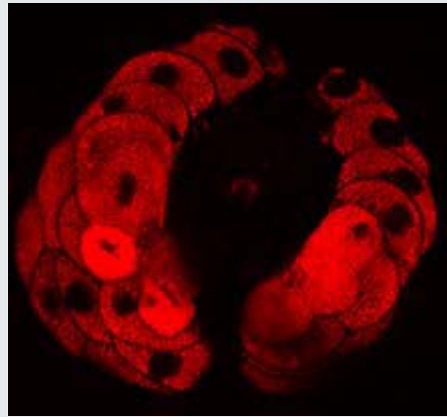



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Seeing Red: A new imaging technique produces video-quality images of red blood cells in living tissue. Researchers used the technology to observe the individual cells in the sebaceous gland in mouse skin (shown) as well as red blood cells moving through the capillaries of live mice.
 Credit: Brian Saar & Christian Freudiger / Harvard University

BIOMEDICINE

Lasers Give Scientists Close-Up View of the Skin

The new technique could lead to an alternative to biopsies.

MONDAY, DECEMBER 6, 2010 | BY JENNIFER CHU

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Scientists at Harvard University have developed a noninvasive imaging technique that captures images at the molecular level so quickly that they can "watch" red blood cells move through the capillaries of a live mouse. The system uses two laser beams set at different frequencies to excite specific types of molecules in the skin. A custom-designed detector picks up the excited molecular signal and translates

it into an image.

Sunney Xie, professor of chemistry and chemical biology at Harvard, says the technique could be a noninvasive alternative to often painful and time-consuming skin biopsies.

"To identify a solid tumor, tumor margins, and metastasis requires cutting and slicing tissue, staining it with dye, and looking at it under a microscope in a pathology lab next door—a process that could take 15 to 20 minutes," says Xie. "Here, we don't need a biopsy; we can obtain almost identical images without cutting the tissue."

Currently, systems like magnetic resonance imaging (MRI) and positron emission tomography (PET) serve as windows into the molecular world. Clinicians use these tools to identify diseases like cancer. To detect specific molecules or cancerous cells, MRI requires the patient to ingest or inject contrast agents, and PET requires low doses of radioactive substances. However, scientists have found that these compounds, also referred to as "labels," may harm or alter normal cellular processes.

In contrast, Xie's technique is label-free, drawing upon a noninvasive imaging system called Raman spectroscopy. Named after Indian scientist C.V. Raman, the technique takes advantage of the fact that certain molecular bonds vibrate at specific frequencies.

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When a monochromatic laser illuminates a molecular sample, the molecules scatter the light back in various ways depending on their natural vibrations.

However, Xie says, the signal from Raman spectroscopy is weak, particularly when applied to living tissue, where molecular composition is heterogeneous. A specific molecular signal could be lost amidst other backscattered noise. To improve sensitivity, Xie and graduate students Brian Saar

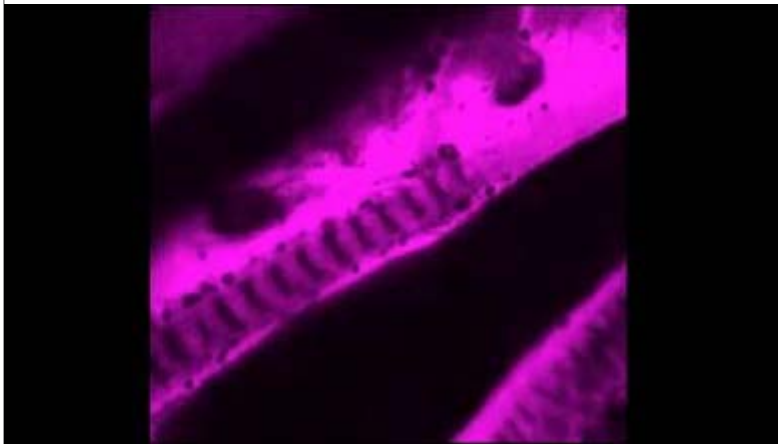
and Christian Freudiger developed a high-speed imaging setup with two lasers instead of the conventional one, exploiting a process known as stimulated Raman spectroscopy. The scientists' goal is to produce label-free images of a wide range of molecules in living animals and humans.

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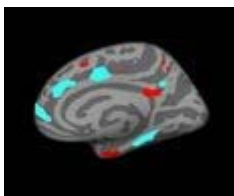
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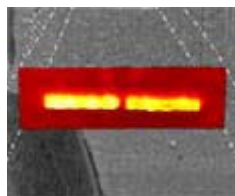
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martinaatayo

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Undesirable Long Term Derivative Offshoots

The non-invasive emphasis on the reported research investigations holds true to the extent that no visible physical impairment or pains on the part of the subject ensues. But the reported scale of molecular excitation induced by laser beams of differential frequency settings predisposes intuitive guess that the brains behind the experimentation must safeguard the examined subject for periodical observation of the targeted molecules within the context of possible cellular or molecular anomaly. Until the step is pursued and certified to be of zero derivative abnormal consequences, application to the benefit of human skin only conveys cloudy mind about aspect of safety. What an excellent investigation !!

Martin Atayo
Washington, D C 20013

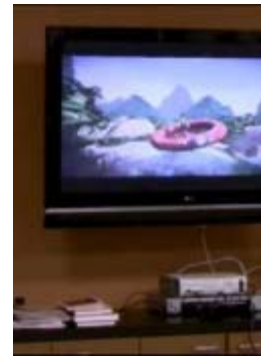
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Silacon

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Good Idea revisiting examined site

Who knows what damage can be done by lasers so re-examining the site makes sense. Your technology could detect deep vein thrombosis, I do believe. This would very valuable.

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