Strokepointer – In Ambulance Stroke Triage | Wouter Potters

Wouter Potters is the CEO and co-founder of Trianect which is developing the pre-hospital stroke triage product, Strokepointer.

News article on our hospital website
TrianecT

Social media:
LinkedIn (Wouter Potters)
LinkedIn (TrianecT – company)

Scientific articles:
1. Neurology
2. Journal of neurology

Highlights:

03:21 Introduction Trianect Strokepointer
10:24 Predicting stroke risk through blood vessel analysis
26:03 EEG technology in ambulances
39:04 Developing AI-powered stroke detection for ambulances
53:44 Stroke diagnosis and treatment using AI
59:20 Stroke treatment and rehabilitation

Transcript:

Wouter Potters 0:00
Jonathan came to me, Hey, can we do EG in the ambulance, regular EG not going to happen, it just takes too long to prepare. Because the first thing that we agreed on, it has to be very, very fast, because if it's not fast, the ambulance is not going to use it.

Wouter Potters 0:15
So what we decided first is we need the technology that we can measure EG in a very fast fashion. So we quickly arrived at dry electrodes, EG, which means that you have a different type of electrode, it looks a bit like like an octopus.

Wouter Potters 0:33
These are plastic electrode coils with silver chlorides, which is an excellent conductor to measure EG. And what you do is you put those on top of the hair, and if you twist them a little bit, they just go through the hair, we test those electrodes in our hospital, at first in volunteers, then we tested it on patients in the outpatient clinic who came in for epilepsy detection.

Wouter Potters 1:03
So we've also started looking for software that we could use to measure E T in the ambulance because all the software that we used inside the hospital, actually was quite cumbersome. But in the end, we found a very nice partner as well in that aspect, which also transformed the software for us, so that we could basically fill in a number and then click on start, and then the measurement would start running.

Intro 1:33
This is the recovery after stroke podcast, with Bill Gasiamis, helping you navigate recovery after a stroke.

Bill Gasiamis 1:47
Hello, and welcome to the Recovery after Stroke podcast. Since I mentioned my book at the beginning of Episode 276. We've discovered a few things that need updating, and that information has been sent back to the team, and shortly fingers crossed the book will be ready to launch. But as I was last week, I'm still giving away the first chapter free. The feedback from it so far has been fantastic.

Bill Gasiamis 2:13
The book is called The unexpected way that the stroke became the best thing that happened and it shares 10 secrets from stroke survivors that will transform your life. If you go to recoveryafterstroke.com/book and fill out the form. You will receive the book in your email a few moments later. If you are a stroke survivor with a story to share about your stroke experience. Now is the perfect time to join me on the show.

Bill Gasiamis 2:37
The interviews are not scripted, you do not have to plan for them. You just need to be a stroke survivor who wants to share your story in the hope that it will help someone else who is going through something similar. If you are a researcher

who wants to share the findings of a recent study, or you are looking to recruit people into your studies, you may also wish to reach out and be a guest on my show.

Bill Gasiamis 2:59
If you have a commercial product that you would like to promote that is related to supporting stroke survivors. To recover there is also a path for you to join me on a sponsored episode of the show. Just go to recoveryafterstroke.com/contact fill out the form explaining briefly which category you belong to and I will respond with more details about how we can connect via Zoom.

Introduction Trianect Strokepointer

Bill Gasiamis 3:21
This is episode 277. My guest today is co-founder of TrianecT Wouter Potters TrianecT is a Dutch company that is developing the Strokepointer, which is a portable EEG device, otherwise known as an electroencephalogram that can be used in ambulances to help detect large vessel occlusions, which are a type of ischemic stroke while the patient is in transit to hospital so that they are transported to the correct hospital that has the facilities to treat such medical emergencies.

Bill Gasiamis 4:03
Saving time in transit and decreasing the possibility of the patient being sent to a hospital that is not able to treat such conditions therefore reducing the amount of time between when the stroke patient starts to show symptoms of stroke. And when treatment begins. Therefore, saving the brain and decreasing the impact stroke has on the patient. Wouter Potters welcome to the podcast.

Wouter Potters 4:29
Thanks a lot, Bill. It's a joy to be here.

Bill Gasiamis 4:34
Thank you for being here I get excited when I say technology is about saving the brain. I get excited but before we talk about the technology, and what you guys are working on and developing. Give me a little bit of a background about you first, and then also about the organization that you're involved in.

Wouter Potters 4:58
Yeah, so I started my study as a technical physician, which is already unique for the Netherlands because it's really at the boundary of medicine, science, and innovation. It also includes two years full-time in academic hospitals.

Wouter Potters 5:16
So that means that you get trained in the hospital, together with the entire team at the hospital. And you also get involved with patients and with patient care. And in the Netherlands, were also allowed to treat patients. So this is my education.

Wouter Potters 5:31
So I did not do medicine and technical medicine. And after that, I did a PhD in MRI. And then I started my career in neurology, which is actually where this project started. And in the neurology field, I was a staff member for seven years. During that time, I also met my, colleague, Jonathan Cuttino a stroke neurologist.

