Precision medicine is not quite where you might think it should be ...


Cover story

What happened to precision medicine?

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When my husband of 27 years was diagnosed with stage IV metastatic renal cell carcinoma in February, I figured we had a fighting chance.

After covering health care for nearly 30 years, I thought I knew the best places to go for precision medicine — which specifically targets cancer based on a patient’s own genetic makeup.

Was I wrong. It turns out that while an entire industry has sprung up in the Valley that employs thousands of people and regularly pulls in millions of dollars in grants to find ways to target different diseases with genetic-based therapies, the progress has been slow on many fronts.

While it’s true there have been advances in precision medicine in some cancers — such as breast cancer — many other cancers, including kidney cancer, are nowhere close to getting similar treatment.

“Any time you’re trying to change an entire construct — and certainly health care is a very large complex construct — then it’s an evolutionary process. It’s not going to occur overnight. You have to be very careful what the construct is that you want to achieve, and you need to understand where you’re starting from,” said Anna Barker, a professor and co-director of Complex Adaptive Systems at Arizona State University and director of the National Biomarker Development Alliance.

Instead, many patients deal with basic standard of care treatment for those with other cancers, which means doctors try chemotherapy drugs they have seen work well on other patients — despite everyone’s genetic differences. It basically becomes a crap shoot.
Sticking with past treatments

Oncologists at Mayo Clinic started my husband Peter Gonzales on Novartis Oncology’s Votrient, a chemotherapy drug that costs $11,000 for a 30-day supply. The drug ate up the tumor like a hungry Pac Man, reducing it by 40 percent.

The challenge with all chemotherapies is that it is essentially a poison to humans. That’s what happened as Peter’s liver enzymes spiked dangerously, causing his oncologist to abandon the treatment after a month.

The doctor suggested it was time to try another chemo drug or perhaps radiation. That’s how it goes when precision medicine isn’t in the doctor’s medical bag.

Precision medicine still is in its infancy, Barker said, adding it’s only been since 2004 when she and a team of scientists sequenced the human genome when she was at the National Institutes of Health.

“The biggest challenge we face in precision medicine is understanding the biology of disease,” said Barker, who also is a professor at ASU. “The complexity of the biology of the human species is profound.”

Finding what works

As technology improves and it becomes less expensive to sequence a genome, scientists will get closer to developing precision medicine for more diseases. In addition, super computers and even artificial intelligence will be key in interrogating huge chunks of data to help determine what causes disease and what drugs respond to them, as well as analyzing the data, Barker said.

“Unless you can analyze the data, having the data doesn’t do you much good,” she said.

Slowing the process is collecting high-quality specimens to study and the inability for scientists to share data with each other. Another barrier is designing experiments that ask clinically relevant questions, Barker said.

“Sometimes people do interesting experiments but it has nothing to do with the impact of clinical care,” she said.

Yet another challenge is some cancers and other diseases just work better for precision medicine than others, said Dr. Kenneth Ramos, associate vice president for precision health services at the University of Arizona.

“Even within the space of cancer patients, some cancers are better suited for precision interventions than others, based on the progress that has been made,” he said.

While many patients may go into treatment with some idea they may get the latest in medical technology, it’s not always the case.

“I don’t want it to sound hopeless,” Barker said. “I’m very hopeful, but we have to be targeted and fixed to create a system that actually works.”

Gearing up for the future

As for Peter’s cancer — which first showed up 12 years ago in his kidney and was surgically removed,
but still managed to find its way into his lung — Barker said kidney cancer is a tough one.

“We haven’t had many drugs for kidney cancer, so what they have done is we talk about standard of care,” Baker said, adding that clinical trials are conducted based on what works best for the masses and not based on anyone’s molecular profile.

Barker’s dream is to have molecular tools that can diagnose disease early, well before reaching the point where drugs are needed, she said.

“For cancer, that’s often too late. We have to get ahead of these things,” she said. “What I want to see is molecular medicine and precision medicine develop for diagnostics, for early detection and ultimately prevention.”

Barker isn’t alone in believing in the future of precision medicine.

“There’s no question that implementation into the medical practice of genomics is absolutely here to stay. But it’s equally in an embryonic state,” said Jeffrey Trent, president and research director of the Translational Genomics Research Institute in Phoenix.  

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