**ProjectXYZ - Clinical Trials Biomarker Testing - CompanyABC**

0:0:0.0 --> 0:0:8.20  
Angela Angle  
Great. So to start off this call would be helpful if you could just give a brief introduction to yourself and your experience and the the type of companies that you've worked at, that would be great.

0:0:9.550 --> 0:0:11.780  
Randy Elliot  
Certainly. So I have been.

0:0:12.590 --> 0:0:19.0  
Randy Elliot  
Working in this industry since at least 1999, depending on how you start counting.

0:0:19.400 --> 0:0:25.950  
Randy Elliot  
Umm and I started out in Human Genetics at xxx.

0:0:26.750 --> 0:0:39.590  
Randy Elliot  
From there I went to Harvard in the early days of genomics, and I was the first employee at the maybe the second at xxx, and I spent three years there building up.

0:0:40.370 --> 0:0:54.140  
Randy Elliot  
Tools and processes to understand genomics information. From there I went to get my PhD at xxx, where I worked in DNA repair cell biology.

0:0:55.260 --> 0:0:56.460  
Randy Elliot  
Molecular genetics.

0:0:57.690 --> 0:1:4.290  
Randy Elliot  
On some different disease areas, including oncology and neurological diseases.

0:1:4.780 --> 0:1:5.80  
Angela Angle  
Umm.

0:1:5.150 --> 0:1:5.740  
Randy Elliot  
Umm.

0:1:7.10 --> 0:1:14.900  
Randy Elliot  
From there to the xxxx, where I spent about five years working mostly on RNA, viruses and genomic tools for those.

0:1:16.620 --> 0:1:29.330  
Randy Elliot  
There, the xxx, where I was conducting genomics related oncology research with the team. I had a team at the xxx and xxx and then I went to.

0:1:30.10 --> 0:1:41.110  
Randy Elliot  
xxxx for 10 years to build up their translational medicine approach. So I was fired when it was an early startup to build that team and to consider.

0:1:42.190 --> 0:1:43.750  
Randy Elliot  
You know how to figure out what every.

0:1:44.560 --> 0:1:52.170  
Randy Elliot  
You know, MC marker means across every type of cancer and build up the database and the reporting services both for patients and biopharma.

0:1:54.460 --> 0:1:58.560  
Randy Elliot  
And I not supposed to mention where I work now. Is that correct?

0:2:5.610 --> 0:2:6.200  
Randy Elliot  
Got it.

0:2:0.640 --> 0:2:7.670  
Angela Angle  
Yeah, just a description of the type of company like size, therapeutics of therapeutic areas of interest and that'll be helpful.

0:2:9.140 --> 0:2:23.690  
Randy Elliot  
Sounds good. So so mid size biotech pharma company that I'm at now and my role is in translational medicine. So I work across research and medical.

0:2:26.190 --> 0:2:26.800  
Randy Elliot  
And.

0:2:27.640 --> 0:2:46.350  
Randy Elliot  
Uh, so figuring out how we're going to measure so the biomarkers for preclinical and which of them are relevant for clinical, which patient populations are relevant and any biomarker related regulatory pieces like CDX's, so companion diagnostics.

0:2:48.790 --> 0:3:1.140  
Randy Elliot  
That's all you know, part of part of that translational approach. It's a personalized medicine company. So the biomarker component is pretty central within the company's approach.

0:3:4.330 --> 0:3:10.350  
Angela Angle  
And at the at your current company, are there certain modalities or therapeutic areas that you're concentrated in?

0:3:12.710 --> 0:3:16.480  
Randy Elliot  
So primarily oncology, but not exclusively.

0:3:17.100 --> 0:3:23.990  
Randy Elliot  
Umm, there was a history of, so there's been a history of working in IO.

0:3:24.610 --> 0:3:34.910  
Randy Elliot  
Primarily not. However, these days. And then there is there are departures into non IO indication or not. Sorry non oncology indications as well.

0:3:36.710 --> 0:3:38.320  
Randy Elliot  
Those are more opportunistic.

0:3:40.320 --> 0:3:58.690  
Angela Angle  
OK, that makes sense. And I guess at what stage do you at your current company typically get involved with biomarker testing? Is this do you, I guess, are you engaging zeros in the early discovery phase or only when you get to a preclinical or clinical testing phase?

0:4:0.80 --> 0:4:28.760  
Randy Elliot  
So both so we use CRO starting from probably not target validation. Usually that's more of an ideation really early that this concept have legs stage but pretty much anything after that within preclinical within research we do engage CRO's for some of the bottom marker work some of it is done in house but some a good amount of it is also.

0:4:29.930 --> 0:4:42.200  
Randy Elliot  
Sent out to CRO and then and then we we definitely use CRO's on the clinical side. So as you approach the clinic probably getting heavier and heavier into CRO's.

0:4:43.720 --> 0:4:45.830  
Randy Elliot  
Or more and more heavily involved at zeros.

0:4:53.980 --> 0:4:54.270  
Angela Angle  
OK.

0:4:48.90 --> 0:4:58.60  
Randy Elliot  
What I'm going to So what I'm going to refer to as the clinical side, I'm going to split into two parts, if that's OK. One is what's directly supporting clinical trials.

0:4:58.810 --> 0:5:5.20  
Randy Elliot  
Which is 100% supported by CRO's, but that are under particular regulatory.

0:5:6.540 --> 0:5:16.320  
Randy Elliot  
Rules, right? Because you may need it, needs to be auditable by the FDA and it needs to meet certain qualifications from the regulatory perspective.

0:5:17.610 --> 0:5:26.330  
Randy Elliot  
And then there are we're going to call it. So actually maybe it's three different pieces there, other experimental biomarkers, some of which are.

0:5:27.740 --> 0:5:38.470  
Randy Elliot  
Kind of referred to in the in the clinical trial protocol, but they're not connected to an endpoint and there's a little bit more flexibility on which zeros will work with for those.

0:5:38.990 --> 0:5:39.290  
Angela Angle  
Umm.

0:5:39.680 --> 0:5:45.300  
Randy Elliot  
And then there are there are kind of follow up questions and posting the other category here would be.

0:5:46.140 --> 0:5:49.510  
Randy Elliot  
Follow up questions questions to understand the system better.

0:5:51.720 --> 0:5:59.640  
Randy Elliot  
Improvements to diagnostics, there are all sorts of things that may come out of the clinical trial that require additional biomarkers work.

0:6:0.640 --> 0:6:5.330  
Randy Elliot  
Yeah. And that falls back in the countries, mostly CRO, but actually some of it can happen in House as well.

0:6:26.700 --> 0:6:27.70  
Randy Elliot  
Yeah.

0:6:7.600 --> 0:6:30.610  
Angela Angle  
So I guess for those more exploratory non endpoint biomarker tests, are these, it sounds like this is being done not at the primary zero that is running all your clinical trials and performing all the the typical tests, the central lab tests and then any biomarker tests related to endpoints is instead a different CRO or are you developing and performing these tests internally?

0:6:32.490 --> 0:6:35.200  
Randy Elliot  
So it's it depends on the question we're asking.

0:6:36.660 --> 0:6:49.720  
Randy Elliot  
But within the clinical side for experimental endpoints, actually even for some of the primary endpoints we may be working with special internally call special TCR, so not our main CRO.

0:6:52.260 --> 0:7:12.710  
Randy Elliot  
And for biomarkers work there end up being a fair number of specialty CRO. Sometimes they actually connect back with the main 0. So you can imagine that the specialty CRO might perform a particular specialized process on your samples and then send them back to the main CRO for whatever the readout will be.

0:7:13.60 --> 0:7:15.270  
Randy Elliot  
Ohh. You know for instance.

0:7:16.490 --> 0:7:19.170  
Randy Elliot  
If you needed to, if you wanted to.

0:7:21.460 --> 0:7:27.240  
Randy Elliot  
If you wanted to isolate something in particular from your cells and then send it back to.

0:7:28.410 --> 0:7:30.70  
Randy Elliot  
Your main ferro for sequencing.

0:7:30.940 --> 0:7:53.350  
Randy Elliot  
So it's very frequent, so sometimes the specialty service CRO is giving you the data themselves and sometimes they're actually kind of playing a one piece of a process with additional cryos. And sometimes your main CRO maybe doesn't want to do the second part of that, although usually they do and you have a third kind of specialized CRO that's in this example would be doing your sequencing.

0:7:55.300 --> 0:7:58.550  
Randy Elliot  
So you can actually you you end up kind of Daisy chaining them together.

0:8:0.240 --> 0:8:10.690  
Angela Angle  
At for these specialty zeros, is it typically you and your company deciding who to use, or is it the the main siero that's identifying and selecting which ones to use?

0:8:11.620 --> 0:8:15.950  
Randy Elliot  
In my experience, it is always us who is selecting.

0:8:16.680 --> 0:8:17.700  
Randy Elliot  
Not the main CRO.

0:8:18.650 --> 0:8:18.930  
Angela Angle  
OK.

0:8:19.500 --> 0:8:32.310  
Randy Elliot  
I'm sure there's some crazy example out there that that would be otherwise, but in general, what we're we're looking to get some some piece of information that not many companies do and.

0:8:33.30 --> 0:8:38.690  
Randy Elliot  
And so we would be letting the main CRO know which company they were working with rather than the other way around.

0:8:40.490 --> 0:8:40.800  
Angela Angle  
OK.

0:8:42.450 --> 0:9:4.420  
Angela Angle  
And I guess this goes back a little bit to when you engage zeros, but I I guess are you do you go to these specialty zeros with a defined biomarker in mind or actually defined test for that biomarker in mind or are you developing that with the CRO or I guess identifying the biomarker in the 1st place with this hero?

