

The future of precision immunology

January 30 2015



Precision medicine is changing the paradigm for how we approach cancer treatment.

In his State of the Union address, President Obama announced a new precision medicine initiative to work on finding a cure for cancer and other diseases. Howard L. Kaufman, a leading immunotherapy expert from Rutgers Cancer Institute of New Jersey recently shared his thoughts in the *Journal of Clinical Oncology* on the progress doctors have made in precision immunology – a type of precision medicine that involves creating a profile of a patient's immune system to fight disease. Kaufman, associate director for clinical science and chief surgical officer at the Cancer Institute, answered some questions from Rutgers Today on the future of the precision medicine field.

The concept of precision – or personalized – medicine

has evolved over the past decade. How far have we come?

Precision medicine is changing the paradigm for how we approach cancer treatment in the modern era. An improved understanding of which genetic mutations are present in individual cancers and how they drive [cancer cells](#) to grow has allowed us to develop more specific - or targeted - therapy for each patient. The ability to rapidly determine the genetic changes in an individual patient, a process that took years just a decade ago, may now be completed in days or even hours. New drugs have been developed that can be used to target the mutations. A similar revolution has taken place in immunology, which focuses on helping the [immune system](#) fight infection and other diseases, including cancer. We now not only have a better understanding of how cancer can outwit the immune system but also how the immune system can mediate tumor regression. This knowledge allows us to create an immune profile in patients and select appropriate immunotherapy to treat specific cancers.

You discuss a recently proposed concept called the 'cancer-immunity cycle' in your editorial. What is this and what does it mean for precision medicine efforts?

The cancer-immunity cycle is a process through which cancer cells are identified by the immune system and trigger a response to kill the tumor cells. While chemotherapy and other [targeted therapy](#) work directly, and quite often rapidly, on cancer cells, immunotherapy may take longer because it is being targeted to more cells that are needed for the immune system to attack multiple cancer cells. Individuals do not always develop immunity to a disease. People with hepatitis B virus, for instance, may take at least three vaccinations to be immunized and even then some patients may not develop immunity. Still, unlike chemotherapy and targeted therapy where resistance to treatment may develop,

immunotherapy effects appear to be long lasting, and in some cases may result in complete eradication of cancer.

Where do you see precision medicine and tumor immunotherapy efforts in the next 10 years?

In the future, we will likely be able to determine a patient's cancer risk earlier and have a profile of his or her immune system. This will allow a tailored treatment regimen with the highest likelihood of providing an improved outcome for patients with cancer. There is already some intriguing data that targeting the cancer cell through precision medicine and the immune system can have synergistic activity against cancer. This is best exemplified by melanoma, the most deadly form of skin [cancer](#), in which both targeted therapy and immunotherapy seem to have a role. Since 2011, seven [new drugs](#) have been approved for the systemic treatment of advanced melanoma, three are targeted therapy and four are immunotherapy agents. Clinical trials combining these drugs are well under way.

Provided by Rutgers University

Citation: The future of precision immunology (2015, January 30) retrieved 23 April 2024 from <https://medicalxpress.com/news/2015-01-future-precision-immunology.html>

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