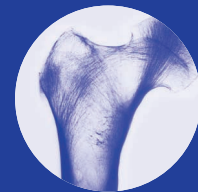


# RADIOLOGY & IMAGING

## VIRTUAL COLONOSCOPY



# Virtual colonoscopy: a faster, safer and accurate way to screen for cancer

The rising incidence of colon cancer and its high mortality rate underscore the need for a more widespread screening programme of individuals over the age of 50. Virtual colonoscopy is a new, safe and less invasive method of colonoscopy

### HIGHLIGHTS

- Despite the fact that timely and accurate screening can prevent colorectal cancer, patients often refuse medical advice and delay or opt out of the screening
- Virtual colonoscopy eliminates not only the physical discomfort of a conventional colonoscopy, but also the risk of the colon walls being perforated by the optical scope

**G**overnment research recently published in the *New England Journal of Medicine* states that the colonoscopy is the “gold standard” test for colon cancer, the USA’s second leading cause of cancer deaths and the deadliest form of cancer among nonsmokers.<sup>1</sup>

The rising incidence of colon cancer and its high mortality rate underscore the need for a more widespread screening programme of individuals over the age of 50. Yet overcoming patients’ fear of the invasive procedure of conventional colonoscopy has been a major hurdle in improving prevention. Despite the fact that timely and accurate screening can prevent colorectal cancer, the traditional invasive colonoscopy is so uncomfortable, with unpleasant preparatory requirements of fasting and harsh colon cleansing, that patients often refuse medical advice and delay or opt out of the screening.

### Cutting-edge technology

Viatronix V3D-Colon technology eliminates all the risk and discomfort of a colonoscopy, while the physician’s ability to visualise polyps is greatly enhanced. The advantages of virtual colonoscopy for patients are obvious:

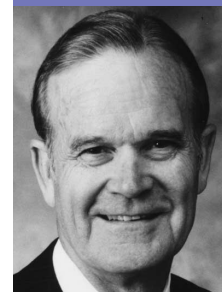
- Less time required for preparation, examination and recovery.
- No sedation, rigorous pre-examination fasting or colon cleansing.
- Negligible risk with insertion only of a thin rubber tube one inch into the rectum.

Equally important are the benefits for medical facilities. The Viatronix system is not only cost-effective and easy to use, but also provides a more thorough and accurate examination tool than conventional optical colonoscopy or even other virtual systems.

“This system eliminates all the risk and discomfort of a colonoscopy”

Offering numerous benefits both to patients and physicians over the conventional optical colonoscopy, as well as over other virtual tools, the Viatronix V3D-Colon system offers a noninvasive, accurate alternative for examining 100% of the colon for polyps, the common precursor of colon cancer. V3D-Colon combines the sophisticated computer imaging of a computed tomography (CT) scan with breakthrough medical diagnostic software technology to provide a patient-friendly, yet incredibly accurate tool for viewing the colon.

The noninvasiveness of the procedure is itself a benefit to patients, eliminating not only the physical discomfort of a conventional colonoscopy, but also the inherent risk of the colon walls being perforated by the optical scope. Adding to that, however, is the fact that a Viatronix virtual colonoscopy requires no sedation, so patients can resume normal activities immediately after the



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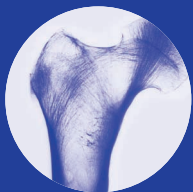
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short 15-minute procedure. Plus, there is no pre-examination fasting or harsh colon-cleansing requirement – patients simply follow a special low-residue diet of easily digestible foods, accompanied by a pleasant-tasting drink containing a small amount of barium, two days before the procedure. The barium enables the V3D-Colon System's software to electronically remove any stool remnants from the bowel images, so there is no need for enemas or vigorous laxative purging.

Almost every reason that patients have for not undergoing a colonoscopy can be eliminated with the Viatronix virtual colonoscopy. It is fast, comfortable and safe, and it offers the most accurate and effective method yet for detecting small polyps.

“The system goes beyond other virtual techniques to offer physicians far greater capabilities for manipulating and analysing scanned images”

Initially, two 40-second single-breath-hold CT scans are taken with the patient in the supine and prone positions. The CT images are sent to the Viatronix V3D-Colon System, where the preprocessor component (V3D-Processor) reconstructs a 3D model of the patient's colon and electronically cleanses the data of debris remnants. Since the system provides automatic segmentation of the colon and an automatic flight path, the radiologist does not have to preconfigure any data. Immediately afterwards, the 3D model of the colon is sent to the reader station (V3D-Viewer) for endoscopic analysis. The 2D CT data is transferred into a 3D model in just 15 minutes, without physician intervention, and a thorough flythrough examination can then be conducted in an additional 15 minutes. By having the ability to immediately receive a second data set by the V3D-Processor after the initial data set is processed and sent to the V3D-Viewer for analysis, there is the creation of a continuous workflow that increases the use of the CT machine and reduces downtime.

While there are other systems in use that provide a similar colon scan, the Viatronix system goes beyond other virtual techniques to offer physicians far greater capabilities for manipulating and analysing the scanned images with a visualisation system that can detect polyps as

small as 3mm in size. In addition, instead of simply running the flythrough movie forward and backward, the Viatronix software allows operators to turn, zoom and rotate the images at will in a “live” volume rendering, dramatically increasing the opportunity to locate and identify polyps. This image manipulation enables physicians to view 100% of the entire surface of the colon – even behind folds – as opposed to approximately 70–80% that can typically be seen in an optical colonoscopy. The V3D-Colon product provides an automatically computed centreline for “live” guided navigation augmented by a fully integrated flight control for precise mapping. Also, any sections that are missed are automatically “tagged” and reported to physicians, enabling them to go back and review the surfaces for 100% coverage.

In addition, unlike other colonoscopic techniques, images produced by the Viatronix system show shadows and reflected light, providing greater detail and depth perception, and eliminating the “washout” effect that could cause a polyp to be overlooked. With the addition of sophisticated lighting tools physicians can highlight areas during an analysis to show greater detail of the colon wall for detecting polyps as small as 3mm. The V3D is also the only system that incorporates a technique called translucent rendering, which can be used to take a virtual look inside a suspected polyp for more accurate identification and analysis.

### Application and development

More than 200 patients have already been tested using the system at the Stony Brook (New York) Medical Centre, where the technology was developed. V3D-Colon is a patented technology, and several of the system's enhancements are patent pending.

For 16 years, the underlying technologies of the V3D-Colon System for noninvasive virtual colonoscopy have been researched and developed at the State University of New York Stony Brook. Combining computer science and biomedicine, the Viatronix research team, consisting of Drs Ari Kaufman, Mark R Wax and Jerome Z Liang, along with other members of the university faculty, developed the underlying technologies. Virtual colonoscopy is the first application of this technology. However, Viatronix plans to apply its software technologies to other organ systems, including the heart, arteries, lungs, bladder and brain. ■

### Reference

1. Lieberman DA, Weiss DG, Veterans' Affairs Cooperative Study Group 380. One-time screening for colorectal cancer with combined fecal occult-blood testing and examination of the distal colon. *N Engl J Med* 2001;345(8):555–60.