Wouter Potters 5:56
And he came up with the problem that he saw a lot of patients that were actually inside the hospital, and that were being treated for stroke, actually, for large vessel occlusion stroke. And half of those patients came from another hospital where they could not treat these patients. So we saw a problem there. And that's actually when we decided we wanted to fix that problem together.

Bill Gasiamis 6:24
That's a huge problem. So before we talk about the problem and your solution, let's talk about your PhD in MRI.

Wouter Potters 6:32
Yes, that's correct.

Bill Gasiamis 6:34
Okay, that's a cool PhD. Tell me about that a little bit, and give me a bit of an idea of what the main focus of your study was, that got you to that outcome.

Wouter Potters 6:45
Yeah, so it's really, it was a different field because the PhD was in the radiology department, where I studied the flow inside blood vessels, more specifically, the philosophy of blood inside blood vessels.

Wouter Potters 7:00
So this is a very basic research, we just looking at how blood flows within the blood vessel. What's very interesting about that is that in the very, very early phases of atherosclerosis, which is also highly relevant for stroke, is that if actually, the blood goes in circles, or over to heartbeat goes in different directions next to the vessel wall.

Wouter Potters 7:28
That means that the blood flow is not streamlined next to the vessel wall, which means that the endothelial cells at the vessel wall, tend to align, as soon as the blood flow is not just laminar in one direction with high velocity, but also creates low velocities and of varying velocities, you get these endothelial cells, they rearrange, which makes them more prone to actually infiltration of inflammatory substances from the blood into the vessel wall.

Wouter Potters 8:03
Which then in the very long term, the hypothesis is that that can create atherosclerosis. In the long term, we know that that can also induce a stroke if it happens in the brain.

Bill Gasiamis 8:16
Because atherosclerosis induces an ischemic stroke or hemorrhagic stroke.

Wouter Potters 8:23
Mostly induces ischemic stroke.

Bill Gasiamis 8:26
Okay. And that's because you've got the blood flow, microscopic changes in the blood flow in the way that it creates high pressures and low pressures inside the blood vessel. And as a result, creates blood clots that form on the blood vessels,

and then get released into the bloodstream, and then maybe, perhaps, into the brain.

Wouter Potters 8:52
It's even a little bit more complicated the net because the blood flows next to the Anthelios cells, and you can see them as small little blocks. And if the blood flow is straightforward in one straight direction, then the cells nicely align, and they form a little bit elongated cells, and they're tightly packed together. And as soon as the blood flow changes, so not the pressure, but the blood flow, the velocity next to the vessel wall.

Wouter Potters 9:21
That alignment that is also protecting the vessel wall itself, actually, this alliance a bit, and then you get this very, very slow buildup of inflammatory inducing substances in the vessel wall, and that attracts then other cells, and they build up and they slowly, very slowly produce a block, as it's called, inside the vessel wall. And if that black at some point becomes very big, or if it's, if it if some incidents are that ruptures.

Wouter Potters 9:58
Then actually it can create a stroke instantaneously ischemic stroke because then there is a sudden clotting of the blood next to the part where the atherosclerosis is, and then you can get an immediate block of the vessel, or it can produce like small plots that shoot to your brain or other body parts.

Trianect Strokepointer – Predicting stroke risk through blood vessel analysis

Bill Gasiamis 10:24
Okay, that's fascinating. It's plumbing 101 I say that because I've seen some weird YouTube documentaries about different things. And every once in a while, you come up against something like plumbing, and why a copper pipe gets damaged on the inside. And it's not dissimilar to what you just described, it's because of the way that the pipe was joined, or welded, or the flow of the water over the joints and the welds, and a simple change in the flow of the water over the weld.

Bill Gasiamis 11:02
And on the inside, it can cause the joint to deteriorate far more rapidly than one would hope. And under severe load, or changes in the weather, because of colder climates, in different countries, etc. You can have different versions of life cycles on these pipes and different reasons why they burst. So it's fascinating how that what you mentioned, is very much applicable to any kind of tube that runs a liquid through it for whatever purposes, but specifically in this in our situation, we're talking about strokes.

Bill Gasiamis 11:49
So is atherosclerosis obvious It's been happening for a long time, Are there early warning signs of atherosclerosis? Can somebody without looking at your habits, can somebody look at a blood vessel and go, This blood vessel is going to be? What's the word? Is it impacted by atherosclerosis in 5, 10, 12 years, or something like that?

Wouter Potters 12:23
Yeah, it's really difficult to state this in a general manner, because there are many patients with many different also pre-existing diseases. So everything depends on that. So and what we usually do in the clinic is that patients get symptoms, sometimes they get neurological symptoms, sometimes the atherosclerosis can also be present in other body parts.

Wouter Potters 12:51
For example, legs, if somebody has trouble walking, or people have less blood flow to their to relax, or they can also have problems with Alexa with terms, that can be a first warning sign. Based on those first warning signs, at the hospital, my colleagues in the radiology department can decide to do for example, ultrasounds, and with the ultrasounds in the neck, you can for example, look for constricted blood vessels constraints are the artery with atherosclerosis in the neck to see if that's present or not.

