Introduction and guest overview

Morning everyone again. Uh thank you for Morning everyone again. Uh thank you for joining us live on our multiple channels joining us live on our multiple channels as far as signals and symptoms podcast.

as far as signals and symptoms podcast. As usual, we want to bring value, value, As usual, we want to bring value, value, value. And I'm very very grateful that value. And I'm very very grateful that I'm joined by my [clears throat] good I'm joined by my [clears throat] good friend Jim and Tom from Lumen Astra friend Jim and Tom from Lumen Astra who's going to tell us how medical who's going to tell us how medical physical devices is impactful in the physical devices is impactful in the future of AI development as well. So future of AI development as well. So it's going to be a very interesting talk it's going to be a very interesting talk today. I will ask them personally as a today. I will ask them personally as a request to tell us all about their request to tell us all about their company, their product as well. So our company, their product as well. So our audiences understand this. This is not audiences understand this. This is not sponsored just FYI. And um I will tell sponsored just FYI. And um I will tell you exactly that um why I'm bringing you exactly that um why I'm bringing them while we go ahead. So let's just them while we go ahead. So let's just start with a few updates and then we're start with a few updates and then we're going to go ahead and introduce uh them going to go ahead and introduce uh them both again and then go from there. So both again and then go from there. So number one, of course, our Harvey Castro number one, of course, our Harvey Castro is out as usual. I don't know where he is out as usual. I don't know where he is. He's flying somewhere. But most is. He's flying somewhere. But most importantly, he was counted as the top importantly, he was counted as the top 100 influential man of 2025 on LinkedIn.

100 influential man of 2025 on LinkedIn. So amazing honor to him. Kudos. And uh So amazing honor to him. Kudos. And uh he is trying to join. Unfortunately, he is trying to join. Unfortunately, he's not finding the internet whichever he's not finding the internet whichever part of the world he is today. Uh great part of the world he is today. Uh great grateful to Ed Marks uh uh for joining grateful to Ed Marks uh uh for joining us today. We're going to talk about us today. We're going to talk about Luminestra. this is u you know Luminestra. this is u you know essentially a device and we're going to essentially a device and we're going to see what they're going to present see what they're going to present and we're going to ask questions and then uh we're going to ask questions and then uh Jim of course is this is an amazing Jim of course is this is an amazing human being he has been in the industry human being he has been in the industry for approximately at least 25 30 years for approximately at least 25 30 years he has had four startups four ex eight he has had four startups four ex eight startups or so four exits with startups or so four exits with acquisition amazing uh person who has acquisition amazing uh person who has helped multiple different startups as helped multiple different startups as well and he's leading the charge Tom is well and he's leading the charge Tom is a biomedical engineer who has actually a biomedical engineer who has actually helped us. Uh you know again uh I I helped us.

Why brain temperature matters in surgery

Uh you know again uh I I actually had him we have been in actually had him we have been in communication for approximately 5 years communication for approximately 5 years when I was actually at Aurora Advocate when I was actually at Aurora Advocate Health. Uh he has he has an MBA from MIT Health. Uh he has he has an MBA from MIT Saloon. Uh and then he is also worked on Saloon. Uh and then he is also worked on the commercial side and he is the the commercial side and he is the business development for Luna Astra. U business development for Luna Astra. U uh as far as updates today is a thin uh as far as updates today is a thin one. Uh this is very important.

one. Uh this is very important. multilingual protects against multilingual protects against accelerated aging in the cross-sectional accelerated aging in the cross-sectional analysis of 27 European countries. I analysis of 27 European countries. I bring this up because of course I'm a bring this up because of course I'm a neurologist and uh we are I'm bilingual neurologist and uh we are I'm bilingual right I started with Udu and Arabic and right I started with Udu and Arabic and now of course English. Uh so the idea now of course English. Uh so the idea was that uh

there's a very important was that uh there's a very important thought process and Ed can comment on it thought process and Ed can comment on it in future that the advent of you know in future that the advent of you know automated translation with AI do you automated translation with AI do you really need to learn multilingualism? I really need to learn multilingualism? I just want to make sure you do because just want to make sure you do because literally that is the only one proven literally that is the only one proven perfection thing. As a matter of fact, perfection thing. As a matter of fact, when my mom was actually thinking, oh, when my mom was actually thinking, oh, my head is not space, I told her to my head is not space, I told her to learn a new language and that really learn a new language and that really helped. Uh we all go through the aging helped. Uh we all go through the aging process. Uh learn multilinguism. A super process. Uh learn multilinguism. A super learner with large language models for learner with large language models for medical emergency advising. And this is medical emergency advising. And this is again uh the way that we have talked again uh the way that we have talked about how we're going to basically about how we're going to basically structure our LLMs into an agentic structure our LLMs into an agentic model. So this was a very good read. Uh model. So this was a very good read. Uh I would recommend that you guys read I would recommend that you guys read this. Uh extremely important. And then this. Uh extremely important. And then today's most important topic is uh this today's most important topic is uh this is a comment from NPJ in precision is a comment from NPJ in precision oncology. All models are wrong yours are oncology. All models are wrong yours are useless. making clinical prediction useless. making clinical prediction models impactful for patients and that's models impactful for patients and that's where Jim and Tom is going to talk about where Jim and Tom is going to talk about today that how data from medical devices today that how data from medical devices needs to go into properly and then how needs to go into properly and then how AI and new medical devices are going to AI and new medical devices are going to work together not to mention their work together not to mention their device by itself alone is fantastic so device by itself alone is fantastic so again uh just going back luminestra is again uh just going back luminestra is basically developing a novel basically developing a novel non-invasive way to measure brain non-invasive way to measure brain temperature and this is so so important temperature and this is so so important in terms of doing cardiac surgeries in in terms of doing cardiac surgeries in terms of doing you know uh continuous terms of doing you know uh continuous monitoring in the neuroICU that I need monitoring in the neuroICU that I need to I can never know exactly what the to I can never know exactly what the temperature of the brain is because I temperature of the brain is because I need to remove that variable to ensure need to remove that variable to ensure we want to maintain normal thermia we we want to maintain normal thermia we just don't know how to and uh there are just don't know how to and uh there are so many ways to control the temperature so many ways to control the temperature now from padding to cold saline IV now from padding to cold saline IV infusion to even their new solutions infusion to even their new solutions that are doing just the neck and again that are doing just the neck and again the goal is shifted from hypothermia to the goal is shifted from hypothermia to normotheria but I just don't know how to normotheria but I just don't know how to measure it and I'm so grateful they are measure it and I'm so grateful they are working on this very problem. So without working on this very problem. So without further ado I'm going to let uh Jim further ado I'm going to let uh Jim reintroduce himself then Tom and then uh reintroduce himself then Tom and then uh once you guys sort of [snorts] take your once you guys sort of [snorts] take your 10 15 minutes then we're going to start 10 15 minutes then we're going to start with the questions.

with the questions. >> Okay. Well, I we're very very excited to >> Okay. Well, I we're very very excited to be here with you on a very emerging and be here with you on a very emerging and important topic and important topic and to give you a little overview of our to give you a little overview of our company. So, we founded a company just company. So, we founded a company just about 5 years ago and we're very much a about 5 years ago and we're very much a deep tech as a as one of the terms is a deep tech as a as one of the terms is a company where we're we're using a company where we're we're using a technology that's actually it's very technology that's actually it's very difficult. It's something that people difficult. It's something that people have thought they could use uh to have thought they could use uh to measure temperature of bodies for measure temperature of bodies for probably 30 or 40 years. When I first probably 30 or 40 years. When I first did due diligence on the technology did due diligence on the technology itself, ran across some white papers and itself, ran across some white papers and some investigations that had been done some investigations that had been done quite a few years ago. And what we're quite a few years ago. And what we're doing is we're building, we're a spin doing is we're building, we're a spin out from the University of Colorado from out from the University of Colorado from the microwave lab there. And we're the microwave lab there. And we're building a small sensor, very small building a small sensor, very small sensor that can be placed anywhere in sensor that can be placed anywhere in your body and it measures internal body

your body and it measures internal body temperature. So for example, if I put it temperature. So for example, if I put it on the forehead, which is our first on the forehead, which is our first focus, we can actually measure brain focus, we can actually measure brain temperature in real time. So isolate the temperature in real time. So isolate the brain, measure it. We could also place brain, measure it. We could also place it over the liver, over kidneys, things it over the liver, over kidneys, things that are very important organs in the that are very important organs in the body that typically aren't measured at body that typically aren't measured at all. Uh just because it's very invasive.