0:9:6.150 --> 0:9:6.400  
Randy Elliot  
It.

0:9:6.640 --> 0:9:19.120  
Randy Elliot  
Really depends on the particular project, so all of the things that you said are possible. I'll give an example of so when I so maybe we don't have a good unique biomarker.

0:9:19.730 --> 0:9:31.730  
Randy Elliot  
For engagement, right. We wanna see target engagement and we need to see that and tell me if I'm getting too technical. I apologize. But if you wanted to see what's happening downstream of.

0:9:42.660 --> 0:9:42.890  
Angela Angle  
Umm.

0:9:32.900 --> 0:9:45.60  
Randy Elliot  
The marker you're trying to hit and you need something that tells you no, we this exact thing. It's not just kind of in generally impacting cancer. You might end up doing a phosphoproteomics screen.

0:9:46.230 --> 0:9:46.520  
Angela Angle  
OK.

0:9:45.900 --> 0:9:57.470  
Randy Elliot  
You don't know what you're looking for, but you know what kind of tool you want to use to figure it out like this is possible, relating something which thing is being phosphorylated by this exact mechanism.

0:9:59.580 --> 0:10:0.180  
Randy Elliot  
And so.

0:10:1.70 --> 0:10:11.600  
Randy Elliot  
You would go, you know, the CRO doesn't know exactly what question they they just know that you need your phosphoproteomics screening and maybe they do some of the analysis and maybe they don't depending on what tools you've got in house.

0:10:12.450 --> 0:10:12.900  
Randy Elliot  
Umm.

0:10:14.170 --> 0:10:15.660  
Randy Elliot  
And so that would be an example of.

0:10:17.170 --> 0:10:20.240  
Randy Elliot  
The you know exploratory biomarker.

0:10:21.80 --> 0:10:24.310  
Randy Elliot  
Hunting in a particular clinical context now.

0:10:25.290 --> 0:10:33.290  
Randy Elliot  
Sometimes, especially on like sometimes you you know what you're looking for, you want to see. Did I drive down this particular target?

0:10:35.370 --> 0:10:43.890  
Randy Elliot  
Sometimes you're CRO doesn't know what target you're again. If you're taking a sequencing approach, they may or may not have any idea what it is that you are actually looking for.

0:10:44.590 --> 0:10:50.970  
Randy Elliot  
Umm you you may tell them you may not. You may rely on their analysis services or not.

0:10:51.630 --> 0:10:56.820  
Randy Elliot  
It's it's not a really a confidentiality question you ask for what you need.

0:10:59.60 --> 0:11:2.10  
Randy Elliot  
And so again, if you know if for instance.

0:11:2.680 --> 0:11:5.360  
Randy Elliot  
You're looking for CT DNA.

0:11:6.150 --> 0:11:18.90  
Randy Elliot  
To you know, one one way to measure of targets are being hit, or if you would be too see whether you're actually eliminating that target in ctna sequencing.

0:11:18.770 --> 0:11:19.100  
Angela Angle  
This is.

0:11:19.240 --> 0:11:22.920  
Randy Elliot  
Umm. And so that that would be a, you know, another kind of.

0:11:23.700 --> 0:11:27.380  
Randy Elliot  
Clinical measure of engagement where you know you.

0:11:28.920 --> 0:11:32.290  
Randy Elliot  
You you ask for the services that you need from the particular CRO.

0:11:34.20 --> 0:11:34.290  
Randy Elliot  
The.

0:11:35.450 --> 0:11:42.170  
Randy Elliot  
I'm trying to get, you know, and then there are other examples where you know exactly what you're looking for and you're readout is.

0:11:50.520 --> 0:11:50.760  
Angela Angle  
Umm.

0:11:45.220 --> 0:11:54.610  
Randy Elliot  
More so, you're doing DD PCR digital droplet PCR, for instance. That's probably something you're main CRO can do.

0:11:55.290 --> 0:11:57.50  
Randy Elliot  
And they're giving you the readout directly.

0:11:58.40 --> 0:11:58.510  
Randy Elliot  
Umm.

0:12:0.320 --> 0:12:3.250  
Randy Elliot  
And but you know exactly what you're looking for already at that point.

0:12:4.410 --> 0:12:11.340  
Randy Elliot  
You know, these are the targets, maybe they help you with primer design. Maybe you've already designed your own primers. You certainly are going to validate them.

0:12:14.910 --> 0:12:19.0  
Randy Elliot  
There are other times where you're doing very in depth assay development.

0:12:19.750 --> 0:12:20.720  
Randy Elliot  
With the CRO.

0:12:23.110 --> 0:12:24.380  
Randy Elliot  
For instance.

0:12:25.560 --> 0:12:28.760  
Randy Elliot  
If you need to develop an IHC or an ISH assay.

0:12:30.880 --> 0:12:33.90  
Randy Elliot  
You may need to partner to.

0:12:33.740 --> 0:12:35.580  
Randy Elliot  
You know, build things out from scratch.

0:12:37.80 --> 0:12:43.360  
Randy Elliot  
You may need to partner to develop your antibody of interest and test it.

0:12:45.550 --> 0:12:58.550  
Randy Elliot  
And especially that becomes well. It becomes a very long and hopefully not too painful journey if you need to develop. If you suspect you're going to need to use it as a companion diagnostic.

0:13:1.10 --> 0:13:1.910  
Randy Elliot  
That's a that's a.

0:13:3.370 --> 0:13:10.760  
Randy Elliot  
That's a very expensive endeavor, and it needs to start quite early in the process, so there's a lot of money tied up in.

0:13:33.800 --> 0:13:34.640  
Randy Elliot  
It's a good question.

0:13:12.730 --> 0:13:39.270  
Angela Angle  
If you use a A specialty 0 to do some sort of proteomics, or genomics, as assays study to identify biomarkers in the 1st place or if you use them to develop a new test for biomarker, do you typically stay with that same zero once you move into the clinical stages of development? I guess I'm trying to understand if there's a lot of overlap between the discovery phase work and the preclinical and clinical work.

0:13:40.640 --> 0:13:41.70  
Randy Elliot  
So.

0:13:42.750 --> 0:14:11.340  
Randy Elliot  
I would say that it either possibility is very much on the table you try to take the Longview. If it you think that you're going to be working on the biomarker long term and you think you're going to need it in the clinic and especially if you think you're going to need it as CDX, you may start out working with the company. That's probably more expensive, but it's able to see it all the way through. But very frequently that's not the case and you'll be working with somebody who doesn't have The Who really wants.

0:14:11.500 --> 0:14:20.280  
Randy Elliot  
To take it all the way through, but it's unlikely that you're going to be able to work with them all the way through, because the development costs on their end are going to be so high.

0:14:21.270 --> 0:14:29.730  
Randy Elliot  
And the time, mostly the timeline will be so long that no matter how good a job they did on the preclinical part, you may not be able to work with them for clinical.

0:14:32.30 --> 0:14:33.150  
Angela Angle  
Yeah, that makes sense.

0:14:32.520 --> 0:14:35.210  
Randy Elliot  
And so that's that's probably, I would say.

0:14:37.780 --> 0:14:41.340  
Randy Elliot  
It's more often the case that you'll that you'll switch vendors.

0:14:42.160 --> 0:14:42.650  
Randy Elliot  
But.

0:14:43.810 --> 0:14:44.240  
Randy Elliot  
But.

0:14:45.590 --> 0:14:51.720  
Randy Elliot  
It's it's better if you don't have to. Often within the CRO S themselves, they have different.

0:14:53.670 --> 0:15:0.920  
Randy Elliot  
If they're kind of bigger or more experienced TRO, they may have different levels of regulation that you work with in.

0:15:1.730 --> 0:15:2.540  
Randy Elliot  
And.

0:15:4.350 --> 0:15:9.270  
Randy Elliot  
Transferring the assay, especially if they're specialized and they know you can't go too many other places.

0:15:9.890 --> 0:15:16.930  
Randy Elliot  
Uh, they will need to redevelop the assay and tiredly within their regulated space when you need it anyway.

0:15:17.540 --> 0:15:17.960  
Randy Elliot  
So.

0:15:19.750 --> 0:15:20.230  
Randy Elliot  
Ah.

0:15:21.800 --> 0:15:31.780  
Randy Elliot  
Your your it's a good model for them, except that you're less locked in and you can take it somewhere else because they're going to charge you for redeveloping the exact same asset.

0:15:39.80 --> 0:15:40.0  
Randy Elliot  
That's exactly right.

0:15:32.900 --> 0:15:41.350  
Angela Angle  
So if the original assay isn't developed in performed on their GOP conditions, or some other regulatory conditions than they may have to revalidate it anyway.

0:15:42.560 --> 0:15:44.350  
Angela Angle  
So it's a good switch, yeah.

0:15:42.310 --> 0:15:50.890  
Randy Elliot  
It's not just revalidate, they actually redevelop it. It's not just a revalidation. They rebuild the entire assay from scratch in a new team, it's.

0:15:51.430 --> 0:15:51.890  
Angela Angle  
OK.

0:15:51.860 --> 0:15:56.630  
Randy Elliot  
It's. Yeah, it's. It's actually much more extensive than just a revalidation.

0:15:57.740 --> 0:15:59.660  
Randy Elliot  
Both from a time and a cost perspective.

0:16:1.60 --> 0:16:2.290  
Angela Angle  
Yeah, that makes sense.

