Double vision: hybrid medical imaging technology may shed new light on cancer

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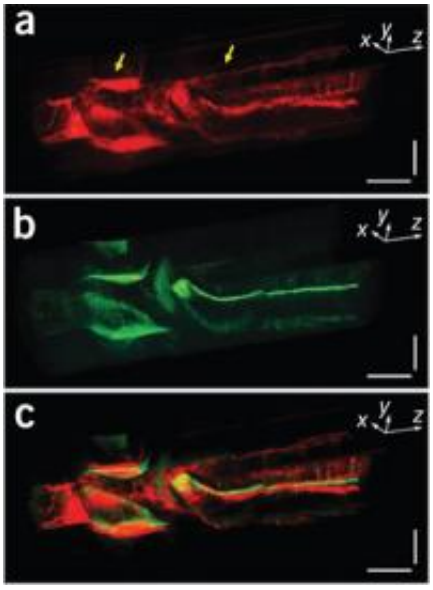

Simultaneous photoacoustic (a) and ultrasound (b) images of a rabbit esophagus show the clarity and detail gained by combining the two imaging techniques (c).

(Medical Xpress) -- Scientists from the University of Southern California in Los Angeles and Washington University in St. Louis have developed a new type of medical imaging that gives doctors a new look at live internal organs.

The imaging combines two existing forms of medical imaging — photoacoustic and ultrasound — and uses them to generate a combined image that high-contrast, high-resolution image that could help doctors

spot tumors more quickly.

“Photoacoustic endoscopy provides deeper penetration than optical endoscopy and more functional contrast than ultrasonic endoscopy,” said Lihong Wang, PhD, principle investigator and corresponding author of a study on the new technology that appeared in Nature Medicine on July 15, and the Gene K. Beare Distinguished Professor in the department of biomedical engineering in Engineering & Applied Science at Washington University in St. Louis.

Wang collaborated with Qifa Zhou, Ruimin Chen and K. Kirk Shung of USC as well as Joon-Mo Yang, Christopher Favazza, Junjie Yao, Xin Cai, Konstantin Maslov from Washington University.

“This is a first time that we have had small endoscopy with two imaging modalities,” said Qifa Zhou, one of the principal investigators and co-authors of the study, and a professor at the NIH Resource Center for Medical Ultrasonic Transducer Technology at USC Biomedical Engineering.

Currently, doctors routinely employ ultrasound endoscopy to study internal organs. This technique places an ultrasound camera, similar to ones used to create images of fetuses, on a flexible scope that can be inserted internally.

Though these images are typically high-resolution, they are also low-contrast — making a dim image, like a photograph shot in a poorly lit room.

To address the problem, Wang, Zhou and their teams added a photoacoustic imaging device to the ultrasound endoscope. The resulting camera zaps organ tissue with a light. When the light is absorbed by tissue, the tissue gets slightly hotter and expands. That expansion

produces a sound pressure wave that the ultrasound device on the endoscope picks up.

“This technology combines the best of both worlds,” said Kirk Shung, director of the NIH Resource Center and a professor of biomedical engineering at USC.

The researchers have tested their new device inside the gastrointestinal tract, producing in vivo images detailed enough to show blood vessels as well as the density of the tissue around them.

“This imaging has fine resolution and high contrast,” said Joon-Mo Yang, PhD, a postdoctoral researcher in Wang’s group. With a clearer picture of what’s going on inside the gastrointestinal tract, doctors could potentially spot colon and prostate cancers earlier.

Provided by Washington University in St. Louis