all. Uh just because it's very invasive. So today, the only way to measure So today, the only way to measure internal temperature during a surgery, internal temperature during a surgery, during an ICU procedure, uh anytime in during an ICU procedure, uh anytime in the hospital or or out in the field, uh the hospital or or out in the field, uh the only way to measure temperature is the only way to measure temperature is invas is very invasively. So bladder invas is very invasively. So bladder temperature, esophageal temperature up temperature, esophageal temperature up through the nose and down through the through the nose and down through the throat are ways to get some kind of of throat are ways to get some kind of of an internal temperature. And basically an internal temperature. And basically it's only where it's convenient to get it's only where it's convenient to get it as opposed to where you actually want it as opposed to where you actually want it. And what we [clears throat] found is it. And what we [clears throat] found is if you just look at cardiac surgeries um if you just look at cardiac surgeries um and look at uh ICU trauma care which and look at uh ICU trauma care which Jana is very very involved with uh we Jana is very very involved with uh we found there's about just the US alone found there's about just the US alone there's about 2.1 million procedures there's about 2.1 million procedures every year performed that require every year performed that require managing brain temperature and usually managing brain temperature and usually that's like in surgery it's often that's like in surgery it's often cooling you're having to cool the body cooling you're having to cool the body or cool the brain in order to have or cool the brain in order to have enough time to lower the metabolism to enough time to lower the metabolism to shut the blood supply off, reduce the shut the blood supply off, reduce the blood supply uh while a procedure is blood supply uh while a procedure is being done like aortic repair for being done like aortic repair for example. Um in the ICU trauma care example. Um in the ICU trauma care typically it's managing to normotheria typically it's managing to normotheria keeping you at 37°C keeping you at 37°C 98.6 98.6 98.6 uh roughly speaking uh Fahrenheit and uh uh roughly speaking uh Fahrenheit and uh to keep you from having either a fever to keep you from having either a fever or actually having hypothermia getting or actually having hypothermia getting too cold uh to that would cause risk for too cold uh to that would cause risk for infection and whatnot. So out of these infection and whatnot. So out of these 2.1 million procedures that require 2.1 million procedures that require managing brain temperature, all of them managing brain temperature, all of them today typically use bladder temperature today typically use bladder temperature as a surrogate because you can't measure as a surrogate because you can't measure brain temperature. And so it's uh in brain temperature. And so it's uh in fact we talked to uh a lot of surgeons fact we talked to uh a lot of surgeons and all we did some of our customer and all we did some of our customer discovery interviews whatnot. Um, discovery interviews whatnot. Um, usually the first reaction we got we get usually the first reaction we got we get is you can do what you know measuring is you can do what you know measuring brain temperature and then the second brain temperature and then the second reaction is well I'm not sure what brain reaction is well I'm not sure what brain temperature is even supposed to be temperature is even supposed to be actually because we are always using actually because we are always using something else as is surrogate and they something else as is surrogate and they learn how to compensate for that and learn how to compensate for that and we'll give you one really good example we'll give you one really good example is aortic repair and so you get an is aortic repair and so you get an aortic dissection or an aneurysm in the aortic dissection or an aneurysm in the aortic arch uh and of course that's the aortic arch uh and of course that's the the the key little piece of organ there the the key little piece of organ there that actually supplies the blood to the that actually supplies the blood to the brain. So they have to shut the blood brain. So they have to shut the blood supply off to the brain while they make supply off to the brain while they make the repair, put a graft in, you know, the repair, put a graft in, you know, into the aortic arch. And into the aortic arch. And [clears throat] [clears throat] [clears throat] so they got to deep cool the brain. And so they got to deep cool the brain. And typically there's two two kind of uh typically there's two two kind of uh veils of thought there. One is uh veils of thought there. One is uh cooling you down to 14 degrees C and the cooling you down to 14 degrees C and the other about 24. Either way, it's a deep other about 24. Either way, it's a deep cooling of your of your brain. But in cooling of your of your brain. But in order to do that, [snorts] they're uh order to do that, [snorts] they're uh again measuring bladder temperature, again measuring bladder temperature, which every we know actually lags the

which every we know actually lags the brain temperature when you're cooling by brain temperature when you're cooling by about 15 minutes. 15 to 20 minutes.

about 15 minutes. 15 to 20 minutes. >> That is so important. 15 minutes. >> That is so important. 15 minutes. >> Yeah. It it's it's a very key thing. And >> Yeah. It it's it's a very key thing. And that also implies that basically a that also implies that basically a change in brain temperature doesn't show change in brain temperature doesn't show up in the bladder for usually 15 to 20 up in the bladder for usually 15 to 20 minutes or so.

minutes or so. >> So So there's two really interesting >> So So there's two really interesting things there. And so what happens is uh things there. And so what happens is uh even though we know it it it's not even though we know it it it's not there. We know it but we don't know it.

there. We know it but we don't know it. The surgeon h doesn't know that it's The surgeon h doesn't know that it's actually reached that temperature. So actually reached that temperature. So the typical procedure is to take the the typical procedure is to take the bladder down to the target temperature bladder down to the target temperature and then wait a few extra minutes to and then wait a few extra minutes to assume that the brain will also reach assume that the brain will also reach the same steady state but they just the same steady state but they just don't know that it's there. Then they don't know that it's there. Then they perform shut off the blood supply do the perform shut off the blood supply do the procedure. uh it's about 17% of people procedure. uh it's about 17% of people die during this surgery. Uh over 60% of die during this surgery. Uh over 60% of the patients will have some amount of the patients will have some amount of cognitive loss you know neural damage cognitive loss you know neural damage you know during this time at cold. So you know during this time at cold.

How Luminestra measures temperature non-invasively

So the key thing is you got to be cold in the key thing is you got to be cold in order to have the time to do the order to have the time to do the procedure but the longer you're cold procedure but the longer you're cold past the threshold there's a very much past the threshold there's a very much increased risk of neural damage bleeding increased risk of neural damage bleeding and other uh side effects including and other uh side effects including death itself. So what we're doing is by death itself. So what we're doing is by having a sensor that actually measures having a sensor that actually measures brain temperature directly brain temperature directly um we can knock that now we see what the um we can knock that now we see what the brain temperature is uh in real time. So brain temperature is uh in real time. So we see changes in just a few we see changes in just a few milliseconds and so that allows us to milliseconds and so that allows us to allows the surgeon to know exactly when allows the surgeon to know exactly when the brain reaches the target the brain reaches the target temperature. And as we said it's about temperature. And as we said it's about 15 to 20 minutes sooner than the bladder 15 to 20 minutes sooner than the bladder does. So they can go ahead and shut does. So they can go ahead and shut confidently shut the blood supply off confidently shut the blood supply off make the procedure occur. uh and then make the procedure occur. uh and then get them warmed back up again. And also, get them warmed back up again. And also, we've talked to profusionists that we've talked to profusionists that actually do the cooling, the cooling actually do the cooling, the cooling system, the bypass cooling. Uh they get system, the bypass cooling. Uh they get excited about this, and there's excited about this, and there's something we actually didn't anticipate.

something we actually didn't anticipate. Uh but what they get excited about is Uh but what they get excited about is the ability to warm the patient up the ability to warm the patient up quicker and safer because you don't want quicker and safer because you don't want to go above 37°. So typically what they to go above 37°. So typically what they do again since they're also looking at do again since they're also looking at bladder temperature with a long delay bladder temperature with a long delay they set their final set temperature at they set their final set temperature at 37. So the blood they're putting back in 37. So the blood they're putting back in the body is 37 which means you see very the body is 37 which means you see very very slowly getting back to the actual very slowly getting back to the actual temperature so that you don't go over temperature so that you don't go over 37. And the profusions tell us that, 37. And the profusions tell us that, hey, if we knew if I know brain hey, if we knew if I know brain temperature real time, I'm going to set temperature real time, I'm going to set my set point of like 37 and a half, get my set point of like 37 and a half, get you up pretty darn close to 37 quickly, you up pretty darn close to 37 quickly, then hit my set point at 37 for the then hit my set point at 37 for the finish. And they think they can knock,

finish. And they think they can knock, we've heard up to to up almost 30 we've heard up to to up almost 30 minutes uh uh cutting off of the warming minutes uh uh cutting off of the warming time. And overall, what that means is time. And overall, what that means is that by cutting this time down, the that by cutting this time down, the amount of time you're cold is reduced.

amount of time you're cold is reduced. We think we can reduce the mortality We think we can reduce the mortality rate by over 20%. And the overall rate by over 20%. And the overall procedure time drops by oh easily half procedure time drops by oh easily half an hour or so which means that the these an hour or so which means that the these are huge teams of people working you are huge teams of people working you know in aortic repair and it means that know in aortic repair and it means that those people can get back to other those people can get back to other procedures other jobs and other things procedures other jobs and other things uh a lot faster. So there's a time uh a lot faster. So there's a time savings there's a safety savings um so savings there's a safety savings um so there's just really a lot of interesting there's just really a lot of interesting benefits you know by being able to benefits you know by being able to measure that. Tom, you want to talk a measure that. Tom, you want to talk a little about just the the other big little about just the the other big application we see is in the ICU application we see is in the ICU um after cardiac.

um after cardiac. >> Before you get into Tom, I'm just going >> Before you get into Tom, I'm just going to tell you our audiences. Um to tell you our audiences. Um >> number one, uh I wanted to invest in the >> number one, uh I wanted to invest in the company. I just have my own investment company. I just have my own investment thesis that I only invest in software.