Wouter Potters 13:30
What they then basically do is look at the lumen of the vessel. And if the lumen is smaller, you can say that if it's much, much smaller than, for example, two centimeters below, you can state there is now a stenosis in his blood vessels. So a decrease of the lumen of, for example, 80%. And once you have a constriction of 80%, it's already severely limited in terms of how much blood can flow through

there. And if it becomes more, then you also get to the stage where it gets symptomatic.

Wouter Potters 14:04
So that means that then also people get problems from this analysis, because also the blood vessels, although they're really big, there's two or some reason for huge blood vessels going to the brain. So that means if one is constricted, that does not mean that there is necessarily a problem because there are still a lot of other blood vessels, or the blood vessels in your brain are connected by the circle of Willis, which is the circular structure of blood vessels. So a lot can be compensated by your own body already, which is quite amazing.

Bill Gasiamis 14:39
It's fascinating, the technical amazement, the body is just so fascinating. I mean, clearly whoever designed it did a great job and made a point of protecting the brain almost at all costs to vertebral arteries and the carotid artery Roger batteries. And yeah, it's It's fabulous. And let's face it, most people have had a stroke, if it wasn't for that amazing way that the brain has been developed and the access that it has to blood from many, many different locations, most of us wouldn't be around.

Bill Gasiamis 15:22
So it's very good. I'm very grateful that it's like that also. What it means is that sometimes stroke survivors ignore the signs of a stroke, because something doesn't suggest necessarily that a stroke is happening, they have headaches, or they have all these weird things going on. Yes. And often that leads them to give information to perhaps 911 In America, or triple zero in Australia, or whichever the organization is in, in the Netherlands, what is it by the way, in the Netherlands.

Wouter Potters 15:57
In Europe is 112.

Bill 16:00
112, It tends to allow people to give the wrong information to the people who are going to help them. And then as a result of that, we end up perhaps waiting in an emergency room or going like you said to the wrong hospital. And that then increases the risk of severe complications because of stroke. And then sometimes

you hear about people who have had a stroke, I've interviewed people who have had a stroke, and three, four or five days later, have gone to finally get help from somebody at a hospital.

Bill 16:44
And then they're always lamenting that I should have known better, I should have gone earlier, etcetera. Now, we should have included but we didn't, and that doesn't matter. What matters is that what you're working on, is a way to predict way before somebody presents to the hospital and has to wait in emergency perhaps, and then has to wait for a scan and all those things.

Bill 17:13
You're presenting the possibility that stroke survivors can be supported in the ambulance. That decision can be made while they are in transit or hospital so that they go to the correct hospital and then B when they get there, there's no guessing as to what might be the challenge with this person, there might be information already available to triage so that they can get processed appropriately. Tell me a little bit about that.

Wouter Potters 17:50
Yeah, first, to get back to you the first part of your question the introduction, people not recognizing symptoms of stroke, that's extremely common in stroke patients. So that's the neglect that they don't have the possibility or the ability to see that there's a stroke going on because obviously, the brain is affected. So that does not help. So people in the environment must recognize these fast signals.

Wouter Potters 18:20
So really, facial expressions, arms, not dropping or not moving, really recognize, know those signs, recognize the signs. And if you see them, just call 911. And explain what you see very objectively that's already very important.

Wouter Potters 18:38
And then the next step, if the ambulance arrives, that's where we come in. So I've been working at Amsterdam UMC for seven years, and in 2018, we had the ID to try stroke patients inside the ambulance, because we saw that half of these ambulances in the Netherlands at least drive to the wrong hospital.

Wouter Potters 19:00
And then these patients get picked up again by a second ambulance, usually

around 60 minutes later on average, and then they get transported to their best therapy. And we all know time is the brain. So this delay can be quite destructive for individuals, meaning not going back to work going back to work, living in a nursing home, and living back home. So the differences are huge in terms of individual patients.

Wouter Potters 19:30
And our aim was, we wanted to develop a trial instrument that could be used in every ambulance by any ambulance personnel across the world. Also, it should be accurate, of course, because we want to accurately depict which patients have to go where, and most specifically, we want to detect large vessel occlusion strokes. So that's a very specific type of ischemic stroke.

Wouter Potters 20:00
The reason why we focus so much on that specific subtype of stroke is that, in 2015, there were a lot of clinical trials that showed that endovascular treatments were very, very beneficial over regular Tramex thrombolysis. And that changed the entire field of stroke care, in the sense that people with stroke now get endovascular treatment where they go into the blood vessel and pull out large blood clots.

Wouter Potters 20:34
The big downside of that is it only works in the big vessels because that's where you can get with these catheters. But if you can manage to get the blood clot out, time is brain, that's the first important thing. So the second thing, that's important is that you bring the patients as fast as possible to the right hospital. And inside the ambulance, we cannot diagnose stroke, because we need the CT scan right now to diagnose stroke.

