“Precision Medicine, AI, and Metabolic Interventions for Cancer Control" (Chris Gregg) [#53]

Brad Power
April 19, 2023

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Meeting Summary

Some advanced cancer patients and researchers push the boundaries of testing and treatment options when the standard tests and treatments aren’t delivering outcomes they consider reasonable.

Chris Gregg is a special combination of being both a scientist and a “Stage 4” (metastatic) cancer patient. He works in neurogenetics and behavioral artificial intelligence to make precision medicine available to everyone. He is currently a tenured associate professor in the Department of Neurobiology & Anatomy and Human Genetics at the University of Utah School of Medicine, and is co-founder and CSO for Storyline Health Inc. He has a rare form of male breast cancer. He had no evidence of disease for 3.5 years, when the life expectancy for his diagnosis is 3 years.

To solve his disease, which has a very poor prognosis, Chris has pioneered a unique approach that includes three very diverse and cutting-edge components:

1. Adaptive therapy
2. Video monitoring of health status
3. Metabolic treatment

1. Adaptive Therapy

Bob Gatenby and his group at Moffitt Cancer Center have been working to turn advanced cancer into a manageable chronic disease through evolutionary biology concepts and adaptive therapy – recognizing that your tumor is a mix of different cell types, and by applying evolutionary theory, you can follow a personalized strategy to permit some of your cells that are sensitive to the treatment you’re on to survive so that they, in turn, will suppress proliferation of

your less fit but resistant cell subpopulations. For example, if you are taking a targeted therapy to block hormone signaling, then cells that are sensitive to hormone signaling will be blocked. But you will also have a subpopulation of cells that are partially resistant to the hormone treatment, and cells that are fully resistant, relying on alternative signals and not responding to hormone signaling or having found ways to get around your drugs. The central idea behind adaptive therapy is that this resistance comes at a cost. You're a gardener. You keep those sensitive cells always available, so that you're always responsive to your drug, and the disease becomes a chronic illness instead of a terminal illness. This approach shows promise in mouse models and in a small trial of prostate cancer.
(For more on Bob Gatenby’s theories and his study pulsing abiraterone for prostate cancer patients, please see our notes from his two sessions - #9 and #21.)

2. Video Monitoring of Health Status

To maintain their disease chronically and stably, advanced cancer patients need to monitor changes to their symptoms, pain, and disease activity to decide when they need to change their treatments. It's wonderful if you have a tumor marker that you can monitor, such as PSA for prostate cancer patients, but many patients do not have one, and some of the biomarkers, including PSA, can be unreliable. We need better tools to monitor biomarkers frequently, and that are scalable and easy to access.

There are many tests and services for monitoring patients’ health. (For more on these services, please see our discussion with Mike Snyder, meeting #52). Current tools mostly fall into two groups:

- *Cheap and scalable*. For example, a patient questionnaire. The data is quite shallow, it has low predictive value, and is not very diagnostic.
- *Expensive and manual*. For example, MRI, CT, and PET scans. The data can be very diagnostic, useful, and sensitive, but you don't have a scanner in your house, and you can't be using it every week.

Chris Gregg and his colleagues are aiming to fill the gap in the diagnostics marketplace by creating a tool (called Storyline) that is data rich, has high value and diagnostic and predictive capabilities, but is also very cheap and massively scalable. With Storyline, patients follow a clinical interview through a smartphone, then the interview and associated data are moved into the cloud, and it is analyzed using a variety of AI algorithms. They can pull out over 20,000 different microfeatures, such as facial movements, facial patterns, pallor, blinking rates, and speech analysis to get a deep understanding of what people are saying, what they're articulating, and how that compares to the thousands of patients that have been through the system before. It's not just what they say, but how they say it. Chris is also using Storyline to track his symptoms and hack his cancer, using the behavioral fingerprints of different types of pain.

3. Metabolic Treatment

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The next problem to solve to make cancer a chronic disease is to attack the mechanisms of resistance in the cancer cells. Building on the theory of adaptive therapy, how can you exploit or expand the cost of resistance to a treatment to make these treatments work more effectively, handicapping the resistant cells so that they can't take over? Nutrition (“food as medicine”) can attack metabolic pathways that resistant cells are using to be resistant to a treatment. There are many diets that are proven to work – such as inflammatory signals, glucose spikes, healing the microbiome, ketogenic, starving, and other diets. The primary problem to solve is compliance. Especially if you're sick, or you don't have a lot of social support, it's very hard to comply with a diet that would actually cause a meaningful clinical effect. Diet programs need to have palatable food, be easy to follow, and effective.

Call to Action

Chris is an amazing scientist and biohacker who is solving his cancer care. There are many kindred citizen scientists in our community, such as Jeff Krolick, who described his approach to supplements, including mushrooms, in this session.

You can engage with Chris by joining his free “Uncharted Health” masterclass (at www.unchartedhealth.org). It will teach you the basic principles of cancer care and give you access to the Storyline symptom trackers, a nutrition program, and his “Metabolic Switching” ebook. You can email him at chris@storylinehealth.com. By donating your health data (e.g., biomarkers, tumor burden, scan results) and monitoring your symptoms, you will understand your own symptoms more deeply and accurately and help train the models that can track very subtle microsymptoms and predict disease activity. And with the meal program, you will be able to test the food delivery and quality.

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Meeting Notes

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Discussion Outline

1. Introductions (0:00)
2. Adaptive therapy. (3:11)
3. Better approaches for adaptive therapy for cancer. (7:47)
4. How to use the QR code. (13:48)
5. How to help build the algorithms. (20:33)
6. The ketogenic diet and prostate cancer. (26:32)
7. The ketogenic diet and androgen deprivation therapy. (31:00)
8. What supplements do you take to fight cancer? (36:10)
9. Integrating EMR data into the storyline. (43:34)
10. What’s involved in growing your own mushrooms? (52:14)

SUMMARY KEYWORDS

patients, psilocybin, symptoms, cells, nk cell, storyline, diet, cancer, mushrooms, problem, treatment, idea, androgen deprivation therapy, moffitt cancer center, moffitt, data, test, metabolic, sensitive

SPEAKERS

Chris Gregg (48%), Jeff Krolick (30%), Brian McCloskey (13%), Russ Hollyer (6%), Rick Stanton (2%)

Brian McCloskey

We are very honored today to have Chris Gregg with us. Chris is a scientist working in neurogenetics and behavioral artificial intelligence to make precision medicine available to everyone. He's currently a tenured associate professor in the Department of Neurobiology and Anatomy and Human Genetics at the University of Utah School of Medicine, and he is the co-founder and CFO of Storyline Health. Chris is also a stage four cancer patient. He has a rare form of male breast cancer with estrogen receptor and progesterone receptor plus HER2. He has known for three and a half years that his life expectancy was three years.

Four years ago he put together a program on extinction strategy using control of metabolic pathways, inflammatory signals, glucose spikes, etc., in a way to starve the cancer. He also leads a masterclass called Uncharted Health, which pulls together knowledge that is available today to more effectively control progression based on ecological and evolutionary principles.

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I'm very curious to see where Chris is going to lead us today. I see some synergy with some sessions that we've had with Bob Gatenby out of the Moffitt Cancer Center, who is an evolutionary biologist, and also runs their radiation oncology department.

Chris Gregg
3:11

I've been looking forward to this talk for quite a while to be honest. One of the things that I hope to get out of it was an opportunity to share the projects that I've been trying to advance and to make some relationships with patients that I hope I could reach out to, to get advice, feedback, participation, etc., in some of the projects that I'm trying to get to move forward quickly.

This picture is a nice picture of my family at Halloween. I had just been diagnosed and was going through chemotherapy, lost all my hair, but it was just perfect for a Dr. Evil costume. I have been battling away in the trenches with a stage four form of male breast cancer.

As we all know, the standard of care leads you down a pathway that ultimately ends with the oncologist running out of drugs and everybody developing resistance to the treatments that are working effectively.

