

Virtual Colonoscopy / CTC

Clinical Trials & Publications

The New England Journal of Medicine

"Accuracy of CT Colonography for Detection of Large Adenomas and Cancers",

<http://www.nejm.org/doi/full/10.1056/NEJMoa0800996>

C. Daniel Johnson, M.D., M.M.M., Mei-Hsiu Chen, Ph.D., Alicia Y. Toledano, Sc.D., Jay P. Heiken, M.D., Abraham Dachman, M.D., Mark D. Kuo, M.D., Christine O. Menias, M.D., Betina Siewert, M.D., Jugesh I. Cheema, M.D., Richard G. Obregon, M.D., Jeff L. Fidler, M.D., Peter Zimmerman, M.D., Karen M. Horton, M.D., Kevin Coakley, M.D., Revathy B. Iyer, M.D., Amy K. Hara, M.D., Robert A. Halvorsen, Jr., M.D., Giovanna Casola, M.D., Judy Yee, M.D., Benjamin A. Herman, S.M., Lawrence J. Burgart, M.D., and Paul J. Limburg, M.D., M.P.H., September 18, 2008, (Vol. 359, No. 12)

In this study of asymptomatic adults, CT colonographic screening identified 90% of subjects with adenomas or cancers measuring 10 mm or more in diameter. These findings augment published data on the role of CT colonography in screening patients with an average risk of colorectal cancer (ACRIN 6664)

"CT Colonography Versus Colonoscopy for the Detection of Advanced Neoplasia",

<http://www.nejm.org/doi/full/10.1056/NEJMoa070543>

David H. Kim, M.D., Perry J. Pickhardt, M.D., Andrew J. Taylor, M.D., Winifred K. Leung, M.D., Thomas C. Winter, M.D., J. Louis Hinshaw, M.D., Deepak V. Gopal, M.D., Mark Reichelderfer, M.D., Richard H. Hsu, M.D., and Patrick R. Pfau, M.D., October 4, 2007, (Vol. 357, No. 14)

Primary CTC and OC screening strategies resulted in similar detection rates for advanced neoplasia, although the numbers of polypectomies and complications were considerably smaller in the CTC group. These findings support the use of CTC as a primary screening test before therapeutic OC

"Computed Tomographic Virtual Colonoscopy to Screen for Colorectal Neoplasia in Asymptomatic Adults",

<http://www.nejm.org/doi/full/10.1056/NEJMoa031618>

Perry J. Pickhardt, M.D., J. Richard Choi, Sc.D., M.D., Inku Hwang, M.D., James A. Butler, M.D., Michael L. Puckett, M.D., Hans A. Hildebrandt, M.D., Roy K. Wong, M.D., Pamela A. Nugent, M.D., Pauline A. Mysliwiec, M.D., M.P.H., and William R. Schindler, D.O., December 2003 issue (Vol. 349, No. 23)

Viatronix was an exclusive participant in the largest-ever clinical trial utilizing 3D virtual colonoscopy as the primary read. This trial compared virtual and optical colonoscopy. Results showed a higher sensitivity for virtual colonoscopy than for optical colonoscopy (the "gold" standard) for adenomas 8mm and larger.

Abdominal Imaging

Missed lesions at CT colonography: lessons learned

<http://www.springerlink.com/content/622733n678945681/fulltext.html>

Perry J. Pickhardt

Department of Radiology, University of Wisconsin School of Medicine & Public Health, E3/311 Clinical Science Center, 600 Highland Ave., Madison, WI 53792-3252, USA,
[Abdominal Imaging](#), *Online First*[™], 27 April 2012,) DOI: 10.1007/s00261-012-9897-z

In conclusion, misinterpretation at CTC can result in neither missed lesions or false-positive diagnosis. This review has focused largely on missed lesions—and ways to minimize mistakes. If the technical factors of bowel preparation, colonic distention, and robust CTC software are adequately addressed on a consistent basis, and the reader is aware of all the potential pitfalls at CTC, important lesions will seldom be missed.

American Gastroenterological Association

"AGA Supports New Guidelines Favoring Tests That Prevent Colorectal Cancer "

<http://www.gastro.org/>

March 5, 2008

The AGA Institute supports CTC as a promising screening test for colorectal cancer, which we believe will be in widespread clinical use in the near future.

Alimentary Pharmacology & Therapeutics

"Virtual vs. optical colonoscopy in symptomatic gastroenterology out-patients: the case for virtual imaging followed by targeted diagnostic or therapeutic colonoscopy"

<http://onlinelibrary.wiley.com/doi/10.1111/j.1365->

[2036.2007.03414.x/abstract;jsessionid=09A7C32C2E0317D75700BA038F6089FA.d03t02](http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2036.2007.03414.x/abstract;jsessionid=09A7C32C2E0317D75700BA038F6089FA.d03t02)

M.Bose, J.Bell, L.Jackson, P.Casey, J.Saunders, O.Epstein Volume 26 Issue 5 Page 727-736, September 2007

In symptomatic patients, three-dimensional virtual colonoscopy is equivalent to optical colonoscopy for diagnosing colon cancer and clinically significant polyps. A case can be made for three-dimensional virtual colonoscopy as a primary modality followed if necessary by same day-targeted optical colonoscopy.

American Cancer Society

"Prevention the Focus of New Colon Cancer Screening Guidelines", Article date: 2008/03/05

<http://www.cancer.org/cancer/news/news/prevention-the-focus-of-new-colon-cancer-screening-guidelines>

CT colonography (virtual colonoscopy) is recommended every 5 years

"Screening and Surveillance for the Early Detection of Colorectal Cancer and Adenomatous Polyps, 2008: A Joint Guideline from the American Cancer Society, the US Multi-Society Task Force on Colorectal Cancer, and the American College of Radiology",

[http://onlinelibrary.wiley.com/journal/10.3322/\(ISSN\)1542-4863?maxtoshow=&HITS=10&hits=10&RESULTFORMAT=&titleabstract=guidelines&searchid=1074190906250_391&stored_search=&FIRSTINDEX=0&journalcode=canjclin](http://onlinelibrary.wiley.com/journal/10.3322/(ISSN)1542-4863?maxtoshow=&HITS=10&hits=10&RESULTFORMAT=&titleabstract=guidelines&searchid=1074190906250_391&stored_search=&FIRSTINDEX=0&journalcode=canjclin)

Bernard Levin, MD, David A. Lieberman, MD, Beth McFarland, MD, Robert A. Smith, PhD, Durado Brooks, MD, MPH, Kimberly S. Andrews, Chiranjeev Dash, MD, MPH, Francis M. Giardiello, MD, Seth Glick, MD, Theodore R. Levin, MD, Perry Pickhardt, MD, Douglas K. Rex, MD, Alan Thorson, MD, Sidney J. Winawer, MD and for the American Cancer Society Colorectal Cancer Advisory Group, the US Multi-Society Task Force, and the American College of Radiology

Based on the accumulation of evidence since that time, the expert panel concludes that there are sufficient data to include CTC as an acceptable option for CRC screening.

"Disparities in cancer screening in individuals with a family history of breast or colorectal cancer"

<http://onlinelibrary.wiley.com/doi/10.1002/cncr.26480/abstract?systemMessage=Wiley+Online+Library+will+be+disrupted+8+Oct+from+10-14+BST+for+monthly+maintenance>

Article first published online: 25 AUG 2011 DOI: 10.1002/cncr.26480

Ninez A. Ponce MPP, PhD^{1,2,*†}, Jennifer Tsui MPH^{1,2}, Sara J. Knight PhD^{3,4,5,6}, Aimee Afable-Munsuz PhD^{6,7}, Uri Ladabaum MD, MS⁸, Robert A. Hiatt MD, PhD^{6,9}, Jennifer S. Haas MD, MSc¹⁰

Knowledge of their family history widened the Latino-white gap in CRC screening among adults. More aggressive interventions that enhance the communication between Latinos and their physicians about family history and cancer risk could reduce the substantial Latino-white screening disparity in Latinos most susceptible to CRC

[“Computed tomographic colonography for colorectal cancer screening](#)

[Risk factors for the detection of advanced neoplasia”](#)

<http://onlinelibrary.wiley.com/doi/10.1002/cncr.28007/abstract>

Cesare Hassan MD, B. Dustin Pooler MD, David H. Kim MD, Antonio Rinaldi MSH, Alessandro Repici MD, Perry J. Pickhardt MD.

