

New RNA and DNA-sequencing platform matches thousands of drugs to late-stage cancer patients

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A comprehensive RNA and DNA sequencing platform benefits late-stage and drug-resistant multiple myeloma patients by determining which drugs would work best for them, according to results from a clinical trial published in *JCO Precision Oncology* in August.

The novel platform, created by Mount Sinai cancer, genomics, and precision health researchers, expands on traditional DNA-based approaches by using RNA sequencing to find targets for a broad swath of FDA-approved cancer drugs beyond those approved specifically for multiple myeloma. This approach was tested in a pilot [precision medicine](#) clinical trial with 64 patients with late-stage and drug resistant multiple myeloma, the second most common blood cancer. All of the patients had run out of other treatment options.

"Our study shows how a precision [medicine](#) approach incorporating RNA sequencing may identify viable and effective therapeutic options beyond the current FDA-approved armamentarium for [multiple myeloma](#) patients," said researcher Samir Parekh, MD, Associate Professor of Medicine (Hematology and Medical Oncology) and Oncological Sciences and Director of Translational Research in Myeloma at The Tisch Cancer Institute at the Icahn School of Medicine at Mount Sinai. "The trial has allowed us to test the accuracy of our platform, laying the foundation for our next-generation precision medicine framework."

The results of this study showed that a comprehensive approach that includes RNA sequencing can provide more treatments for patients with advanced disease beyond the standard DNA analysis currently available. A majority of the patients in the trial received a drug based on their cancer's RNA profile and many benefited from their personalized treatment plans.

"Current approaches in precision oncology aim at matching specific DNA mutations to drugs, but incorporation of genome-wide RNA profiles had not been clinically assessed before now," said researcher Alessandro Lagana, Ph.D., Assistant Professor of Genetics and Genomic Sciences at the Institute for Next Generation Healthcare and the Icahn Institute for Genomics and Multiscale Biology at the Icahn School of Medicine at Mount Sinai. "We expect RNA sequencing will play a larger role in the precise delivery of targeted drugs in oncology."

Mount Sinai researchers have already received funding to develop a next-generation clinical trial that will incorporate machine learning algorithms into this precision medicine platform, which will implement interactive learning techniques to refine the predictions based on a patient's success with the therapies and a physician's opinion of the treatment plan.

"This research is part of an accelerating paradigm shift in cancer therapy, where treatment may be given based on the specific genomic alterations observed in a patient's tumor, rather than on the tumor histology or tissue type," said Joel Dudley, Ph.D., Executive Vice President for Precision Health, Director of the Institute for Next Generation Healthcare, and Associate Professor of Genetics and Genomic Sciences at the Icahn School of Medicine at Mount Sinai.

"RNA sequencing will likely complement current precision medicine strategies in the near future due to its ability to capture more dynamic aspects of unique tumor biology and provide information beyond what is capable with DNA alone."

Provided by The Mount Sinai Hospital

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