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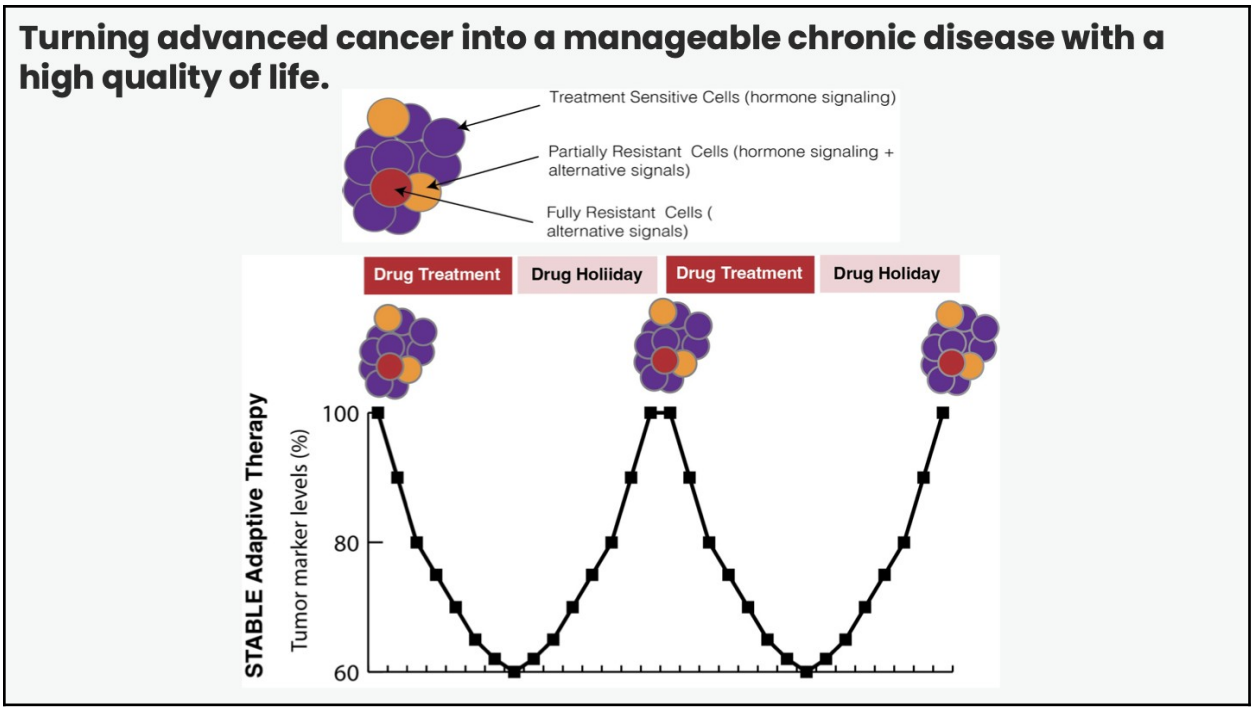
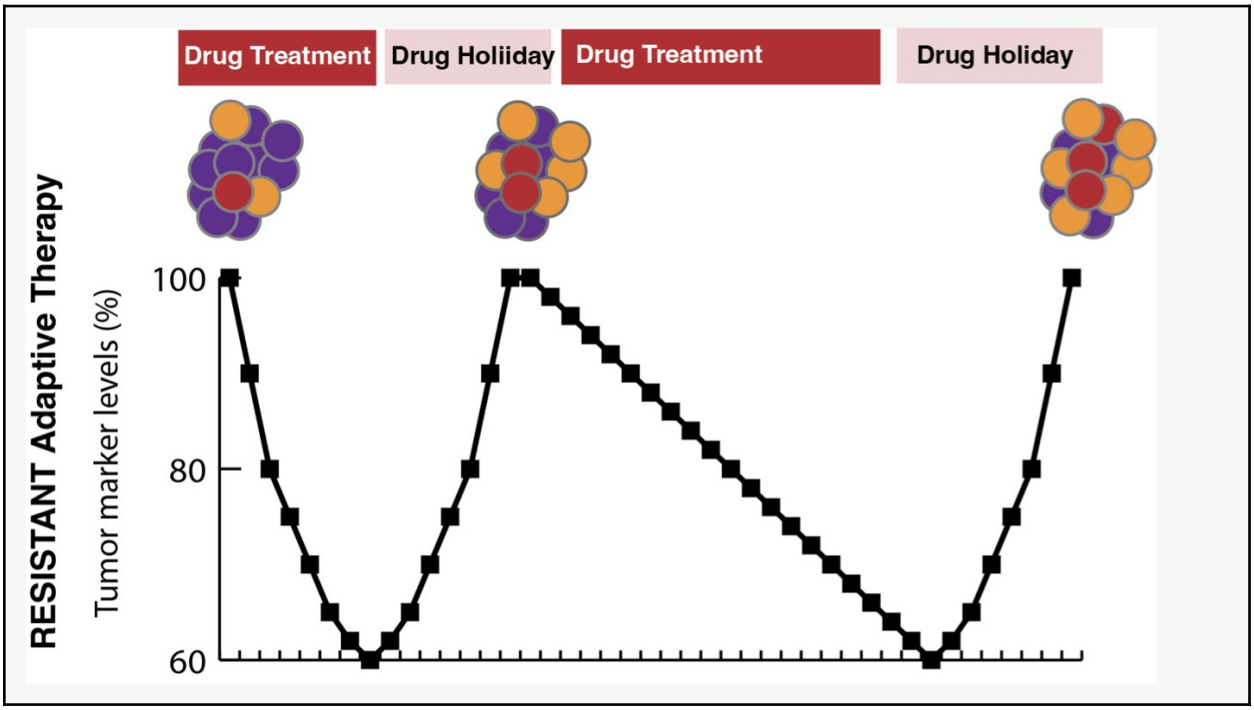


I've been very intrigued and stood in this problem that Bob Gatenby and his group at Moffitt have been working on to turn advanced cancer into a manageable chronic disease, and doing my best to participate and contribute to that effort.



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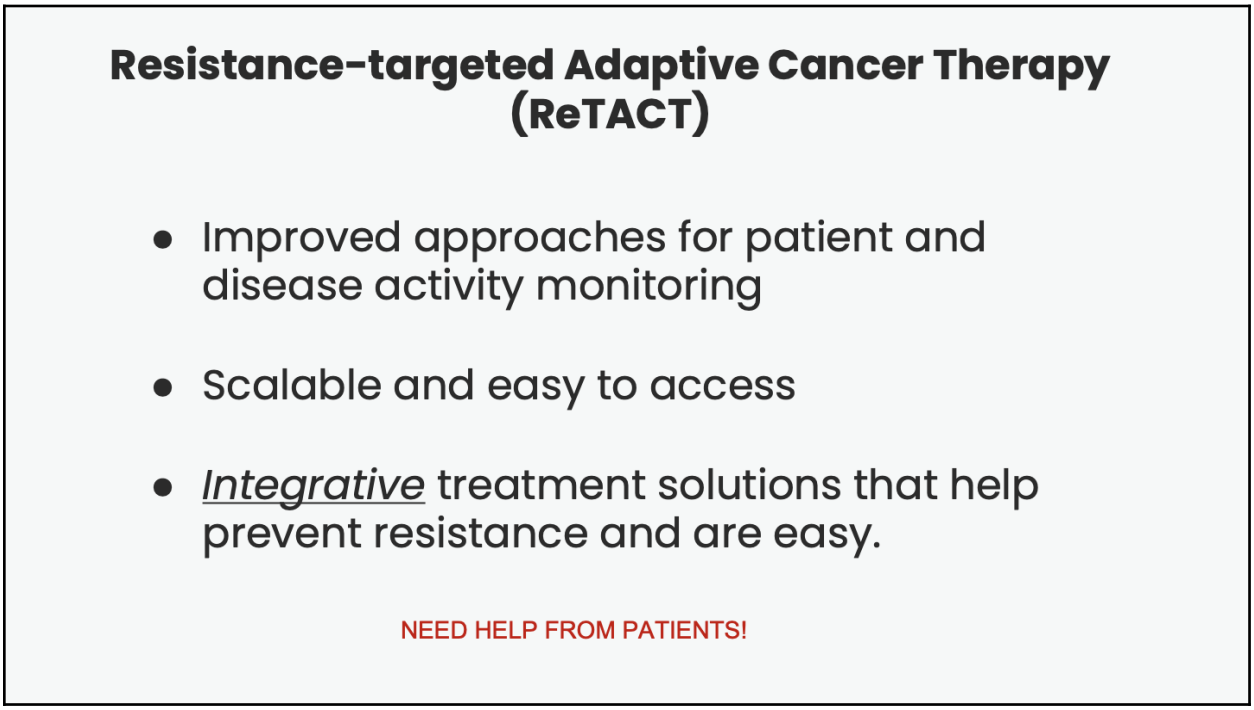
For those of you who are not familiar with this approach and the concepts behind it, I just want to introduce it quickly. The idea is that any tumor is a mix of cells, some cells are sensitive to the treatment that you're taking at the time, for example, are sensitive to hormone signaling that you might block with your targeted therapy. And then you've got a subpopulation of cells that are partially resistant to the treatment sitting in there. And they're in part relying on hormone signaling and alternative signals. And then you've got cells that are fully resistant and potentially fully relying on alternative signals and not responding to hormone signaling or have found ways to get around the drugs. The central idea behind adaptive therapy, which is Bob's idea, is that this resistance comes at a cost.



I'm very interested in the idea that you can exploit or expand that cost to make these treatments work more effectively. The way this works is you've got your tumor that's predominantly representing the sensitive population of cells, you go on your drug treatment, it attacks those cells. The idea is to never overtreat so that you lose the sensitive cells, you always want to keep, like a good gardener, a good population of sensitive cells, because you have control over them. And they in turn, have control over the resistant population through competition. And then you go on your holiday that allows the sensitive cells and the disease to essentially return to a defined level, and then go back on the drug treatment and knock it down, and then it comes back. You're a gardener, keeping those sensitive cells always available. So you're always responsive to your drug, and the disease becomes a chronic illness instead of a terminal illness. This approach shows promise in mouse models and in a small trial of prostate cancer.

But the problem is that the vast majority of patients ultimately do progress, so that the resistant population takes over, and the treatment strategy fails.

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We're interested in coming up with improved approaches for adaptive therapy. I refer to the project that I've been working on as resistance-targeted adaptive cancer therapy to improve this, and essentially handicap the resistant cells so that they can't take over.

There are a number of problems to solve to make this a reality for a lot of patients. We need to improve approaches for patient and disease activity monitoring. It's wonderful if you have a tumor marker that you can monitor, but many patients do not. And even if you do have a tumor marker that you can monitor, you need to be monitoring it so frequently that you will be tied to your hospital. If you live right next to your hospital, great. If you don't, then you've got a really big commute. It can be a real problem if you're going to live for 20, 30, or 40 years. We need solutions for monitoring that are scalable and easy to access. And we need integrative treatment solutions that can help prevent resistance by attacking this metabolic cost. All of this needs to be easy and deployable at scale.

This is a little call for help.

Shortly after I was diagnosed, I founded a company called Storyline which aims to use AI technologies to enable massively scalable precision medicine.