thesis that I only invest in software. So if I did have the money, I would So if I did have the money, I would invest. That is nothing. Again, this is invest. That is nothing. Again, this is not sponsored. I love what the product not sponsored. I love what the product is and everything. Number two, uh this is and everything. Number two, uh this is again he talked about aortic surgery, is again he talked about aortic surgery, right? Now think about protecting brain right? Now think about protecting brain for any surgery. There's a 5% risk of for any surgery. There's a 5% risk of stroke and forget every goddamn surgery.

stroke and forget every goddamn surgery. Why can we not protect the brain? Just Why can we not protect the brain? Just decreasing I don't talk about talking decreasing I don't talk about talking about degree going all the way to 24 about degree going all the way to 24 degrees or 14 degrees. Can we actually degrees or 14 degrees. Can we actually decrease the risk of those 5% of stroke decrease the risk of those 5% of stroke for every surgery to 2 and a half%.

for every surgery to 2 and a half%. because the amount of cognitive def because the amount of cognitive def deficits we can do and we we're talking deficits we can do and we we're talking about slow cooling. Now let me explain about slow cooling. Now let me explain the audiences and then add here because the audiences and then add here because he is actually XC CIO of MO clinic and he is actually XC CIO of MO clinic and you know Cleveland sorry Cleveland you know Cleveland sorry Cleveland Clinic etc. So these are like board Clinic etc. So these are like board members and they need to understand when members and they need to understand when they start you know thinking about these they start you know thinking about these devices coming because what kind of devices coming because what kind of improvement uh can hypothermia what is improvement uh can hypothermia what is the problem it decreases the celery the problem it decreases the celery clearance. So when it decreases the clearance. So when it decreases the celiac clearance you have a significant celiac clearance you have a significant increased chance of pneumonia when you increased chance of pneumonia when you are hypothermia kidneys livers retina are hypothermia kidneys livers retina everything actually does get impacted so everything actually does get impacted so more importantly for me is always not to more importantly for me is always not to go over hypothermia either I don't have go over hypothermia either I don't have the measurements we are just honestly at the measurements we are just honestly at the end of the day you know spitballing the end of the day you know spitballing here so let's not do that and then once here so let's not do that and then once I have it so we can actually control it I have it so we can actually control it minimize the time of the extra minimize the time of the extra significant extreme cooling for example significant extreme cooling for example in aortic is needed but also when we do in aortic is needed but also when we do karate endoctoies I'm currently using karate endoctoies I'm currently using EEG to monitor and decrease the bis EEG to monitor and decrease the bis monitor etc this

could be so much better monitor etc this could be so much better in terms of actually making sure why in terms of actually making sure why because EEG is one thing because we want because EEG is one thing because we want to really depress it because when you to really depress it because when you cut through this and I take the cloud cut through this and I take the cloud out I don't but I mean I'm there in the out I don't but I mean I'm there in the room because uh I'm doing an EG room because uh I'm doing an EG monitoring half the time or something monitoring half the time or something like that what I'm saying is that that like that what I'm saying is that that would be actually so useful to protect would be actually so useful to protect the brain the brain because we can actually go in through a because we can actually go in through a you know and remove the clot right away you know and remove the clot right away right I have the intervention is right I have the intervention is actually sitting there sometimes in the actually sitting there sometimes in the that hey we're going to do a karate that hey we're going to do a karate endctomy if the clot is going to go up endctomy if the clot is going to go up while I'm pulling it out they can go in while I'm pulling it out they can go in with a catheter and pull it out if the with a catheter and pull it out if the brain was cooled the damage that even brain was cooled the damage that even that 5 to 6 minutes happens is going to that 5 to 6 minutes happens is going to decrease significantly decrease significantly so my problem is always cooling cooling so my problem is always cooling cooling cooling I'm going to let Tom first cooling I'm going to let Tom first define traumatic brain injury, neuro use define traumatic brain injury, neuro use cases and everything and then we'll go.

cases and everything and then we'll go. Harvey, you found a spot, man. The most Harvey, you found a spot, man. The most influential man and most eligible influential man and most eligible bachelor in Dallas.

bachelor in Dallas. [laughter] I knew you guys were going to be out and I knew you guys were going to be out and I wanted to bring Jim uh and we'll send I wanted to bring Jim uh and we'll send you contact informations and everything you contact informations and everything on the back end. Um Tom, just two on the back end. Um Tom, just two seconds. Ed is going to go away because seconds. Ed is going to go away because he has a flight to catch. Ed, do you he has a flight to catch. Ed, do you have any questions first of what you have any questions first of what you heard and then we'll we'll continue this heard and then we'll we'll continue this wherever however long Jim and Tom wants wherever however long Jim and Tom wants to.

to. to. [clears throat] [clears throat] [clears throat] >> Super super fascinating and interesting. >> Super super fascinating and interesting. I do have a question, but first an I do have a question, but first an observation. you know, I worked in the O observation. you know, I worked in the O uh full-time and then at Cleveland uh full-time and then at Cleveland Clinic, I worked in the Oce and I was Clinic, I worked in the Oce and I was part of I was I didn't do too many part of I was I didn't do too many neurosurgeries, but a lot of cardio uh neurosurgeries, but a lot of cardio uh surgeries and it was amazing. I don't surgeries and it was amazing. I don't think most audience would know that think most audience would know that literally to cool the body uh and to literally to cool the body uh and to cool the heart like doing u some very u cool the heart like doing u some very u um you know cabbage and things like that um you know cabbage and things like that where uh literally putting ice in where uh literally putting ice in people's bodies.

people's bodies. >> I mean that I don't think most people >> I mean that I don't think most people understand it. It was it was it was understand it. It was it was it was trippy for me actually to think that how trippy for me actually to think that how as much as advancements we've done in as much as advancements we've done in the O and surgery and things like that the O and surgery and things like that there's still a long way to go. So the there's still a long way to go. So the fact that you all have come up with this fact that you all have come up with this technology just talking about brain technology just talking about brain health now and and the ability to health now and and the ability to monitor in real time uh the brain monitor in real time uh the brain temperature to save I mean that's temperature to save I mean that's dramatic the stats that you were just dramatic the stats that you were just citing uh that that's dramatic that's citing uh that that's dramatic that's transformational change in quality and transformational change in quality and saving people's lives. It's just saving people's lives. It's just amazing. But so my question is the amazing. But so my question is the technology itself um it sounds like it's technology itself um it sounds like it's been around a while. Why do you think been around a while. Why do you think why do you think it's just now that why do you think it's just now that people are uh open to this and and uh people are uh open to this and and uh interested in it or or what what is it interested in it or or what what is it in the marketplace that has suddenly uh in the marketplace that has suddenly uh created this opportunity for you to created this opportunity for

you to introduce this amazing technology?

introduce this amazing technology? So as a as a lot of things in science So as a as a lot of things in science these days I've had an interesting these days I've had an interesting conversation with a couple of MIT conversation with a couple of MIT friends of mine recently just talk about friends of mine recently just talk about how do we how do there's such a huge how do we how do there's such a huge body of knowledge there's so many PhDs body of knowledge there's so many PhDs out there people double PhDs how do you out there people double PhDs how do you actually learn enough in an area to actually learn enough in an area to actually make a contribution to it actually make a contribution to it anymore and the answer really is it's anymore and the answer really is it's it's interdisciplinary it's where you it's interdisciplinary it's where you have several different technology areas have several different technology areas coming together I mean bringing in you coming together I mean bringing in you know AI by itself know AI by itself is is just another it's another it's is is just another it's another it's another computational science kind of another computational science kind of thing. But it's when you combine it with thing. But it's when you combine it with bioscience with life sciences with bioscience with life sciences with mechanical engineering with other you mechanical engineering with other you combine it with another discipline combine it with another discipline that's when the real benefit and stuff that's when the real benefit and stuff happens. Now for us the technology we're happens. Now for us the technology we're using is a thing called we're taking using is a thing called we're taking advantage of black body radiation and advantage of black body radiation and that was actually the first uh photonic that was actually the first uh photonic effect quantum effect that was actually effect quantum effect that was actually discovered by Max plank back in 19 discovered by Max plank back in 19 December 20th 1900.

