutic. Therefore, all positive colonography scans must be followed up by optical colonoscopy for polyp removal or by surgery to remove larger masses. It should be noted that the large majority of individuals presenting for colon screening exam do not have significant polyps; CT colonography may permit these individuals to avoid endoscopy while correctly and more easily identifying those that require endoscopic or surgical resection. If open surgery is necessary, colonography has the advantage of indicating the position of the lesion within the abdomen, making surgery easier.

## Patient Scheduling at MGH

Please note that CT colonography for cancer screening is not covered by most insurance at this time. CT colonography of asymptomatic patients can be performed at MassGeneral West in Waltham or at MassGeneral Imaging in Chelsea.

### ( Internal Access Only )

[How to order CT colonography](#)

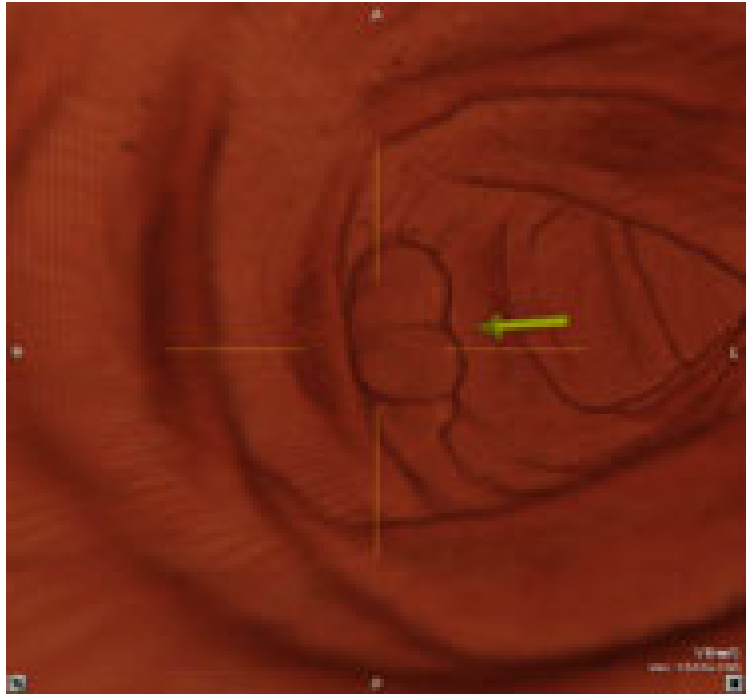
[Patient information about colonography](#)

Instructions for patients on using the PEG [GoLYTELY](#) or [NuLYTELY](#) Prep

[Instructions for patients on using the Fleet-1 Prep](#)

[Faxable order form \(Download .pdf\)](#)

If you have any patients who are interested in being part of the clinical study of the minimally prepped CTC, which requires both CTC with ingested contrast agent and colonoscopy, please contact [Dr. Michael Zalis](#) , or [Dr. Cordula Magee](#).



**3D reconstruction image of colon.**

Arrow indicates 1.5 cm adenoma.

## Further Information

For further information about CT colonography, please contact [Dr. Michael Zalis](#), 617-726-8396

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