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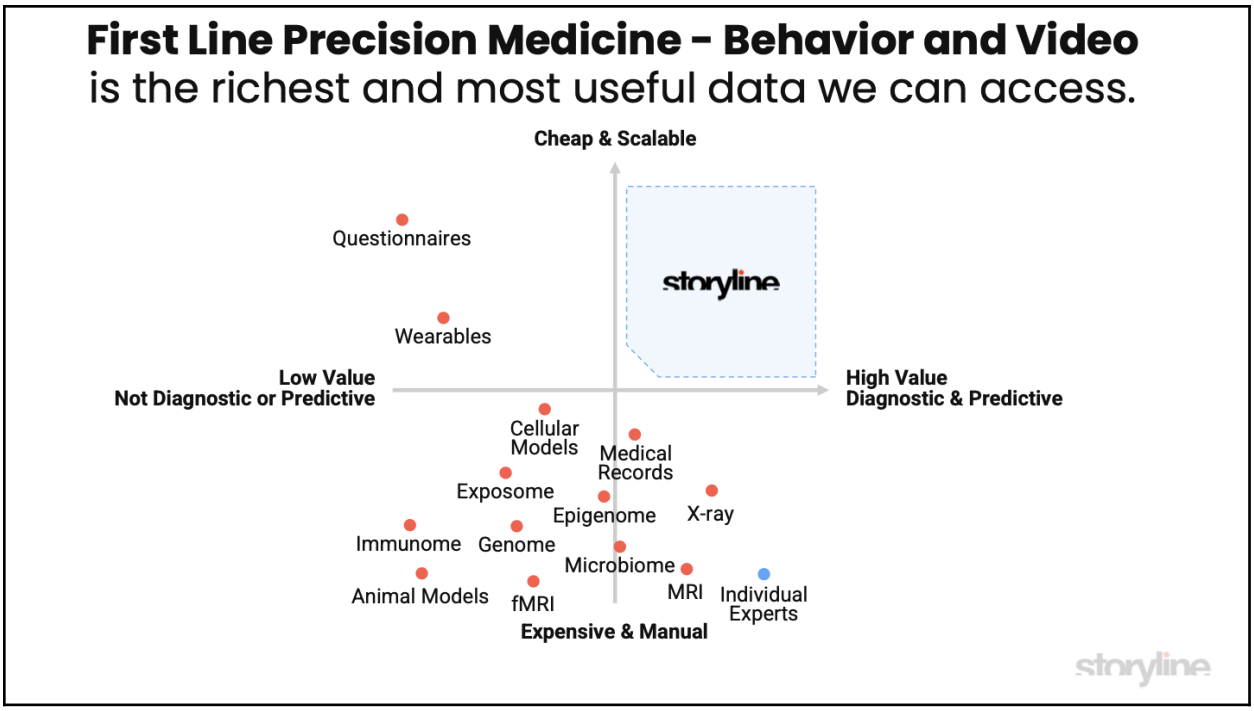

There are a number of different solutions out there for monitoring patients’ health. They fall into three classes:

- They're very cheap, and very scalable, like a form or a questionnaire. But the data is quite shallow, it has low predictive value, and is not very diagnostic.
- There are fantastic technologies like MRIs, and CT, PET scans, etc. That can be very diagnostic and useful and sensitive, but they're expensive and manual. You don't have one in your house. You can't be using it every week.
- We were aiming to fill what we saw as a gap to create a technology that was data rich and had high value and diagnostic and predictive capabilities, but was also very cheap and massively scalable. Ultimately, what we built is a platform that operates through a smartphone, where patients do a clinical interview through the smartphone, and that interview and the data is recorded and moved into the cloud, where we analyze it using a whole bunch of different AI algorithms.

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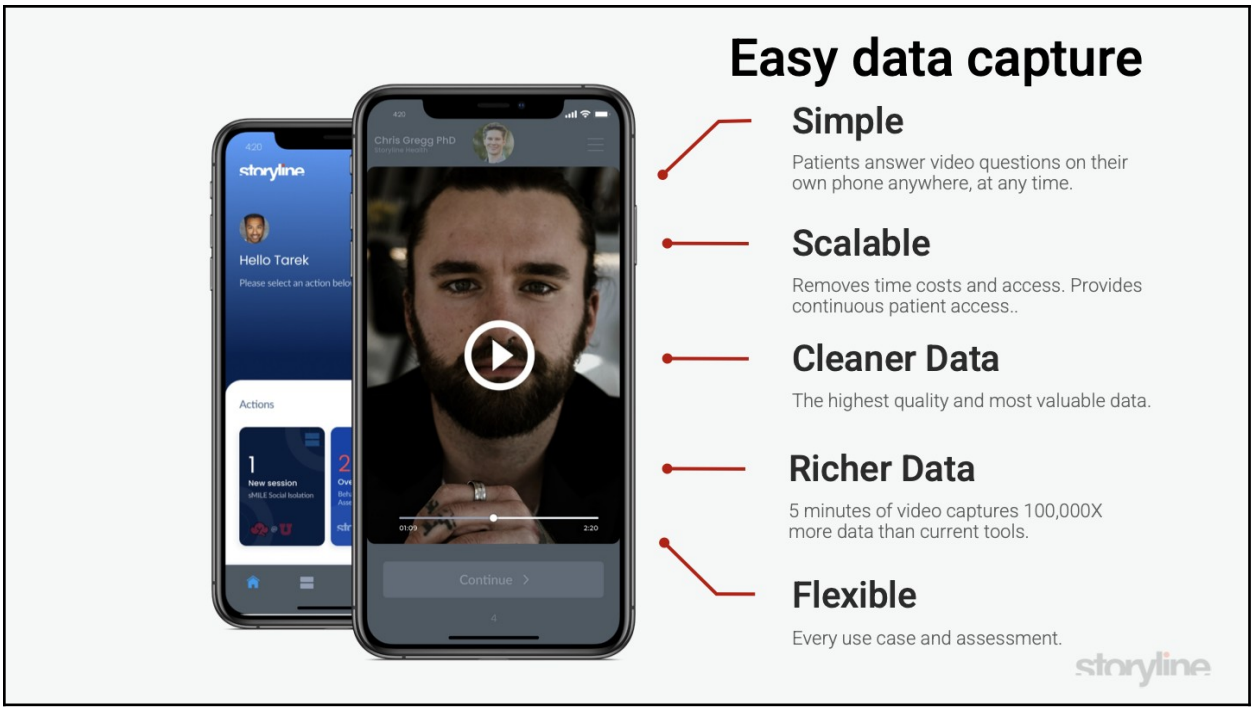

Here's a bunch of patients, for example, doing a neurological assessment: “Look directly into the camera. Puff your cheeks. Raise your eyebrows twice. Stick out your tongue all the way. Smile a big smile.”

That sounds live. But it's not live. The clinician has built an assessment, and people are just following along with it asynchronously. That makes it very, very scalable and easy for people to follow.

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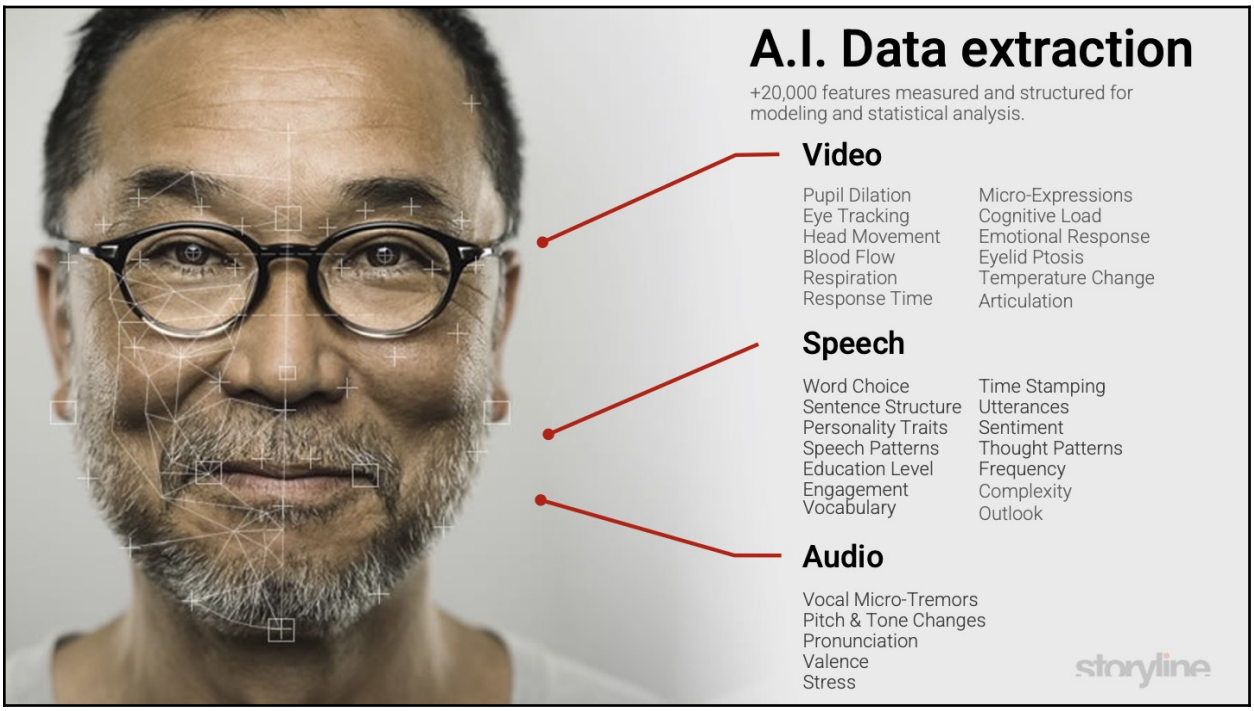

Then that data is moved into the cloud. We've architected a massive series of microservices that analyze the videos. We can now pull out over 20,000 different microfeatures, such as facial movements, facial patterns, and pallor. Things like blinking rates can be very predictive and useful. There are NLP technologies that analyze speech. We get a deep understanding of what people are saying, what they're articulating, and how that compares to the thousands of patients that have been through the system before, and what sorts of information are embedded in those patterns. It's not just what you say, but how you say it.