Wouter Potters 21:04
So long story short, we decided to discuss what technology we could use to diagnose drugs, and we came up with the EEG, or the electroencephalography, or the brainwave measurements, as we call it. And these brainwave measurements, change almost instantaneously, when you suffer from a stroke, because the blood vessel closes, or is blocked.

Wouter Potters 21:34
And once the blood flesh is blocked, there is no oxygen and no glucose supplied to

your brain cells. And that means that the activity of the brain cells immediately drops. And we know this already, because we use this technique already in the hospital, for example, in patients who operate on one of the carotid arteries to remove, for example, atherosclerosis, we use this technology to measure the brain to make sure that nothing happens to the brain during the surgery.

Wouter Potters 22:08
As soon as you close one of the vessels and you see that something's going wrong in the brain, that means that the other vessels do not compensate enough to compensate for that blood vessel, which is essentially also what happens in strokes. When a festival gets blocked by a large vessel, then the area behind that vessel no longer is supplied with oxygen, and you immediately see a change in brainwaves when you see a slowing of the brainwaves and less activity. And this is what we're trying to measure with EEG.

Bill 22:48
So EEG sounds familiar because most people will know about ECG. Yes, electrocardiograph, right?

Wouter Potters 23:00
It's essentially the ECG for the brain, as we call it, right?

Bill 23:03
Okay. So the EEG is something is a technology that has already been used good track record. And it's usually used in the operating room.

Wouter Potters 23:16
So a good track record has been used since the 1980s, when people still use the papers and needles with ink to measure EEG. And they're in the hospital, it's mostly used inside in neurology departments where they are using it to mostly diagnose patients who are suspected of epilepsy. Because in epilepsy, you have a sudden onset of huge activity inside the brain.

Wouter Potters 23:48
You can if you have an if you get an IED you can try to detect those events. So that's what it's used been for mainly, also for sleep research. So people who have trouble at night with breathing or sleeping or also get an EEG together with all kinds of other measurements to measure that. So that's in the hospital and for monitoring during surgery.

Wouter Potters 24:17
It’s also been used a lot for example, in surgeries on the biggest vessels that you have in your body, the biggest arteries, you always want to make sure that your brain is not affected during the surgery because then you would end up after surgery with brain damage. So that’s also where a lot of these monitoring takes place as well.

Bill 24:39
And the monitoring is usually sticky pads stuck on the head is that how it usually looks that it can.

Wouter Potters 24:48
Allow for the monitoring actually, you want to be 100% sure of this correctly. So actually, for the monitoring, they screw these electrodes in the head of the Patients, that there’s not a lot of electrodes to them. But they are very tightly coupled with the skin so that there are three single-use electrodes, and they just twist it into the skin a little bit like a screwdriver, but then very, very tiny, which makes sure that the contact is perfect.

Wouter Potters 25:19
Inside the neurology department, it looks like either a cap with 32 electrodes, or more, sometimes even 256, or five on the 12 electrodes, and then each electrode that is put onto the brain is connected, to the skin, with a little bit of glue, or a little bit of like a gel. So you can imagine that if you have to attach all those electrodes, it takes a lot of time. So for 32 electrodes to people there. I think they’re busy for 10 minutes, and then all the electrodes are connected to this game.

Wouter Potters – EEG technology in ambulances

Bill 26:03
Okay, so for me, because I’m a novice, and that’s okay. I see I hear about technology. We’re already using it inside the hospital, we’re already using it in the operating rooms. Just take it and put it in the ambulance, no big deal, right? That should be as simple as that. However, the process is not as simple as let’s just take it and put it in the ambulance.

Bill 26:29
Explain to me the thinking behind getting it in the ambulance and how you guys have to change it. What is all that has almost been proven to be effective I should change it so that it continues to be effective in a different setting where the parameters are very different. You're in a car, the car is moving, you don't have all the equipment, you don't have a lot of technicians on hand, you have ambulance drivers, who potentially paramedics and who are not necessarily doctors don't have the skill in this area.

Bill 27:09
Oh, my God, all the things that you guys would have had to solve. To put this in an ambulance. It just seems like a massive project. Tell me a little bit about the transition from inside the hospital to in the ambulance.

Wouter Potters 27:20
Yeah, so the first thing we did this week, we, because Jonathan, at this point, this is the point where Jonathan came to me, Hey, can we do EG in the ambulance? And we were like, okay, regular EG not gonna happen, it just takes too long to prepare, because the first thing that we agreed on, it has to be very, very fast, because if it's not fast, the ambulance is not going to use it for good reason. After all, these patients have to get to the hospital as soon as possible.

Wouter Potters 27:50
So you cannot spend 10 minutes on electrodes and then hope that will go right, and then do this in a trial or a study four for free and with more than 300 patients, that's just not ethical. So what we decided first is we need a technology that we can measure EG in a very fast fashion. So we quickly arrived at dry electrodes EG, which means that you have a different type of electrode, it looks a bit like like an octopus. And these are plastic electrodes coated with silver-silver chloride, which is an excellent conductor to measure EG.