Article first published online: 10 JUN 2013. DOI: 10.1002/cncr.28007

Age and sex were identified as important independent predictors of advanced neoplasia risk in individuals undergoing screening CTC, whereas BMI and a positive family history of colorectal cancer were not. These results have implications for appropriate patient selection. Cancer 2013

American Journal of Gastroenterology

[Association Between Colonoscopy Rates and Colorectal Cancer Mortality](#)

<http://www.nature.com/ajg/journal/vaop/ncurrent/full/ajg201083a.html>

Linda Rabeneck, MD, MPH 1,2,3,4, Lawrence F. Paszat, MD, MS 2,3,4, Refik Saskin, MSc 4 and Therese A. Stukel, PhD 2,4

OBJECTIVES: Although colonoscopy use has increased in the United States and Canada since the early 1990s, it is unclear whether this has been associated with benefit at the population level. Our objective was to evaluate the association between regional colonoscopy rates and death from colorectal cancer (CRC).

[“Queue Position in the Endoscopic Schedule Impacts Effectiveness of Colonoscopy”](#)

<http://www.nature.com/ajg/journal/v106/n8/full/ajg201187a.html>

Alexander Lee MD¹, John M Iskander MD¹, Nitin Gupta MD¹, Brian B Borg MD¹, Gary Zuckerman DO¹, Bhaskar Banerjee MD¹ and C Prakash Gyawali MD, MRCP¹

Polyp detection rates decline as time passes during an endoscopist's schedule, potentially from endoscopist fatigue. Queue position may be a novel surrogate measure for operator fatigue.

[“Diagnostic Accuracy of Probe-Based Confocal Laser Endomicroscopy and Narrow Band Imaging for Small Colorectal Polyps: A Feasibility Study”](#)

<http://www.nature.com/ajg/journal/vaop/ncurrent/abs/ajg2011376a.html>

Muhammad W Shahid MD^{1,5}, Anna M Buchner MD, PhD^{2,5}, Michael G Heckman MS³, Murli Krishna MD⁴, Massimo Raimondo MD¹, Timothy Woodward MD¹ and Michael B Wallace MD, MPH¹ *Am J Gastroenterol* advance online publication 8 November 2011; doi: 10.1038/ajg.2011.376

pCLE demonstrated higher sensitivity in predicting histology of small polyps compared with NBI, whereas NBI had higher specificity. When used in combination, the accuracy of pCLE and NBI was extremely high, approaching the accuracy of histopathology. Together, they may reduce the need for histological examination. However, further studies are warranted to evaluate the role of these techniques, especially in the population-based colon cancer screening.

American Journal of Roentgenology

"Extracolonic Findings on CT Colonography Increases Yield of Colorectal Cancer Screening"

<http://www.ajronline.org/content/195/3/677.abstract>

Ganesh R. Veerappan, Mazer R. Ally, Jong-ho R. Choi, Jennifer S. Pak, Corinne Maydonovitch, Roy K.H. Wong, Am. J. Roentgenol., Sept 2010; 195: 677-686

"Automated Measurement of Colorectal Polyp Height at CT Colonography: Hyperplastic Polyps Are Flatter Than Adenomatous Polyps"

<http://www.ajronline.org/content/193/5/1305.abstract>

Ronald M. Summers, Jiamin Liu, Jianhua Yao, Linda Brown, J. Richard Choi, and Perry J. Pickhardt, Am. J. Roentgenol., Nov 2009; 193: 1305 - 1310

"CT Colonography Predictably Overestimates Colonic Length and Distance to Polyps Compared With Optical Colonoscopy"

<http://www.ajronline.org/content/193/5/1291.abstract>

James E. Duncan, Michael P. McNally, W. Brian Sweeney, Andrew B. Gentry, Duncan S. Barlow, Donald W. Jensen, and Brooks D. Cash, Am. J. Roentgenol., Nov 2009; 193: 1291 - 1295

"CT Colonography: Coming of Age", C. Daniel Johnson, Am. J. Roentgenol., Nov 2009; 193: 1239 – 1242

<http://www.ajronline.org/content/193/5/1239.abstract>

"Normalized Distance Along the Colon Centerline: A Method for Correlating Polyp Location on CT Colonography and Optical Colonoscopy"

<http://www.ajronline.org/content/193/5/1296.abstract>

Ronald M. Summers, Jeffrey A. Swift, Andrew J. Dwyer, J. Richard Choi, and Perry J. Pickhardt, Am. J. Roentgenol., Nov 2009; 193: 1296 - 1304

"Comparison of Optical Colonoscopy and CT Colonography for Polyp Detection"

<http://www.ajronline.org/content/193/5/1289.full>

Dachman, A.H., Am. J. Roentgenol., 2009; 193:1289-1290

"Comparison of Polyp Size and Volume at CT Colonography: Implications for Follow-Up CT Colonography",

<http://www.ajronline.org/content/193/6/1561.abstract>

Emily Bethea, Ogonna K. Nwawka, and Abraham H. Dachman, Am. J. Roentgenol., Dec 2009; 193: 1561 – 1567

"Clinical Management of Small (6- to 9-mm) Polyps Detected at Screening CT Colonography: A Cost-Effectiveness Analysis",

<http://www.ajronline.org/content/191/5/1509.full?maxtoshow=&HITS=10&hits=10&RESULTFORMAT=1&author1=pickhardt&andorexacttitle=and&andorexacttitleabs=and&andorexactfulltext=and&searchid=1&FIRSTINDEX=0&sortspec=relevance&resourcetype=HWCIT>

Perry J. Pickhardt, Cesare Hassan, Andrea Laghi, Angelo Zullo, David H. Kim, Franco Iafrate, and Sergio Morini, Am. J. Roentgenol., Nov 2008; 191: 1509 - 1516.

"Performance of a previously Validated CT Colonography Computer-Aided Detection System in a New Patient Population",

<http://www.ajronline.org/content/191/1/168.full?maxtoshow=&HITS=10&hits=10&RESULTFORMAT=1&author1=pickhardt&andorexacttitle=and&andorexacttitleabs=and&andorexactfulltext=and&searchid=1&FIRSTINDEX=0&sortspec=relevance&resourcetype=HWCIT>

Ronald M. Summers, Laurie R. Handwerker, Perry J. Pickhardt, Robert L. Van Uitert, Keshav K. Deshpande, Srinath Yeshwant, Jianhua Yao, and Marek Franaszek Am. J. Roentgenol., Ju 2008; 191: 168-174

"Replacing Barium Enema with CT Colonography in Patients Older Than 70 Years: The Importance of Detecting Extracolonic Abnormalities",

<http://www.ajronline.org/content/189/5/1104.abstract?maxtoshow=&HITS=10&hits=10&RESULTFORMAT=1&author1=Tolan&searchid=1&FIRSTINDEX=0&sortspec=relevance&resourcetype=HWCIT>

Damian J. M. Tolan, Euan M. Armstrong, and Anthony H. Chapman, Am. J. Roentgenol., Nov 2007; 189: 1104 - 1111

" Primary 2D Versus Primary 3D Polyp Detection at Screening CT Colonography",

<http://www.ajronline.org/content/189/6/1451.abstract?maxtoshow=&HITS=10&hits=10&RESULTFORMAT=1&author1=pickhardt&andorexacttitle=and&andorexacttitleabs=and&andorexactfulltext=and&searchid=1&FIRSTINDEX=0&sortspec=relevance&resourcetype=HWCIT>

Perry J. Pickhardt, Andrew D. Lee, Andrew J. Taylor, Steven J. Michel, Thomas C. Winter, Anthony Shadid, Ryan J. Meiners, Peter J. Chase, J. Louis Hinshaw, John G. Williams, Tyler M. Prout, S. Hamid Husain, David H. Kim, 189, December 2007

"Translucency Rendering in 3D Endoluminal CT Colonography: A Useful Tool for Increasing Polyp Specificity and Decreasing Interpretation Time",

<http://www.ajronline.org/content/183/2/429.full?maxtoshow=&HITS=80&hits=80&RESULTFORMAT=1&author1=pickhardt&andorexacttitle=and&andorexacttitleabs=and&andorexactfulltext=and&searchid=1&FIRSTINDEX=0&sortspec=relevance&resourcetype=HWCIT>

P. J. Pickhardt August 2004 AJR:183(2),429 - 436

"Three-Dimensional Endoluminal CT Colonography (Virtual Colonoscopy): Comparison on Three Commercially Available Systems",

<http://www.ajronline.org/content/181/6/1599.abstract?maxtoshow=&HITS=80&hits=80&RESULTFORMAT=1&author1=pickhardt&andorexacttitle=and&andorexacttitleabs=and&andorexactfulltext=and&searchid=1&FIRSTINDEX=0&sortspec=relevance&resourcetype=HWCIT>

P. J. Pickhardt December 4, 2003 AJR: 181, 1599-1606

Among Viatronix, GE and Vital Images products, V3D-Colon was heavily favored by participating physicians, ranking consistently higher in all categories (92%), including polyp conspicuity, 3D effect, likeness to OC and navigational features.