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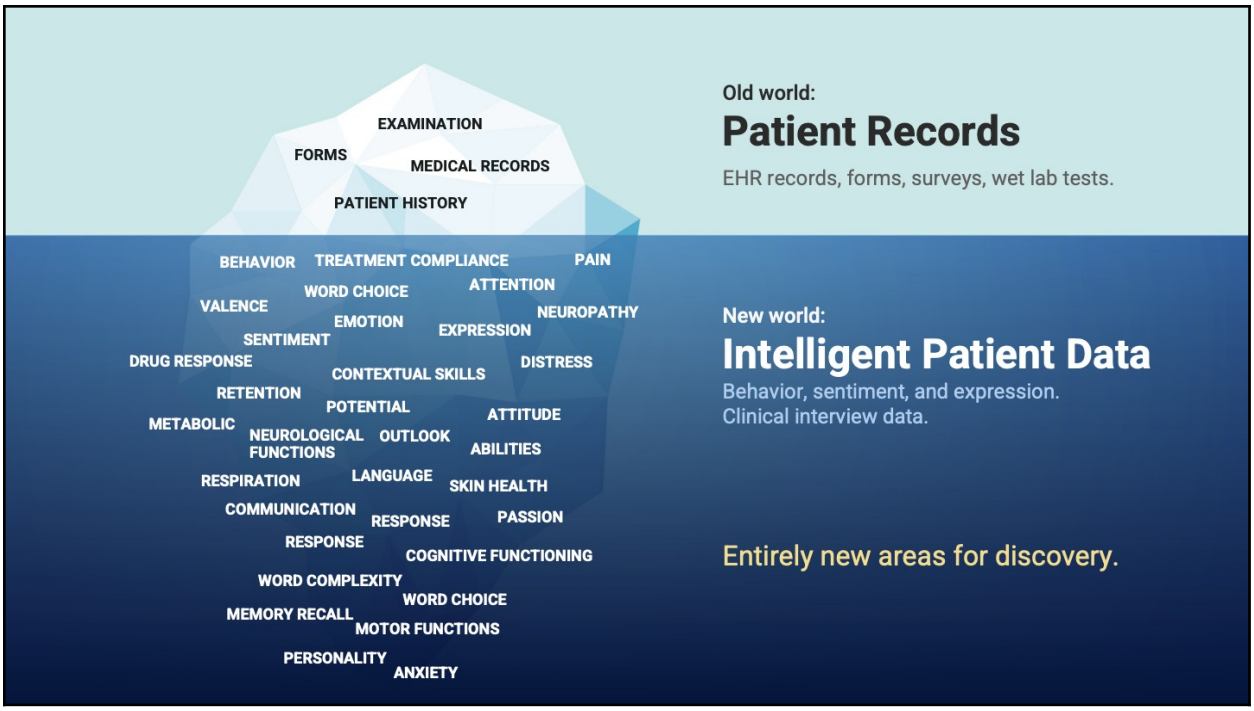

We built systems for analyzing vocal patterns, vocal structure, and emotion. All of this makes that whole experience very objective and data-driven. Currently in the clinic, we're mostly using forms, in-person exams, medical records, patient histories, and things like that.

We're hoping we can grow into this whole new world, to analyze symptoms, understand patients, and build precision medicine solutions that take advantage of much, much deeper understanding of behavior, personality symptomatology, mental health, neurological functions, etc.

One of the areas that I'm focused on is creating the world's largest collection of symptom phenotypes in oncology using deep AI phenotyping, looking at how different symptoms predict treatment responses, quality of life, mental health phenotypes, and then disease burden course and tumor marker dynamics and things like that.

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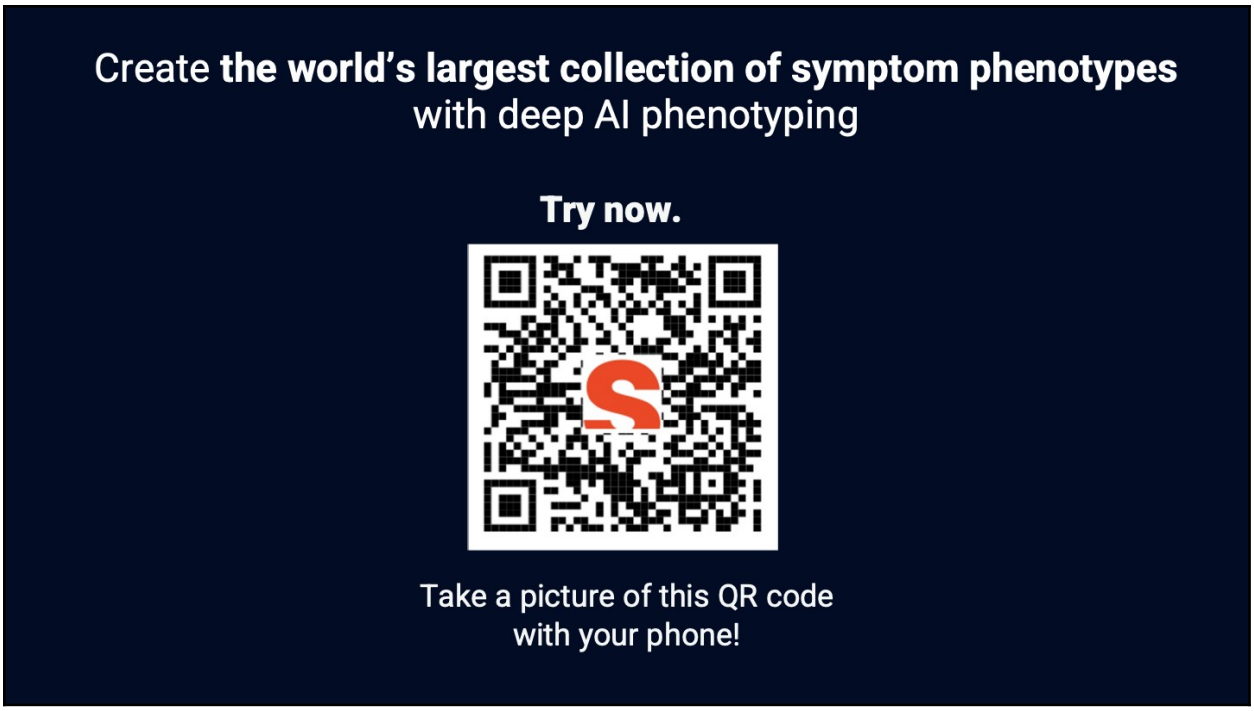
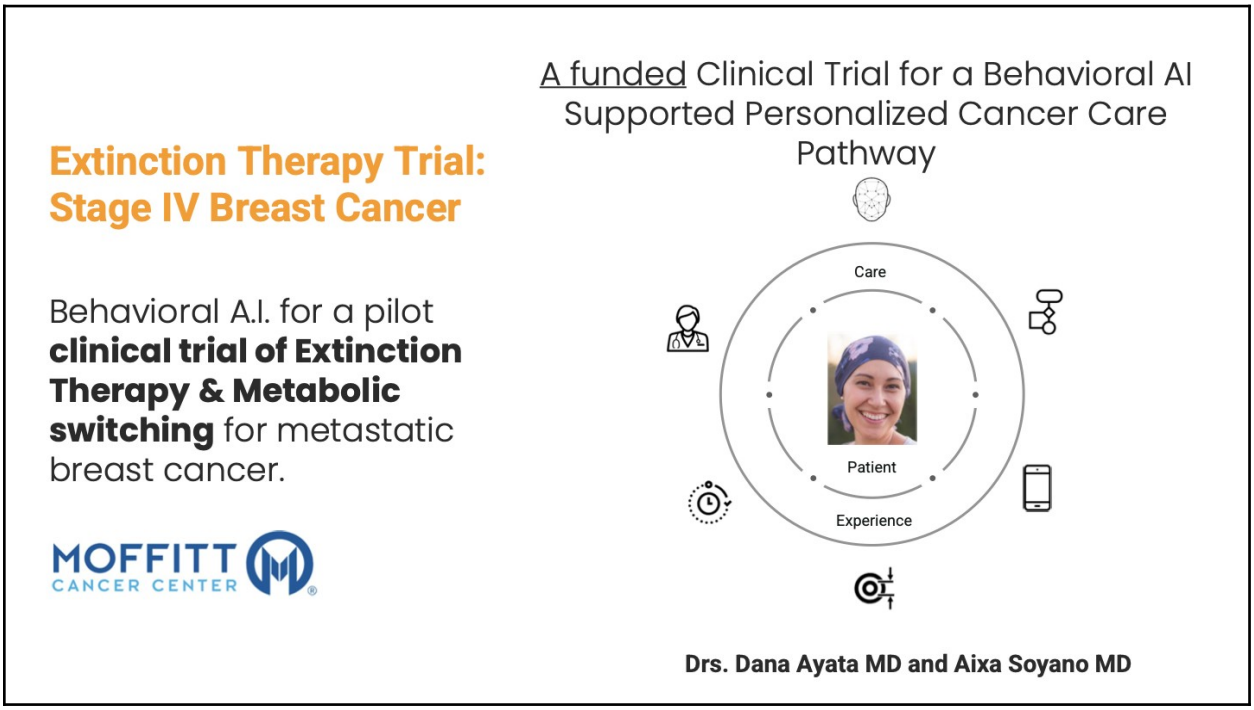