Wouter Potters 28:34
And what you do is you put us on top of the hair, and if you twist them a little bit, they just go through the hair. And this was back in 2018. There were just a few innovations in this area. And one of our partners just released a US to commercial products that could measure dry electrodes, etc. And we thought, well, we're gonna need that specific product, and we're going to test it.

Wouter Potters 29:02
So that's what we first did we tested those electrodes in our hospital, at first in volunteers, then we tested it on patients in the outpatient clinic, we came in for epilepsy detection. And we just asked them after the measurements, do we want to participate in a study just to check this, check out these new electrodes, and at some point, whatever, okay, this is going to work.

Wouter Potters 29:25
So we've also started looking for software that we could use to measure eg in the ambulance because all the software that we used inside the hospital, actually was quite cumbersome, with a lot of clicks, a lot of training required just to just click on Start measurements. So in the end, we found a very nice partner as well in that aspect, which also transformed the software for us, so that we could fill in a number that was the start. Then just click can start, and then the measurement will start running.

Wouter Potters 30:02
And that's actually what we've been using then. And the other thing was it needed to be portable. So we created a nice aluminum suitcase that was, I think this big. And we had the suitcase. And we also tested with the suitcase successfully in our emergency department, because we were just stepping it up a little bit. We didn't want to start in acute patients. But once we were sure that the technology worked, we could validate in these acute stroke patients, which are often very severe.

Wouter Potters 30:40
So they're also really hard to obstruct, sometimes. So we wanted to validate that this would work within five minutes from start to end. And we did this at the emergency department also in quite a lot of patients and we saw, okay, now we know we think this is going to work. And we were already in discussions with ambulance services as well. First Ambulance Amsterdam was the first ambulance company we collaborated with. So we went with the suitcase to them.

Wouter Potters 31:07
And we said, well, we have this and this ID for this study. And we want to place this device in your hands. And they were looking at this and he said, No, far too heavy. We're not going to carry this. And they said Come with us. So we went to the ambulance. And actually, they showed us what they had to carry to each

patient where they went in with us, okay, we have to rethink this. And actually, some of the ambulance personnel there were very helpful. So they also showed us what they would want to improve this.

Wouter Potters 31:36
So we quickly just got all the equipment out of our Aminian suitcase and used repackages in a lighter, lightweight back. And from there, we continued with our first study, which included 12 ambulances, because later on a second ambulance company joined. And then the next step was really to train all the ambulance personnel. So we trained 125 ambulance personnel, which was quite a lot. But thanks to our PhD students, that was all performed in a very, very short timeframe.

Wouter Potters 32:10
And then we just started measuring. And at the start, there were still a lot of hurdles, because data quality is worse, and is a major issue with EEG, because if you compare it to ECG, it's affected 1000s, lower in terms of signal strength. So it's a really small signal that we're trying to measure. But we slowly got the software better and better to also prepare, for example, to look at contact quality with the skin. And at the end of the study, we got to a point where we could measure correctly, around 65% of the patients, which is still not sufficient.

Wouter Potters 32:55
But to prove the general principle that we can use the G for structured, large vessel occlusion stroke in the ambulance, that was more than sufficient because we knew that the technology could be improved. After all, we have many ideas to improve it. There's a new study going on, that hourly implements some of those improvements the for the headset for the gap.

Wouter Potters 33:20
And we have new developments going on also within the company to further improve data quality, and also to provide feedback to the m&s personnel while they are measuring because that's important. That's something we did not do in the first study.

Bill 33:35
It just sounds amazing. So the study the initial study with the 120 ambulance personnel that went into their ambulances, did it reveal the type of information

that you're hoping and as a result, did that mean that you guys got patients to the right hospital instead of the wrong hospital?

Wouter Potters 33:57
So we got the right information. But we only knew this after we analyzed the data. So that's always the problem. Nobody ever measured inside the ambulance, or at least nobody published about it. And so we did not have the data on beforehand. We could actually, know it from the emergency department. But the downside of the emergency department is that's always later than the ambulance. So we did not know what we would find in the ambulance yet. We had some IDs, but we did not write an algorithm yet that could make a decision.

Wouter Potters 34:35
It would be unethical if we would have made a decision already then. So the first study was about collecting data. And afterwards deciding if we would have made a decision using this algorithm. Would this patient then be brought to the right hospital yes or no? So this is what we did. We developed an algorithm based on the data we collected and then retrospectively looked at it If we had used this algorithm, would that have helped this LV stroke patient? Yes or no?

Bill 35:06
And you got some positive results? Absolutely, yeah.

Wouter Potters 35:10
So we had 90% accuracy 91%. Actually, for one of the parameters 80% accuracy for one of the other parameters, means that we can detect the elvio strokes well. But at the same time, there is also a small portion of the nonelvio strokes or another diagnosis that we also detected as alpha strokes. This means they also get brought to a very comprehensive stroke center, where they can also be excellently treated.

Bill 35:44
Right. That's fascinating. So then there's another level of training that needs to occur because what you're hoping is that, are you hoping that the data is going to be able to be live in the field? Understood, and then, therefore, the people in the ambulance make the decision? Or does that data get sent elsewhere? And then the information gets sent back to the ambulance about where to send that patient.