"Electronic Cleansing and Stool Tagging in CT Colonography: Advantages and Pitfalls with Primary Three Dimensional Evaluation",

<http://www.ajronline.org/content/181/3/799.full?maxtoshow=&HITS=80&hits=80&RESULTFORMAT=1&author1=pickhardt&andorexacttitle=and&andorexacttitleabs=and&andorexactfulltext=and&searchid=1&FIRSTINDEX=0&sortspec=relevance&resourcetype=HWCIT>

Perry J. Pickhardt, September 2003:181, 799-805

"Performance of a Previously Validated CT Colonography Computer-Aided Detection System in a New Patient Population",

<http://www.ajronline.org/content/191/1/168.full?maxtoshow=&HITS=10&hits=10&RESULTFORMAT=1&author1=pickhardt&andorexacttitle=and&andorexacttitleabs=and&andorexactfulltext=and&searchid=1&FIRSTINDEX=0&sortspec=relevance&resourcetype=HWCIT>

Ronald M. Summers, Laurie R. Handwerker, Perry J. Pickhardt, Robert L. Van Uitert, Keshav K. Deshpande, Srinath Yeshwant, Jianhua Yao, and Marek Franaszek Am. J. Roentgenol., Jul 2008; 191: 168 - 174.

"National CT Colonography Trial (ACRIN 6664): Comparison of Three Full-Laxative Bowel Preparations in More Than 2500 Average-Risk Patients"

<http://www.ajronline.org/content/196/5/1076.abstract>

Amy K. Hara, Mark D. Kuo, Meridith Blevins, Mei-Hsiu Chen, Judy Yee, Abraham Dachman, Christine O. Menias, Betina Siewert, Jugesh I. Cheema, Richard G. Obregon, Jeff L. Fidler¹, Peter Zimmerman¹, Karen M. Horton, Kevin Coakley, Revathy B. Iyer, Robert A. Halvorsen Jr., Giovanna Casola, and C. Daniel Johnson, May 2011 196(5): 1076–1082. doi:10.2214/AJR.10.4334.

Polyp detection was comparable for all three preparations, although phosphosoda had significantly higher patient compliance and the least residual stool.

[“CT Colonography in Patients Who Have Undergone Sigmoid Colostomy: A Feasibility Study”](#)

<http://www.ajronline.org/content/197/4/W653.full>

Ju Hee Lee, Seong Ho Park, Seung Soo Lee, Ah Young Kim, Jin Cheon Kim, Chang Sik Yu, and Hyun Kwon Ha, October 2011 197:W653-W657; doi:10.2214/AJR.10.6225

CT colonographic examination through a sigmoid stoma was technically feasible with currently available instruments, but further improvements in technique are needed.

[“Radiation-Related Cancer Risks From CT Colonography Screening: A Risk-Benefit Analysis”](#)

<http://www.ajronline.org/content/196/4/816.full>

Amy Berrington de González¹, Kwang Pyo Kim², Amy B. Knudsen³, Iris Lansdorp-Vogelaar⁴, Carolyn M. Rutter⁵, Rebecca Smith-Bindman⁶, Judy Yee⁷, Karen M. Kuntz⁸, Marjolein van Ballegooijen⁴, Ann G. Zauber⁹ and Christine D. Berg¹⁰, April 2011, Vol. 196:4, pp 816-823

Concerns have been raised about recommending CTC as a routine screening tool because of potential harms including the radiation risks. Based on these models, the benefits from CTC screening every 5 years from the age of 50 to 80 years clearly outweigh the radiation risks.

[“Screening CT Colonography: Multicenter Survey of Patient Experience, Preference, and Potential Impact on Adherence”](#)

<http://www.ajronline.org/content/198/6/1361.abstract>

B. Dustin Pooler¹, Mark J. Baumel², Brooks D. Cash³, Fouad J. Moawad³, Mark S. Riddle⁴, Amy M. Patrick⁵, Mark Damiano³, Matthew H. Lee¹, David H. Kim¹, Alejandro Muñoz del Río¹, Perry J. Pickhardt¹, Received August 1, 2011; accepted after revision December 4, 2011.

Respondents reported a very high satisfaction level with CTC, and those who had experienced both modalities indicated a preference for CTC over optical colonoscopy. These results suggest that CTC has the potential to increase adherence to CRC screening guidelines if widely available.

“CT Colonography of a Medicare-Aged Population: Outcomes Observed in an Analysis of More Than 1400 Patients”

<http://www.ajronline.org/content/199/1/W27.full.pdf+html?sid=3d0fa698-0768-4b30-996a-071c5e076ede>

Brooks D. Cash¹, Mark S. Riddle¹, Ishan, Bhattacharya¹, Duncan Barlow¹, Donald Jensen¹, Nicolas Moya del Pino¹, Perry J. Pickhardt², DOI:10.2214/AJR.11.7729 Received August 20, 2011; accepted after revision October 27, 2011.

The frequency of referral to colonoscopy based on a polyp size threshold of 6 mm was 14.5%. Colorectal neoplasia was found in 9.3% of patients, with advanced neoplasia in 3.3%. Potentially important extracolonic findings were observed in 2.9% of patients. The low rates of referral to colonoscopy, prevalence of advanced neoplasia, and prevalence of extracolonic findings make CTC a viable option for Medicare-aged patients.

Abdominal Aortic Aneurysm at Screening CT Colonography: Prevalence and 5-Year Outcomes

Scientific Session 7 — Gastrointestinal Imaging

“Abdominal Aortic Aneurysm at Screening CT Colonography: Prevalence and 5-Year Outcomes-Scientific Session 7 — Gastrointestinal Imaging”

http://www.ajronline.org/content/198/5_Supplement/198_5_Supplement_047.full#fn-group-1

Pooler, B. S.; Kim, D.; Hinshaw, J.; Pickhardt, P. University of Wisconsin, Madison, WI, Tuesday, May 1, 2012

Incidental abdominal aneurysms were detected in over 1% of screening CTC patients. When not initially present at index examination, aneurysms did not develop in the intervening years, strongly suggesting an extracolonic benefit to this colorectal cancer screening examination.

Annals of Internal Medicine

Is Computed Tomographic Colonography Being Held to a Higher Standard?

<http://www.annals.org/content/152/3/178.full.pdf+html>

Samita Garg, MD, and Dennis J. Ahnen, MD

Recent guidelines for colorectal cancer screening have reached different conclusions on whether computed tomographic colonography (CTC) is an acceptable screening option, and the Centers for

Medicare & Medicaid Services recently decided not to cover CTC screening. The rationale against recommending or covering CTC screening includes concerns about radiation exposure, false negative rates for small polyps, the discovery of extracolonic findings, variability in performance, a lack of targeted studies, a higher adenoma rate in the Medicare-eligible age group, and an absence of evidence that covering CTC would increase overall screening rates. Similar concerns can be raised for other recommended and covered colon cancer screening tests, but it seems that CTC is being held to a new and higher standard.

"Location of Adenomas Missed by Optical Colonoscopy",
<http://www.annals.org/content/141/5/352.abstract>

Perry J. Pickhardt, MD; Pamela A. Nugent, MD; Pauline A. Mysliweic, MD, MPH; J. Richard Choi, ScD, MD; and William R. Schnindler, DO, September 7, 2004 | Volume 141 Issue 5 | Pages 352-359

Diagnostic Accuracy of Laxative-Free Computed Tomographic Colonography for Detection of Adenomatous Polyps in Asymptomatic Adults
A Prospective Evaluation

<http://www.annals.org/content/current>

Michael E. Zalis, MD; Michael A. Blake, MB BCh; Wenli Cai, PhD; Peter F. Hahn, MD, PhD; Elkan F. Halpern, PhD; Imrana G. Kazam, PhD; Myles Keroack, MD; Cordula Magee, PhD; Janne J. Na^oppi, PhD; Rocio Perez-Johnston, MD; John R. Saltzman, MD; Abhinav Vij, MD; Judy Yee, MD; and Hiroyuki Yoshida, PhD, Ann Intern Med May 15, 2012 156:692-702;

Computed tomographic colonography was accurate in detecting adenomas 10 mm or larger but less so for smaller lesions. Patient experience was better with laxative-free CTC. These results suggest a possible role for laxative-free CTC as an alternate screening method.