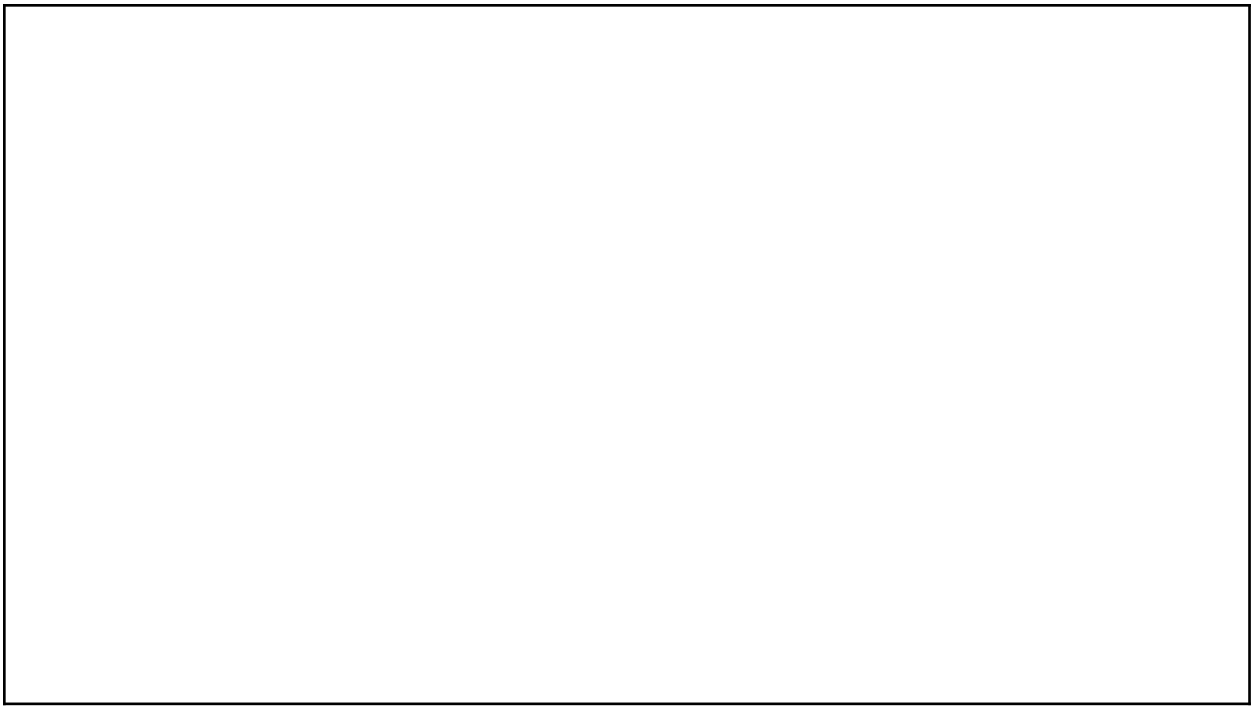
This is all very easy to do. You could take a picture of the QR code, which takes you straight into the app on your phone. Then you can do the assessment that way. That makes it very easy to deploy, on websites or wherever.



We're in the process of using this technology in a clinical trial that will be at the Moffitt Cancer Center. The idea is to build a very rich and supportive care pathway for these evolutionary and

ecology-inspired approaches to cancer care, where the patient first is deeply profiled. So you have this deep understanding of the individual that's about to go through the treatment. And then there's educational and important information that's delivered to the patient to architect the care pathway and a series of steps that they need to go through to get the best outcome and their treatment that's delivered through their phone. So they don't necessarily need to be coming all the time into the care facility. That means that if we get an amazing solution at Sloan Kettering, you don't necessarily have to go to Sloan Kettering to get access to the care pathway. It can be scaled out to people, globally. So all of this needs to be massively scalable and easily deployed, and safe and easy to use. And so we'll be testing that in this pilot trial.

Now that's the monitoring problem, where you need to monitor changes to symptoms, pain and disease activity to be able to understand when you want to change the dose of your drugs and take on different metabolic or chemotherapy interventions to maintain your disease chronically and stably. That's the problem we're trying to solve there.



The next problem to solve is to have interventions that attack the mechanisms of resistance. The area that I'm interested in focusing on right now for that is metabolic strikes attacking metabolic pathways that these resistant cells are using to be resistant to the drug treatment.

Chris Gregg
16:09

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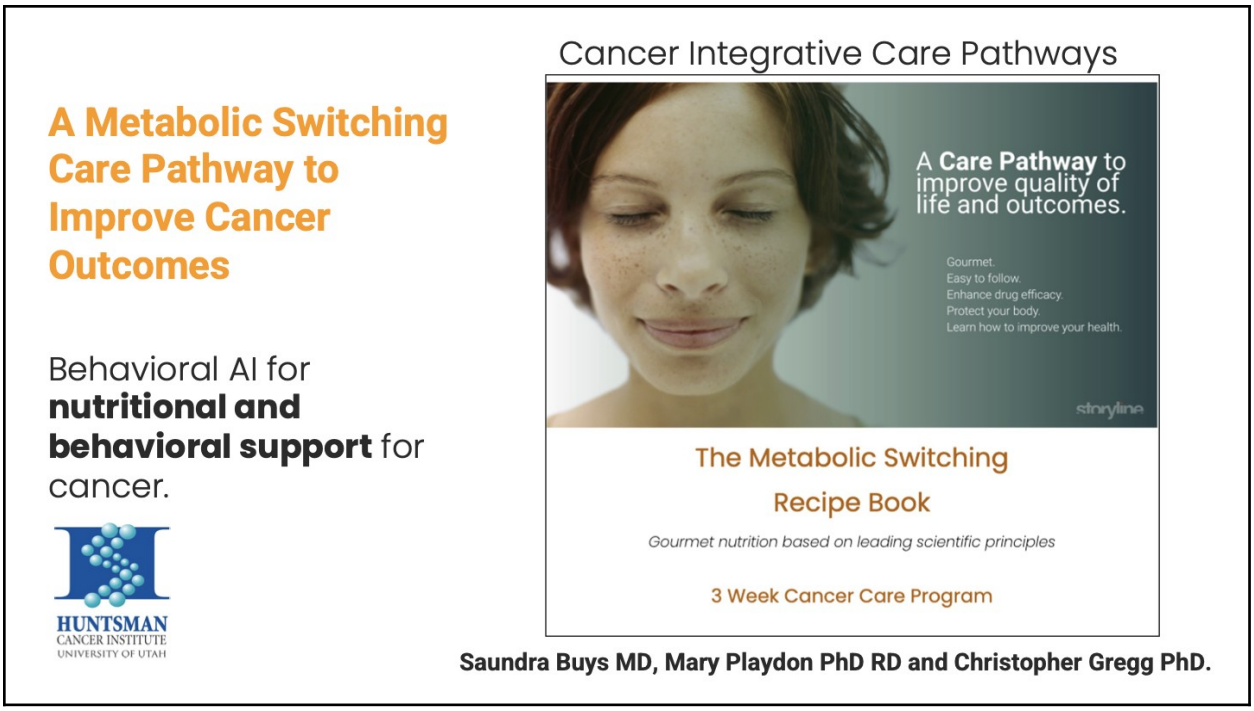

Metabolic or dietary interventions – the ketogenic diet, low methionine diet, anti-inflammatory diet, low glycemic diet, etc., have all been around for a long time. They're incredibly effective in mice, often as effective as the chemotherapies. But every time people try to deploy these in the real world and clinical care settings, they fail because compliance is too low. It's too hard for the patients to adhere to the diets. As one reads these clinical studies, it's often in the fine print that only a subpopulation finished the entire study, and many of the patients dropped out.

In my view, the primary problem to solve is the compliance problem in this nutrition and “food for medicine” ecosystem. I have focused on that for the past few years, trying to put together programs that are palatable, easy-to-follow, and effective.

I've written a book called “The Metabolic Switching Recipe Book”. It's a totally free ebook. It always will be. I feel I'm a paid academic, so my job is already to communicate this to the world. That has been put together. The program itself is great. It's fine to have a recipe book. It's fine to have that type of information. But there are many of those sorts of things out there in the world. But in truth, patients don't do it. It's too much work. Especially if you're sick, or you don't have a lot of social support, it's very hard to comply with a diet that would actually cause a meaningful clinical effect.

