Scientists develop crystal ball for personalized cancer treatment

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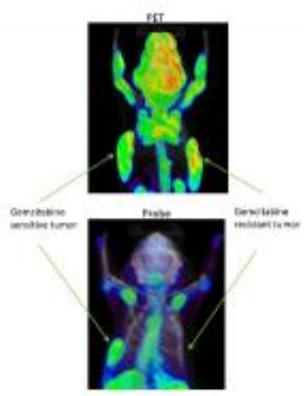

Top, a PET scan reveals a mouse with two tumors; the left tumor is gemcitabine-sensitive and the right tumor is gemcitabine-resistant. Below, the UCLA probe is absorbed only by the cells of the (left) tumor that responds to gemcitabine.

For many cancer patients, chemotherapy can be worse than cancer itself. A patient may respond to one drug but not another -- or the tumor may mutate and stop responding to the drug -- resulting in months of wasted time, ineffective treatment and toxic side effects.

Now UCLA scientists have tested a non-invasive approach that may one day allow doctors to evaluate a tumor's response to a drug before prescribing therapy, enabling physicians to quickly pinpoint the most effective treatment and personalize it to the patient's unique

biochemistry. The *Proceedings of the National Academy of Sciences* publishes the UCLA findings in its Feb. 2 advance online edition.

"For the first time, we can watch a chemotherapy drug working inside the living body in real time," explained Dr. Caius Radu, a researcher at the Crump Institute for Molecular Imaging and assistant professor of molecular and medical pharmacology at the David Geffen School of Medicine at UCLA. "We plan to test this method in healthy volunteers within the year to determine whether we can replicate our current results in humans."

In an earlier study, Radu and his colleagues created a small probe by slightly altering the molecular structure of gemcitabine, one of the most commonly used chemotherapy drugs. They labeled the probe with a special tag that enabled them to watch its movement throughout the body during imaging.

In this study, the UCLA team injected the probe into mice that had developed leukemia and lymphoma tumors. After an hour, the researchers imaged the animals' bodies with positron emission tomography (PET), a non-invasive scan often used on cancer patients to identify whether a tumor has spread from its original site or returned after remission.

"The PET scanner operates like a molecular camera, enabling us to watch biological processes in living animals and people," said Radu, who is also a member of the Jonsson Comprehensive Cancer Center at UCLA. "Because we tag the probe with positron-emitting particles, the cells that absorb it glow brighter under the PET scan."

"The PET scan offers a preview for how the tumor will react to a specific therapy," added first author Rachel Laing, a UCLA graduate researcher in molecular and medical pharmacology. "We believe that the

tumor cells that absorb the probe will also take up the drug. If the cells do not absorb the probe, it suggests that the tumor might respond better to another medication."

The UCLA researchers plan to expand the scope of their research by examining whether the probe can predict cellular response to several other widely used chemotherapy drugs. Their goal is to determine whether the probe can provide a diagnostic test of clinical value.

"The beauty of this approach is that it is completely non-invasive and without side effects," said Radu. "If we are successful in transporting this test to a clinical setting, patients will be able to go home immediately and resume their daily activities."

If testing in healthy subjects proves safe and effective, UCLA researchers will begin recruiting volunteers for a larger clinical study of the probe in cancer patients.

Source: University of California - Los Angeles