Archives of Internal Medicine

Computed Tomographic Colonography to Screen for Colorectal Cancer, Extracolonic Cancer, and Aortic Aneurysm Model Simulation With Cost-effectiveness Analysis

<http://archinte.ama-assn.org/cgi/content/abstract/168/7/696?maxtoshow=&HITS=10&hits=10&RESULTFORMAT=&fulltext=pickhardt&searchid=1&FIRSTINDEX=0&resourcetype=HWCIT>

Cesare Hassan, MD; Perry Pickhardt, MD; Andrea Laghi, MD; Daniel Kim, MD; Angelo Zullo, MD; Franco lafrate, MD; Lorenzo Di Giulio, MD; Sergio Morini, MD
Arch Intern Med. 2008;168(7):696-705

When detection of extracolonic findings such as AAA and extracolonic cancer are considered in addition to colorectal neoplasia in our model simulation, CT

colonography is a dominant screening strategy (i.e., more clinically effective and more cost-effective) over both colonoscopy and colonoscopy with 1-time ultrasonography.

Adherence to Colorectal Cancer Screening

A Randomized Clinical Trial of Competing Strategies

<http://archinte.ama-assn.org/cgi/content/short/172/7/575>

John M. Inadomi, MD; Sandeep Vijan, MD, MS; Nancy K. Janz, PhD; Angela Fagerlin, PhD; Jennifer P. Thomas, BS; Yunghui V. Lin, RN, MA; Roxana Muñoz; Chim Lau, BA; Ma Somsouk, MD, MAS; Najwa El-Nachef, MD; Rodney A. Hayward, MD, April 9, 2012

Arch Intern Med. 2012;172(7):575-582. doi:10.1001/archinternmed.2012.332

The common practice of universally recommending colonoscopy may reduce adherence to CRC screening, especially among racial/ethnic minorities. Significant variation in overall and strategy-specific adherence exists between racial/ethnic groups; however, this may be a proxy for health beliefs and/or language. These results suggest that patient preferences should be considered when making CRC screening recommendations.

AuntMinnie.com

“Acceptance grows for VC among patients, referring physicians”

<http://www.auntminnie.com/index.asp?sec=ser&sub=def&pag=dis&ItemID=97026>

Eric Barnes, November 3, 2011

A large survey of patients who underwent virtual colonoscopy at three U.S. centers found high acceptance of the noninvasive exam, as well as a reluctance to undergo conventional colonoscopy among nearly one-third of screening patients, according to results presented at the 2011 International Symposium on Virtual Colonoscopy in Cambridge, MA.

“Virtual Colonoscopy Advocates Press on for Reimbursement”

<http://www.auntminnie.com/index.asp?sec=ser&sub=def&pag=dis&ItemID=96896>

David Barnes, October 26, 2011

Virtual colonoscopy screening advocates were upbeat about their quest for reimbursement of the exam at this week’s 2011 International Symposium on Virtual Colonoscopy. Which is not to say that getting paid to perform virtual colonoscopy has been an easy struggle, or a particularly quick one.

[“Virtual colonoscopy boosts screening compliance”](http://www.auntminnie.com/index.asp?sec=ser&sub=def&pag=dis&ItemID=95268)

<http://www.auntminnie.com/index.asp?sec=ser&sub=def&pag=dis&ItemID=95268>

Eric Barnes, May 17, 2011

Offering virtual colonoscopy as an option for colorectal cancer screening significantly boosted patient compliance in programs operated by U.S. naval medical centers, according to a study presented at last week's Digestive Disease Week (DDW) meeting in Chicago.

[“Technology brings new opportunities in VC screening”](http://www.auntminnie.com/index.asp?sec=ser&sub=def&pag=dis&ItemID=96905)

<http://www.auntminnie.com/index.asp?sec=ser&sub=def&pag=dis&ItemID=96905>

Eric Barnes, October 27, 2011

Technology is affecting virtual colonoscopy in ways that will improve the patient experience and increase the technique's detection accuracy, according to presentations at the 2011 International Symposium on Virtual Colonoscopy.

Reviewing a few of the dozens of recent technology and research advancements presented at the symposium, Dr. Ronald Summers, PhD, director of radiology research at the U.S. National Institutes of Health (NIH), touched on innovations in virtual colonoscopy that could change practice patterns and differentiate VC from other colons screening tests.

[“Some VC patients won't consider other screening exams”](http://www.auntminnie.com/index.asp?sec=ser&sub=def&pag=dis&ItemID=95465)

<http://www.auntminnie.com/index.asp?sec=ser&sub=def&pag=dis&ItemID=95465>

Eric Barnes, June 6, 2011

Nearly all individuals screened with virtual colonoscopy are satisfied enough to say that they prefer the exam for future colorectal cancer screening, according to a study presented at last month's Digestive Disease Week meeting in Chicago.

[“CAD helps expert radiologists detect difficult polyps on VC”](http://www.auntminnie.com/index.asp?sec=ser&sub=def&pag=dis&ItemID=94169)

<http://www.auntminnie.com/index.asp?sec=ser&sub=def&pag=dis&ItemID=94169>

Erik L. Ridley, February 15, 2011

Computer-aided detection (CAD) software can boost the performance of even expert radiologists in finding challenging polyps on virtual colonoscopy studies, say researchers from the University of Chicago.

"VC should target rare growths rather than all polyps" - By Marty Graham April 13, 2011

<http://www.auntminnie.com/index.aspx?sec=log&URL=http%3a%2f%2fwww.auntminnie.com%2findex.aspx%3fSec%3dsup%26Sub%3dvco%26Pag%3ddis%26ItemId%3d94931%26wf%3d4308>

"Study boosts screening by adding colon exams to mammo visits" - By Kate Madden

Yee AuntMinnie.com staff writer October 15, 2010

<http://www.auntminnie.com/index.aspx?sec=log&URL=http%3a%2f%2fwww.auntminnie.com%2findex.aspx%3fsec%3dsup%26sub%3dwom%26pag%3ddis%26ItemID%3d92474%26wf%3d4008>

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"Study: VC improves colon screening rates" - By AuntMinnie.com staff writers October 21, 2010

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"Higher colonoscopy complication rates found in seniors" - By Eric Barnes

AuntMinnie.com staff writer October 19, 2010

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"Lack of sleep linked to risky colon polyps" - By Reuters Health October 18, 2010

<http://www.auntminnie.com/index.aspx?sec=log&URL=http%3a%2f%2fwww.auntminnie.com%2findex.aspx%3fsec%3dsup%26sub%3dvco%26pag%3ddis%26itemId%3d92400>

"Adenoma recurrence more likely among the overweight" - By Eric Barnes AuntMinnie.com staff writer October 18, 2010

<http://www.auntminnie.com/index.aspx?sec=log&URL=http%3a%2f%2fwww.auntminnie.com%2findex.aspx%3fsec%3dsup%26sub%3dvco%26pag%3ddis%26itemId%3d92399>

"Surveillance VC is promising for follow-up after colon surgery" - By Eric Barnes

AuntMinnie.com staff writer October 12, 2010

<http://www.auntminnie.com/index.aspx?sec=log&URL=http%3a%2f%2fwww.auntminnie.com%2findex.aspx%3fsec%3dsup%26sub%3dvco%26pag%3ddis%26itemId%3d92337>

"Missed cancers common after colonoscopy" - By Reuters Health October 7, 2010

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"Requiring prone and supine CAD marks boosts VC results" - By Eric Barnes

AuntMinnie.com staff writer July 14, 2010

<http://www.auntminnie.com/index.aspx?sec=log&URL=http%3a%2f%2fwww.auntminnie.com%2findex.aspx%3fSec%3dsup%26Sub%3dvco%26Pag%3ddis%26ItemId%3d91317>

"Screening VC sorts out incidental kidney lesions" - By Eric Barnes AuntMinnie.com staff writer June 15, 2010

<http://www.auntminnie.com/index.aspx?sec=log&URL=http%3a%2f%2fwww.auntminnie.com%2findex.aspx%3fSec%3dsup%26Sub%3dvco%26Pag%3ddis%26ItemId%3d90980>

"5-year C-RADS analysis shows stable VC screening results" - 05/06/2010

<http://www.auntminnie.com/index.aspx?sec=log&URL=http%3a%2f%2fwww.auntminnie.com%2findex.aspx%3fSec%3dsup%26Sub%3dvco%26Pag%3ddis%26ItemId%3d90530%26wf%3d3719>

In what is likely the largest screening population ever classified by virtual colonoscopy's standardized reporting system, C-RADS, researchers found stable results over five years in the single-center program, along with a large majority of patients who were able to avoid invasive colonoscopy.

