What's been the most interesting development in your area in the last two years?

The whole notion of precision medicine has been gaining significant traction in recent years. While we have increasingly incorporated evidence-based algorithms into clinical care, the wealth and proliferation of molecularly-targeted agents, particularly in the field of oncology, has been astounding. At the same time, our capacity to obtain detailed genomic and other large-scale molecular data has grown by exponential proportion as sequencing technologies have undergone a generational leap. Moreover, we have entered an increasingly data-centric era with electronic health information feeding into databases from all directions and devices.

It is at the nexus of these transformative currents that President Obama announced the launch of the Precision Medicine Initiative in his 2015 State of the Union address. The initiative itself prescribes concrete federal-level steps to facilitate research efforts; however, its biggest significance perhaps is in emphasizing the exciting and profound potential to revolutionize how we improve health and treat disease. Corresponding efforts such as the Veterans Administration’s “Million Veterans Program” (MVP) to sequence 1 million genomes are well underway. In fact, the VA just announced over 500,000 patients accrued to the MVP, already making it the largest such biobank in existence and a potential treasure trove for future exploration.
What projects are you currently working on and are there opportunities for fellow faculty to participate?

The prevailing success and emphasis of precision medicine approaches in oncology to-date has been targeting actionable cancer-specific mutations (a recent example of this approach is the NCI-MATCH trial). However, it is increasingly clear that tolerability of and resistance to cancer therapy may also be a function of host physiology, environment and genetics. In brief, cancer cannot and should not be considered in isolation from the patients it affects. My over-arching research emphasis therefore is to investigate biomarkers of treatment-related toxicity and host-specific modifiers of efficacy.

At present, I am investigating potential genomic predictors of immunotherapy responsiveness in patients with melanoma and other cancers. I am also interested in exploring genetic modifiers of the side effects of other cancer therapies (e.g. radiotherapy), and will be working under the auspices of the computational biology program on multiple omics-related projects.

I am always eager to explore opportunities for collaboration, and in particular am looking to work with other faculty who would leverage the MVP over the coming years.

A hypothetical: if you could have one tool that would solve a seemingly impenetrable problem in your work, what would it do? You have unlimited resources to design this tool, so think big.

Imagine an electronic health record system that not only facilitates patient care, but could provide you with the latest evidence tailored to the patient sitting right in front of you. Imagine that the patient’s own genome could inform whether you would prescribe drug A or drug B, whether you might avoid a treatment entirely due to excess individualized risk, whether you might tell someone to get that scan every three months instead of annually. This truly is the heart and the dream of precision medicine, but it is and will remain unachievable without us being able to integrate our point-of-care observations and data with robust and deep learning.

I see the current structure of our electronic health record systems as perhaps the biggest obstacle to research and to the implementation of a rapid learning health system that could integrate point-of-care clinical decision support. Thinking “big” here, I would completely replace existent platforms with a new paradigm to capture structured patient information and facilitate templated observations. Data would flow seamlessly behind the scenes and constantly add to our aggregate knowledge. This new ecosystem would enable patients and their providers to interact with personalized health data (e.g. imaging, genomics, mobile health streams, biomarker levels) and the latest scientific evidence on an unprecedented level, all with the click of a button or two.

This dream probably sounds crazy, but it may surprise you to learn that we have the technology and the know-how to make this happen – today! What we lack is the audacity and the resources to actually pave a new way.