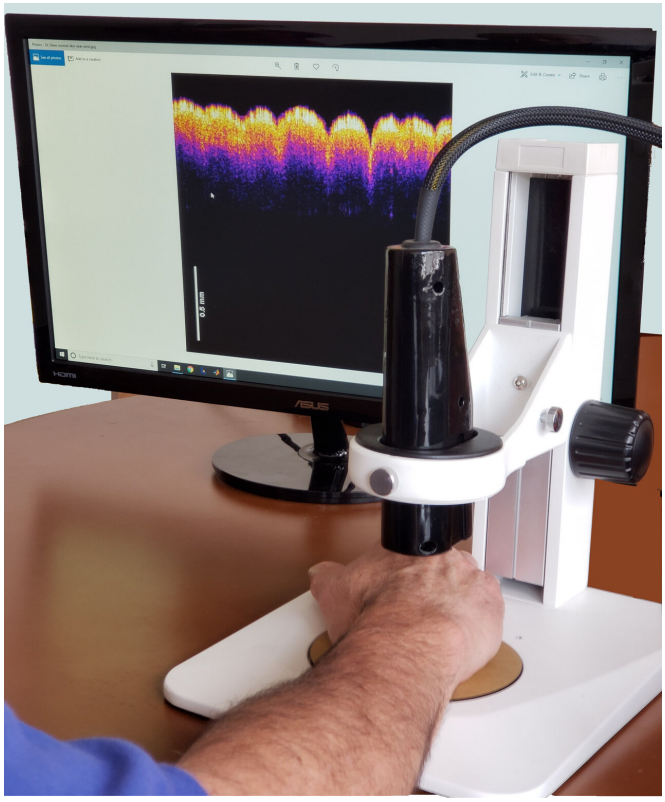
Scientists create 'virtual biopsy' device to detect skin tumors

13 June 2019



The virtual biopsy prototype device can distinguish between healthy skin and different types of skin lesions and carcinomas. Credit: Rutgers University

Using sound vibrations and pulses of near-infrared light, a Rutgers University scientist has developed a new "virtual biopsy" device that can quickly determine a skin lesion's depth and potential malignancy without using a scalpel.

The ability to analyze a skin tumor non-invasively could make biopsies much less risky and distressing to patients, according to a report in Wiley Online Library. Currently, physicians who perform surgical biopsies often don't know the extent of a lesion—and whether it will be necessary to refer the patient to a specialist for extensive tissue removal or plastic surgery—until surgery has already begun.

The first-of-its-kind experimental procedure, called vibrational optical coherence tomography (VOCT), creates a 3-D map of the legion's width and depth under the skin with a tiny laser diode. It also uses soundwaves to test the lesion's density and stiffness since cancer cells are stiffer than healthy cells. An inch-long speaker applies audible soundwaves against the skin to measure the skin's vibrations and determine whether the lesion is malignant.

"This procedure can be completed in 15 minutes with no discomfort to the patient, who feels no sensation from the light or the nearly inaudible sound. It's a significant improvement over surgical biopsies, which are invasive, expensive and time consuming," said lead researcher Frederick Silver, a professor of pathology and laboratory at Rutgers Robert Wood Johnson Medical School.

The study found that a prototype VOCT device, which awaits FDA approval for large-scale testing, is able to accurately distinguish between healthy skin and different types of skin lesions and carcinomas. The researchers tested the device over six months on four skin excisions and on eight volunteers without skin lesions. Further studies are needed to fine-tune the device's ability to identify a lesion's borders and areas of greatest density and stiffness, which would allow physicians to remove tumors with minimally invasive surgery.

More information: Frederick H. Silver et al, Comparative "virtual biopsies" of normal skin and skin lesions using vibrational optical coherence tomography, *Skin Research and Technology* (2019). DOI: 10.1111/srt.12712

Provided by Rutgers University

APA citation: Scientists create 'virtual biopsy' device to detect skin tumors (2019, June 13) retrieved 15 August 2022 from https://medicalxpress.com/news/2019-06-scientists-virtual-biopsy-device-skin.html

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