0:16:3.580 --> 0:16:31.430  
Angela Angle  
I'm and I guess for biomarkers they to get into a little bit more of the the testing and and the technical side we were thinking about it in terms of for kind of major categories, 1 being genomics, another proteomics and maybe include amino acids in here. Then we have immune monitoring tests which could be flow cytometry or the cellular assay, cellular phenotyping and then histopathology which includes the ISH and the IRC.

0:16:32.550 --> 0:16:32.810  
Randy Elliot  
Yep.

0:16:33.200 --> 0:16:40.990  
Angela Angle  
Are there any other? Does this categorization make sense to you? Are there any other categories of tests that you think about being important for biomarkers?

0:16:42.80 --> 0:16:48.460  
Randy Elliot  
So can you say them again? You said I'm sorry. I'm gonna actually write them down so that I keep track of what's within.

0:16:49.250 --> 0:16:50.20  
Randy Elliot  
Each one.

0:16:49.300 --> 0:16:50.110  
Angela Angle  
Oh yeah.

0:16:52.530 --> 0:16:52.880  
Randy Elliot  
I got.

0:16:51.670 --> 0:16:53.790  
Angela Angle  
Proteomics. Genomics.

0:16:53.470 --> 0:16:56.250  
Randy Elliot  
So yeah, OK, got it. Now I'm with you.

0:16:55.320 --> 0:16:57.370  
Angela Angle  
Immune monitoring and then histopathology.

0:16:58.920 --> 0:16:59.620  
Randy Elliot  
Umm.

0:17:2.670 --> 0:17:3.300  
Randy Elliot  
So.

0:17:4.720 --> 0:17:5.850  
Randy Elliot  
I think those are.

0:17:7.320 --> 0:17:9.330  
Randy Elliot  
Certainly main categories.

0:17:11.230 --> 0:17:13.100  
Randy Elliot  
In addition to those.

0:17:15.930 --> 0:17:21.20  
Randy Elliot  
So do you mean for biomarker identification or just for I mean biomarker work in general?

0:17:23.140 --> 0:17:35.10  
Angela Angle  
I guess work in general like I I I guess our hypothesis for something like proteomics is that most of the time you're using like a some sort of mass spec essay to.

0:17:42.450 --> 0:17:42.780  
Randy Elliot  
Umm.

0:17:46.900 --> 0:17:47.340  
Randy Elliot  
Yes.

0:17:35.760 --> 0:17:48.690  
Angela Angle  
Uh. Find the biomarkers and validate them in the 1st place and then you may switch to an amino assay later. Although I I guess there could be proteomics panels, transcriptome panels that can be used as biomarkers as well.

0:17:50.800 --> 0:17:51.250  
Randy Elliot  
You.

0:17:50.140 --> 0:17:51.620  
Angela Angle  
Yeah, here's how you think about that.

0:17:53.120 --> 0:17:53.520  
Randy Elliot  
So.

0:17:54.350 --> 0:18:2.900  
Randy Elliot  
I'm imagining that well, because you split out pretty much I I think of transcriptomics as kind of being part of genomics, but it isn't. It isn't.

0:18:4.40 --> 0:18:8.100  
Randy Elliot  
Is the place are very important role for looking at pathway modulation?

0:18:9.740 --> 0:18:19.690  
Randy Elliot  
Which is an important ancillary question frequently to the to your biomarker question, is it working in the same way for instance in different scenarios?

0:18:24.220 --> 0:18:25.20  
Randy Elliot  
And.

0:18:27.300 --> 0:18:29.660  
Randy Elliot  
I think what else could be?

0:18:30.920 --> 0:18:32.200  
Randy Elliot  
Missing your.

0:18:36.630 --> 0:18:46.850  
Randy Elliot  
I mean, there are also just molecular biology assays that are very routinely run as part of biomarker monitoring, genomics, I guess include we're using that to include.

0:18:47.470 --> 0:18:53.30  
Randy Elliot  
Some monitoring approach maybe, depending on what tools you're using, but to track things over time.

0:18:54.340 --> 0:18:55.640  
Angela Angle  
Using like digital PCR.

0:18:55.430 --> 0:18:55.930  
Randy Elliot  
Like mint.

0:18:56.740 --> 0:18:58.850  
Randy Elliot  
Yeah. Or minimal residual disease.

0:18:59.440 --> 0:18:59.720  
Angela Angle  
OK.

0:19:0.20 --> 0:19:2.220  
Randy Elliot  
You and you know like MRD.

0:19:2.660 --> 0:19:3.0  
Angela Angle  
Yeah.

0:19:3.140 --> 0:19:6.750  
Randy Elliot  
Which is maybe genomics, or maybe a different assay?

0:19:7.680 --> 0:19:8.370  
Randy Elliot  
To tell.

0:19:9.0 --> 0:19:9.520  
Randy Elliot  
And.

0:19:10.330 --> 0:19:11.320  
Randy Elliot  
What's still there?

0:19:20.210 --> 0:19:20.780  
Angela Angle  
Yeah, and.

0:19:20.140 --> 0:19:22.470  
Randy Elliot  
I mean, I think so. Yeah, I think I. Ohh sorry. Go ahead.

0:19:31.190 --> 0:19:31.520  
Randy Elliot  
Umm.

0:19:48.340 --> 0:19:48.690  
Randy Elliot  
OK.

0:19:24.20 --> 0:19:53.590  
Angela Angle  
No, I just gotta gonna follow up in and ask about for, I guess in your immune oncology space and more precision medicine focus, what are the kind of major platforms that you tend to use and may want your CRO or require your CRO to offer and maybe we could start like in one category by itself and just starting with genomics I guess what are the typical platforms and technologies that you would look for in the CRO require?

0:19:55.740 --> 0:19:56.210  
Randy Elliot  
So.

0:19:58.520 --> 0:20:2.190  
Randy Elliot  
And actually one thing else uh, so really.

0:20:5.180 --> 0:20:8.810  
Randy Elliot  
There's not a lot where I look for one consolidated CRO.

0:20:9.440 --> 0:20:9.720  
Angela Angle  
Umm.

0:20:9.900 --> 0:20:18.380  
Randy Elliot  
Other other than kind of the central CRO, there aren't. I'm not. I'm rarely looking for one stop shopping. I'm usually looking at something fairly specialized.

0:20:19.690 --> 0:20:21.150  
Randy Elliot  
I feel like more often than not.

0:20:24.270 --> 0:20:27.80  
Randy Elliot  
So right, if we if we're looking for transcriptomics.

0:20:28.230 --> 0:20:35.550  
Randy Elliot  
Will if if the that's the main thing we're looking at, then what we'll look at is. Ohh well, for how many? How much sample?

0:20:50.160 --> 0:20:50.400  
Angela Angle  
Umm.

0:20:36.200 --> 0:20:55.380  
Randy Elliot  
Can I get how much data so I'm looking for a panel? Ohh they'll give you transcriptomics and they'll do the genomic sequencing too. Or they'll do kind of some additional like what their package that they'll give us for that type of data. But I'm not usually saying, oh, can they do transcriptomics and GDPR and itch?

0:20:56.400 --> 0:21:6.340  
Randy Elliot  
I'm. I'm not usually looking. I your questions don't usually pile up where you're asking the same thing at the same time, and most of the specialized CRO aren't.

0:21:7.410 --> 0:21:8.200  
Randy Elliot  
Offering.

0:21:9.990 --> 0:21:11.530  
Randy Elliot  
A very broad array.

0:21:12.320 --> 0:21:15.730  
Randy Elliot  
Of of services, in my experience. So.

0:21:16.840 --> 0:21:20.690  
Randy Elliot  
I guess it depends on how specialized your questions are, but in that so in the genomics world.

0:21:22.800 --> 0:21:24.950  
Randy Elliot  
Especially in oncology, there are often.

0:21:26.290 --> 0:21:36.270  
Randy Elliot  
So there are panels. There's whole exome. There's whole genome. You're giving up. You know, if you go to the bigger panels, you're giving up a lot of sensitivity. So you have to think about.

0:21:38.310 --> 0:21:40.700  
Randy Elliot  
What sensitivity do you need for what you're trying to measure?

0:21:47.10 --> 0:21:47.700  
Randy Elliot  
There's.

0:21:49.0 --> 0:21:49.500  
Randy Elliot  
So you're.

0:21:50.230 --> 0:21:54.210  
Randy Elliot  
Probably looking at different types of DNA and RNA readouts.

0:21:54.910 --> 0:21:55.460  
Randy Elliot  
Umm.

0:21:56.470 --> 0:22:3.980  
Randy Elliot  
You may be. So if you're looking more specialized than that, you may be looking at single cell sequencing to for any number of reasons.

0:22:5.650 --> 0:22:5.970  
Angela Angle  
Umm.

0:22:6.400 --> 0:22:16.870  
Randy Elliot  
For instance, if you're trying to figure out which exact types of or or you know we're getting into amino monitoring, you may be using close sitomer try to figure out cell of origin or you may be using single cell sequencing for that.

0:22:23.790 --> 0:22:25.10  
Angela Angle  
I guess yeah for.

0:22:23.450 --> 0:22:26.540  
Randy Elliot  
I guess so. You said within Geneva. Ohh sorry. Go ahead.

0:22:27.940 --> 0:22:30.160  
Angela Angle  
I just wanted to clarify for like some of your.

0:22:30.790 --> 0:22:43.110  
Angela Angle  
Transcriptomics work or genomics work like how targeted it usually is. Do you have a few or few small number of targets that you're looking for? You really doing a lot more like whole genome home, whole exam work?

0:22:45.410 --> 0:22:50.110  
Randy Elliot  
So both both can be extremely important.

0:22:51.610 --> 0:22:53.400  
Randy Elliot  
Not probably whole genome.

