New Ways to Detect Colon Cancer

3-D virtual screening now being used

Photo: Stony Brook University

Dr. Arie Kaufman showcases a 3-D image generated by the virtual colonoscopy software he invented with a team of computer scientists and radiologists at Stony Brook University.

What if your physician could take a walk, or fly, through one of your internal organs to see if it's healthy? That's possible now with the colon. The result is a "virtual colonoscopy," which doesn't require a tube-camera to be placed inside your body.

By Christopher Klose

"Walking through the hall one day, it suddenly dawned on me that you could actually 'fly' through organs of the body. So we put two-plus-two together," recalls Arie Kaufman, chairman of the computer science department at New York's Stony Brook University. Dr. Kaufman is one of the world's leading researchers in the high-tech medical fields of biomedical visualization, computer graphics, virtual reality, and multimedia.

The year was 1994. Kaufman's "two-plus-two" was a respirator pipe—like a garden hose with tiny holes in the sides—eraser, pair of scissors, tank of water, and spiral CT (computed tomography) scanner.

"We cut the eraser into three pieces, to simulate polyps, glued them inside the respirator pipe and submersed the pipe in water, scanned it, looked at the results—and 'Bingo!' We had proved you could scan a tubular structure—such as a human organ, like the colon—and view it in virtual reality."

Later, he and his team used it with anatomically detailed, three-dimensional representations of a cadaver (dead body) from the National Library of Medicine's Visible Human project (www.nlm.nih.gov).

By 1996, Kaufman and his colleagues had patented a pioneering computer software system and techniques for 3-D virtual colonoscopy for colon cancer screening.

"Things click in the life of an inventor," says Kaufman. "You use your life experience; that's what I like."

First approved by the U.S. Food and Drug Administration in 2000, thanks to continuing improvements, Kaufman's system today is able to "map" the colon wall, forming the basis for an electronic biopsy (medical test) of the entire colon surface.

"It doesn't replace a real biopsy," Kaufman says. "But it gives an initial indication of the medical significance of the abnormalities and can automatically detect and visualize masses and abnormalities, just like a mammogram for the colon."

Among its advantages, virtual colonoscopies are quicker and cheaper than standard colonoscopies. Dr. Kaufman's newest system, although not widely available, even makes it possible to see colon walls without having to physically evacuate the bowels. So people don't need to do the dreaded "complete bowel preparation."

"It's been very exciting to help save lives," Dr. Kaufman says of his work. "But most important, everyone over 50 needs to get screened. Most colorectal cancer can be prevented. Detect early, remove polyps, and the cancer is gone!"

Dr. Kaufman is now working on a similar system for the prostate.