December 20th 1900. Um so that's so it's a quantum effect Um so that's so it's a quantum effect has been known for a long time and what has been known for a long time and what it is is everything in the universe it is is everything in the universe gives off broadspectctrum energy uh gives off broadspectctrum energy uh electromagnetic energy proportional to electromagnetic energy proportional to its temperature and so it's first was its temperature and so it's first was used uh very often in uh radio used uh very often in uh radio telescopes. That's how radio we we we telescopes. That's how radio we we we are making a little tiny miniature radio are making a little tiny miniature radio telescope that's aimed 4 centimeters telescope that's aimed 4 centimeters into your body instead of being aimed into your body instead of being aimed 10,000 lighty years at a star to measure 10,000 lighty years at a star to measure the temperature of that star. So radio the temperature of that star. So radio astronomy uses this technology. Uh every astronomy uses this technology. Uh every weather satellite uses this aimed down weather satellite uses this aimed down at the earth to figure out at the earth to figure out precipitation, water content and whatnot precipitation, water content and whatnot for weather predictions and whatnot. Um for weather predictions and whatnot. Um but uh the the what happened was people but uh the the what happened was people thought you should be able to do this thought you should be able to do this and so several people over the last 30 and so several people over the last 30 years or so have come up with a sensor years or so have come up with a sensor not unlike that looks like ours. Uh they not unlike that looks like ours. Uh they put it on the body with what they call put it on the body with what they call it's a radiometer that makes the it's a radiometer that makes the measurement, a microwave measurement.

measurement, a microwave measurement. put them on a treadmill, the power goes put them on a treadmill, the power goes up. Take them off the treadmill, the up. Take them off the treadmill, the power goes down. But they've had no idea power goes down. But they've had no idea how to actually calibrate that and get a how to actually calibrate that and get a temperature out of it. Uh so it's just temperature out of it. Uh so it's just uh you're you're probably hotter, you're uh you're you're probably hotter, you're probably cooler, but we don't know how probably cooler, but we don't know how much at all. And that's where uh Zoya much at all. And that's where uh Zoya Papovich who's a professor that we we're Papovich who's a professor that we we're working with is one of the co-founders working with is one of the co-founders of our company. She uh DARPA was trying of our company. She uh DARPA was trying to they wanted a sensor uh during the to they wanted a sensor uh during the Afghanistan war. They had they wanted a Afghanistan war. They had they wanted a sensor that could measure internal body sensor that could measure internal body temperature for early warning of heat temperature for early warning of heat stress because they have thousands of stress because they have thousands of casualties a year from heat stress in casualties a year from heat stress in the military h you know humping around the military h you know humping around 130 pounds of gear, you know, in bad 130 pounds of gear, you know, in bad environments. And

so they went to a environments.

Clinical applications and ICU use cases

And so they went to a couple of different companies uh in couple of different companies uh in university to get a sensor and they university to get a sensor and they couldn't come up with anything and Zoya couldn't come up with anything and Zoya ran across a professor said I got some ran across a professor said I got some ideas on that and she just brought a ideas on that and she just brought a whole different direction to the problem whole different direction to the problem and figured out how to do that and figured out how to do that calibration and that's where our patents calibration and that's where our patents and a lot of our IPs around how we and a lot of our IPs around how we actually do that and how we calibrate actually do that and how we calibrate because what we're doing is we're because what we're doing is we're measuring very very small microwaves uh measuring very very small microwaves uh that are coming out that your body that are coming out that your body generates that are proportional to generates that are proportional to temperature And it's going through seven temperature And it's going through seven layers to get to the brain up here.

layers to get to the brain up here. We're going through, you know, skin, We're going through, you know, skin, fat, muscle, bone, meningas, the and the fat, muscle, bone, meningas, the and the the fluid, and then the actual brain the fluid, and then the actual brain itself. And by going about four c we see itself. And by going about four c we see about 4 cm deep, which gets us to the about 4 cm deep, which gets us to the gray matter. Uh, but you have to gray matter. Uh, but you have to calibrate because each one of those is calibrate because each one of those is kind of like looking through water how kind of like looking through water how it refracts. It does the same. All these it refracts. It does the same. All these layers do that to the to the signal layers do that to the to the signal coming out of your body. So we have to coming out of your body. So we have to we've come up with a way to come up with we've come up with a way to come up with waiting factors and all to be able to waiting factors and all to be able to extract and find the actual brain extract and find the actual brain temperature. But uh so it's actually temperature. But uh so it's actually it's just a it's a it's something that it's just a it's a it's something that people expected you could do but no one people expected you could do but no one figured out how to actually do it until figured out how to actually do it until we just had somebody look at it from a we just had somebody look at it from a whole different direction and had the whole different direction and had the aha moment.

aha moment. >> Just add for me the exciting part is the >> Just add for me the exciting part is the noninvasive part that you can just stick noninvasive part that you can just stick a patch. Can you show the patch again a patch. Can you show the patch again Jim? That is just amazing. Uh that Jim? That is just amazing. Uh that >> yeah this this is roughly the size >> yeah this this is roughly the size roughly the size I don't have we I don't roughly the size I don't have we I don't have one with me at the moment here. I I have one with me at the moment here. I I always carry one with me always carry one with me >> and and all of a sudden I'm I'm calling >> and and all of a sudden I'm I'm calling in from home and I didn't have one here in from home and I didn't have one here at home. So I apologize.

at home. So I apologize. >> I mean we need to roughly the size of an >> I mean we need to roughly the size of an it's roughly the size of an Apple Watch.

it's roughly the size of an Apple Watch. She's basically the size of our She's basically the size of our >> we need to figure out when we you know >> we need to figure out when we you know what my temperature is when I'm talking what my temperature is when I'm talking to my wife and she's not she's in a bad to my wife and she's not she's in a bad mood too, you know. So [laughter] mood too, you know. So [laughter] anyways, so just to let you know and I'm anyways, so just to let you know and I'm very interested because it actually very interested because it actually opens up the non-invasive part but opens opens up the non-invasive part but opens up a lot of my options to cool. I can up a lot of my options to cool. I can use intravascular cooling. I can just use intravascular cooling. I can just thread a arter artery up to the brain thread a arter artery up to the brain and then ask them to cool only the brain and then ask them to cool only the brain part while they're doing the surgery part while they're doing the surgery quickly. Reduces the overall again o quickly. Reduces the overall again o time that is so important. anytime under time that is so important. anytime under the ventilator is always very tough the ventilator is always very tough especially with these patients who have especially with these patients who have cardiac issues. And then the number cardiac issues. And then the number three that I'm excited is what Tom is three that I'm excited is what

Tom is going to say is I'm going to let him going to say is I'm going to let him talk about it. Tom go ahead. Uh uh what talk about it. Tom go ahead. Uh uh what we sort of talked about the applications we sort of talked about the applications in neuro and beyond just uh you know any in neuro and beyond just uh you know any surgery.

surgery. surgery. >> Yeah. Yeah. So to give some background, >> Yeah. Yeah. So to give some background, uh I previously worked for BD uh in uh I previously worked for BD uh in their targeted temperature management uh their targeted temperature management uh division working with the Arctic Sun. Uh division working with the Arctic Sun. Uh and one of the things that I would hear and one of the things that I would hear from doctors who were using this, it was from doctors who were using this, it was primarily after a cardiac arrest. They primarily after a cardiac arrest. They were cooling their patients down uh to were cooling their patients down uh to make sure that they were able to have make sure that they were able to have the best chance of recovery. Uh and you the best chance of recovery. Uh and you know, they would be controlling using know, they would be controlling using the bladder temperature, but they really the bladder temperature, but they really wanted to know the brain temperature.

wanted to know the brain temperature. They're trying to control the brain. Uh They're trying to control the brain. Uh there's some controversy about targeted there's some controversy about targeted temperature management in terms of what temperature management in terms of what is the right target temperature for is the right target temperature for these patients to reach. Uh what's best these patients to reach. Uh what's best for them? Is it 33°, 36°, 37°? Just for them? Is it 33°, 36°, 37°? Just making sure they're not getting a fever.

making sure they're not getting a fever. Uh but really they're looking at that Uh but really they're looking at that with that surrogate measurement from the with that surrogate measurement from the bladder. Uh so it's an interesting thing bladder. Uh so it's an interesting thing for us to to think about. uh has that for us to to think about. uh has that controversy really just been around are controversy really just been around are they measuring it the right way? So they measuring it the right way? So wherever you look at those you know uh wherever you look at those you know uh those models that you were showing at those models that you were showing at the at the start of this junide it's a the at the start of this junide it's a matter of are we making our decisions on matter of are we making our decisions on the right information and really that's the right information and really that's where we think luminastra plays into a where we think luminastra plays into a lot of this you know big data revolution lot of this you know big data revolution that we have with AI and healthcare uh that we have with AI and healthcare uh if we're making decisions on uh data if we're making decisions on uh data coming in on temperature we want to make coming in on temperature we want to make sure we're making it on what we're sure we're making it on what we're actually trying to measure not something actually trying to measure not something that is similar but can be different for that is similar but can be different for different people. Uh you know, someone different people. Uh you know, someone that's a larger individual, their that's a larger individual, their bladder temperature is going to change bladder temperature is going to change at a different rate than someone who's a at a different rate than someone who's a smaller elderly person. Uh so just smaller elderly person. Uh so just thinking about all those other variables thinking about all those other variables that come in, it's going to have an that come in, it's going to have an impact on what that temperature is. Uh impact on what that temperature is. Uh so are we making decisions on this so are we making decisions on this target temperature based on the right target temperature based on the right information coming in. So this is information coming in. So this is something that we can have that's going something that we can have that's going to be truly non-invasive unlike what to be truly non-invasive unlike what they're using today is going to be, you they're using today is going to be, you know, they'd be able to control what know, they'd be able to control what they're actually trying to measure they're actually trying to measure instead of something else here. So instead of something else here. So something that would have a a big impact something that would have a a big impact and could help to settle some of this and could help to settle some of this information about what's what's the information about what's what's the right dosage when we think about right dosage when we think about temperature as a therapy and treatment temperature as a therapy and treatment uh for cardiac arrest, for TBI, for uh for cardiac arrest, for TBI, for stroke.