0:22:54.10 --> 0:22:56.100  
Randy Elliot  
Frequent but whole exome is pretty common.

0:23:0.150 --> 0:23:9.750  
Randy Elliot  
You you might be looking sometimes you're using sequencing to look at an individual target where you need a really, really high level of sensitivity.

0:23:10.830 --> 0:23:11.890  
Randy Elliot  
More often, but.

0:23:12.840 --> 0:23:13.460  
Randy Elliot  
The.

0:23:14.960 --> 0:23:20.310  
Randy Elliot  
Very frequently, you're also looking for combinations of variants that are meaningful in certain ways.

0:23:21.260 --> 0:23:25.760  
Randy Elliot  
You're trying to figure out how they interplay with each other, so you'd be using a larger panel.

0:23:26.680 --> 0:23:30.390  
Randy Elliot  
Or worse, smaller panels depending on your questions and how much money you can spend on it.

0:23:32.890 --> 0:23:35.460  
Randy Elliot  
And you're not just looking for.

0:23:36.440 --> 0:23:39.290  
Randy Elliot  
One readout, but you're maybe you're looking at it to see.

0:23:40.360 --> 0:23:46.960  
Randy Elliot  
Which patients are more likely to respond or whether there are certain variants that are indicating different things about your patient population?

0:23:48.790 --> 0:23:50.580  
Randy Elliot  
Or the extent of response.

0:23:53.20 --> 0:23:56.610  
Randy Elliot  
So the combination of alterations in the genomic space is?

0:23:58.50 --> 0:23:59.500  
Randy Elliot  
Is extremely important.

0:24:0.940 --> 0:24:1.900  
Randy Elliot  
And I'd say.

0:24:5.500 --> 0:24:10.370  
Randy Elliot  
Though the tools are still very much under development, and there's there's a lot of still.

0:24:13.210 --> 0:24:19.430  
Randy Elliot  
Room to develop in that space. How to how to make sense of the the complex data that's coming out?

0:24:22.580 --> 0:24:32.20  
Angela Angle  
Yeah. And I I guess I didn't wanna get back to a point that you brought up that that's really interesting is that you mentioned some of the a lot of these technologies you kind of consider them.

0:24:33.50 --> 0:24:50.590  
Angela Angle  
Uh, I guess you're only offer often going for one of the men a time. So I I'm curious on the CRO selection side, do you typically have as CRO that's like this is who we go to for all of our proteomics work. We're gonna send all of our Histology work to this other CRO.

0:24:51.590 --> 0:24:53.590  
Angela Angle  
Or on the other hand, how?

0:24:54.310 --> 0:25:0.260  
Angela Angle  
How often or are you engaging a single zero for multiple of these types of services at at the same time?

0:25:2.750 --> 0:25:3.200  
Randy Elliot  
So.

0:25:5.890 --> 0:25:7.20  
Randy Elliot  
I would say.

0:25:7.880 --> 0:25:9.960  
Randy Elliot  
We do very fit for purpose so.

0:25:17.750 --> 0:25:18.100  
Angela Angle  
Umm.

0:25:11.490 --> 0:25:23.460  
Randy Elliot  
We've had, you know, good experiences with some CRO and less than perfect experiences with others. And so our own experience with what they can do versus what they say they can do matters a fair amount.

0:25:24.570 --> 0:25:31.520  
Randy Elliot  
But it's not so much that this is avenger, that we always go to for this kind of sequencing we've worked with.

0:25:32.980 --> 0:25:39.660  
Randy Elliot  
4 vendors for that you know for that kind of work and they all have different, you know, areas of interest and different strengths.

0:25:41.450 --> 0:25:46.630  
Randy Elliot  
Well, maybe not all of them have different strengths, but, but you're usually choosing from a list.

0:25:47.470 --> 0:25:50.610  
Randy Elliot  
Yeah, you're, it's, it's it's rarely a straight line of like.

0:25:51.530 --> 0:25:55.70  
Randy Elliot  
I need, I'm gonna say sequencing. Therefore I'm going to go to this one.

0:25:56.110 --> 0:25:56.560  
Randy Elliot  
Umm.

0:25:58.440 --> 0:26:7.210  
Randy Elliot  
And I I realized I I didn't give a very complete answer on what we kind of look for, which you know, there were genomic signatures that we look for as well methylation that we look for.

0:26:8.550 --> 0:26:12.590  
Randy Elliot  
Which again, I'm putting methylation in at the genetics under.

0:26:13.320 --> 0:26:14.590  
Randy Elliot  
Genetic genomics.

0:26:14.890 --> 0:26:15.310  
Angela Angle  
Yeah.

0:26:15.620 --> 0:26:17.660  
Randy Elliot  
When you think about putting them somewhere else.

0:26:20.780 --> 0:26:23.360  
Randy Elliot  
So there there are some additional pieces.

0:26:23.480 --> 0:26:25.710  
Randy Elliot  
The HLA.

0:26:26.570 --> 0:26:27.530  
Randy Elliot  
Genotyping.

0:26:29.130 --> 0:26:33.140  
Randy Elliot  
Is sometimes you could. You could consider and you know.

0:26:34.100 --> 0:26:39.630  
Randy Elliot  
And I'm, you know, monitoring assay or you, but often you're using genomics assays to get there.

0:26:45.290 --> 0:26:46.60  
Angela Angle  
Yeah. Good.

0:26:47.110 --> 0:26:51.250  
Randy Elliot  
So but you. But you were asking about, like, how much one stop shopping matters.

0:26:52.380 --> 0:26:52.790  
Angela Angle  
Yeah.

0:26:52.310 --> 0:26:55.830  
Randy Elliot  
It would be. It would be really nice to do and we do try to.

0:26:57.70 --> 0:27:6.240  
Randy Elliot  
And so one of the one of the very expensive parts of the process from a time perspective is getting the legal agreements in place.

0:27:7.10 --> 0:27:12.320  
Randy Elliot  
And that's probably the one of the bigger pushes to try to work with companies you've worked with before.

0:27:14.320 --> 0:27:16.440  
Randy Elliot  
You always want your data as soon as.

0:27:17.130 --> 0:27:18.90  
Randy Elliot  
You can have it.

0:27:18.830 --> 0:27:28.90  
Randy Elliot  
And you don't wanna lose months of months and months of time going back and forth on legal and companies that are able to.

0:27:31.110 --> 0:27:37.230  
Randy Elliot  
Have a flexible approach to legal and move things forward quickly are much more likely to get our business.

0:27:40.150 --> 0:27:40.390  
Angela Angle  
And.

0:27:39.780 --> 0:27:41.570  
Randy Elliot  
Where you know where it's others that are like.

0:27:42.240 --> 0:27:46.890  
Randy Elliot  
Well, we won't work with your template. You have to work with our template.

0:27:52.470 --> 0:27:52.780  
Angela Angle  
Umm.

0:27:47.450 --> 0:27:56.490  
Randy Elliot  
Umm. And we're going to go 16 rounds back and forth. The You may well end up just working with someone else because you can't actually get it done.

0:28:15.710 --> 0:28:16.40  
Randy Elliot  
So.

0:27:59.150 --> 0:28:17.220  
Angela Angle  
And I guess for a single project, is it often that you'll need like multiple of these categories of services like you'll need both proteomics and genomics or is it really for one project you typically only going with one? I'm just trying to understand like how valuable this one stop shop could potentially be?

0:28:19.430 --> 0:28:20.650  
Randy Elliot  
Ohh so.

0:28:22.980 --> 0:28:24.350  
Randy Elliot  
I don't think that there's a.

0:28:25.810 --> 0:28:32.230  
Randy Elliot  
Most clinical programs would involve multiple special multiple CRO's for this kind of readout.

0:28:32.950 --> 0:28:35.260  
Randy Elliot  
I referral kind of all different readouts so.

0:28:36.700 --> 0:28:39.510  
Randy Elliot  
Could there be one that just? Yeah.

0:28:42.600 --> 0:28:56.0  
Randy Elliot  
And then thinking about, I mean the questions also come up at different points in time. So it's not necessarily that you know what you're looking for when you're selecting at the beginning, say like when I say at the beginning, like when something's going into the clinic you're looking at.

0:28:57.470 --> 0:28:58.750  
Randy Elliot  
The endpoints that you know about.

0:29:0.210 --> 0:29:10.560  
Randy Elliot  
Maybe some of the endpoints that are nice to have but are not must haves, but you know you're collecting samples for them, but along the way you're almost certainly going to come up with other questions that you need to sort out as well.

0:29:15.60 --> 0:29:24.950  
Randy Elliot  
If you ask the question to clinical operations, they would tell you it's very important to have a single vendor. But when you're when you talk to somebody who's responsible for.

0:29:26.870 --> 0:29:31.360  
Randy Elliot  
The biomarker side, which patients is this working in, why is what's actually happening here?

0:29:31.980 --> 0:29:32.270  
Angela Angle  
Isn't.

0:29:32.320 --> 0:29:42.610  
Randy Elliot  
Two for me. What central is being able to get the right type of data to answer your question and I don't care very much whether I'm getting it from one company or multiple companies.

0:29:43.230 --> 0:29:43.560  
Angela Angle  
Is is.

0:29:44.750 --> 0:29:45.860  
Angela Angle  
Yeah, that makes sense.

0:29:47.710 --> 0:30:18.720  
Angela Angle  
I'm curious. Guess wanna move a little bit to the specific biomarker side real quick and and just curious in the immuno oncology space, are there any specific or sets of biomarkers that are becoming more interesting and you know it doesn't necessarily need to be specific to any of the the programs that you're working on. But I mean in the space there's a lot of work on the ill family of cytokines and PD1 PDL one has been pretty prominent. But are there any?

