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New imaging technique identifies receptors for targeted cancer therapy

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Dartmouth researchers have developed a fluorescence imaging technique that can more accurately identify receptors for targeted cancer therapies without a tissue biopsy. They report on their findings in "Quantitative in vivo immunohistochemistry of epidermal growth factor receptor using a receptor concentration imaging approach," which was recently published in *Cancer Research*.

"Protein overexpression is a hallmark of certain cancers and is used in clinical oncology to personalize treatment through tumor detection, molecular therapies, and therapeutic monitoring," said lead author Kimberley S. Samkoe, assistant professor of Surgery at the Geisel School of Medicine and adjunct assistant professor at Thayer School of Engineering. "Protein expression is currently measured through a total protein analysis of tumor tissue. This new technique allows us to accurately determine the amount of protein receptors available for binding a drug without invasive biopsy."

The researchers developed a dual-tracer in vivo receptor concentration imaging (RCI) technique that involves the simultaneous injection of both a targeted and a non-targeted imaging agent. They then studied the protein expression of five tumors, comparing the RCI data to that determined by clinical immunohistochemistry, either scored by a pathologist (as performed in the clinic) or analyzed independently by a computer. They found that the protein expression determined by RCI strongly correlated to that determined by tissue analysis. They also found that commonly used techniques of measuring protein expression, such as

Western blots or flow cytometry, did not correlate to the RCI values, and in fact over-predicted the number of receptors available for therapeutic or diagnostic targeting.

"Accurately determining the population of protein receptors in a tumor available for targeting by molecular therapies or diagnostic imaging agents can greatly impact oncology patient outcomes," said Samkoe. "Our in vivo receptor concentration imaging technique is a novel approach for fluorescence imaging that can potentially impact clinical assessment of tumor status and malignant tissue classification."

Samkoe noted that this study looks at the average receptor expression within the tumor. The next step will be to look at tumors on a microscopic level in order to correlate receptor expression to distinct physiological features such as cellular viability, cellular type, vascularity, and overall tumor architecture

More information: cancerres.aacrjournals.org/con … 472.CAN-14-0141.long

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