Intro 36:09

If you've had a stroke, and you're in recovery, you'll know what a scary and confusing time it can be, you're likely to have a lot of questions going through your mind. Like, how long will it take to recover? Will I recover? What things should I avoid? In case I make matters worse, doctors will explain things that, you've never had a stroke before, and you probably don't know what questions to ask. If this is you, you may be missing out on doing things that could help speed up your recovery.

Intro 36:39
If you're finding yourself in that situation, stop worrying, and head to recoveryafterstroke.com where you can download a guide that will help you it's called Seven Questions to Ask Your Doctor about your Stroke. These seven questions are the ones Bill wished he'd asked when he was recovering from a stroke, they'll not only help you better understand your condition. And they'll help you take a more active role in your recovery, head to the website. Now, recoverafterstroke.com and download the guide. It's free.

Wouter Potters 37:12
Yeah, so both options are possible, we have a very strong preference for deciding on the ambulance because ambulance personnel is very independent. Because they're very independent, they're also really fast. Because if you have to call somebody send data, even if it's all automated, and then wait for the call back. That cost you a few minutes. In a stroke, every second counts. So why not do everything on site as much as possible, because we do do the measurement before we start driving.

Wouter Potters 37:47
Because we don't want artifacts from driving. Because you never know if there is a roundabout or if there are bumps in the road that will cause artifacts, and you never know when they will happen. So we measure while we're still standing. And then we do the measurements. The idea is then that our algorithm which we now developed, will be used to make a decision and then the eminence personnel can use that decision from the algorithm to decide if I'm going to this hospital, or if I'm going to this hospital.

Wouter Potters 38:18
And there are many more options. Because there are a lot of different regions and a lot of different countries, the distances in Australia are much different from the

distances. In the Netherlands, for example, we don't take stroke patients with a plane from one region to another region. I think in Australia, this does happen.

Wouter Potters 38:36
So there are a lot of different situations and countries where actually, the same algorithm might provide a different outcome because you have to take into account the likelihood of a large vessel occlusion stroke, which you also have to take into account that in some countries, it takes three hours to get the patients to large vessel occlusion stroke treatments. So these are all factors that need to be taken into account.

Developing AI-powered stroke detection for ambulances

Bill 39:04
Yeah, in Australia, some people live 3, 4, or 5 hours away from the nearest hospital, let alone the nearest stroke unit. Yes. So we have the Royal Flying Doctors, which offers a service to pick up people in airplanes and bring them back to the hospital. So there's that. And then there's also just depending on you know, where near the metropolitan area people live, how easy how easily accessible it is to get to a hospital where we'll vote, they'll be flown in by helicopter.

Bill 39:40
For example, if they are an hour away, road traffic conditions would mean that perhaps that trip would take two or three hours. So they get Hallie back into the hospital. Three, what at least in Melbourne is at least I think three or four major hospitals that accept Helicopter patients. Yes. So it's. So it's amazing that you're going to be able to take the technology out of the hospital and then bring it into the ambulance.

Bill 40:16
The ambulance is the absolute maximum marvel of modern medicine, it's just the most miraculous thing that exists, the things that paramedics can do and achieve for the people are fascinating. I'm, I know, I know lots of people have had a stroke and have not been able to detect that they were having a stroke, because they didn't know they were too young, never came across a fast message, never knew anybody who had a stroke, assumed it was one thing or another or need to make

an edit to decide about I need to get to work today.

Bill 40:57
Because if I don't get to work, I'm gonna lose my job. And then as a result of those decisions, they don't go back to work at all. And this situation would impact the lives of a lot of people. Now, it's, it seems exciting. And it seems like this is a project that's going to come to fruition very, very quickly, should be very soon. But the process isn't very quick how long has the project been bubbling away and developing this possibility?

Wouter Potters 41:31
Yeah. Because it's very much, it's very much something that should be in every ambulance all around the world, if you can manage to get it in there. But I imagined focusing on on how far widening the scope of the project is, and how many people you can implement this process onto and then help would surely be a distraction. It's then about kind of trying to go well, let's just get all our I's dotted here and our T's crossed right here. And let's just make this thing robust, make it work, let's get the data.

Bill 47:27
And let's develop it further. And make it make it what you said, it should save time and not take time. That's what an amazing being to be considering, you know when you're developing a product, fish should be saving time and not taking time. So I love the idea of that. And although I do see a massive scope for it, it obviously would be fantastic to know that when it's ready to go to the United States or Australia, they'd be able to make a quicker decision.

Bill 48:04
Because you guys have done all the work already. And you're getting amazing results. In the Netherlands and Europe, for example. Now, when you are dealing with the Netherlands, are you automatically dealing with all of Europe? or Yes, individual countries, then differently set up, does it being in the European Union break that barrier a little?