stroke. stroke. Just to give you a little bit of Just to give you a little bit of background again uh again extremely background again uh again extremely important when you see you uh what we important when you see you uh what we have done is that TTM again there have done is that TTM again there [clears throat] is no confusion about [clears throat] is no confusion about normotheria for sure hypothermia there normotheria for sure hypothermia there is no confusion it helps the problem is is no confusion it helps the problem is not creating the problem is not the not

creating the problem is not the hypothermia the problem is that the rest hypothermia the problem is that the rest of the body becomes so many of the body becomes so many complications that the the benefit that complications that the the benefit that I got from the hypothermia the risk went I got from the hypothermia the risk went up and therefore I lost all the benefit.

up and therefore I lost all the benefit. So with these uh measurement tools, I So with these uh measurement tools, I can actually more slowly target, slowly can actually more slowly target, slowly warm, slowly increase. I can do a little warm, slowly increase. I can do a little bit more management. I'm just going to bit more management. I'm just going to tell you one story that you're going to tell you one story that you're going to laugh. Um so there are ice packs laugh. Um so there are ice packs everywhere. Arctic sun is there. And I everywhere. Arctic sun is there. And I thought the patient is being cooled and thought the patient is being cooled and then after 7 hours or so, we realized then after 7 hours or so, we realized and it was measuring the arctic sun.

and it was measuring the arctic sun. This happens. I mean, what can you do? This happens. I mean, what can you do? Uh, this is unfortunate, but it happens Uh, this is unfortunate, but it happens in the ICU. I mean, I can tell you in the ICU. I mean, I can tell you stories about ICU. You're going to hate stories about ICU. You're going to hate it. And I know you probably have to log it. And I know you probably have to log off to get on the flight. Please do. So, off to get on the flight. Please do. So, the second thing I want to tell you the second thing I want to tell you right now is that that again the there right now is that that again the there are crucial times that I need to adjust.

are crucial times that I need to adjust. So, for example, the ICP went up high, So, for example, the ICP went up high, right? The EVD is there because that's right? The EVD is there because that's measuring the intraable pressure and measuring the intraable pressure and then it's going up and then I've used then it's going up and then I've used manitol hypertonic saline solution. I've manitol hypertonic saline solution. I've done everything manageable possible done everything manageable possible except for pop the skull out which again except for pop the skull out which again is a big discussion but long story short is a big discussion but long story short I need to quickly cool the patient for I need to quickly cool the patient for some minutes let the brain relax and some minutes let the brain relax and then go back up slowly. These controls I then go back up slowly. These controls I don't have because I don't have don't have because I don't have measurements. So therefore you need to measurements. So therefore you need to understand that I don't have act control understand that I don't have act control and therefore I cannot dose. Think about and therefore I cannot dose. Think about literally dosing any medication from 500 literally dosing any medication from 500 millig to,000 milligs to 1500 millig to,000 milligs to 1500 milligrams. The only reason that I milligrams. The only reason that I cannot do it because I cannot measure cannot do it because I cannot measure it. And now that I can have a it. And now that I can have a measurement tool, I can actually talk measurement tool, I can actually talk about it. And number two of course the about it. And number two of course the current measurement possibilities are current measurement possibilities are insane. I mean do you know and the third insane. I mean do you know and the third thing I want to also emphasize that once thing I want to also emphasize that once you have the measurement pathway I know you have the measurement pathway I know there are multiple other startups that there are multiple other startups that are working on just cooling the brain are working on just cooling the brain from intraasal from intra you know ear from intraasal from intra you know ear even as I talked to you about even as I talked to you about intravascular intravascular intravascular none of them can come to market because none of them can come to market because they don't have measurements so this they don't have measurements so this this will explode into a real this will explode into a real breakthrough for other startup companies breakthrough for other startup companies to come in into this uh fold and bring to come in into this uh fold and bring us these solutions where we can have us these solutions where we can have localized regional uh hypothermia localized regional uh hypothermia approach. Let's say you're doing just a approach. Let's say you're doing just a liver cancer extraction. Why don't you liver cancer extraction. Why don't you just cool the freaking liver for a just cool the freaking liver for a little bit so that there if even if little bit so that there if even if there is a bleeding then it will be there is a bleeding then it will be contained or whatever that case may be contained or whatever that case may be because you know as I said every time because you know as I said every time you do something you have a chance of you do something you have a chance of throwing a clot into the brain causing throwing a clot into the brain causing strokes, heart attacks etc. And uh once strokes, heart attacks etc. And uh once we have the technology to measure better we have the technology to measure better then we can have the technology to then we can have the technology to improve hypothermia regionally as well.

improve hypothermia regionally as well. So Tom thank you so much for sharing So Tom thank you so much for sharing that. J, I was going to say that that that. J, I was going to say that that you actually bring up a really important you actually bring up a really important point, which is if you can't measure point, which is if you can't measure something, it changes your thinking something, it changes your thinking about how you think about the problem.

about how you think about the problem. So, for example, if I can't me if I if I So, for example, if I can't me if I if I can't measure brain temperature, then can't measure brain temperature, then there's really not too much need for there's really not too much need for just only if I had a technology for just just only if I had a technology for just cooling the brain itself, you can't take cooling the brain itself, you can't take advantage of that. Um, and so it, so by advantage of that. Um, and so it, so by having something new, like if I can having something new, like if I can actually measure brain temperature in actually measure brain temperature in real time, measure liver temperature, real time, measure liver temperature, kidney temperature, then all of a sudden kidney temperature, then all of a sudden it just changes your thinking. And all it just changes your thinking. And all of a sudden, we're going to have a lot of a sudden, we're going to have a lot of aha moments now where people say, of aha moments now where people say, "Okay, here's something I've thought "Okay, here's something I've thought about, but it just wasn't worthwhile. So about, but it just wasn't worthwhile. So I haven't thought about it for several I haven't thought about it for several years. Now we have a new opportunity to years. Now we have a new opportunity to actually do and take an action." uh actually do and take an action." uh because of one technology you know because of one technology you know begats many other technologies very begats many other technologies very often in solutions often in solutions >> correct >> correct >> correct >> I mean I I had to do CPR on a patient >> I mean I I had to do CPR on a patient for 40 minutes and I called my for 40 minutes and I called my cardiologist to put an intra aerotic cardiologist to put an intra aerotic balloon pump and in the aorta it's balloon pump and in the aorta it's pushing the blood right and then I'm pushing the blood right and then I'm taking the patient to the neuro to taking the patient to the neuro to basically take off the pop off the skull basically take off the pop off the skull or whatever the bleed is and now I'm I'm or whatever the bleed is and now I'm I'm just sitting there and I'm not cooling just sitting there and I'm not cooling the patient why not the patient why not this is stupid the [laughter] reason I'm this is stupid the [laughter] reason I'm not doing it because I don't know if the not doing it because I don't know if the pneumonia is going to do and all of this pneumonia is going to do and all of this process the minute I have this the process the minute I have this the patient is already interotic just guide patient is already interotic just guide the whole catheter up a little more and the whole catheter up a little more and clue cool it right by the time the clue cool it right by the time the patient gets to the surgery it's it's patient gets to the surgery it's it's because I again I already have a femoral because I again I already have a femoral exercise I already have an interal I can exercise I already have an interal I can guide another catheter up slightly so guide another catheter up slightly so that's and then just a little bit up I that's and then just a little bit up I mean you don't need a neuro intensivist mean you don't need a neuro intensivist warrior the cardio interventional warrior the cardio interventional cardiologist can do that and then you cardiologist can do that and then you can and That's not too much. Cool it can and That's not too much. Cool it down enough. I mean honestly if I'm down enough. I mean honestly if I'm going to tell you the story I never told going to tell you the story I never told anyone. So anyways um people don't anyone.