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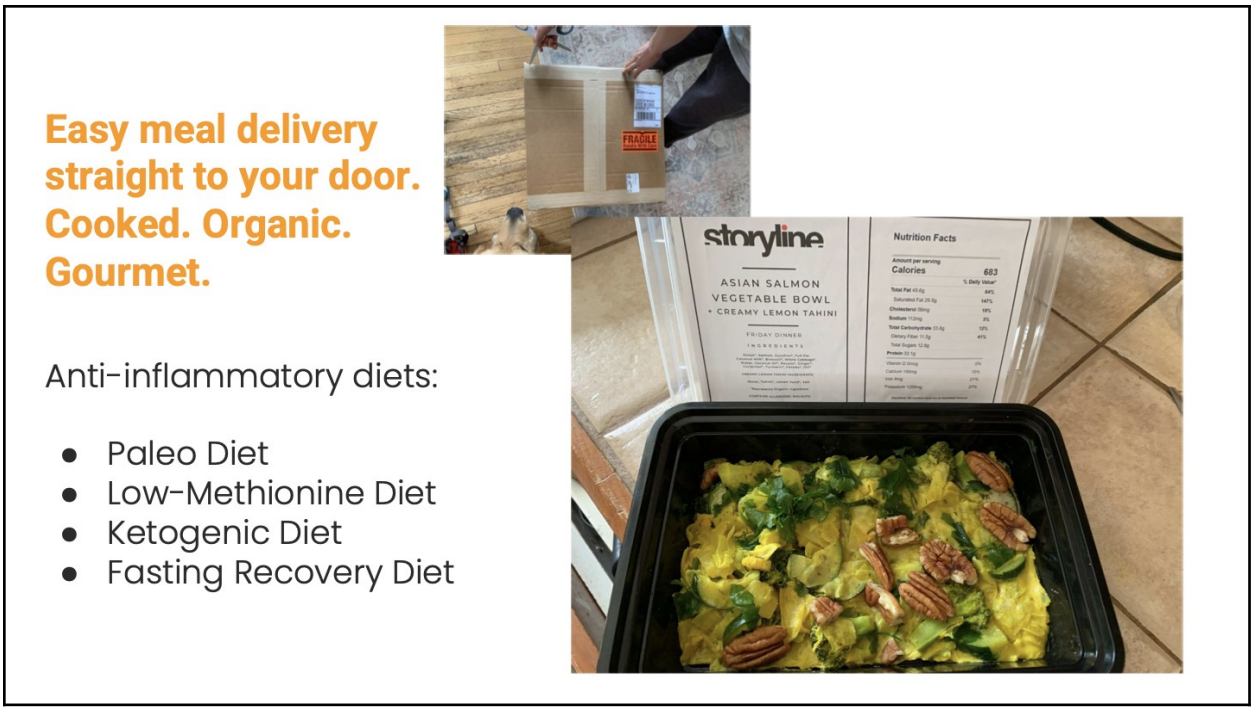

Ultimately, I found I had to build a partnership through Storyline with an organization that makes these meals. We've got different diet types. These are all specifically thought of for cancer. They're particularly thought to reduce inflammatory signals that could be driving resistance, as well as other metabolic signals. We've got a diet plan for a paleo diet, a low methionine diet, a ketogenic diet, and a fasting recovery diet. All of these are very good meals, honestly. They arrive in the mail. They're cooked for you in these little boxes that have information on them, when to have them, all in this sequential program that's been put together as well as nutritional information. My hope is that this actually helps to solve one of the biggest barriers to tackling these metabolic pathways for improved adaptive therapy, which is just making it easy for patients to do the diets.

I've been working on these sorts of problems for the past several years, in imbalance with maintaining an NIH-funded research program in my lab, being CSO of Storyline, managing my own care, and being a dad.

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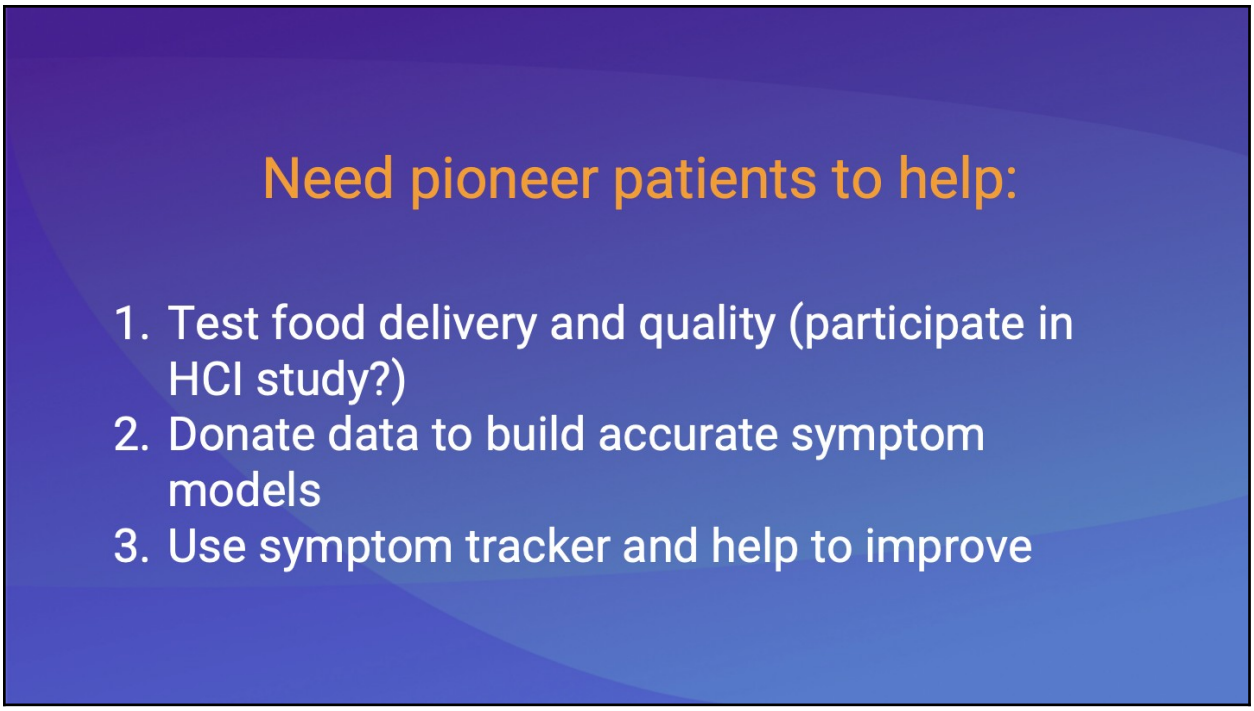

I'm looking for some help, honestly. If there are patients who are interested to participate. These could be folks that would be okay with me reaching out to say, “Hey, can you try this assessment?” Or, “Can you try this meal delivered to your house and tell me if it tastes okay?” “What are the issues that you're seeing on your end?” This is very, very, very helpful, as I work to solve these problems. I would love to have folks that would be willing to work with me to test out the food delivery and the food quality and participate in the study that we're doing through the Huntsman Cancer Institute, to test the feasibility of delivering these meals to cancer patients at scale remotely, throughout the country.

Chris Gregg
20:38

The other area that I need help with is to build these algorithms that can monitor very subtle, but objective microsymptoms that are hopefully diagnostic and predictive of disease activity, important disease and treatment changes. It requires a lot of people to be willing to donate data and participate in the effort of monitoring their symptoms, and providing any tumor marker or other tumor burden and scan data that they'd be willing to help train the models.

I'm trying to collect that data through a masterclass that I've put together, which is totally free and teaches a lot of the basic principles of cancer care. That'll be a portal for deploying a lot of these initiatives to get data to owners. Through that masterclass, as I'll show in a minute, you can access symptom trackers, and you can give me feedback. This symptom tracker is a pain in the butt. There are so many different ways to change it that I would like done. I'm not getting to express my symptoms very effectively, etc. Just getting user feedback to iterate and improve this is so helpful.

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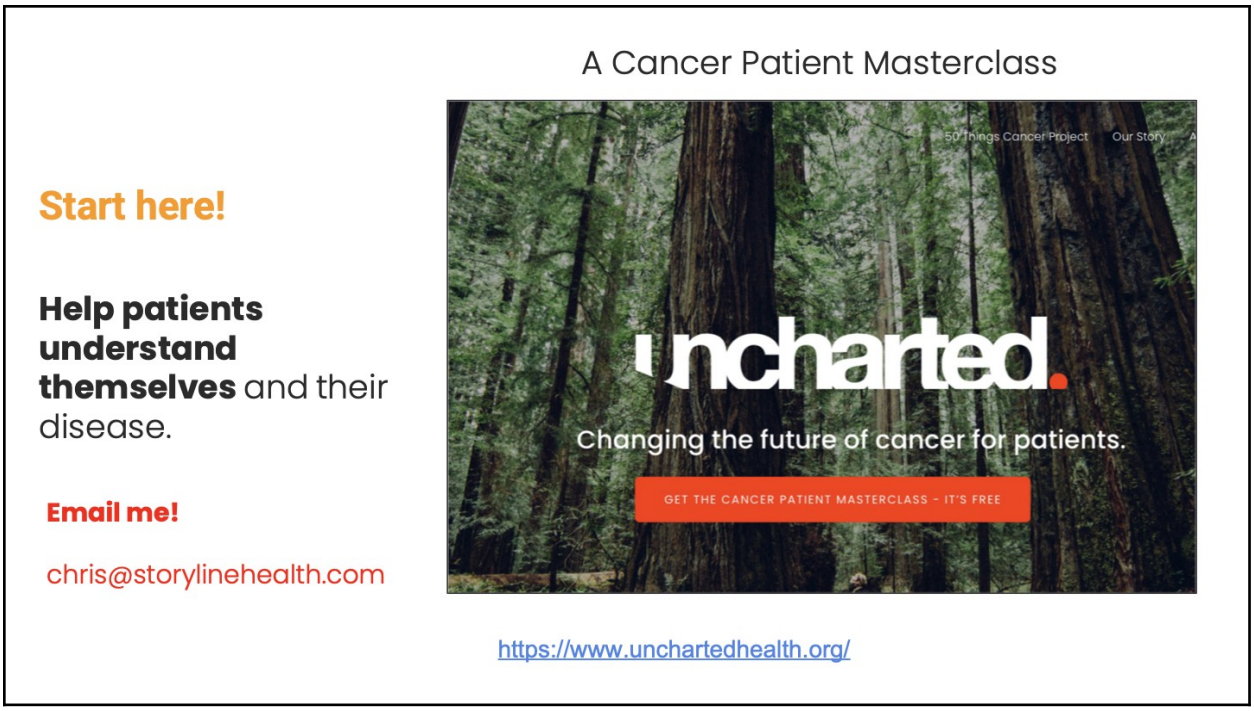

If you're interested and willing to help, you can either go to the “Uncharted Health” cancer patient masterclass, which is where I'm building the portal, to access in nutrition, the metabolic switching ebook, and all of these data donation and study efforts to build these models for helping to manage cancer care precisely and at scale. Or you could just email me at chris@storylinehealth.com, or even reach out to me in the lab or wherever you can find me through the internet. And I'd be so delighted to connect, discuss, get feedback, etc.