"Massive VC study yields trove of extracolonic cancers" - 03/23/2010

<http://www.auntminnie.com/index.aspx?sec=log&URL=http%3a%2f%2fwww.auntminnie.com%2findex.aspx%3fSec%3dsup%26Sub%3dvco%26Pag%3ddis%26ItemId%3d90023>

A study of more than 10,000 asymptomatic screening subjects found that more than one in 200 had unsuspected and typically large but mostly early-stage cancers detected outside the colon at virtual colonoscopy (also known as CT colonography or CTC).

"Obama gets virtual colonoscopy, keeps presidential powers (Viatronix V3D-Colon software used for performing VC)"

<http://www.auntminnie.com/index.aspx?sec=log&URL=http%3a%2f%2fwww.auntminnie.com%2findex.aspx%3fSec%3dsup%26Sub%3dvco%26Pag%3ddis%26ItemId%3d89674>

As part of his first annual comprehensive physical exam as chief executive, U.S. President Barack Obama underwent a virtual colonoscopy exam (also known as CT colonography or CTC) that found him free of colorectal polyps or cancer, chief White House physician and Navy Captain Dr. Jeffrey Kuhlman told reporters yesterday.

"VC obviates need for colonoscopy even in symptomatic patients" By Eric Barnes, AuntMinnie.com staff writer February 24, 2010

<http://www.auntminnie.com/index.aspx?sec=log&URL=http%3a%2f%2fwww.auntminnie.com%2findex.aspx%3fSec%3dsup%26Sub%3dvco%26Pag%3ddis%26ItemId%3d89513%26wf%3d3601>

Even among individuals with symptoms suggesting a higher risk of colorectal polyps and cancer, virtual colonoscopy screening is enough to prevent most of them from having to undergo invasive colonoscopy. Researchers from Venlo, Netherlands, said that referrals to optical colonoscopy after VC (also known as CT colonography or CTC) remained low even among the oldest symptomatic patients in the group's recent study.

"VC screening maintains performance in Medicare population" by Eric Barnes, AuntMinnie.com, November 9, 2009

<http://www.auntminnie.com/print/print.asp?sec=sup&sub=vco&pag=dis&ItemId=87925&printpage=true>

"Meta-analysis reveals paucity of advanced neoplasia in small polyps" by Eric Barnes, AuntMinnie.com, November 2, 2009

<http://www.auntminnie.com/print/print.asp?sec=sup&sub=vco&pag=dis&ItemId=87858&printpage=true>

"VC CAD nabs undetected polyps in jumbo screening study" ,Eric Barnes, 10/29/09

<http://www.auntminnie.com/print/print.asp?sec=sup&sub=adv&pag=dis&ItemId=87808&printpage=true>

"VC's high positive predictive value important for colonoscopy follow-up ", Eric Barnes, 4/30/09

http://www.viatronix.com/pdfs/AuntMinnie_UW.pdf?sec=sup&sub=adv&pag=dis&ItemId=85491&printpage=true

"VC CAD plus 3D improves sensitivity for novice readers", Eric Barnes, 4/21/09

<http://www.auntminnie.com/print/print.asp?sec=sup&sub=adv&pag=dis&ItemId=85491&printpage=true>

"VC/AAA Screening combo cost-effective in older adults", Eric Barnes, 3/26/09

<http://www.auntminnie.com/print/print.asp?sec=sup&sub=vco&pag=dis&ItemId=80766&printpage=true>

"Model finds small polyp surveillance safe, cost-effective", Eric Barnes, 11/4/2008

<http://www.auntminnie.com/print/print.asp?sec=sup&sub=vco&pag=dis&ItemId=83242&printpage=true>

"Wider 3D viewing angle may aid polyp detection", Eric Barnes, 9/9/2008

<http://www.auntminnie.com/print/print.asp?sec=sup&sub=vco&pag=dis&ItemId=82350&printpage=true>

"ACR, others exhort CMS to cover virtual colonoscopy", By Aunt Minnie.com Staff Writers, 6/19/2008

<http://www.auntminnie.com/print/print.asp?sec=sup&sub=vco&pag=dis&ItemId=81525&printpage=true>

"VC's extracolonic findings lend an edge in cost-effectiveness", Eric Barnes, 4/15/2008

"American Cancer Society recognizes virtual colonoscopy screening benefit",

<http://www.auntminnie.com/print/print.asp?sec=sup&sub=vco&pag=dis&ItemId=80279&printpage=true>

Erik L. Ridley, 3/5/2008

The ACS says "Provided that advanced, proven techniques are employed in the clinical setting, CTC is included in the guidelines as an option for colorectal cancer screening and prevention in average-risk adults aged 50 years and older"

"Disparate VC results suggest 2D/3D debate isn't over", Eric Barnes, 12/11/2007

<http://www.auntminnie.com/print/print.asp?sec=sup&sub=adv&pag=dis&ItemId=79218&printpage=true>

"Primary 3D VC equivalent to colonoscopy", Eric Barnes, 9/12/2007

<http://www.auntminnie.com/print/print.asp?sec=sup&sub=vco&pag=dis&ItemId=77489&printpage=true&d=1>

"Significant Extracolonic Cancer Found in VC Screening Patients", Eric Barnes, 6/12/2007
<http://www.auntminnie.com/index.aspx?sec=log&URL=http%3a%2f%2fwww.auntminnie.com%2findex.aspx%3fSec%3dsup%26Sub%3dcto%26Pag%3ddis%26ItemId%3d76224>

"Translucency rendering aids prepress 3D VC", Eric Barnes, 5/14/2007
<http://www.auntminnie.com/index.aspx?sec=log&URL=http%3a%2f%2fwww.auntminnie.com%2findex.aspx%3fSec%3dsup%26Sub%3dvco%26Pag%3ddis%26ItemId%3d75721>

"Screening model calls VC most cost-effective colon exam", Eric Barnes, 4/24/2007
<http://www.auntminnie.com/index.aspx?sec=log&URL=http%3a%2f%2fwww.auntminnie.com%2findex.aspx%3fSec%3dsup%26Sub%3dvco%26Pag%3ddis%26ItemId%3d75489>

"VC CAD delivers accuracy on unfamiliar datasets", Eric Barnes, 2/5/2007
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"Low Incidence of Serious Extracolonic Findings Seen in VC Screening Population", Eric Barnes, 12/18/2006
<http://www.auntminnie.com/print/print.asp?sec=sup&sub=vco&pag=dis&ItemId=73975&printpage=true>

"New Data Reveal Higher Efficacy for Primary VC Screening", Eric Barnes, 10/18/2006
<http://www.auntminnie.com/print/print.asp?sec=sup&sub=adv&pag=dis&ItemId=72821&printpage=true>

"VC Finds Early Niche in Screening", Eric Barnes, 9/27/2006
<http://www.auntminnie.com/print/print.asp?sec=sup&sub=vco&pag=dis&ItemId=72547&printpage=true>

"VC Finds Risky Polyps, Might Reduce Polypectomies", Eric Barnes, 6/8/2006
<http://www.auntminnie.com/print/print.asp?sec=sup&sub=vco&pag=dis&ItemId=71295&printpage=true>

"Study finds happier patients with laxative-free VC prep"
<http://www.auntminnie.com/index.aspx?sec=sup&sub=vco&pag=dis&ItemID=97787>

Eric Barnes, AuntMinnie.com staff writer, December 21, 2011

A laxative-free virtual colonoscopy bowel preparation significantly improved the patient experience in a study of more than 600 screening subjects by researchers at Massachusetts General Hospital (MGH) and three other U.S. institutions.

"Easy 1-day VC prep delivers high sensitivity"
http://www.auntminnie.com/index.aspx?sec=rca&sub=rsna_2011&pag=dis&ItemID=97593

By [Eric Barnes, AuntMinnie.com staff writer](#) , November 30, 2011

Virtual colonoscopy using a same-day bowel preparation showed high diagnostic accuracy and equally high patient satisfaction in a study from Italy presented on Wednesday at the RSNA 2011 meeting.

[Virtual colonoscopy delivers in laparoscopy planning](#)

<http://www.auntminnie.com/index.aspx?sec=sup&sub=cto&pag=dis&ItemID=98899>

By Eric Barnes, AuntMinnie.com staff writer, April 4, 2012

Italian researchers have found that virtual colonoscopy outperforms conventional colonoscopy for planning laparoscopic surgery in patients with colorectal cancer or complicated diverticular disease. They presented their results at the recent European Congress of Radiology (ECR).