0:30:18.880 --> 0:30:26.720  
Angela Angle  
Kind of a more emerging or potentially an important biomarkers that are becoming more well known or appreciated these days.

0:30:28.930 --> 0:30:32.140  
Randy Elliot  
So within I/O there are.

0:30:34.430 --> 0:30:40.660  
Randy Elliot  
So I think the the answer is yes. So some of them are coming out of the sequencing world.

0:30:41.720 --> 0:30:44.770  
Randy Elliot  
So two more mutation burden, TMB.

0:30:45.450 --> 0:30:45.710  
Angela Angle  
Umm.

0:30:45.650 --> 0:30:47.980  
Randy Elliot  
And MSI and.

0:30:51.400 --> 0:30:52.250  
Randy Elliot  
Ohh, come on Randy.

0:30:53.90 --> 0:30:54.260  
Randy Elliot  
Ohh shoot, I said. My baby.

0:30:57.380 --> 0:31:0.410  
Angela Angle  
Uh, so you said MSI of. What does that stand for?

0:30:59.900 --> 0:31:4.720  
Randy Elliot  
Yes, I, said Ms. I, I'm sorry. I I yes. So.

0:31:6.580 --> 0:31:7.430  
Randy Elliot  
LOH.

0:31:8.560 --> 0:31:12.870  
Randy Elliot  
MSI TMD I think HRD is 1 to watch.

0:31:14.760 --> 0:31:22.490  
Randy Elliot  
Right now, it's really only proven in ovarian and endometrial, but I think watch this space that's going to be.

0:31:23.910 --> 0:31:29.770  
Randy Elliot  
Continue to grow in importance as people get a better understanding. Maybe of what it means in different.

0:31:30.610 --> 0:31:37.50  
Randy Elliot  
Types of cancer I'm I realize I'm being oncology centric. Would you like me to be broader than oncology?

0:31:39.350 --> 0:31:53.720  
Angela Angle  
I mean, if you could speak to Eris beyond, I called you that, that's would be great. And just any connection to like this biomarker is really important and oncology, this biomarker is really important and neurology the like that kind of association would be helpful.

0:31:55.140 --> 0:32:2.950  
Randy Elliot  
Yeah. I so in terms of newer biomarkers, I've seen the most growth within oncology. I think the kind of.

0:32:3.640 --> 0:32:10.750  
Randy Elliot  
Repeat expansion type readouts and the HLA readouts are all pretty well established.

0:32:11.700 --> 0:32:14.40  
Randy Elliot  
For for other disease areas.

0:32:15.380 --> 0:32:23.70  
Randy Elliot  
Although I think especially with the with the repeat readouts, there's probably still work, but could be done to make it better.

0:32:23.810 --> 0:32:24.480  
Randy Elliot  
I think.

0:32:30.400 --> 0:32:42.960  
Randy Elliot  
I think that there are interesting areas of development of kind of immuno like immuno development work going on in neonatal space as well but which biomarkers would I say.

0:32:43.670 --> 0:32:49.800  
Randy Elliot  
Again, people are relying more heavily on genomic tools to get genetic readouts.

0:32:54.120 --> 0:32:58.550  
Randy Elliot  
More and more, and so I've seen that as a shift in in.

0:33:0.40 --> 0:33:1.970  
Randy Elliot  
Perry needle testing or you know?

0:33:10.480 --> 0:33:11.700  
Angela Angle  
Yeah, I guess, yeah. Good.

0:33:23.620 --> 0:33:23.910  
Angela Angle  
Mm-hmm.

0:33:10.470 --> 0:33:29.20  
Randy Elliot  
And then so yeah, go. So you were asking specifically about immuno monitoring I I mean I do think I think you were we talked not at all yet maybe about flow cytometry. But I do think flow cytometry remains a very, very important tool much more on the preclinical side.

0:33:29.970 --> 0:33:32.980  
Randy Elliot  
Then it's clinical. It's just a really tough.

0:33:33.740 --> 0:33:35.690  
Randy Elliot  
That's it's a tough assay type.

0:33:36.450 --> 0:33:37.780  
Randy Elliot  
For the for the clinic.

0:33:39.20 --> 0:33:40.830  
Randy Elliot  
Too much hands on for each sample.

0:33:43.100 --> 0:33:50.610  
Angela Angle  
For some of the genetic markers that you mentioned, are these being used for like inclusion criteria in trials or are they kind of?

0:33:52.80 --> 0:33:57.890  
Angela Angle  
To use a bucket, patients on like whether they're responders or nonresponders, how are those being used in the clinical phase?

0:33:59.430 --> 0:34:1.800  
Randy Elliot  
Uh, so within clinical trials?

0:34:4.480 --> 0:34:12.300  
Randy Elliot  
That's a very good question. I think that they are being used both to. So they're being used primarily for patient identification.

0:34:12.970 --> 0:34:22.20  
Randy Elliot  
It's a big company, is doing it. They may be binning things kind of both with and, you know, not visible within their clinical trial. But you know high TMB and low TMB.

0:34:23.400 --> 0:34:24.170  
Randy Elliot  
Can you do?

0:34:26.930 --> 0:34:34.460  
Randy Elliot  
Or same with MSI with some cutoff, putting them into different bins and understanding which patients are responding or not.

0:34:35.390 --> 0:34:41.80  
Randy Elliot  
Certainly for HRD, some of there are already drugs who have labels.

0:34:41.720 --> 0:34:49.470  
Randy Elliot  
That call out of these these as like genomic signatures as the.

0:34:50.860 --> 0:34:56.170  
Randy Elliot  
As part of the label for which patients are going to respond to this drug, for which patients the drug is relevant for.

0:34:58.80 --> 0:35:2.0  
Randy Elliot  
And they they may come with a companion diagnostic for that readout.

0:35:3.140 --> 0:35:10.240  
Randy Elliot  
Now that they're well established, sometimes those are post market commitments to the FDA that get postponed a fair bit.

0:35:11.140 --> 0:35:12.890  
Randy Elliot  
And everyone's still trying to figure out.

0:35:13.630 --> 0:35:23.930  
Randy Elliot  
How the EU, and so that some of them are already in labels for the EU as well, sorry if I'm going too far afield with the EU, but like HRD, is already part of labels.

0:35:24.630 --> 0:35:25.470  
Randy Elliot  
In the EU.

0:35:26.160 --> 0:35:26.450  
Angela Angle  
Umm.

0:35:28.890 --> 0:35:34.840  
Randy Elliot  
And but they're getting into companion diagnostics now and it's not quite clear what that's going to be in yet.

0:35:37.470 --> 0:35:40.290  
Randy Elliot  
They're kind of later to it than the US, but they're taking a.

0:35:41.550 --> 0:35:44.640  
Randy Elliot  
They're taking a different enough approach. They're not actually still sure what they're.

0:35:45.220 --> 0:35:45.560  
Angela Angle  
Umm.

0:35:45.470 --> 0:35:47.540  
Randy Elliot  
But but they know that they're requiring it soon.

0:35:49.950 --> 0:36:8.220  
Angela Angle  
Have you mentioned tumor mutational burden and and I'm curious what that uh and what you're actually measuring there. Is it just the total number of mutations that is present in the full tumor sample or is there any sort of spatial measurement or waiting for types of mutations that may be more impactful. Just curious how that works?

0:36:9.140 --> 0:36:13.670  
Randy Elliot  
So it's usually a mutations per megabase I think is the is the general.

0:36:19.270 --> 0:36:19.520  
Angela Angle  
Umm.

0:36:16.60 --> 0:36:21.450  
Randy Elliot  
Natural it's it's the kind of unit for it, depending on who's.

0:36:23.390 --> 0:36:24.480  
Randy Elliot  
Like so.

0:36:25.670 --> 0:36:36.200  
Randy Elliot  
It's not 100% standardized and actually there is kind of an attempt at harmonization that's pretty recent to make TMB more similar between companies.

0:36:37.910 --> 0:36:39.590  
Randy Elliot  
But the the general idea is.

0:36:40.850 --> 0:36:52.590  
Randy Elliot  
Across the entire area that you've sequenced, how many mutations are you seeing? And a lot of places will look to remove the known drivers because they're not looking for the driver mutations themselves. You're looking for kind of the?

0:36:57.850 --> 0:36:58.140  
Angela Angle  
Umm.

0:36:53.670 --> 0:36:58.990  
Randy Elliot  
The additional genomic damage separate from what's driving the cancer.

0:37:0.850 --> 0:37:9.340  
Angela Angle  
OK. And then that's primarily used as kind of a a risk assessment to like how much could the chances of progression or severity disease?

0:37:10.400 --> 0:37:12.330  
Randy Elliot  
So ohh for I OS it's.

0:37:13.560 --> 0:37:19.770  
Randy Elliot  
It is a readout that tells you whether you're patient, is likely to respond to the IO drug or not.

0:37:26.30 --> 0:37:26.480  
Randy Elliot  
Ohh.

0:37:22.320 --> 0:37:26.520  
Angela Angle  
Is it like a higher burden or a lower burden associated with better outcome there?

0:37:27.150 --> 0:37:33.600  
Randy Elliot  
Sorry. Yeah, higher burden is associated with better outcome, so more damage makes it more likely that.

0:37:41.460 --> 0:37:41.800  
Angela Angle  
OK.

0:37:34.290 --> 0:37:44.820  
Randy Elliot  
Your body's going to be able to say, oh, that's a non self sell. I should kill it there with the IO drug. So more damage is actually better for, you know.

