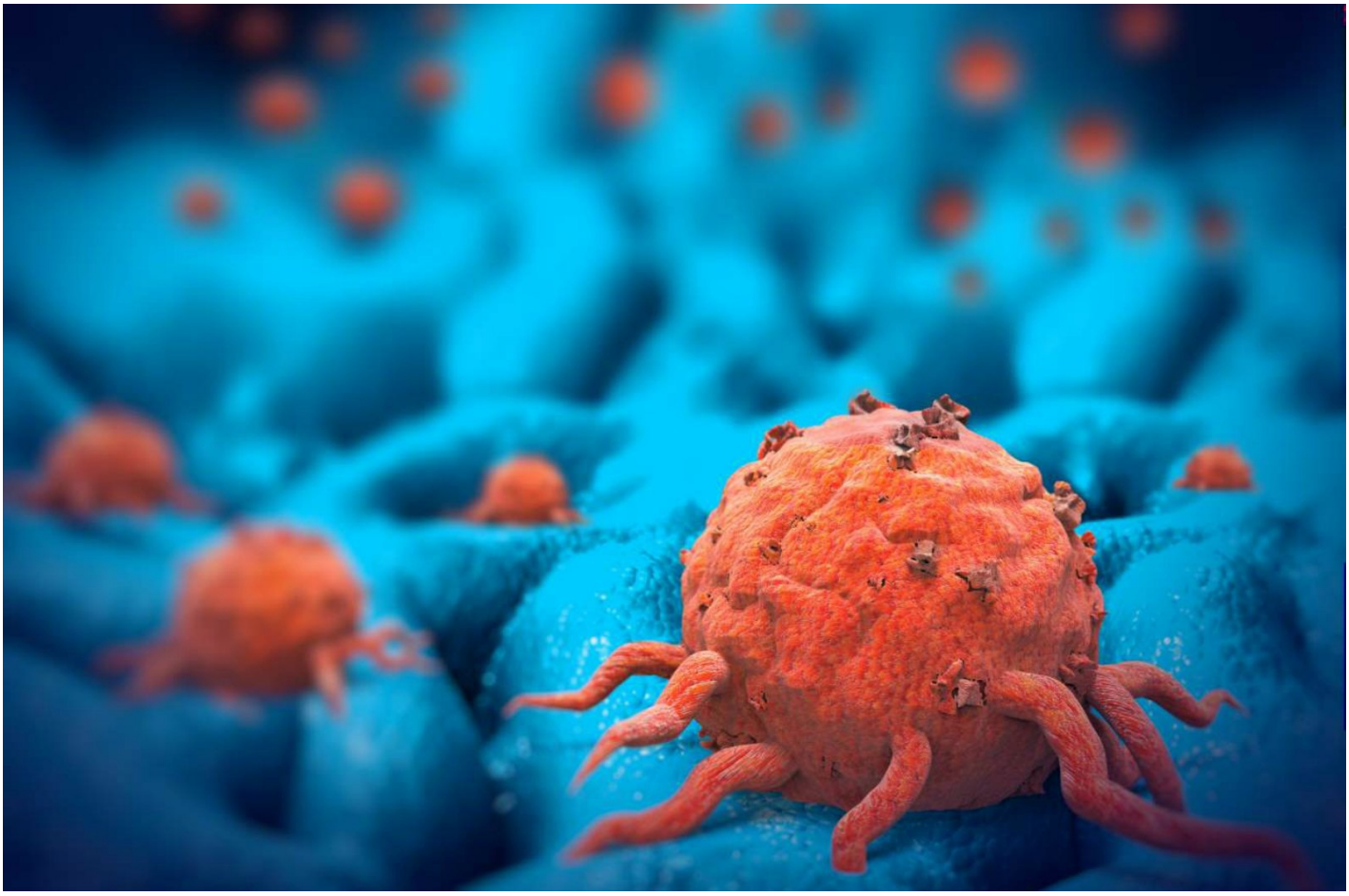
3-D Virtual Colonoscopies: Changing Attitudes, Reducing Cancer

SUNY Stony Brook



Colorectal cancer is a leading cause of cancer-related deaths worldwide and claims about 677,000 men and women annually, according to the World Health Organization. This cancer burden can be decreased if cases are detected and treated early. Unfortunately, most individuals over 50 avoid the unpleasant and invasive tests that can screen for colorectal cancer or precancerous growths—until now.

A new 3-D Virtual Colonoscopy, also known as computed tomography (CT) colonography, is changing the way people view colorectal screening. It is expected to become more commonly used than a conventional optical colonoscopy thanks to its non-invasive nature. The procedure takes less than 15 minutes and typically requires the patient to drink a contrast solution, which eliminates the need for a harsh purgative prior to the scanning. The patient, without being sedated and after a small tube is inserted in the rectum to inflate the colon with CO2, lays on his/her back and stomach while a CT scan takes pictures of the abdomen and pelvis in several seconds.

This fast, safe and cost effective procedure is based on patented diagnostic 3-D imaging software, techniques and a

computer system developed by a Stony Brook University research team led by its inventor, Arie E. Kaufman, a Distinguished Professor and Chairman of the Department of Computer Science who pioneered the field of "volumetric representation." Unlike an ordinary 2-D computer image, a 3-D volumetric representation is a stack of 2-D images laid on top of each other forming a continuous 3-D space. Development of volumetric representation, which was funded by the National Science Foundation, has led to a number of advances in software for graphics display and graphics acceleration hardware.

> *By offering the capability to screen lots of people quickly, easily, inexpensively and noninvasively, the virtual colonoscopy can change the way people throughout the world view colorectal screening and start to save thousands of lives worldwide through early detection and treatment,*
>
> Arie E. Kaufman

In the case of the 3-D Virtual Colonoscopy, approved for use in the United States by the Food and Drug Administration, this innovative computer graphics technology puts the CT images together into a high quality 3-D computerized image of the colon so a physician can see 100 percent of its surface vs. the estimated 77 percent with a conventional colonoscopy. After the exam a radiologist can actually "fly through" the patient's virtual colon, from beginning to end, and around all folds, thoroughly searching for polyps that are as small as a few millimeters. By contrast, a conventional colonoscopy using a fiber optic endoscope is invasive and expensive, and requires a day of preparation involving laxatives and usually a day for the procedure since the patientmust be sedated. A conventional colonoscopy also carries the risk of perforation of the colon wall and even a small risk of death.

To date, more than 100 potentially lifesaving 3-D Virtual Colonoscopy systems have been used in the United States to screen thousands of patients. In 2008, both Siemens Healthcare of Germany and GE Healthcare of General Electric Company signed non-exclusive licenses for the portfolio of innovations developed by Kaufman and his team.

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