["Repeat VC after 5 years shows few advanced lesions"](#)

<http://www.auntminnie.com/index.aspx?sec=sup&sub=cto&pag=dis&ItemID=99666>

By Eric Barnes, AuntMinnie.com staff writer, June 13, 2012

Individuals who were negative in their first round of virtual colonoscopy screening tend to stay that way at repeat screening five years later. The results are a positive sign that VC is a good way to detect significant lesions before they can advance to malignancies.

[AJR: Virtual colonoscopy's time has come](#)

<http://www.auntminnie.com/index.aspx?sec=sup&sub=imc&pag=dis&ItemID=103832&wf=1>

By [Eric Barnes, AuntMinnie.com staff writer](#)

June 27, 2013 -- Virtual colonoscopy researchers have served up all the evidence the U.S. government asked for, and as a result they've concluded the time is now for approval of the technique to screen for colorectal cancer, according to an article published in the July American Journal of Roentgenology.

Cancer

["Age and Illness Increase Colonoscopy Risks"](#)

<http://www.viatronix.com/pdfs/underuse.pdf>

Gregory S. Cooper, MD, Tzuyung Doug Kou, PH, MA, CANCER, Volume 112, Issue 2, Pages 293-299, Published Online

In a population-based cohort of Medicare beneficiaries, despite insurance

reimbursement, there is significant underuse of colorectal testing. Given the ability of screening tests to reduce cancer incidence and mortality, continued efforts to promote screening are clearly warranted.

Cancer Consultants.com

"Underuse of colorectal cancer screening in a cohort of medicare beneficiaries"

<http://www.annals.org/content/150/12/849.abstract>

Reference: Warren JL, Klabunde CN, Mariotto AB et al. Adverse events after outpatient colonoscopy in the Medicare population. *Annals of Internal Medicine*. 2009;150:849-857.

This study suggests that the overall risk of colonoscopy complications among Medicare beneficiaries is low. Nevertheless, risk increases with age and with certain chronic health problems. These observations suggest that some elderly or debilitated patients might have fewer complications from a CT colonography when the risks of perforation and bleeding are nonexistent.

Centre for Reviews and Dissemination

NHS Economic Evaluation Database (NHS EED)

"CT colonography to screen for colorectal cancer and aortic aneurysm in the Medicare population: cost-effectiveness analysis"

<http://www.crd.york.ac.uk/CRDWeb/ShowRecord.asp?ID=22009101823>

Pickhardt PJ, Hassan C, Laghi A, Kim DH, 1/16/2011 10:11 AM

The authors concluded that CTC was a highly cost-effective screening strategy.

Diagnostic Imaging

Two sites show how to make CTC clinically routine - Diagnostic Imaging

<http://www.diagnosticimaging.com/display/article/113619/1549672>

Each has taken a distinct approach to making CT colonography part of the clinical routine, Pickhardt reaching out to third-party payers and Puckett reaching ... Greg Freiherr, April 6, 2010

"Extracolonic Findings from CT Colonography Can Uncover Serious Disease", James Brice, 05/21/2009

"CT Colonography bests conventional screening in cost-effectiveness test", Pia Pyne Miller, 4/23/2007

"GI Docs Find Value in Virtual Colonoscopy", C.P. Kaiser, 5/31/2006

Gastroenterology

"AGA Standards for Gastroenterologists for Performing and Interpreting Computed Tomography Colonography: 2011 Update"

[http://www.gastrojournal.org/article/S0016-5085\(11\)01368-0/fulltext](http://www.gastrojournal.org/article/S0016-5085(11)01368-0/fulltext)

Brooks D. Cash, Don C. Rockey, Joel V. Brill, December 2011

As the technology surrounding CT colonography evolves, it is important that gastroenterologists not only understand the multiple issues surrounding CT colonography, but also that those who wish to perform it be able to interpret it accurately.

"Standards for Gastroenterologists for Performing and Interpreting Diagnostic Computed Tomographic Colonography",

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Don C. Rockey, Matthew Barish, Joel V. Brill, Brooks D. Cash, Joel G. Fletcher, Prateer Sharma, Sachin Wani, Maurits J. Wiersema, Laura E. Peterson, and Jennifer Conte, 2007;133:1005–10242-158

"Surface Visualization at 3D Endoluminal CT Colonography: Degree of Coverage and Implications for Polyp Detection",

[http://www.gastrojournal.org/article/S0016-5085\(06\)00068-0/abstract](http://www.gastrojournal.org/article/S0016-5085(06)00068-0/abstract)

Perry J. Pickhardt, MD; Andrew J. Taylor, and Deepak V. Gopal, 2006 | 130: 1582-1587

"Computed Tomographic Virtual Colonoscopy Computer-Aided-Polyp-Detection in Screening",

[http://www.gastrojournal.org/article/S0016-5085\(05\)01772-5/abstract](http://www.gastrojournal.org/article/S0016-5085(05)01772-5/abstract)

Ronald M. Summers, Jianhua Yao, Perry J. Pickhardt, Marek Franaszek, Ingmar Bitter, Daniel Brickman, Vamsi Krisna, and J. Richard Choi, 2005 | 129: 1832-1844

"Position of the American Gastroenterological Association (AGA) Institute on Computed Tomographic Colonography",

[http://www.gastrojournal.org/article/S0016-5085\(06\)02211-6/fulltext](http://www.gastrojournal.org/article/S0016-5085(06)02211-6/fulltext)

2006 | 131: 1627-1628

Gastrointestinal Endoscopy

"CT Colonography: Perforation Rates and Potential Radiation Risks"

<http://www.ncbi.nlm.nih.gov/pubmed/20451817>

Berrington de Gonzalez A, DPhila, *, Kwang Pyo Kim, PhD, Judy Yee, MDc Gastrointest Endosc Clin N Am. 2010 Apr;20(2):279-291 April 2010

Although several organizations have raised concerns about the safety of CTC, the current evidence suggests that the risks are likely to be small. The data on colonic perforation suggest that the rate is low (0.005%-0.03%), especially compared with colonoscopy (0.06%-0.19%). Also, because no sedation is required the cardiopulmonary risks are avoided. Current CTC technique uses low-dose parameters. The 2009 American College of Radiology practice guidelines specifically recommend the use of low-dose technique for screening CTC. Studies have been

performed showing that with the use of multidetector CT scanners the ability to detect polyps of size 6 mm and larger is maintained with low-dose techniques. New dose-modulation techniques that are now available may be used to help reduce radiation dose further.

“Impact of a CT Colonography Colorectal Cancer Screening Program on Optical Colonoscopy: 5 Year Data”

[http://www.giejournal.org/article/S0016-5107\(10\)00361-5/fulltext](http://www.giejournal.org/article/S0016-5107(10)00361-5/fulltext)

Mark E. Benson, Jeff Pier, Sally Kraft, David H. Kim, Perry J. Pickhardt, Deepak V. Gopal, Mark Reichelderfer, Kevin Dasher, Patrick Pfau, Volume 71, Issue 5 , Page AB129, April 2010

Since the initiation of third party covered CTC screening at our institution, the overall number of total CRC screening exams (CTC + OC) has greatly increased. 2) Furthermore, the initiation of a CTC screening program did not lead to a reduction in the number of OC exams performed, conversely, a significant increase in the number of screening and total OC exams completed was observed. 3) Five years after the initiation of a CTC CRC screening program, OC remains the predominant screening modality for colorectal cancer.

General Surgery News

“Disruption of Screening Colonoscopy Looming on the Horizon. Can Focus on Better Quality Colonoscopy Prevent This?”

http://www.generalsurgerynews.com/ViewArticle.aspx?d=In+the+News&d_id=69&i=September+2011&i_id=762&a_id=19011

Caroline Helwick, SEPTEMBER 2011 | VOLUME: 38:9

In his lecture, Dr. Rex said that colonoscopy dominates colorectal cancer (CRC) screening in the United States and has had a “huge impact” on the practice of gastroenterology, but many wonder whether it will someday be supplanted by a newer, perhaps even better approach.

