Making Sense of Precision Medicine Test Results

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Andrew Schorr:
Hello and welcome to Patient Power. I'm Andrew Schorr. Well, I'm joined by really one of the pioneers of precision and personalized medicine, and that's Dr. Razelle Kurzrock, and she the Director for Personalized Cancer Therapy at University of California San Diego. Dr. Kurzrock, thanks so much for being with us.

Dr. Kurzrock:
My pleasure.

Andrew Schorr:
Dr. Kurzrock, so we've heard this term, personalized cancer therapy or precision medicine. So where are we now, and what's—what's its need? What's been wrong, if you will, with cancer therapy leading up to this?

Dr. Kurzrock:
So I think we're beginning to make real headway in this field, and what was wrong in the past is that we really did not understand well enough how to classify tumors, so we did it in the best way that we could, which was really pretty simple. We decided if a tumor came from the breast or from the lung or from the colon and we called it breast cancer or lung cancer or colon cancer, but that didn't tell us what was really wrong with each individual tumor.

Today we have tools like genomics where we can probe deep in the cell and understand specifically what is wrong with each patient's tumor, and we're beginning to be able to tailor therapy based on the specific abnormalities in each patient's cancer.

Andrew Schorr:
Okay. So I, as a two-time cancer survivor, both chronic lymphocytic leukemia myself and now with another one, myelofibrosis, I know I—you pull, or my doctor has a blood draw, you know, nine, 10 tubes of blood, and sometimes it gets sent off to some sophisticated lab. We've been hearing about something called next-generation sequencing. So is this the sort of supercomputing power that's beginning to look at the blood or the solid tumor tissue in a new way to get these insights?

Dr. Kurzrock:
That's exactly what the next-generation sequencing is. So the way we used to find out what was wrong with the tumor, the simple way, is with the light microscope, and that would allow us to look at the surface of the cell and say, oh, this cell comes from the breast, this is a breast cancer.

Next-generation sequencing is what I call the molecular microscope, but it's not really a microscope. It's a sophisticated, computerized way of looking at the tumor, looking at the DNA and finding out precisely what are the genetic abnormalities in that patient's DNA.

Andrew Schorr:
Hmm. Well, it could be complicated. Now, I think most patients are aware we have the Human Genome Project, and they were looking at sort of the healthy genetics, if you will. And I guess now you can see the aberrations when cancer has happened, but we don't know it all, do we? So you keep identifying new cancer genes, right?

Dr. Kurzrock:
Absolutely. So we've moved extraordinarily quickly in the last 10, 15 years, but I don't think we're at the end of the road. The more technology we have the more complex it actually gets but also the more we find things that we can actually specifically target to the benefit of patients.

Andrew Schorr:
Okay. So there you are, you're getting all this information that comes out, so you have these tools that may come out of a blood test or may be a biopsy, you do this next-generation sequencing. You're identifying new genes, and there are more and more medicines that are either approved or in development. How can a doctor and patient make sense of this?

Dr. Kurzrock:
So it is a little bit complex, and again we've made a lot of headway, but there's still a ways to go. So what a doctor can now get is a report that says not only that this is a breast cancer but will tell that doctor what the specific mutations in that patient's cancer are. And depending on that report, there may be five mutations or five abnormalities, or there could be 50 abnormalities.

So, of course, this is all an opportunity for the doctor to have new therapies that target those abnormalities, but in a way it's an embarrassment of riches, because the doctor now has almost too much information. And which of those abnormalities should the doctor prioritize? That becomes a challenge.

Andrew Schorr:
Hmm. And also, I mean you're at a university setting, and you have subspecialists who deal with certain more narrow areas of cancer. But in the U.S. and in many countries you have more general hematologists and oncologists who have to treat all comers, so they need help, I would think, with this input of data comes back for specific illnesses. So they need support, I guess, decision support.

Dr. Kurzrock:
I think the decision support is very critical at this point in time, and as we get more technology it's going to become even more critical. At UCSD, the way we approached it is in a partnership between myself and my colleagues at the supercomputer center where we began to develop ways of exploiting the computer capabilities to put very, very complicated data sets together and understand what we should be doing for individual patients.