0:37:45.450 --> 0:37:47.370  
Randy Elliot  
Uh for immuno oncology drugs.

0:37:48.230 --> 0:37:49.420  
Angela Angle  
OK. Yeah, that's helpful.

0:37:50.680 --> 0:38:1.500  
Angela Angle  
And for immuno oncology drugs in in particular, are there any types of assays that are specific for these kind of therapies like I don't know some sort of immune response to ensure that?

0:38:2.350 --> 0:38:6.720  
Angela Angle  
The therapy is not causing some sort of cytokine storm or other issue.

0:38:15.670 --> 0:38:20.640  
Randy Elliot  
I think that there are. It's not my particular area of expertise, so.

0:38:22.460 --> 0:38:24.80  
Randy Elliot  
So you're saying with I/O drugs?

0:38:24.750 --> 0:38:27.890  
Randy Elliot  
How would you know in your readout if?

0:38:30.670 --> 0:38:31.530  
Angela Angle  
I guess for.

0:38:30.860 --> 0:38:34.160  
Randy Elliot  
If it's causing the wrong kind of reaction, is that is that kind of.

0:38:35.850 --> 0:38:36.770  
Randy Elliot  
Is that what you're asking?

0:38:36.280 --> 0:38:51.60  
Angela Angle  
Yeah, I guess that's one aspect of it. But for, I guess, IO drugs versus some other class of drugs like neurology or something more distantly related like a metabolic disease. Are there any types of tests?

0:38:51.930 --> 0:39:1.240  
Angela Angle  
Specific for this class of drugs or performing on every program or, uh, a large majority of programs that you'd be developing.

0:39:4.30 --> 0:39:6.450  
Randy Elliot  
That was in the biomarker space so much.

0:39:7.780 --> 0:39:8.90  
Angela Angle  
OK.

0:39:7.150 --> 0:39:11.300  
Randy Elliot  
Umm from a safety perspective, absolutely.

0:39:12.920 --> 0:39:24.740  
Randy Elliot  
So, like a pharmacokinetic like already so like from the not pharmacokinetics but from a drug safety perspective, there are tons of assays that would be considered must DOS for different types of drugs.

0:39:25.870 --> 0:39:28.270  
Randy Elliot  
From the biomarker perspective, I don't, I don't.

0:39:29.70 --> 0:39:32.390  
Randy Elliot  
See it as a it's it's usually.

0:39:34.40 --> 0:39:38.230  
Randy Elliot  
Kind of drug specific, it might be drug class specific where you know what you're.

0:39:41.520 --> 0:39:47.170  
Randy Elliot  
You a lot of it, would have started preclinically. You would have done it and you know in animal studies to say, OK.

0:39:47.870 --> 0:39:52.840  
Randy Elliot  
If you're working in the cell cycle, we're going to look at the different cell cycle readouts for.

0:39:54.40 --> 0:40:0.400  
Randy Elliot  
For every CDK that's known, because we know we're operating in a cell cycle space.

0:40:2.610 --> 0:40:8.180  
Randy Elliot  
So in that sense, yes, there are. But, but I don't think of that.

0:40:9.410 --> 0:40:11.190  
Randy Elliot  
So much has biomarker work.

0:40:12.330 --> 0:40:13.130  
Randy Elliot  
As safety.

0:40:17.230 --> 0:40:19.0  
Angela Angle  
OK. Yeah, that that's helpful.

0:40:18.100 --> 0:40:19.810  
Randy Elliot  
As like struggling 50, yeah.

0:40:21.250 --> 0:40:33.600  
Angela Angle  
I just wanted to spend a little bit of time on companion diagnostics and I guess at a high level, what do you typically see as the role of the CRO in this process and when you start engagement?

0:40:34.840 --> 0:40:47.110  
Randy Elliot  
Ohh my goodness ah, like by the you should have started it by the time you've even thought about that target as a potential, so you can't start early enough is what I actually mean there.

0:40:48.770 --> 0:40:56.680  
Randy Elliot  
And but the the truth of it is so companion diagnostics are very expensive.

0:40:57.530 --> 0:40:58.230  
Randy Elliot  
And.

0:41:0.10 --> 0:41:0.950  
Randy Elliot  
Companies will.

0:41:2.680 --> 0:41:4.940  
Randy Elliot  
We'll see what they can do to.

0:41:6.560 --> 0:41:16.610  
Randy Elliot  
Start them later. Be more sure that a particular program is likely to advance before moving into the CDX space as much as possible.

0:41:17.450 --> 0:41:17.900  
Randy Elliot  
Umm.

0:41:19.340 --> 0:41:23.40  
Randy Elliot  
For the development of an actual CTX, I feel like.

0:41:24.740 --> 0:41:35.910  
Randy Elliot  
100% of the time, it's gotta be very close to 100% of the time. Companies are looking to work with CRO. They're looking to work with CRO, who have done it before because the regulatory burden is huge. So.

0:41:36.660 --> 0:41:42.50  
Randy Elliot  
I feel like when it comes to where the work is on a companion diagnostic from a CRO.

0:41:44.420 --> 0:41:45.130  
Randy Elliot  
It is.

0:41:46.800 --> 0:41:55.70  
Randy Elliot  
I you know, it may well be much more, you know, a 5050 split between regulatory and scientific.

0:41:56.10 --> 0:41:56.400  
Angela Angle  
Umm.

0:41:56.90 --> 0:41:59.810  
Randy Elliot  
Is that that regulatory burden is just very heavy and.

0:42:0.660 --> 0:42:2.410  
Randy Elliot  
In, in my experience.

0:42:4.70 --> 0:42:7.810  
Randy Elliot  
The vast, vast majority of that regulatory burden lives with Sierra.

0:42:10.680 --> 0:42:11.380  
Randy Elliot  
You.

0:42:12.640 --> 0:42:14.270  
Randy Elliot  
The specific timeline.

0:42:15.220 --> 0:42:21.360  
Randy Elliot  
Uh again, the legal partnering part of that CRO piece may take up to a year.

0:42:23.80 --> 0:42:26.600  
Randy Elliot  
And you know, figuring out what that up, you know, is usually kind of an up front.

0:42:30.900 --> 0:42:31.230  
Angela Angle  
Mm-hmm.

0:42:27.380 --> 0:42:47.920  
Randy Elliot  
Amount of money paid to get the deal signed and then milestones along the way and agreements that will take place without post marketing commitments because on CD's, the FDA may well ask for additional support that goes on beyond the approval. So all of that has to get sorted out up front and is can be a very heavy lift.

0:42:48.620 --> 0:42:56.440  
Randy Elliot  
Umm, so you have to have that year. You know if you're doing it, if you're being careful, you budget a year for that piece of the process.

0:42:57.90 --> 0:42:58.220  
Randy Elliot  
And then.

0:43:0.250 --> 0:43:6.440  
Randy Elliot  
Usually about a year for the scientific development, maybe 18 months until you'd be ready to file something.

0:43:7.560 --> 0:43:7.870  
Angela Angle  
Umm.

0:43:7.680 --> 0:43:21.980  
Randy Elliot  
From when the agreement starts it. Of course it depends on what the specific CRX is. If it's something very simple, you might be able to, I said CR XI might CDX. It depends on what the specific CDX is. It's something simple. It may take a bit less time.

0:43:22.590 --> 0:43:25.650  
Randy Elliot  
If you're doing something really unique, it could take a bit more time.

0:43:29.640 --> 0:43:34.780  
Randy Elliot  
And it depends on how much upfront you work you've done. So if you're looking at something new.

0:43:35.510 --> 0:43:45.50  
Randy Elliot  
And you're going to, for instance, need to decide on a cut off, right? Ah, I've got this ish assay, and if I go on and think about how.

0:43:46.580 --> 0:43:55.350  
Randy Elliot  
You know how much of something there is that's going to say, you know, above that amount, those patients are going to be in and below that amount. Patients are going to be out.

0:43:57.130 --> 0:44:3.260  
Randy Elliot  
The validation for that particular cutoff could take a lot of time. You need to have a lot of of.

0:44:4.490 --> 0:44:9.100  
Randy Elliot  
Data to support it, you probably need to have a lot of patience in your clinical trial to do it.

0:44:10.350 --> 0:44:10.610  
Angela Angle  
Mm-hmm.

0:44:11.570 --> 0:44:19.320  
Randy Elliot  
In order to convince the the FDA of a particular cutoff, you're looking at, you know, more time, more money when you're doing something unique.

0:44:22.240 --> 0:44:22.500  
Angela Angle  
It.

0:44:21.600 --> 0:44:27.740  
Randy Elliot  
In, the FDA has said that for you know, if you're piling on to an existing.

0:44:28.380 --> 0:44:31.800  
Randy Elliot  
CDX instead of doing it from scratch, you now.

0:44:33.520 --> 0:44:38.870  
Randy Elliot  
Pretty much just need to bridge to it. You just need some validation to show that it should apply to you too, so you.

0:44:39.180 --> 0:44:39.450  
Angela Angle  
Umm.

0:44:40.730 --> 0:44:46.330  
Randy Elliot  
That's pretty new, so that nobody's 100% like we're, we're just figuring out what the FDA means by that.

0:44:47.450 --> 0:45:7.820  
Randy Elliot  
But it should drive the cost down and it should for CRO drive down the the risk of entry a little bit. If you're able to do a copycat companion diagnostic. Yeah. This other companion diagnostic out there already measures these exact things and EGFR.

0:45:9.830 --> 0:45:12.850  
Randy Elliot  
Cool. We need to measure those exact things too.

0:45:14.40 --> 0:45:21.410  
Randy Elliot  
You could go. You know, you could go to the company that's already doing and say, hey, we'd really like to pile on how much are you going to charge us?