Health Imaging & IT

“Virtual Colonoscopy Going for the Gold (Standard)”

http://www.healthimaging.com/index.php?option=com_articles&division=hiit&r=1

Beth Walsh, 9/01/07

“Wait and “C”

http://www.imagingeconomics.com/issues/articles/2007-08_09.asp

Renee Dilulio, August 2007

"Third-Party Payor-Reimbursed Study Validates Virtual Colonoscopy"

http://www.imagingeconomics.com/issues/articles/2006-12_04.asp#3

Cat Vasko, 12/04/2006

Health Imaging.com

"Low-dose protocol doesn't affect 3D CTC" by Editorial Staff, Healthimaging.com

<http://www.healthimaging.com/topics/advanced-visualization/low-dose-protocol-doesnt-affect-3d-ctc>

Japan Radiological Society

"Initial experience with computed tomographic colonography applied for noncolorectal cancerous conditions"

<http://www.springerlink.com/content/w6403n34r01w6015/>

Tamaki Ichikawa · Shuichi Kawada · Satoru Hirata · Shu Ikeda · Yuuki Sato · Yutaka Imai, July 2011, Vol. 29:6, pp. 386-393) Jpn J Radiol (2011) 29:386–393 DOI 10.1007/s11604-011-0569-7

The indications for CTC were varied for patients with noncolorectal cancerous conditions. CTC was not necessarily required for the diagnosis of noncolorectal cancers. Unlike colonoscopy or CT without preparation, CTC was able prove the existence of both colonic and extracolonic findings, so it may reduce the number of colonoscopies performed after CTC. It may also be used in weakened patients with malignancy who were unable to undergo colonoscopy.

Journal of the American College of Radiology

"Adoption of CT Colonography by US Hospitals"

[http://www.jacr.org/article/S1546-1440\(10\)00444-8/abstract](http://www.jacr.org/article/S1546-1440(10)00444-8/abstract)

Megan McHugh, PhD, Awo Osei-Anto, MPP, Carrie N. Klabunde, PhD, Barbara A. Galen, MSN, CRNP, CNMT, March 2011, Volume 8, Issue 3, Pages 169-174

Growth of CT colonographic services at US hospitals occurred even in the absence of Medicare coverage or agreement among national guideline-setting organizations regarding CTC's use in screening. Almost one-third of hospitals that offer CTC do not offer optical colonoscopy and may not be prepared to provide adequate follow-up for patients with failed CTC.

“Clinical Use of CT Colonography for Colorectal Cancer Screening in Military Training Facilities and Potential Impact on HEDIS Measures”

[http://www.jacr.org/article/S1546-1440\(12\)00277-3/abstract](http://www.jacr.org/article/S1546-1440(12)00277-3/abstract)

Brooks D. Cash, MD, Kathryn Stamps, MPH, Elizabeth G. McFarland, MD, Andrew R. Spiegel, Esq, Sally W. Wade, MPH

CTC is actively being used for CRC screening across military treatment facilities. The inclusion of CTC as a HEDIS-compliant CRC screening test has the potential to significantly increase health care system compliance for National Committee for Quality Assurance CRC screening measures.

Journal of Clinical Oncology

“Racial Disparities in Stage-Specific Colorectal Cancer Mortality Rates From 1985 to 2008”

<http://jco.ascopubs.org/gca?gca=jco%3BJCO.2011.37.5527v1&allch=&submit=Go>

Anthony S. Robbins, Rebecca L. Siegel, and Ahmedin Jemal, JCO JCO.2011.37.5527; published online on December 19, 2011

The black-white disparities in CRC mortality increased for each stage of the disease, but the overall disparity in overall mortality was largely driven by trends for late-stage disease. Concerted efforts to prevent or detect CRC at earlier stages in blacks could improve the worsening black-white disparities

Journal of Computer Assisted Tomography

"Polyp Detection at 3-Dimensional Endoluminal Computed Tomography Colonography: Sensitivity of One-Way Fly-Through at 120 Degrees Field-of-View Angle"

http://journals.lww.com/jcat/Abstract/2009/07000/Polyp_Detection_at_3_Dimensional_Endoluminal.27.aspx

by Pickhardt, Perry J. MD; Schumacher, Clark MD; Kim, David H. MD, Journal of Computer Assisted Tomography: July/August 2009 - Volume 33 - Issue 4 - pp 631-635 doi: 0.1097/RCT.0b013e31819778ea

Journal of General Internal Medicine

“Predictors of CT Colonography Utilization Among Asymptomatic Medicare

Beneficiaries” March 29, 2013

<http://link.springer.com/article/10.1007/s11606-013-2414-4/fulltext.html>

Hanna M. Zafar, MD MHS¹, Jianing Yang, BS², Michael Harhay, MPH², Anna Lev-Toaff, MD¹, and Katrina Armstrong, MD MSCE²

¹Department of Radiology, Hospital of the University of Pennsylvania, Philadelphia, PA, USA; ²Department of Internal Medicine, Hospital of the University of Pennsylvania, Philadelphia, PA, USA.

During the 2 years preceding CMS denial for screening, CTC was targeted to asymptomatic patients with relatively appropriate clinical indications for CTC/not receiving OC. However, CTC utilization was lower among certain demographic groups, including minority patients. These findings raise the possibility that future coverage of screening CTC might exacerbate disparities in colorectal cancer screening while increasing overall screening rates.

The Journal of Urology

"Prevalence of Urolithiasis in Asymptomatic Adults: Objective Determination Using Low Dose Noncontrast Computerized Tomography",

<http://www.sciencedirect.com/science/article/pii/S0022534709029383>

Cody J. Boyce, Perry J. Pickhardt, Edward M. Lawrence, David H. Kim, and Richard J. Bruce

A clinical study of more than 5,000 asymptomatic individuals is shedding new light on the prevalence and sequelae of stone disease in adults screened with virtual colonoscopy. Researchers found evidence of calculi in nearly 9% of the study population, results that tweak assumptions about groups thought to be at higher risk of stone disease.

Urolithiasis is an expensive and time-consuming condition for healthcare providers to treat, accounting for more than 2 million office visits and nearly 200,000 hospital admissions each year, with estimated costs of more than \$2 billion annually in the U.S., noted study authors Dr. Cody Boyce, Dr. Perry Pickhardt, Dr. Edward Lawrence, Dr. David Kim, and Dr. Richard Bruce from the University of Wisconsin School of Medicine and Public Health in Madison. Studies also suggest that the incidence of symptomatic stone disease is increasing, they wrote.

Kay Granger

"CMS Made the Wrong Decision", 05/12/2009

<http://www.viatronix.com/pdfs/Granger.pdf>

The Lancet Oncology

“Participation and yield of colonoscopy versus non-cathartic CT colonography in population-based screening for colorectal cancer: a randomised controlled trial”

[http://www.thelancet.com/journals/lanonc/article/PIIS1470-2045\(11\)70283-2/abstract](http://www.thelancet.com/journals/lanonc/article/PIIS1470-2045(11)70283-2/abstract)

Esther M Stoop*, Margriet C de Haan*, Thomas R de Wijkerslooth, Patrick M Bossuyt, Marjolein van Ballegooijen, C Yung Nio, Marc J van de Vijver, Katharina Biermann, Maarten Thomeer, Monique E van Leerdam, Paul Fockens, Jaap Stoker, Ernst J Kuipers, Evelien Dekker, Published Online: November 15, 2011

Participation in colorectal cancer screening with CT colonography was significantly better than with colonoscopy, but colonoscopy identified significantly more advanced neoplasia per 100 participants than did CT colonography. The diagnostic yield for advanced neoplasia per 100 invitees was similar for both strategies, indicating that both techniques can be used for population-based screening for colorectal cancer. Other factors such as cost effectiveness and perceived burden should be taken into account when deciding which technique is preferable.

“Strong Evidence in Support of CT Colonography Screening”

[http://www.thelancet.com/journals/lanonc/article/PIIS1470-2045\(11\)70297-2/fulltext](http://www.thelancet.com/journals/lanonc/article/PIIS1470-2045(11)70297-2/fulltext)

Perry J. Pickhardt, M.D., Published Online: November 15, 2011

The bottom line is quite simple—too many people are dying of a readily preventable disease. The issue with screening for colorectal cancer is not related to test efficacy per se, but rather to the willingness of patient participation (and study availability). By offering the additional option of CT colonography for screening, overall patient outcomes will be positively affected by the equivalent (or greater) yield for advanced neoplasia coupled with a decrease in complications and costs.

“Computed tomographic colonography versus barium enema for diagnosis of colorectal cancer or large polyps in symptomatic patients (SIGGAR): a multicentre randomised trial”

<http://www.sciencedirect.com/science/article/pii/S0140673612621242>

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Prof [Dion Morton](#), FRCS, Prof [Jane Wardle](#), PhD^a, Prof [Wendy Atkin](#), PhD^b, for the SIGGAR investigators [‡]

Available online 14 February 2013

CTC is a more sensitive test than BE. Our results suggest that CTC should be the preferred radiological test for patients with symptoms suggestive of colorectal cancer.