Andrew Schorr:
Okay. So that means what are the cancer mutations that are being identified from the tests, which are the significant ones, right?

Dr. Kurzrock:
Absolutely.

Andrew Schorr:
And then—or which ones are sort of along for the ride, maybe, we could say. I think you call them—the bad guys are the driver mutations, I think you all call them, and then how does that line up with current therapies, investigational therapies and the combinations.

Let's talk for a minute about combination therapy, because so often in cancer you try to hit the cancer with a one-, two-, three-, even a one-, two-, three-, four-punch now so that permutations, if you will, get quite extensive.

Dr. Kurzrock:
That is exactly correct. So one of the problems in precision medicine is the patient will have a lot of different abnormalities in their genomics, but the doctor will then pick one of those abnormalities and try to target it. And obviously that's not enough. But the challenge in trying to target multiple abnormalities is how do you do that and what combinations of drugs do you use.

And just to show you the complexity, if there's 300 anti-cancer drugs and you want to do a two-drug combination, there's 45,000 two-drug combinations. And if you want to do a three-drug combination, there's 4.5 million, approximately, three-drug combinations. So figuring that out is not a simple task.

Andrew Schorr:
Okay. So to have supporting that, that is simply getting advice or guidance, but that can improve, I would think, the safety and the effectiveness of the cancer care you get, because you're getting what's right for you.

Dr. Kurzrock:
Absolutely. So more and more we're understanding that giving drugs randomly to patients, which is what we've sort of done in the past, and it's really been based on randomized trials, means that about 20 percent, sometimes 30 percent of patients will respond. And the other 70 or 80 percent of patients derive no benefit, or maybe they're even harmed by the drugs that we give.

So now what we're trying to do is with appropriate support how do we customize a combination for each individual patient in order to optimize the response for that particular patient.

Andrew Schorr:
Hmm. Okay. So what can we patients do to facilitate the growing understanding and complexity, benefit us rather than be under a sea of data and maybe not having the best decisions being made?

Dr. Kurzrock:
So that is actually quite a challenge. I think for patients it's very important to—especially if they have a disease where—which is a lethal disease, and that's true in a lot of metastatic solid tumors—for them to seek out physicians that understand not just traditional oncology but have a good understanding of targeted therapy, immunotherapy, genomics and the whole field of precision medicine and that are looking for new ways and participating in studies of this new way of doing treatments to optimize what we now know about cancer.

Andrew Schorr:
Okay. So I just want to summarize for a second. So it sounds like the increased computing power that's developed and increases year after year has enabled sequencing of what our tumor say or what our blood says, what their biopsy says. And now you're using supercomputing power to look at the combinations of available or clinical trial treatments to see what applies to an individual. Did I get it right?

Dr. Kurzrock:
Absolutely. What we know is that each tumor is very complicated, and each tumor is different from all other tumors, so we can't put patients in a basket and treat them all the same way. We need to understand the complexity of that individual's tumor, and we need to formulate a combination therapy strategy that is customized or tailored for that patient. And that requires really computing power and physicians that are very attuned to this new way of approaching patients.

Andrew Schorr:
Wow. Well, it's a field that continues to evolve. Dr. Kurzrock, I want to thank you for your leadership in this with your colleagues around the world in pushing this forward, personalized medicine, precise for us. And it sounds like now with what you're doing at UC San Diego in marrying supercomputing with these clinical results that people can get the best

care, and I hope that can proliferate. And I know for us patients, we'll talk this up, because we want to get what's right for us.

Thank you, Dr. Razelle Kurzrock, from UCSD for being with us today on Patient Power.

Dr. Kurzrock:
Thank you.

Andrew Schorr:
Okay. I'm Andrew Schorr. Stay tuned to precision medicine and speak up so you can get the right tests and the right analysis to help you and your doctor do what's right for you. Remember, knowledge can be the best medicine of all.