0:45:23.190 --> 0:45:28.320  
Randy Elliot  
They'll say zillion dollars because they can, but other companies could.

0:45:29.30 --> 0:45:34.240  
Randy Elliot  
Kind of pre validate against the common things and then pick up customers that way as well.

0:45:35.690 --> 0:45:37.330  
Randy Elliot  
You know, so they could get that CDX.

0:45:37.990 --> 0:45:41.30  
Randy Elliot  
Approved and then they would be on the menu of.

0:45:42.320 --> 0:45:42.660  
Randy Elliot  
You know.

0:45:44.70 --> 0:45:46.130  
Randy Elliot  
Who you could go to for that kind of work.

0:45:47.800 --> 0:45:51.880  
Randy Elliot  
I think the first the first CDX is always the hardest to get.

0:45:56.480 --> 0:45:56.900  
Angela Angle  
Yeah.

0:45:53.400 --> 0:45:58.830  
Randy Elliot  
Because you don't have a proven track record, I would say in that space in general.

0:45:59.710 --> 0:46:9.360  
Randy Elliot  
It is probably one of the hardest places to break in. Everybody says they want to do it and everyone who needs one is very risk averse.

0:46:22.310 --> 0:46:22.710  
Randy Elliot  
Yeah.

0:46:12.930 --> 0:46:24.70  
Angela Angle  
And I guess in the when you have a the drug commercialized using the CD's, the CRO become one of the test providers for the commercial stage or does it usually go to some external lab?

0:46:25.180 --> 0:46:26.410  
Randy Elliot  
No. Well.

0:46:27.260 --> 0:46:29.200  
Randy Elliot  
No, usually. So what it would mean to.

0:46:29.950 --> 0:46:34.660  
Randy Elliot  
To do the to build the CD X would mean that then they are 8 provider.

0:46:49.230 --> 0:46:49.550  
Angela Angle  
Mm-hmm.

0:46:36.590 --> 0:46:57.940  
Randy Elliot  
In perpetuity. After so, depending on the disease and the marker, people may or may not use that company to actually do the testing, even though you have to name it in the label. You know they FDA has said, OK, your CDX is whoever it may be that doctors never ordered that text. So it's not kind of a a guarantee of commercial success for that company down the road.

0:46:59.270 --> 0:47:0.680  
Randy Elliot  
From a testing perspective.

0:47:2.190 --> 0:47:6.960  
Angela Angle  
But sounds like they are kind of on the hook to be one of the providers should it go through.

0:47:9.0 --> 0:47:9.270  
Angela Angle  
OK.

0:47:6.330 --> 0:47:12.510  
Randy Elliot  
Yes, they're on the hook to be one of the providers, but it it it, but they aren't necessarily used clinically.

0:47:12.140 --> 0:47:12.570  
Angela Angle  
Yeah.

0:47:13.950 --> 0:47:14.980  
Angela Angle  
OK. That makes sense.

0:47:15.790 --> 0:47:24.340  
Angela Angle  
And how involved is is the biopharma company typically on the assay development in the 1st place or is that typically all handled by the 0?

0:47:27.200 --> 0:47:31.10  
Randy Elliot  
I'm not sure I understand. Can can. Can you say that again?

0:47:38.500 --> 0:47:38.960  
Randy Elliot  
Yep.

0:47:32.190 --> 0:47:46.40  
Angela Angle  
So I guess there's a biomarker that you have in mind to use for the CDX and then the specific assay is there any involvement from the biopharma company in developing that assay or is it that all typically performed by the CRO?

0:47:45.460 --> 0:47:59.670  
Randy Elliot  
Ohh by selecting the CRO you have pretty much selected the essay type. So if you went to a sequencing company it would be because you wanted a sequencing type readout for your assay. If you went to.

0:48:0.480 --> 0:48:10.910  
Randy Elliot  
Thermo Fisher be and to look at a single marker readout. It's because you know they do single Margarita out. Technically, I would say it is a collaboration. They wouldn't.

0:48:11.720 --> 0:48:12.140  
Randy Elliot  
You know.

0:48:13.20 --> 0:48:13.910  
Randy Elliot  
They wouldn't.

0:48:15.660 --> 0:48:20.830  
Randy Elliot  
Build it kind of without you know there there is kind of consistent communication about what's being built.

0:48:23.390 --> 0:48:39.160  
Randy Elliot  
And and so they can't really take it in there like the whatever company you've contracted for the CDX, it doesn't mean that they're kind of going to run away without you. The pharma company is collaborating on on what that readout is going to look like, what validation looks like.

0:48:40.730 --> 0:48:42.340  
Randy Elliot  
Being, you know, accepting that.

0:48:43.20 --> 0:48:46.600  
Randy Elliot  
That these milestones in the development have been met etcetera.

0:48:49.220 --> 0:48:50.300  
Angela Angle  
OK. That's helpful.

0:48:51.910 --> 0:48:53.220  
Angela Angle  
And the last.

0:49:1.340 --> 0:49:1.640  
Randy Elliot  
Sure.

0:49:8.660 --> 0:49:9.90  
Randy Elliot  
Sure.

0:49:13.10 --> 0:49:13.260  
Randy Elliot  
Yep.

0:48:53.800 --> 0:49:23.560  
Angela Angle  
A part of our conversation I did want to ask about some specific feedback on some of the zeros that you mentioned in the screen here. Then any others that you being worked with in the past? I did wanna focus on some of the more what we're considering the specialized zeros and saw two of them were cellcarta and precision for medicine. So I'm just curious for those the capacity that you work with them and if you had to compare like where do you use or I mean I guess without comparing what do you see as the?

0:49:23.660 --> 0:49:26.10  
Angela Angle  
The main strengths of these two zeros.

0:49:29.230 --> 0:49:29.720  
Randy Elliot  
Umm.

0:49:31.700 --> 0:49:35.50  
Randy Elliot  
So Carta and precision for medicine so.

0:49:36.60 --> 0:49:36.520  
Randy Elliot  
I.

0:49:38.530 --> 0:49:38.860  
Randy Elliot  
So.

0:49:40.30 --> 0:49:42.660  
Randy Elliot  
Have experience with both.

0:49:44.350 --> 0:49:49.300  
Randy Elliot  
And have been happy working with both. That is to say in general.

0:49:51.540 --> 0:49:53.120  
Randy Elliot  
These are companies I would not.

0:49:53.870 --> 0:49:57.760  
Randy Elliot  
Select against. Based on my experience.

0:49:58.520 --> 0:50:1.480  
Randy Elliot  
Trying to think of how to talk about what.

0:50:3.670 --> 0:50:7.90  
Randy Elliot  
What I can say about specific?

0:50:8.380 --> 0:50:8.920  
Angela Angle  
Oh, OK.

0:50:8.20 --> 0:50:11.480  
Randy Elliot  
I mean there my my experience with them is that they are both.

0:50:12.440 --> 0:50:16.910  
Randy Elliot  
Experienced and flexible, which are and.

0:50:23.60 --> 0:50:27.240  
Randy Elliot  
And I guess they compared with some of the more specialized.

0:50:28.100 --> 0:50:33.240  
Randy Elliot  
Things that we run, they actually run a bigger so cellcarta run to pretty big.

0:50:34.240 --> 0:50:35.820  
Randy Elliot  
Panel of technologies.

0:50:36.790 --> 0:50:37.70  
Angela Angle  
Mm-hmm.

0:50:36.810 --> 0:50:38.140  
Randy Elliot  
Which can be very helpful.

0:50:38.860 --> 0:50:39.480  
Randy Elliot  
Uh.

0:50:40.680 --> 0:50:41.370  
Randy Elliot  
For.

0:50:43.450 --> 0:50:51.610  
Randy Elliot  
I guess they both do. They both have, you know, 4 specialized companies. They both have a pretty big panel of things that they offer.

0:50:52.280 --> 0:50:56.0  
Randy Elliot  
And so instead of when I talked about Daisy chaining things together before.

0:50:56.570 --> 0:50:56.860  
Angela Angle  
Umm.

0:50:57.40 --> 0:51:1.480  
Randy Elliot  
You may be able to do more work within the same company, which is very nice when you can do it.

0:51:2.80 --> 0:51:2.690  
Randy Elliot  
Umm.

0:51:3.570 --> 0:51:5.210  
Randy Elliot  
It for either of those companies.

0:51:5.830 --> 0:51:8.10  
Randy Elliot  
Umm, I'm trying to think.

0:51:9.0 --> 0:51:10.980  
Randy Elliot  
About whether there are.

0:51:15.620 --> 0:51:19.80  
Randy Elliot  
Particular reasons I would say you know, I mean it, it's really.

0:51:19.870 --> 0:51:27.950  
Randy Elliot  
A combination of. It's almost always a combination of can they do, we believe they can do it, which is for both of these companies.

0:51:28.790 --> 0:51:30.760  
Randy Elliot  
That confidence is generally there.

0:51:32.890 --> 0:51:34.930  
Randy Elliot  
Time and cost.

0:51:35.800 --> 0:51:36.590  
Randy Elliot  
And.

0:51:37.420 --> 0:51:37.990  
Randy Elliot  
So.

0:51:38.700 --> 0:51:39.650  
Randy Elliot  
For certain.

0:51:42.940 --> 0:51:55.70  
Randy Elliot  
Trying to think if there if there are things I mean they. So we very frequently would look at multiple companies and and compare the the time and cost and what and how much also how much sample they need.

0:51:55.890 --> 0:51:56.380  
Randy Elliot  
Umm.