Russ Hollyer
23:33

Concerning the keto diet and the Paleo diet, are the diet plans made for prostate cancer in particular, or just cancer in general?

Chris Gregg
23:51

The way I think about this problem, and I'm writing an article for *Frontiers in Oncology* on this right now, it's on my mind that every cancer is different, and every patient is different. The problem that you're facing in adaptive therapy is a little bit of a biohacking problem.

Chris Gregg
24:31

When you have a lot of sensitive cells in your tumor, and you get your drug treatment, the slope of the decrease is pretty steep. If you have a lot of resistant cells, then the slope is going to be

pretty slow, and it may peter out at a higher level. That delta, the difference between the slope here and the slope there, is a very useful biomarker. The idea is that if your dietary intervention, your metabolic strike, which I'm proposing patients do during the grow back period when you go to your drug holiday, because the idea is that you want to handicap these drug resistant cells so that the sensitive cells have some of an advantage, and they grow back, and then you've got more purple than you have the other colors. In that case, you may not necessarily know that it's a ketogenic diet, a low methionine diet, or a Paleo diet. There may be different supplements that you want to integrate, like curcumin, or EGCG, which has some interesting anti-cancer effects, into that process. And you can iterate during your adaptive therapy treatment by monitoring the difference in the slope between the kill. If you do a diet during this regimen, this period, and you get a really steep response, then you know that whatever you did during here in terms of your supplements and diet, probably gave the sensitive cell population a boost, and you've learned something. And then you can follow that and continue to iterate and improve. What I'm trying to do is build diet programs that give patients flexibility to hack this out themselves.

Russ Hollyer
26:32

The adaptive therapy is pretty much have been doing since day one. I was curious about the keto diet in particular, how well that seems to work for prostate cancer. I've done it myself eight times. Four times my PSA went down, three times it went up, and one time it was unchanged. That's not enough data to really tell anything. But prostate cancer is one of the few cancers that's primarily lipid driven, at least in the early stages. I was wondering if the keto diet, which is very good for many cancers, would be applicable for prostate cancer?

Chris Gregg
27:26

It’s a good question. And to be honest, I'm not an expert in prostate cancer. I don't think I'm really well armed to answer your question. It sounds like you already know more than I do about it.

Russ Hollyer
27:37

Maybe just prostate cancer. Prostate cancer is about the only one that is lipid-driven. So increasing fats might be counterproductive.

I did have another question: do any of the diets or supplements, in your opinion, induce DNA double strand breaks damage or inhibit the repair of the DNA?

Chris Gregg
28:11

I don't think so. I have not come across any evidence that suggests any of those diets would have major effects on DNA damage.

Russ Hollyer
28:21

That approach, using the mid-effective duration of treatments and mixing things up and keeping the sensitive cells alive, if you will, at some low level, but keeping them around. It seems to be pretty important to avoid castrate resistance because if we kill all of the androgen sensitive cells the androgen-insensitive cells and mutations could take over, and we're left with a population that we can't control as easily.

Chris Gregg
29:11

It is the problem to solve. To make this more effective, thinking a lot about this, working through all the details in this review article, thinking about oxidative stress as something that one can target. Some of these resistant cells have very high levels of oxidative stress, and they're really redlined. And that for some patients may be useful, while other patients may have evolved mechanisms for decreasing oxidative stress, and that may not be the best target. I just feel like there's a lot of tinkering that needs to be done as one optimizes this. And it's tricky, very, very tricky.

Russ Hollyer
29:49

It is a tricky problem. It's like you said, it is very individual: where they are, their phenotypes, what type of cancer they have. Prostate cancer is very heterogeneous in nature. There are 200 known mutations. There are lots of variables.

Brian McCloskey
30:15

Jeff Krolick is a patient who is being seen at the Moffitt Center by Bob Gatenby. He just started his adaptive therapy in February, and Jeff, maybe if you can just give us a little bit of an overview in terms of what your patient experience has been getting onboarded into the Moffitt Center, what the adaptive therapy regimen looks like, and how any of Chris's technologies are being integrated into your care.

Jeff Krolick
31:00

I've been working with my current oncologist for about three years, Dr. Dawn Lemanne. She has steered me to the Moffitt Cancer Center and set up a virtual meeting with them in February. I

was fortunate to find Dr. Lemanne because from the very beginning, she was very mindful of not having me be on androgen deprivation therapy for too long. When I was diagnosed, I was stage four. I had a hip lesion as well as prostate cancer outside of the prostate capsule. I had done radiation treatment at Johns Hopkins with Dr. Tran (?) in conjunction with the androgen deprivation therapy. It's called consolidation. Dr. Lemanne had strongly recommended that during radiation treatment, I follow a ketogenic diet specifically measuring a ketone level with a two on the scale. I'm not quite sure what that means, but two on the ketone scale, right before I went in for radiation treatment, and if I was a little bit high, that was okay. But if I was a little bit low, I had some refined coconut oil that I could take and that would push it up. The idea was, at least according to my oncologist’s thinking, burning primarily ketones was protective of healthy cells, and it also weakened cancer cells making them more susceptible to the radiation treatment, and my experience through that was I had zero radiation side effects.

My PSA went down as low as 0.2, but then started climbing again even on androgen deprivation therapy. When we got close to what might be a target level, she facilitated the meeting with the Moffitt Cancer Center, and then I just started that protocol in February, and I'm using, and have used previously, a newer oral androgen deprivation therapy agent Orgovyx, which does not have a flare and works very quickly. Also when you discontinue it, testosterone tends to come back faster than other agents. That's where I am now. I've gone through one cycle, and I'm on the upswing, and probably will start taking Orgovyx again when we get my next PSA tests back, which I do weekly.

Chris Gregg
35:16

Jeff, are you on a full drug holiday?

Jeff Krolick
35:18

Yes.

Chris Gregg
35:20

Did they stop the drug? They didn't do a dose reduction?

Jeff Krolick
35:22

I just stopped it cold.

Chris Gregg
35:26

How long did it take to go back?

Jeff Krolick
35:33

I have to go back and look. My oncologist does a graph, and has gone back even before I started this, so we can see the pattern. I want to say it was about six weeks that it started to get back and probably the numbers that we're talking about are low 20s at the peak, and about 4.5 at the lower end. The idea is to keep cycling between those two unless I experience something that might be a symptom of prostate cancer, and then they'll consider restarting it. But I've been fortunate so far, and I don't really have any symptoms. That's been an abstract process for me, because I don't feel sick and never really felt sick with it.

Chris Gregg
36:41

That's great. I hope that stays that way for a long, long time.

Jeff Krolick
36:46

The other thing that I do is a low carb diet with an overall calorie stamp that I follow pretty closely, not perfectly. And exercise in a regimen of some supplements. One of the labs can do a natural killer cell activity test. And when I first started, it was always below the cutoff, like there's no NK cell activity here. But with a supplement regimen, I seem to be able to get it up into the low normal range, which for me is good based on where it was before. So we're that's also a piece of what I do.

Chris Gregg

What supplements do you take?

Jeff Krolick
38:20

Oh, god, it's a long list, but the ones I'm talking about are rotating through a variety of immune-boosting mushrooms, Reishi, Turkey Tail, I'm trying to think of the other one. It's a common brown button mushroom that's been processed a little bit. The white button mushroom, gray Arcus. I rotate through those. I'm not taking the same one all the time. But the two things that seem highly correlated with an increased NK cell activity, which is really my understanding, are the only part of the immune system which can actually recognize and attack tumor cells reliably. There's a product from a company called Life Extension called “NK cell activator”. It's made

from a patented process. It’s some kind of fermented rice bran. But that seems to reliably keep me up in the low normal range. Chaga is in my rotation too. I'm not remembering.

My oncologist right from the beginning had recommended a low daily dose of an antiviral valacyclovir, which I guess is used more commonly in Scandinavian countries. But I found if I pulse that, like maybe do three quarters of a dose once a week, that also increases my NK cell activity measurements. So that's the scoop with me so far.

Brian McCloskey
39:58

Chris, since Jeff is a patient at the Moffitt Cancer Center, do you have access to his data?

Chris Gregg
40:14

It's very early stages in terms of getting Storyline’s technology deployed at Moffitt. We've had many discussions about it. There are a couple of issues, but one issue is funding. We've just recently got a donor who's put up money for a study of extinction therapy in metastatic breast cancer. That'll probably be the first deployment of Storyline in a clinical setting at Moffitt. We have deployed it here at Huntsman. But that'll be the first deployment there. There are some leadership changes and interesting things going on at Moffitt. We'll see how things flush out, but there may be some changes there.

Brian McCloskey
41:04

With your facial recognition, slash phenotyping technology, would that be relevant for Jeff?