Roadmap, funding, and product strategy

So anyways um people don't realize in ICU there's one thing called realize in ICU there's one thing called compassion fatigue. compassion fatigue. And uh the reason that I went out of And uh the reason that I went out of inperson neur ICU after being the inperson neur ICU after being the director of neur ICU director of stroke director of neur ICU director of stroke for three and a half years is that I for three and a half years is that I lost a 24 year old. She was an amazing lost a 24 year old. She was an amazing person. And then um she had two twins at person. And then um she had two twins at the age of 3 years old, which was the age of 3 years old, which was exactly the age of my daughter. And we exactly the age of my daughter. And we did everything. And unfortunately, she did everything. And unfortunately, she passed. [clears throat] And then um passed. [clears throat] And then um we I mean she was actually an organ we I mean she was actually an organ donor as well. And what I still remember donor as well. And what I still remember everything because the grandmother came everything because the grandmother came at the end and then actually thanked me at the end and then actually thanked me that Janate, you know, when you walked that Janate, you know, when you walked in everything started happening. I know in everything started happening. I know the result was not ideal but but then I the result was not ideal but but then I it

just put me to tears because at that it just put me to tears because at that point she brought the twin daughters point she brought the twin daughters and I just wanted to see how I could and I just wanted to see how I could have changed anything and maybe I have changed anything and maybe I couldn't maybe this may not have helped couldn't maybe this may not have helped because of course I believe in the Lord because of course I believe in the Lord and the everything and the everything in in any capacity whatever that case we in in any capacity whatever that case we call it the force but at the end of the call it the force but at the end of the day I wish I wish we had some of these day I wish I wish we had some of these technologies that we can just for some technologies that we can just for some minutes uh freeze the brain for 20 30 minutes uh freeze the brain for 20 30 minutes literally not that because I was minutes literally not that because I was able to get her in the O in less than 17 able to get her in the O in less than 17 minutes.

minutes. minutes. >> Mhm. >> Mhm. >> Mhm. >> But still lost her. >> But still lost her. >> Well, healthare healthcare in general is >> Well, healthare healthcare in general is it's an extremely personal experience it's an extremely personal experience beyond there's technologies, there's beyond there's technologies, there's science, there's drugs, there's you know science, there's drugs, there's you know there's all kinds of things that get there's all kinds of things that get involved with healthcare and whatnot but involved with healthcare and whatnot but it's really a personal experience. We it's really a personal experience. We just to mention something briefly. You just to mention something briefly. You know, the brain is the thing where we know, the brain is the thing where we we've been focused on. Um but when we we've been focused on. Um but when we first started the company, the first first started the company, the first thing we did was we uh and for any of thing we did was we uh and for any of you out there that are ever thinking you out there that are ever thinking about, you know, doing a startup company about, you know, doing a startup company of your own. Uh number one thing to do of your own. Uh number one thing to do is customer discovery. Go out and talk is customer discovery. Go out and talk to customers. We learned so much the to customers. We learned so much the first time I met Janade. uh to talk to first time I met Janade. uh to talk to him about his job and how his him about his job and how his perspective is on it that uh it perspective is on it that uh it illuminates a lot of things for us and illuminates a lot of things for us and it it makes us understand how important it it makes us understand how important things are and what things that aren't things are and what things that aren't important we need to that we can skip important we need to that we can skip on. But some of the we did about 20 25 on. But some of the we did about 20 25 interviews real quick just to see is interviews real quick just to see is there was there any other technology out there was there any other technology out there we just weren't aware of. um is there we just weren't aware of. um is there really a need for you know brain there really a need for you know brain temperature or other parts of internal temperature or other parts of internal temperatures like that and we just got a temperatures like that and we just got a resounding response and and we actually resounding response and and we actually identified over about a dozen different identified over about a dozen different applications and so brain we've talked applications and so brain we've talked about clinical applications we've talked about clinical applications we've talked about [snorts] but just a few others about [snorts] but just a few others like I mentioned military from being like I mentioned military from being able to do early warning heat stress now able to do early warning heat stress now early warning heat stress isn't just for early warning heat stress isn't just for military uh think about a fireman they military uh think about a fireman they got three layers of insulation on their got three layers of insulation on their body they're highly stressed in the job body they're highly stressed in the job they're they're they're and they've got a huge radiant heat and they've got a huge radiant heat source, right, that they're in the source, right, that they're in the middle of the whole time. So, you talk middle of the whole time. So, you talk about heat stress, firemen go through about heat stress, firemen go through this just all the time. And we've talked this just all the time. And we've talked to a few firemen and found out that to a few firemen and found out that basically asked him said they they know basically asked him said they they know it's a problem. He said, "Boy, if you it's a problem. He said, "Boy, if you could actually measure internal could actually measure internal temperature and get that out to one of temperature and get that out to one of our medical people, uh, then we would our medical people, uh, then we would know someone's in trouble before it know someone's in trouble before it happens." And I we and and we I'd put it happens." And I we and and we I'd put it on every single one of our of our fire on every single one of our of our fire our people, our personnel. And what uh our people, our personnel. And what uh we asked him and said, "Well, when is it we asked him and said, "Well, when is it right now? When do you actually measure right now? When do you actually measure the internal temperature?" And he said, the internal temperature?" And he said, "In the hospital." It's after something.

"In the hospital." It's after something. >> We're building mobile stroke units. I >> We're building mobile stroke units.

I mean, people are having a stroke. The mean, people are having a stroke. The ambulance has a cat scanner. We can ambulance has a cat scanner. We can actually just, you know, put that, actually just, you know, put that, [laughter] [laughter] [laughter] >> you know, this is insane because I know >> you know, this is insane because I know if it's a bleed, we might be able to if it's a bleed, we might be able to secondarily know that is it going to be secondarily know that is it going to be a bleeding type or not. I mean, this is a bleeding type or not. I mean, this is all hypothetical. I'm just saying that all hypothetical. I'm just saying that there's so many new applications that there's so many new applications that we're going to develop. hopefully the we're going to develop. hopefully the aha moments that she is talking about.

aha moments that she is talking about. Uh Jim uh can you uh share what exactly Uh Jim uh can you uh share what exactly is the road map from today? What is your is the road map from today? What is your fundraising strategy as well? We would fundraising strategy as well? We would like Harvey's and mine and Edwards like Harvey's and mine and Edwards audiences do include a lot of VCs and audiences do include a lot of VCs and everything. So we would love to know everything. So we would love to know about uh what the process is going to about uh what the process is going to be. uh and then ask whatever your ask is be. uh and then ask whatever your ask is both in terms of uh as you know I'm a both in terms of uh as you know I'm a startup founder too and I like to startup founder too and I like to explore these technologies we're going explore these technologies we're going to bring more people to understand this to bring more people to understand this process because we truly believe on process because we truly believe on these transformational technologies so these transformational technologies so the floor is yours go ahead whatever you the floor is yours go ahead whatever you want to share want to share >> yeah so on at a high level the general >> yeah so on at a high level the general roadmap we have so so when we did those roadmap we have so so when we did those first interviews uh we identified a first interviews uh we identified a bunch of different applications and then bunch of different applications and then what we did was we started doing a lot what we did was we started doing a lot more interviews and we ended up doing more interviews and we ended up doing probably I think we've talked to over probably I think we've talked to over 200 different people now uh mostly in 200 different people now uh mostly in medical profession uh and to to further medical profession uh and to to further identify the applications and needs the identify the applications and needs the priorities etc and so we ended up with a priorities etc and so we ended up with a road map of of priorities so the first road map of of priorities so the first thing we're trying to do is uh is brain thing we're trying to do is uh is brain temperature in general before we go to temperature in general before we go to other parts of the body and then other parts of the body and then secondly with the brain temperature secondly with the brain temperature there's an awful lot of different things there's an awful lot of different things that it affects so we're looking at one that it affects so we're looking at one is in the cardiology area so looking at is in the cardiology area so looking at uh aortic repair very specifically uh aortic repair very specifically because there's 32,000 of those every because there's 32,000 of those every year, high death rate, etc. So, we know year, high death rate, etc. So, we know that's a priority. Uh and and so that's that's a priority. Uh and and so that's one we're focused on right now. But then one we're focused on right now. But then from there, we want to go to general from there, we want to go to general cardiac uh any kind of general general cardiac uh any kind of general general cardiac surgery anytime there's a bypass cardiac surgery anytime there's a bypass and any kind of cooling, even mild and any kind of cooling, even mild hypothermia, uh like the the cabbage hypothermia, uh like the the cabbage that that Jana Jana mentioned a minute that that Jana Jana mentioned a minute ago. Um and then from after surgery, we ago. Um and then from after surgery, we want to go to the ICU. And there's three want to go to the ICU. And there's three specific things. ICU trauma care for uh specific things. ICU trauma care for uh postcardiac arrest after stroke and postcardiac arrest after stroke and after brain trauma or TBIS uh where after brain trauma or TBIS uh where we're trying to measure to to we're trying to measure to to normotheria. And then from there uh we normotheria. And then from there uh we we sort of see a second and this is all we sort of see a second and this is all going to be basically a wired sensor going to be basically a wired sensor because generally in surgery where it's because generally in surgery where it's emergency situations very often um they emergency situations very often um they don't want to they actually have told us don't want to they actually have told us they don't want a Bluetooth or they they don't want a Bluetooth or they don't want a a wireless device. They don't want a a wireless device. They want something that can basically peel, want something that can basically peel, stick, plug in, get results. Um, but stick, plug in, get results. Um, but then we we know we can actually then we we know we can actually miniaturaturize this and get down to a miniaturaturize this and get down to a wireless. So, in the future, we're going wireless. So, in the future, we're going to be having a second product line that to be having a second product line that is actually a wearable. Uh, and the idea is actually a wearable. Uh, and the idea there would be things like uh again there would be things

like uh again early warning of heat stress and early warning of heat stress and hypothermia, so military um the uh uh hypothermia, so military um the uh uh first responders. And then a very first responders. And then a very interesting one maybe we'll get to in a interesting one maybe we'll get to in a minute is that got an incredible it's a minute is that got an incredible it's a very awakening story in athletics. And very awakening story in athletics. And so we think there's a huge application so we think there's a huge application for athletics both for for performance for athletics both for for performance optimization and safety and all. And optimization and safety and all. And [snorts] um and then also getting into [snorts] um and then also getting into consumer thermometry. Uh that was consumer thermometry. Uh that was actually our last the last area we actually our last the last area we wanted to get into because getting into wanted to get into because getting into consumer thermometry there's already 110 consumer thermometry there's already 110 companies that make thermometers uh for companies that make thermometers uh for a consumer. mostly all infrared a consumer. mostly all infrared scanning. Now they scan your forehead.