0:51:58.160 --> 0:52:1.490  
Randy Elliot  
To get whatever readout we we would want and.

0:52:2.320 --> 0:52:10.680  
Randy Elliot  
We have processes in place or a little different for the mostly on the clinical side, we have processes in place when things get over a certain dollar amount.

0:52:11.640 --> 0:52:16.330  
Randy Elliot  
And to try to compare companies, a lot of that's actually just being.

0:52:17.110 --> 0:52:17.520  
Randy Elliot  
Umm.

0:52:19.920 --> 0:52:25.250  
Randy Elliot  
Different companies have very different levels of stringency around that.

0:52:26.70 --> 0:52:26.340  
Angela Angle  
Umm.

0:52:25.960 --> 0:52:32.110  
Randy Elliot  
I'm in different levels of process around that that more heavily usually weights cost.

0:52:33.150 --> 0:52:33.640  
Randy Elliot  
Uh.

0:52:37.430 --> 0:52:59.620  
Angela Angle  
I guess when you think about these two companies or or maybe there's another major company that you would bucket into these more broad offering specialty companies, are there one that is there one that's like really good at genomics or one that's really good at Histology or do you or do you kind of view them as similar across the different test types that we talked about?

0:53:4.80 --> 0:53:4.520  
Randy Elliot  
So.

0:53:11.240 --> 0:53:20.950  
Randy Elliot  
And try to think of whether I'm trying to think about the answers to both of those questions, whether there are other companies. I I think there are other companies I would bucket with them and now I have to think of what they are.

0:53:23.950 --> 0:53:25.300  
Randy Elliot  
Mosaic maybe?

0:53:26.340 --> 0:53:29.230  
Randy Elliot  
But I have to double check to make sure that I'm not mixing up.

0:53:33.500 --> 0:53:34.310  
Randy Elliot  
I'm thinking about.

0:53:35.790 --> 0:53:36.130  
Randy Elliot  
Yeah.

0:53:33.690 --> 0:53:38.0  
Angela Angle  
Yes, I maybe it could have been better to to just ask one part of the question at a time.

0:53:38.750 --> 0:53:39.60  
Randy Elliot  
Yeah.

0:53:43.430 --> 0:53:43.750  
Randy Elliot  
Umm.

0:53:39.140 --> 0:53:45.910  
Angela Angle  
I guess first for the the different test types. Do you view it their like competency across types as?

0:53:46.690 --> 0:53:55.740  
Angela Angle  
Like pretty equal across the the two companies and the different types of tests or their some test types or technologies that one of the companies seem really good at.

0:53:58.150 --> 0:53:58.660  
Randy Elliot  
I.

0:54:0.360 --> 0:54:4.450  
Randy Elliot  
In some ways, I'm far enough away from it I that I.

0:54:8.420 --> 0:54:13.160  
Randy Elliot  
I think of them both as very competent companies. I don't think of them as having.

0:54:13.870 --> 0:54:16.150  
Randy Elliot  
Particular areas that they're better at than the others.

0:54:17.220 --> 0:54:17.560  
Angela Angle  
OK.

0:54:17.300 --> 0:54:21.650  
Randy Elliot  
I will also say that the members of my team may feel differently from me about that.

0:54:23.580 --> 0:54:23.940  
Randy Elliot  
I.

0:54:28.680 --> 0:54:29.40  
Angela Angle  
Umm.

0:54:24.690 --> 0:54:36.0  
Randy Elliot  
Trust my team members to that, that they companies are in the right space more than I actually look into them myself at this point and the companies have changed since I was the one doing the ordering directly.

0:54:38.100 --> 0:54:38.530  
Randy Elliot  
So.

0:54:38.380 --> 0:54:39.480  
Angela Angle  
OK, no, no problem.

0:54:39.800 --> 0:54:40.200  
Randy Elliot  
Yeah.

0:54:41.140 --> 0:54:51.370  
Randy Elliot  
No, I I think of them both as good, strong, competent companies that we're happy to work with, but not I don't think of them as having kind of 1 area that like, Oh no, that's who I would definitely go to for that.

0:54:52.460 --> 0:54:53.470  
Angela Angle  
Yeah, that makes sense.

0:54:54.830 --> 0:55:3.230  
Angela Angle  
And the last couple minutes I did wanna touch a little bit on the geography of zeros and how that how important that is for.

0:55:9.940 --> 0:55:10.190  
Randy Elliot  
Yep.

0:55:4.40 --> 0:55:11.190  
Angela Angle  
Or or not important, the lab physical lab locations are for the development stage versus the preclinical versus the the clinical work.

0:55:12.180 --> 0:55:12.570  
Randy Elliot  
Yep.

0:55:13.820 --> 0:55:25.850  
Randy Elliot  
Ohh so I think that that's a really good question. I would say it depends a little bit on the type of assay. If you're doing blood based assays and timing is important then geography becomes very important.

0:55:27.530 --> 0:55:34.120  
Randy Elliot  
That matters frequently, mostly clinically, cause you're mostly talking about patients, blood taken and clinical trials.

0:55:35.700 --> 0:55:36.900  
Randy Elliot  
And then it becomes a big deal.

0:55:38.310 --> 0:55:39.380  
Randy Elliot  
If you are.

0:55:41.960 --> 0:55:44.550  
Randy Elliot  
And especially so we're talking about specialized euros.

0:55:46.90 --> 0:55:50.480  
Randy Elliot  
Stability is, so their ability to be flexible on receiving samples.

0:55:52.250 --> 0:56:0.550  
Randy Elliot  
And you know, whatever the protocols of the company they're working with our matter a lot. Yeah, because you probably want things sent directly from the site.

0:56:1.390 --> 0:56:9.210  
Randy Elliot  
The clinical trial I'm talking about clinical side, sorry from the clinical trial site directly to the specialty lab.

0:56:10.30 --> 0:56:13.590  
Randy Elliot  
If timing is going to be important, that becomes a very.

0:56:14.220 --> 0:56:22.490  
Randy Elliot  
Central piece if you have to send it through your sent your centralized lab or if there can't be flexible to process or operational pieces.

0:56:23.160 --> 0:56:23.710  
Randy Elliot  
Umm.

0:56:24.390 --> 0:56:28.280  
Randy Elliot  
Then then they're not going to be a company anybody wants to work with anymore.

0:56:29.680 --> 0:56:35.750  
Randy Elliot  
Right. Ohh well it was like 4.9 millions of blood in the tube, not five. So we threw your sample away.

0:56:36.930 --> 0:56:38.200  
Randy Elliot  
Is not going to get you very far.

0:56:39.260 --> 0:56:39.590  
Angela Angle  
Yeah.

0:56:40.470 --> 0:56:43.550  
Randy Elliot  
But it is if it wasn't coming, I wouldn't mention it.

0:56:45.290 --> 0:56:45.750  
Randy Elliot  
And.

0:56:47.390 --> 0:56:54.280  
Randy Elliot  
So that on the clinical side, geography matters much like matters more, especially for time sensitive readouts.

0:56:55.580 --> 0:56:57.860  
Randy Elliot  
For non time sensitive readouts.

0:56:58.620 --> 0:57:1.210  
Randy Elliot  
I would say US based matters much more.

0:57:4.60 --> 0:57:18.450  
Randy Elliot  
Because the shipping is though a lot of labs are, you know, there are a lot of labs based in China and in Europe preclinical especially for China clinical, there's a fair amount in Europe, but the shipping has become.

0:57:20.370 --> 0:57:23.110  
Randy Elliot  
Much more complicated and in terms of what kind of?

0:57:24.50 --> 0:57:33.500  
Randy Elliot  
Information each sample needs and the timing can be tricky and samples can get held up in lost and so while Europe is still possible.

0:57:34.260 --> 0:57:35.100  
Randy Elliot  
And.

0:57:36.530 --> 0:57:41.230  
Randy Elliot  
Use it has. It is actually becoming harder in my experience.

0:57:42.470 --> 0:57:48.730  
Randy Elliot  
Are you are we talking mostly US or I can talk a little more about international, but if you you're more curious about your US, I could stick to that.

0:57:50.20 --> 0:58:1.780  
Angela Angle  
I guess so particular geography in focus, but I I guess is 1 quick question then the the last minute person the your view of the APAC region, are there any?

0:58:2.610 --> 0:58:8.200  
Angela Angle  
Specific countries or or geographies where it you find it more important to have a lab location.

0:58:9.580 --> 0:58:11.110  
Randy Elliot  
Uh. Uh, so?

0:58:11.770 --> 0:58:15.110  
Randy Elliot  
China's regulatory is very China centric.

0:58:16.210 --> 0:58:32.40  
Randy Elliot  
So if you are going to do business there, you'll need labs there most likely Japan. The other big market there has their own approach, especially to CDC's, but also probably a local lab will be important there for different regulatory reasons.

0:58:35.960 --> 0:58:39.590  
Randy Elliot  
Singapore is much more flexible and think about the bigger drug markets in Asia.

0:58:39.650 --> 0:58:39.960  
Angela Angle  
Umm.

0:58:41.310 --> 0:58:56.340  
Randy Elliot  
And will often go with with a more European style. They still, if it's a big enough market, having local testing will matter and sometimes for regulatory it matters. But Japan and China would be, in my experience, the most important in a pack for that.

0:59:1.900 --> 0:59:6.920  
Randy Elliot  
And they both require kind of validation to come from their own patient populations.

0:59:7.960 --> 0:59:20.420  
Randy Elliot  
Especially China requires that and so that means kind of more of the assay development, more of the validation for the needs to happen locally within those geographies.

0:59:22.780 --> 0:59:23.150  
Angela Angle  
OK.