Chris Gregg
41:16

I monitor my symptoms and symptom changes daily using Storyline. As I have tried different diets and metabolic interventions, I monitor the pain symptoms. I have a lot of metastatic sites in my skeleton. The pain patterns and symptoms, fatigue, and mental health are pretty interesting to monitor. There's a lot of information there that we're not using. It takes a little bit of education to teach patients how to articulate them. But then the AI can pick up on these patterns is my hope. This needs to be trained and linked to ground truth markers of tumor burden. That's going to take some time.

Jeff Krolick
42:13

There's one other thing that I will add here, and I'm fine with recording it. Oregon is a psilocybin legal state, one of the leaders nationally in developing psilocybin end of life substance abuse treatment. But since the beginning of this year, and this is more just for cognitive enhancement, but it also has, a mood enhancing, even spiritual piece. I follow a microdosing protocol recommended by Paul Stamets. That's another piece. ~~I'm~~ not ~~doing that~~ related to the cancer treatment directly. It's more just for my mood and well being. Apparently, there's some research that shows this actually has a significant benefit for maintaining a high level of cognition and neuroplasticity, even though the microdosing. That's my full disclosure here.

Brian McCloskey
43:31

Chris, I just want to dig in a little bit more regarding Storyline. We can download Storyline for free, and we can begin to use it for free. I think you'll have some folks, hopefully, from this call that will do that. I will do that. But I'm also curious, what data you are integrating on the back end to enhance the feedback that you're picking up through Storyline? A lot of us have a lot of health data. We've been sequenced multiple times. How are you integrating that? How are you integrating the EMR information?

Chris Gregg
44:20

At this stage, we're not integrating EMR information. We just don't have a system set up to seamlessly pull it in. It is actually easy to do. We just haven't built it into the platform. At this stage, the way it would work is you do an assessment in Storyline that would be like this video assessment and a neurological assessment to capture this important symptom data and microsymptom data. Then I would ask for you to enter your tumor marker levels. That's where I'm focused right now. Can I predict your tumor marker levels, Based on particular patterns of symptomatology, and microsymptomatology? If that can be done, then that's a very, very good starting point. Of course, it would be nice to be able to integrate metabolic panels, CVCs and other pieces of information and really see how much of that molecular information can be derived. All of this rolls up into the central nervous system. How much can be derived from behavioral patterns?

Brian McCloskey
45:35

Mike Snyder from Stanford had a discussion with us. Do you work with him?

Chris Gregg
45:48

I certainly know Mike, and I participated in a panel with him on trying to solve chronic fatigue syndrome. Ron Davis at Stanford is leading that effort, and Mike is involved. I see him in September for that. But other than that, that's it.

Russ Hollyer
46:20

Jeff, did your MO put you on to mushrooms?

Jeff Krolick
46:28

Yes. She gave me a baseline. She was very clear that she doesn't carry or sell any of that. But she said, “Here's one that I would recommend.” She had a couple that she recommended and said, “If you want to explore, that's fine. Read up, and ask me if you're unsure, and rotate them, so you're not just doing the one, but you're trying different ones, so you don't encourage signaling pathways to change.” So you're always keeping everything a little off balance.

Russ Hollyer
47:10

My MO thnks there is something to mushrooms too. She did a fellowship at Moffitt. She doesn't think that we know the doses or stages when they're going to be best. The same with fasting. But she thinks there's something to both of those.

Brian McCloskey
47:34

I'm sorry, just to be clear. Are you talking about psilocybin mushrooms? Or are you talking about all mushrooms?

Russ Hollyer
47:42

My question to her was in general about mushrooms.

Jeff Krolick
47:57

The psilocybin path I took was my initiative following a mycologist Paul Stamets recommendation and kind of summary of research. I talked to my oncologist about it. She knew all about it and even said, “If you're going to do it this year, here's a good supplement to do with that.” And again, this is legal in Oregon. So I know what I'm getting, I grow my own, which I think is always the best thing to do, at least for right now.

“Precision Medicine, AI, and Metabolic Interventions for Cancer Control" (Chris Gregg) [#53]

Chris Gregg
48:39

I participated in a psilocybin trial for terminal cancer patients here. I have to say it was an extraordinary experience. Storyline is now deployed in some clinical studies of psychedelics for existential distress, end of life care, and how to optimize the treatments and the setting and all of that kind of thing to get the best outcomes for different folks. I'm definitely interested in Jeff and mushroom stuff.

Jeff Krolick
49:13

That's a whole other dimension. I'm happy to talk with people about my experience with that, but I think even through the longer haul of androgen deprivation therapy, I occasionally used some psilocybin, and I'll say it very simply, it definitely kept my spirits up in a different kind of way. It's not like caffeine or pot or anything like that. It's a different experience that stays with you and even kind of changes you in some ways.

Rick Stanton
50:05

It changes you for the better?

Jeff Krolick
50:10

I think so. I can only talk from my experience, it gives a kind of perspective of being at peace with the end of life, although I'm not at that point, fortunately. A prostate cancer diagnosis, especially if it's stage four, suddenly, “Okay, I'm mortal, and this is going on.” It puts it in a different perspective where you are more at peace and accepting of it. It does more than that, too. There have been lots of trials. Johns Hopkins ran a large end of life psilocybin trial. Where I am in Portland, Oregon Health Science University is doing a lot of work with end of life, and also psilocybin for substance abuse, treatment, even trauma treatment. So there seems to be something to that. Everybody's trying to find out what's the best approach for using it.

Rick Stanton
51:32

I definitely strive to become at peace with mortality. You know, I feel that I'm most at ease as my mood or connection with God kind of deepens. I understand what you're saying a lot. Because you can get uptight. You can get all anxious. It's nice when that dissipates and you kind of go, “Okay, I'm just gonna have a great day today.”

Brian McCloskey
52:19

Jeff, what's involved in growing your own mushrooms?

Jeff Krolick
52:32

I can talk about this at length. There's a place in Vermont that markets a variety of different mushroom spores, including a variety of psilocybin cubensis species with a variety of subspecies. But they market them for microscopic studies. They send you a package with slides and all of that, but the spores are in a plastic syringe. There's another company called Midwest Growers that actually makes growth mediums in hermetically sealed bags with a little injector port. It is very easy to do. It takes about a month and a half to two months from start to finish. They have the growth medium down. The key is to keep it at about 76 degrees, and they'll even sell you a little thermometer, and there's a specific frequency of blue light that you use, right toward the end. that tells the mycelia to start pinning, start growing mushrooms, you put that down for two days. I got it the very first time I tried it. It's very doable.

Brian McCloskey
54:06

Maybe there's a separate session here. Just think about that. We may follow up with you on a separate question. Because it's certainly often talked about in cancer circles. You seem to have a fair bit of expertise. Maybe if you can put that on your radar that we can call upon you to do that.

Russ Hollyer
54:38

How do you monitor your NK cell activity?

Jeff Krolick
54:46

So apparently, the only readily available test at a commercial lab is through Quest Diagnostics, and they have a test called an NK cell activity test. That's different from a test which just counts how many cells. I've got lots of NK cells, but they're not as active as we would like them. I don't know how they do it. There's something about making them fluoresce, and they put them in a medium, and they see what they do with that. I actually don't know the details of it. I get that done once a month. It is a simple blood draw. It's very special. They have to make sure that they send it out that day. You can't do it toward the end of the week. It's got to be processed at one of their central labs within 48 hours. It's blown often. I go to a place where they know how to do it. My NK cell test was an 8, which is right on the edge. I have been able to get mine up as

high as the low 20s. But reliably in the high teens. Now the range is up to something like 125. It'd be nicer to be up in the 40s or 50s. Given where we often are with cancer, which somehow has a mechanism to turn off that activity, getting it even a little bit active, like an 8, is good. But getting it up into the teens, or as high as you can get it, is good. I don't know how much that contributes to anything, but it's one more thing.

Chris Gregg
56:58

Have you ever plotted your PSA against your NK activity levels?

Jeff Krolick
57:06

I did initially, and then I didn't do it anymore. But recently I started pulsing the antiviral, and I would take that, but because of the NK cells only going once a month, but adding the pulse valacyclovir somehow even increased that. I do both of those. I don't seem to have any side effects from the valacyclovir. I have a history of cold sores and not genital herpes, but another kind of herpes, which I guess can activate or stimulate cancer growth. That's part of my regimen.

Brian McCloskey
58:02

Jeff, can you remind me what your Gleason score is?

Jeff Krolick
58:07

It was 8 when I was first diagnosed. I had a pelvic lesion, and the pelvic lesion and my prostate bed were treated with radiation. I do have a very small new pelvic lesion as of the last scan. I also have two lymph lesions, which may have been there all along, but were missed initially. But that seems to be it at this point.

Brian McCloskey
58:43

Chris, what are the key takeaways that you want this group to have? And second, how can we help you?

Chris Gregg
58:58

The key takeaways are that we now have some solutions to make the metabolic interventions, which I think a lot of patients want. We have solutions to make those easier. And if that's something you're interested in piloting, please reach out to me and let me know.

The other thing is just to let people know that we're working on improved ways of understanding symptoms. And if that's something you're interested in participating in and understanding your own symptoms more deeply and accurately and seeing how it relates to your NK cells or cycling mushrooms or whatever you're interested in biohacking out.

Brian McCloskey
59:44

I'd be excited to support and get involved with that. So, the easiest way for us to get activated or integrated into your work is to sign up for Storyline?

Chris Gregg
59:57

That's one way to do it. But I would love to have a connection with whomever would like to do that. So if you could just reach out to me directly, and then I could talk with you about it, that would be a good starting point.