scanning. Now they scan your forehead. >> So but just just for your knowledge way >> So but just just for your knowledge way I'm going to use this because metabol I'm going to use this because metabol metabolomics is becoming an extremely metabolomics is becoming an extremely important field for this. So just so important field for this. So just so that people understand for my health the that people understand for my health the KPIs are very different. We don't KPIs are very different. We don't understand that V2 is the most important understand that V2 is the most important right I mean that was like the KPI that right I mean that was like the KPI that nobody knew like five years ago. Now of nobody knew like five years ago. Now of course everyone wants to do this. There course everyone wants to do this. There is actually a true in my opinion. It's a is actually a true in my opinion. It's a different market, but I love it that you different market, but I love it that you said it. But there's a longevity market said it. But there's a longevity market that is going to come through in which that is going to come through in which your device is going to be very your device is going to be very important for with V2 essentially doing important for with V2 essentially doing uh I mean currently the patch can last uh I mean currently the patch can last like 8 hours or so or 12 12 hours like 8 hours or so or 12 12 hours whatever the design is we can improve it whatever the design is we can improve it for 24 hours and once I have that data for 24 hours and once I have that data that is going to be improvement not to that is going to be improvement not to mention I mean in ovulation right mention I mean in ovulation right >> people that are trying to get pregnant >> people that are trying to get pregnant >> that is such a huge important one more >> that is such a huge important one more better right at the you know at the better right at the you know at the abdominal rather than you know checking abdominal rather than you know checking it again with the mouth to like why like it again with the mouth to like why like do you understand what I'm trying to say do you understand what I'm trying to say and you go in the depth of 4 cm so those and you go in the depth of 4 cm so those are niche consumer places that you might are niche consumer places that you might go into uh one would be longevity number go into uh one would be longevity number two would be as I told you uh ovulation two would be as I told you uh ovulation but I just want to show you guys but I just want to show you guys something that is more important again something that is more important again not to brag my own tooth but why not uh not to brag my own tooth but why not uh this is what we have built for uh this is what we have built for uh for our acute neurology. Right? We are for our acute neurology. Right? We are currently building this process in which currently building this process in which you guys can see my screen.

you guys can see my screen. >> Window Canva share. >> Window Canva share. Oh, come on. Oh, come on. Oh, there it is. It says it's sharing. Oh, there it is. It says it's sharing.

You guys share. Do you see it? You guys share. Do you see it? >> Yes. No, it came up. Okay, perfect. So >> Yes. No, it came up. Okay, perfect. So think this is going to be our real-time think this is going to be our real-time dashboard because it's all about acute dashboard because it's all about acute care and everything and I'm going to care and everything and I'm going to have AI imaging findings with QA have AI imaging findings with QA extraction verification and the whole extraction verification and the whole goal of combining all these data silos goal of combining all these data silos is to understand how much we going to is to understand how much we going to need help in terms of poststroke need help in terms of poststroke rehabilitation rehabilitation rehabilitation and now I can have another important and now I can have another important piece of information that throughout the piece of information that throughout the process the minute the ambulance goes in process the minute the ambulance goes in strap this goes through the whole strap this goes through the whole process of DNK and everything comes back process of DNK and everything comes back out. And now on this dashboard, there's out. And now on this

dashboard, there's another dashboard called Lumin Astra another dashboard called Lumin Astra that's going to give you brain reading that's going to give you brain reading for the last 12 hours or so essentially for the last 12 hours or so essentially telling us that you know what to expect telling us that you know what to expect because it's very hard. I mean again because it's very hard. I mean again things remember if you can't measure it, things remember if you can't measure it, you can't improve it and then we can you can't improve it and then we can start this uh and then eventually again start this uh and then eventually again start improving the whole process with start improving the whole process with more measurements as we go along.

more measurements as we go along. >> Yeah. Uh >> Yeah.

Audience Q&A and closing remarks

Uh we uh you're on seed round, right, Jim? we uh you're on seed round, right, Jim? >> Yes. So, as I said, that's kind of our >> Yes. So, as I said, that's kind of our roadmap of things we're trying to build roadmap of things we're trying to build and uh in order to get there, first off, and uh in order to get there, first off, I mean, I want to say that we've got uh I mean, I want to say that we've got uh this is my eighth uh early stage company this is my eighth uh early stage company I've been involved with. and and and by I've been involved with. and and and by far this is just one of the most far this is just one of the most exciting applications I've ever been exciting applications I've ever been involved with and two probably the most involved with and two probably the most exciting team I've ever had a chance to exciting team I've ever had a chance to work with because it was very deep tech work with because it was very deep tech very hard basically it's very hard very hard basically it's very hard science to do in fact when we started science to do in fact when we started the company we knew we had several years the company we knew we had several years of work to do to get it before it could of work to do to get it before it could be commercialized be commercialized um and so um and so >> I know because I wanted to hire Tom but >> I know because I wanted to hire Tom but you got doing faster you got doing faster >> no we're not going to let you have him >> no we're not going to let you have him here [laughter] here [laughter] that's that's actually that's not his that's that's actually that's not his real name So you can't find him, real name So you can't find him, [laughter] but we we [laughter] but we we >> fantastic team. No doubt about it.

>> fantastic team. No doubt about it. >> So we've got, you know, we we've got a >> So we've got, you know, we we've got a couple MIT people, the the founder of couple MIT people, the the founder of the or my co-founder and the inventor of the or my co-founder and the inventor of this technology is a Caltech PhD. Uh this technology is a Caltech PhD. Uh we've got two other P PhDs from the we've got two other P PhDs from the University of Colorado that are in University of Colorado that are in microwave and in physics that are microwave and in physics that are working on our our algorithms for for working on our our algorithms for for extracting temperature, etc. But uh extracting temperature, etc. But uh because this is a novel thing, it hasn't because this is a novel thing, it hasn't been done before and because there's been done before and because there's such an important potential societal such an important potential societal level impact of what we can do with this level impact of what we can do with this technology, it made it easier easier for technology, it made it easier easier for us to actually find non-diluted funding.

us to actually find non-diluted funding. So, so far we in fact we're very So, so far we in fact we're very fortunate, knock on on some wood here, fortunate, knock on on some wood here, is that we're seven for eight. Thank is that we're seven for eight. Thank you, Jenny. We always need some support you, Jenny. We always need some support like that, but we're we're seven for like that, but we're we're seven for eight in our grant applications and eight in our grant applications and wins. Uh so we've we've raised $3.3 wins. Uh so we've we've raised $3.3 million from uh National Science million from uh National Science Foundation, from the US Army, from the Foundation, from the US Army, from the state of Colorado. Um we've got two state of Colorado. Um we've got two grant applications out right now with grant applications out right now with the National Institute of Health, NIH, the National Institute of Health, NIH, uh that thinks this is a very important uh that thinks this is a very important technology for them. Um as well as a technology for them. Um as well as a military uh uh proposal out with thing military uh uh proposal out with thing called CDMRP, which is a congressionally called CDMRP, which is a congressionally directed medical research projects, and directed medical research projects, and that's aimed at military applications that's aimed at military applications that have dual use. that can also be that have dual use. that can also be used in civilian, you know, applications used in civilian, you know, applications as well.

as well. >> Beautiful. >> Beautiful. >> Beautiful. >> But the the problem is we've been able >> But the the problem is we've been able to raise a lot of money like that and to raise a lot of money like that and we're going to continue to do that we're going to continue to do that because we think the non-dilutive money because we think the non-dilutive money is a very good way for us to uh protect is a very good way for us to uh protect you know investors in our company etc.

you know investors in our company etc. from dilution and whatnot. Um but also from dilution and whatnot. Um but also >> also it gives you the proof that this is >> also it gives you the proof that this is important.