[Computed tomographic colonography versus colonoscopy for investigation of patients with symptoms suggestive of colorectal cancer \(SIGGAR\): a multicentre randomised trial](http://www.sciencedirect.com/science/article/pii/S0140673612621862)

<http://www.sciencedirect.com/science/article/pii/S0140673612621862>

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Guidelines are needed to reduce the referral rate after CTC. For most patients, however, CTC provides a similarly sensitive, less invasive alternative to colonoscopy.

[“Assessment of volumetric growth rates of small colorectal polyps with CT colonography: a longitudinal study of natural history”](http://www.thelancet.com/journals/lanonc/article/PIIS1470-2045(13)70216-X/abstract)

[http://www.thelancet.com/journals/lanonc/article/PIIS1470-2045\(13\)70216-X/abstract](http://www.thelancet.com/journals/lanonc/article/PIIS1470-2045(13)70216-X/abstract)

Dr Perry J Pickhardt MD, David H Kim MD, B Dustin Pooler MD, J Louis Hinshaw MD, Duncan Barlow MD, Don Jensen MD, Mark Reichelderfer MD, Brooks D Cash MD The Lancet Oncology, Early Online Publication, 7 June 2013. doi:10.1016/S1470-2045(13)70216-X [Cite or Link Using DOI](#)

Volumetric growth assessment of small colorectal polyps could be a useful biomarker for determination of clinical importance. Advanced adenomas show more rapid growth than non-advanced adenomas, whereas most other small polyps remain stable or regress. Our findings might allow for less invasive

National Cancer Institute – Life Lines

[“Colorectal Cancer Screening: for African Americans, It’s about Prevention, Not Just Detection”](http://www.cancer.gov/cancertopics/disparities/lifelines/2013/2013-colorectal-cancer-AA.pdf) March 2013 by National Cancer Institute

<http://www.cancer.gov/cancertopics/disparities/lifelines/2013/2013-colorectal-cancer-AA.pdf>

Nature Reviews Clinical Oncology

[“Screening: CT colonography: time for clinical implementation”](http://www.nature.com/nrclinonc/journal/v6/n4/full/nrclinonc.2009.20.html), Perry J. Pickhardt, MD, April 2009

<http://www.nature.com/nrclinonc/journal/v6/n4/full/nrclinonc.2009.20.html>

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Radiology

Colorectal and Extracolonic Cancers Detected at Screening CT Colonography in 10 286 Asymptomatic Adults,

<http://radiology.rsna.org/email?gca=radiology;255/1/83¤t-view-path=/content/255/1/83.full.pdf+html>

Authors: 1. Perry J. Pickhardt, MD, 2. David H. Kim, MD, 3. Ryan J. Meiners, MD, 4. Kimberly S. Wyatt, MD, 5. Meghan E. Hanson, MD, 6. Duncan S. Barlow, MD, 7. Priscilla A. Cullen, RN, 8. Rahim A. Remtulla, MD and 9. Brooks D. Cash, MD

The overall detection rate of unsuspected cancer is approximately one per 200 asymptomatic adults undergoing routine screening CT colonography, including about one invasive CRC per 500 cases and one extracolonic cancer per 300 cases. Detection and treatment at an early presymptomatic stage may have contributed to the favorable outcome.

CT Colonography: Performance and Program Outcome Measures in an Older Screening Population,

<http://radiology.rsna.org/content/254/2/493.abstract>

David H. Kim, MD, Perry J. Pickhardt, MD, Meghan E. Hanson, MD and J. Louis Hinshaw, MD

Purpose: To evaluate computed tomographic (CT) colonography performance and program outcome measures in an older cohort (65–79 years) of an established large-scale colorectal cancer screening program.

"Unsuspected Extracolonic Findings at Screening CT Colonography: Clinical and Economic Impact",

<http://radiology.rsna.org/content/241/2/417.abstract?maxtoshow=&HITS=10&hits=10&RESULTFORMAT=&author1=pickhardt&searchid=1&FIRSTINDEX=0&sortspec=relevance&resourcetype=HWCIT>

Perry J. Pickhardt, MD, Meghan E. Hanson, MD, David J. Vanness, PhD, Justin Y. Lo, MS, David H. Kim, MD, Andrew J. Taylor, MD, Thomas C. Winter, MD, and J. Louis Hinshaw, MD, Radiology 2008;249:151-159

Detection of relevant unsuspected extracolonic disease at CT colonographic screening is not rare, accounting for a relatively large percentage of cases in which additional workup was recommended. Judicious handling of potential extracolonic findings is warranted to balance the cost of additional workup against the potential for early detection of important disease, because many findings will prove to be of no clinical consequence.

"Screening for Colorectal Neoplasia with CT Colonography: Initial Experience from the 1st Year of Coverage by Third-Party Payers",

<http://radiology.rsna.org/content/241/2/417.abstract?maxtoshow=&HITS=10&hits=10&RESULTFORMAT=&author1=pickhardt&searchid=1&FIRSTINDEX=0&sortspec=relevance&resourcetype=HWCIT>

Perry J. Pickhardt, MD, Andrew J. Taylor, MD, David H. Kim, MD, Mark Reichelderfer, MD, Deepak V. Gopal, MD, and Patrick R. Pfau, MD, 2006. 0:2412052007

As a primary colorectal screening tool, CT colonography covered by third-party payers has an acceptably low endoscopic referral rate and a high concordance of positive findings at optical colonoscopy.

"Linear Polyp Measurement at CT Colonography: In Vitro and in Vivo Comparison

of Two-Dimensional and Three-dimensional Displays",

<http://radiology.rsna.org/content/236/3/872.abstract?maxtoshow=&HITS=10&hits=10&RESULTFORMAT=&author1=pickhardt&searchid=1&FIRSTINDEX=0&sortspec=relevance&resourcetype=HWCIT>

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Linear polyp measurement on 3D endoluminal views was significantly more accurate than measurement on 2D transverse, coronal, or sagittal views, both in vitro and in vivo, for the CT colonography system evaluated. Use of the optimized 2D view substantially reduced 2D measurement error and may be valuable when used in conjunction with 3D measurement.

"Building a CT Colonography Program: Necessary Ingredients for Reimbursement and Clinical Success",

<http://radiology.rsna.org/content/235/1/17.full?maxtoshow=&HITS=80&hits=80&RESULTFORMAT=&author1=pickhardt&searchid=1&FIRSTINDEX=0&sortspec=relevance&resourcetype=HWCIT>

Perry J. Pickhardt, MD, Andrew J. Taylor, MD, Gary L. Johnson, MD, Lawrence A. Fleming, MD, Debra A. Jones, MD, Patrick R. Pfau, MD, Mark Reichelderfer, MD, 2005; 235:17-20

The challenges facing widespread implementation of CT colonography programs for primary screening are substantial but certainly not insurmountable.

"Incidence of Colonic Perforation at CT Colonography: Review of Existing Data and Implications for Screening of Asymptomatic Adults",

<http://radiology.rsna.org/content/239/2/313.full?maxtoshow=&HITS=80&hits=80&RESULTFORMAT=&author1=pickhardt&searchid=1&FIRSTINDEX=0&sortspec=relevance&resourcetype=HWCIT>

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The actual risk of colonic perforation at CT colonography is exceedingly low and may likely approach zero in asymptomatic patients who are undergoing screening when specific techniques are employed.

"CT Colonography in the Detection of Colorectal Polyps and Cancer: Systematic Review, Meta-Analysis, and Proposed Minimum Data Set for Study Level Reporting"

http://radiology.rsna.org/content/237/3/893?ijkey=74bdf96b48fc6b038e54e7b58ec73ccddee07da&keytype=tf_ipsecsha&linkType=ABST&journalCode=radiology&resid=237/3/893

Steve Halligan, MD, FRCP, FRCR, Douglas G. Altman, DSc, Stuart A. Taylor, MD, MRCP, FRCR, Susan Mallett, DPhil, Jonathan J. Deeks, MSc, Clive I. Bartram, FRCP, FRCS, FRCR and Wendy Atkin, PhD, December 2011, 261 (3)

CT colonography seems sufficiently sensitive and specific in the detection of large and medium polyps; it is especially sensitive in the detection of symptomatic cancer. Studies are poorly reported, however, and the authors propose a minimum data set for study reporting.

The National CT Colonography Trial: Assessment of Accuracy in Participants 65 Years of Age and Older

C. Daniel Johnson, MD, MMM, For the Group, February 12, 2012

For most measures of diagnostic performance and in most subsets, the difference between senior-aged participants and those younger than 65 years was not statistically significant.

Radiology Today

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<http://online.wsj.com/article/SB122515172081974303.html>

By Rhonda L. Rundle, The Wall Street Journal, 10/28/2008

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Allan S. Brett, M.D., Journal Watch, November 1, 2007, Vol 27 No. 21