

'Organoids' can help pinpoint the right therapies for cancer patients

June 22 2020



Cancer cell during cell division. Credit: National Institutes of Health

Precision medicine, using the power of the human genome to diagnose and treat patients, is about to get even more precise.

A new program called PATRIOT, developed by the Translational Genomics Research Institute (TGen), an affiliate of City of Hope, is using organoids—laboratory cultures derived from samples of patient tumors—to provide a whole new level of accuracy in prescribing anti-cancer treatments.

PATRIOT builds on other precision medicine programs devised by Ashion Analytics, a TGen clinical laboratory, which uses its GEM ExTra proprietary test to match each patient's unique cancer to the best available cancer treatments.

PATRIOT, which stands for PATHway based RNA and DNA Integration with tumor Organoid Testing for clinical therapeutics, will be showcased in a study presentation June 22-24 at the second 2020 virtual annual meeting of the American Association for Cancer Research (AACR).

"Cancer tumors are complicated," said Dr. Sunil Sharma, Deputy Director of TGen Clinical Sciences and Chief of Translational Oncology and Drug Development at the HonorHealth Research Institute.

"PATRIOT is a very powerful platform that will make GEM ExTra even more powerful. This will expand the use of RNA analysis in a way that has never been used before."

In this system, organoids—which can mimic the reactions of solid tumors in patients' bodies—are grown in a laboratory and then used to test different anti-cancer therapies.

"It's a way of conducting clinical trials on a laboratory plate," said Dr. Sharma, who also is a Professor and Director of TGen's Applied Cancer Research and Drug Discovery Division.

The study being presented at AACR shows how Dr. Sharma's TGen lab,

using melanoma tumor samples provided by HonorHealth, used the new PATRIOT system to identify [potential therapeutic targets](#) by focusing on molecular pathways within [tumor cells](#), a level of analysis that goes beyond searching for mutations in DNA, and even builds on top of the intricate analysis of RNA-expression provided by Ashion's GEM ExTra.

"These druggable targets were validated on the tumor organoids," said Dr. Sharma, who hails the system as a whole new way to provide therapeutic benefit to patients. "This allows for a holistic assessment of a patient's tumor for improving therapy recommendations and expanding personalized therapy options."

In addition, he said, PATRIOT analysis of organoids gives investigators the ability to test immunotherapy options in the laboratory.

Ashion's GEM ExTra platform already has expanded the therapeutic potential of genomic sequencing by using RNA sequencing to identify novel fusions and alternate transcripts, providing additional [tumor](#) profiling data in addition to that identified by DNA sequencing.

Unlike many other genomic sequencing tests, which use panels of dozens or even hundreds of known cancer-causing genomic variants, Ashion's GEM ExTra screens cancer patients for all of the nearly 3 billion nucleotides, or letters, in human DNA, which includes more than 19,000 genes.

The next step, Dr. Sharma said, is to test the predictions from PATRIOT and GEM ExTra analysis of patient organoids in the laboratory to see if they might work in a larger clinical trial.

Provided by The Translational Genomics Research Institute

Citation: 'Organoids' can help pinpoint the right therapies for cancer patients (2020, June 22)
retrieved 20 April 2024 from
<https://medicalxpress.com/news/2020-06-organoids-therapies-cancer-patients.html>

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