important. important. >> It it does. It's a because it's these >> It it does. It's a because it's these are very competitive and they're getting are very competitive and they're getting more competitive because with the more competitive because with the clawbacks recently from the government.

clawbacks recently from the government. Uh that's actually why we've actually Uh that's actually why we've actually shifted well not shifted we're still shifted well not shifted we're still going to be going for non-diluted grants going to be going for non-diluted grants but we've also put an emphasis and we're but we've also put an emphasis and we're trying to raise some outside money right trying to raise some outside money right now. In fact we've got uh we're looking now. In fact we've got uh we're looking to to get us through up up right up to to to get us through up up right up to our uh FDA uh uh submission next year.

our uh FDA uh uh submission next year. Um we're looking for about 1.2 2 million Um we're looking for about 1.2 2 million right now and we've just uh we just right now and we've just uh we just closed our first uh first piece of that closed our first uh first piece of that 150,000 just last week and last 150,000 just last week and last Thursday. So that's exciting for us. Um Thursday. So that's exciting for us. Um but the but basically what we're looking but the but basically what we're looking to do is about 1.2 million now and then to do is about 1.2 million now and then probably next year about 4 million and probably next year about 4 million and then we actually think we know we need then we actually think we know we need probably about 10 to 15 million after probably about 10 to 15 million after that to to get everything into market to that to to get everything into market to really scale up a sales force and really scale up a sales force and distribution channels etc. However, we distribution channels etc. However, we think a lot of that's going to come from think a lot of that's going to come from still non-diluted funding from NIH.

still non-diluted funding from NIH. We'll be able to do a lot of little mini We'll be able to do a lot of little mini trials as we go along. For each trials as we go along. For each application, we get into doing a trial application, we get into doing a trial to show the efficacy like for cardiac uh to show the efficacy like for cardiac uh for cardiac arrest, for TBI, for stroke, for cardiac arrest, for TBI, for stroke, etc. And we think a lot of those will be etc. And we think a lot of those will be able to do non-dilutive funding. So, able to do non-dilutive funding. So, that's kind of our path both from a that's kind of our path both from a technology standpoint and then also technology standpoint and then also that's our kind of our a little bit of that's our kind of our a little bit of our our financial path there. So, our our financial path there. So, [snorts] [snorts] [snorts] >> awesome. I love it. Thank you for >> awesome. I love it. Thank you for sharing it guys. We're going to put sharing it guys. We're going to put everything including their LinkedIn into everything including their LinkedIn into the show notes also into the newsletter the show notes also into the newsletter uh that goes has 11,000 subscribers now.

uh that goes has 11,000 subscribers now. So the idea is that again we want to So the idea is that again we want to bring these technologies help these bring these technologies help these companies who are bringing companies who are bringing transformative stuff and again putting transformative stuff and again putting it back into the AI world with the it back into the AI world with the measurements because garbage in garbage measurements because garbage in garbage out. We want to make sure that I get out. We want to make sure that I get this correct information that I can this correct information that I can build more applications on including build more applications on including physical devices for regional cooling physical devices for regional cooling and software as medical devices to and software as medical devices to understand prediction modeling for the understand prediction modeling for the future. Yeah, future. Yeah, >> again very very important. Once we have >> again very very important. Once we have enough corpus of data, we can actually enough corpus of data, we can actually even before the patient lands into the even before the patient lands into the ER, you will have a set you know a ER, you will have a set you know a dashboard saying this is potentially how dashboard saying this is potentially how this is

going to be uh the output of the this is going to be uh the output of the outcome of the patient prediction again outcome of the patient prediction again of course but then the outcome can be of course but then the outcome can be adjusted just because now you know what adjusted just because now you know what the risk and benefits are already and the risk and benefits are already and you can talk more intelligently to the you can talk more intelligently to the patient the family that hey I'm doing patient the family that hey I'm doing this risky thing but here's the outcome this risky thing but here's the outcome that I'm expecting can we do it and that I'm expecting can we do it and therefore I need that measurements to do therefore I need that measurements to do so. Tom, do you want to add anything so. Tom, do you want to add anything before we close?

before we close? >> No, just thank you for your time. I I >> No, just thank you for your time. I I think this is something that, you know, think this is something that, you know, AI is impacting all areas of our our AI is impacting all areas of our our life. You know, we use it a lot uh as a life. You know, we use it a lot uh as a startup just in terms of helping to startup just in terms of helping to identify opportunities. We've seen it identify opportunities. We've seen it improve and help us find some of these improve and help us find some of these applications and ways to contact it. You applications and ways to contact it. You know, I've I've thought of it like I've know, I've I've thought of it like I've got a whole team of interns is kind of got a whole team of interns is kind of how I think about GPT. Uh where, you how I think about GPT. Uh where, you know, you don't want to take it as know, you don't want to take it as gospel truth. Uh but you've got all of gospel truth. Uh but you've got all of this information that helps us take the this information that helps us take the small team that we've got and really use small team that we've got and really use it to the best advantage we can. People it to the best advantage we can. People with experience that Jim's brought with experience that Jim's brought together to form our team, uh now has together to form our team, uh now has all of this additional power to uh help all of this additional power to uh help put everything that we put together in put everything that we put together in it. So, uh, just one of the ways that we it. So, uh, just one of the ways that we as a a small startup have been able to, as a a small startup have been able to, uh, get to where we are today and and uh, get to where we are today and and hopefully have some rapid acceleration hopefully have some rapid acceleration of our growth. So, appreciate all you of our growth. So, appreciate all you do, Jun, to help get the word out about do, Jun, to help get the word out about good things coming for Luminestra.

good things coming for Luminestra. Again, I'm always available. Um, I just Again, I'm always available. Um, I just want to make sure because I do this, uh, want to make sure because I do this, uh, I don't like to get involved into I don't like to get involved into officially advisory shares, but you are officially advisory shares, but you are always available. let me know who you always available. let me know who you need from my contacts. Anything that need from my contacts. Anything that needs to to support this mission. And needs to to support this mission. And again, this is both uh clinical and uh again, this is both uh clinical and uh military applications. We're going to military applications. We're going to see a lot more success both in terms of see a lot more success both in terms of clinical and military and commercial clinical and military and commercial success as we go along. Jim and Tom, success as we go along. Jim and Tom, thank you so so much for coming on this.

thank you so so much for coming on this. Uh we'll bring you back sometime for Uh we'll bring you back sometime for five minutes just to give us, you know, five minutes just to give us, you know, six month update or 12 month update. So six month update or 12 month update. So that way people are already know that that way people are already know that how we are progressing in this uh how we are progressing in this uh process process process >> and we and thank you very much for the >> and we and thank you very much for the opportunity and I I'd reach out to your opportunity and I I'd reach out to your audience and just say hey feel free Jana audience and just say hey feel free Jana is going to give you contact information is going to give you contact information for us and and give us a call. Uh sure for us and and give us a call. Uh sure we'd love to have you invest in our we'd love to have you invest in our company but that's the but but aside company but that's the but but aside from that we really want to like when we from that we really want to like when we first met Janade first thing he said is first met Janade first thing he said is Janade I want to we want to interview Janade I want to we want to interview you. I want to know about what you do you. I want to know about what you do and how what your perspective is and and how what your perspective is and help us think this through, you know, help us think this through, you know, more. And so anyone out there who's who more. And so anyone out there who's who thinks that there's anything that this thinks that there's anything that this kind of an internal temperature could kind of an internal temperature could actually affect your job, your role and actually affect your job, your role and application, we'd love to hear from you.

application, we'd love to hear from you. So anesthesiologists, So anesthesiologists, profusionists, uh ICU care, surgical profusionists, uh ICU care, surgical care, pretty much any physician, care, pretty much any physician, temperature is something that's actually temperature is something that's actually very vital. uh and and and so we would very vital. uh and and and so we would love to hear from you uh to get your love to hear from you uh to get your opinions, your thoughts on this and help opinions, your thoughts on this and help us think through this for future us think through this for future applications and all.

applications and all. >> Again, thank you so much for everyone >> Again, thank you so much for everyone joining. This is going to be uh every joining. This is going to be uh every week Wednesday. Uh it is 9 uh 8 a.m.

week Wednesday. Uh it is 9 uh 8 a.m. Central Standard Time that we go live Central Standard Time that we go live and this is recording is going to be and this is recording is going to be available in the future. Uh next week available in the future. Uh next week announcement, we are not going to go announcement, we are not going to go live because of Thanksgiving and the live because of Thanksgiving and the week after we'll catch up as we go week after we'll catch up as we go along. Thank you guys for joining live, along. Thank you guys for joining live, whoever did. And again, make sure that whoever did. And again, make sure that you contact Jim and Tom uh through you contact Jim and Tom uh through LinkedIn as well.

LinkedIn as well. >> Thank you. Bye. >> Thank you. Bye. >> Thank you all very much. >> Thank you all very much. >> Thank you. >> Thank you.