Wouter Potters 48:31
Now, for the regulatory approval, we have the CE mark. So it's a bit like the FDA approval. That's the same across Europe. But that does not mean that the insurance companies and all the ambulance services are organized in the same

fashion as well. Because there's always going to be small differences. But also, in essence, the problem is the same everywhere, because their stroke patients are everywhere, and their ambulances are everywhere.

Wouter Potters 49:00
Not every hospital has an event under endovascular treatments and not every hospital will get it as well, because just impossible to deliver good care of such high complexity in every hospital. Yeah.

Bill 49:14
And how does how does a project like this get funded? I imagine it takes a lot of resources to get it to the point of actually having a product that's in an ambulance, and then developing it further. How does it get funded? How did you guys manage that?

Wouter Potters 49:30
Yeah, so for the research phase. We were surprised because usually what happens if you apply for research funding? You apply for the funding and then you get like a no, four times nine times and then you get a yes. But for and it also happens for all our other projects put for this project. For some reason, we don't know why we applied for four projects and we got four yeses.

Wouter Potters 49:56
So we got Well, I wouldn't say easy because we're still to work, but we got relatively easily funded for actually the first MLS phase. So we started with crowdfunding for the Dutch heart of our nation. So we did a crowdfunding campaign to get the first 60k in funding to outfit six of those ambulances with EEG devices. And then some commercial companies contributed, just gave us or gave Jonathan, some funding to also make sure that the ambulance project got on track so that we could speed up a little bit.

Wouter Potters 50:38
And with that, we could collect pilot data to show that we could measure EEG data with ambulance personnel. That allowed us to go for slightly bigger grants with other commercial collaborators, for example, the company that develops the EEG device and the caps. And they're a company that works on AI algorithms, also an acute stroke.

Wouter Potters 51:04

So with that information with that consortium, we could then really get to the next stage where we could hire two Ph.D. students if you will then collect more data. You also have more ideas for new funding, and we could apply for the next funding. And this has been ongoing like this. So this is the research funding. But well, I quit my job. And I thought, well, it was very easy to get funded.

Wouter Potters 51:29
So it's probably gonna stay this way. But then you get in a situation where you have a great ID, you validated in research, and then you want to bring it to the patient, and the only way to bring it to the patient is to create a commercial product out of it.

Wouter Potters 51:45
Because it's it requires millions of funding to get from the stage where you're in academia, where you validate the ID, to, the place where you have the regulatory approval, so that takes millions and a lot of work for years. And then you need to find somebody that is interested, that wants to find that part. To the ends, because you cannot go halfway because then you have like, half of everything is nothing.

Wouter Potters 52:16
So that's now the tricky part. So we have two shareholders Amsterdam UMC, and the company from Germany, they believe in this ID. And they found that the first round with loads, and we've got a lot of nondilutive public funding as well. And this is what we're now all using to just reduce the risks in our company so that we can reduce the risk sufficiently so that we can attract external investors because that's the next step, we need external money also, to further develop this ID into a product.

Wouter Potters 52:57
And for me, it sometimes still feels weird, because we first had to add, that we just want to make an impact with our research. But I now also recognize that you cannot reach that impact. Well, you also have to be very commercial because otherwise, those people will filter ID from the party after academia, you have to be a little bit commercial because otherwise, they won't fund it.

Wouter Potters 53:23
Because things that investors want are impact. But he also wants a return on

investment. So that's the two things that Well, at first, they were kind of conflicting for me because I'm a scientist by heart. I'm slowly moving towards the commercial side. So this is the next challenge that we have.

Trianect Strokepointer – Stroke diagnosis and treatment using AI

Bill 53:43
That's the problem in academia is that the people that are doing it are passionate about their project, and they want to get the information out there. They want to discover something and tell you about it. And then it stops there and it kind of falls on deaf ears because there's no point putting a financial investment into something if you can't get a return on your investment somewhere down the track.

Bill 54:09
I love that idea. I love the fact that you guys have slowly but surely, the product has molded people from being researchers or Ph.D. Ph.D. students to researchers to commercially thinking individuals who now are raising capital who now are looking for, you know, a whole bunch of ways to solve all these different problems to the gets this thing in the ambulance.

Bill 54:35
In the end, that is exactly what's necessary. It's a massive skill set. I imagined it would have been really difficult for you to go from one stage to the other stage to the other stage and to then at some point, you're going I'm not doing what I started out doing. I didn't think I was ever going to be raising capital or trying to find money for this. Is it bizarre to go through all those stages in your journey and end up being this guy who needs money?

Wouter Potters 55:06
Well, in some way, it's bizarre. But I also like it a lot, because, down the road, you'll learn a lot about how all the different parts of this method of integration work. After all, I've worked in the hospital for 11 years, seven years in neurology. I've also done innovation within the hospital and just with hospital money within the hospital within the neurology department and the entire hospital.

Wouter Potters 55:33
And then it's, then it's really easy to get innovation through because you just have money coming from one source, and the same source benefits. And then you just can create a nice product that's useful for users within the hospital. With right now we want to create something really for society.

Wouter Potters 55:48
So you need to be involved with all the stakeholders, you need to know what everybody wants, and you learn a lot down the road on all the aspects of company building, but also on how you can do research better if you would do it next time. Because all the choices we've made were made a lot of sense. But if I look back here, there are of course always things that also could have been more efficient, better.

Wouter Potters 56:16
Maybe it was smarter not to publish, our data in a very early stage and just keep everything a secret, and then at the end, publish everything, but also have more protection for the company. So these are all things that that come down comes under.

Bill 56:32
Yeah, I see. Because then you risk other people taking the idea and trying to get it to market.

Wouter Potters 56:42
Well, I'm not that worried about that. Because our goal is for this technology to reach the patient. So if another person reaches the patient's earlier, the beverage. But we also want to get our innovation out there, because we think we have a unique data set.

Wouter Potters 57:00
It's the largest EEG data set and pre-hospital stroke patients. So we really can create the best algorithms, because for algorithms that can make decisions that really can determine life or death, you need to be sure. So more is more data, more good quality data is better.

Wouter Potters 57:22
And we have that big advantage that we do have that data. I don't know if any other research groups or companies have so much access to this data.

Bill 57:33
Yeah, I have one more question. Before we wrap up? Do you have an idea of the number of people that you will be able to help? So for example, one in four people in the world will have a stroke in their lifetime? 80% of those will be ischemic strokes. And then I don't know what the data is, after that. How many of them are, you know, large visual vessels? occlusions, and all that kind of stuff?

Bill 57:59
So then based on the information, the data that you know, the statistics are, you know about stroke and large vessel occlusions? Do you know the number of people? Or do you have a hope of what the number of people is that you'll be able to assist further, as opposed to when this technology didn't exist?

Wouter Potters 58:19
Yes. So I think that each year if you look at the global picture, we could help 1.8 million people who are now being brought to the wrong hospital. So I think there is a large opportunity there. And this number is also growing each year with the aging population. So I think there are many, many people. And added to that, we also see that endovascular treatments get better and better.

Wouter Potters 58:47
So that also more and more people with strokes in slightly smaller vessels can be helped. So and also there is of course hemorrhagic stroke. In the end, we also hope that we can detect those types of strokes. So I also hope that we can enlarge as we collect more data and more types of patients that can also increase the number of people that we can help by directing them directly to write treatments for those patients.

Stroke treatment and rehabilitation

Bill 59:15
Are certainly hope that you can also roll it out for hemorrhagic stroke patients. It's an area that seems to be neglected but because they're not as common as ischemic strokes, there's less work bandhan in that space, but I'm a hemorrhagic stroke survivor. And I know a lot of them who have come, come good and I've had help and have been supported and things are going well. So we're not missing out on amazing technology by any stretch of the imagination.

Bill 59:47
That’s certain, but what that means is if you’re getting a minute, and as an additional 1.8 million people support it and help that is several For an amazing number of people that are going to go back to regular work, they’re going to go back to regular life, they’re going to be able to go and be a regular part of their community.

Bill 1:00:10
And they’re going, that’s going to decrease the number of incidences of disability after stroke, that will then decrease the number of people that need medical assistance and rehabilitation, and timing, you know, off work and all these things and not being a part of their family. I mean, the scope for positive change down the line is massive, because that’s the thing that I understand is that when somebody has a stroke, getting back to regular life is a really big task.

Bill 1:00:42
For me, it took seven years, my whole journey took, it took three and a half, three years to get to surgery to brain surgery, after three bleeds. And then it took another four years to get into a cognitive space where I was capable of holding down a job. And being an active member of my community, my family, you know, playing the roles that I was playing before, as a father, as a husband, as a son as a brother. And it’s just the scope. Down the line seems like it’s going to make a really big impact.

Bill 1:01:19
Right there where we want it. I’ve heard of people who have been lucky from thrombectomy is where they’ve been into, at the right time at the right place, exactly the right things, everything fell into place for them. So they ended up in the emergency room, a stroke was diagnosed almost immediately, and they had a thrombectomy. Within an hour, the clot was removed. And then I’ve also heard of people who have been from TPA.

Bill 1:01:46
So this just sounds like it’s another awesome move in that part of the process where you guys get to help those guys who implemented thrombectomy as a solution who implement the TPA as a solution, you guys get to say to him, Hey, here’s another one for you. I’ve, we’ve got another one for you. And we know that way, way before we ended up in the wrong emergency room.

Wouter Potters 1:02:12
Yeah, that's really what we are what we are trying to do, really getting more patients to the right treatment in the right hospital. That's the goal that we have, because I recognize also the story they tell about grief limitation, and how long it takes. It's an incredible journey that some people make. And also, it's quite incredible what people can achieve, even with their disabilities.

Wouter Potters 1:02:38
But if we can somehow reduce only a very, very small portion of the disability for an individual, that can make a huge difference. For example, if somebody can play the guitar again, if he fancies playing guitar that would change his life. So that's really what I hope to achieve. Also, with our products, getting more people to the right treatments at the right time.

Bill 1:03:04
Well, thank you so much for being on the podcast, I appreciate it. Great, fantastic stuff that you guys are doing. I loved the fact that there are people out there who are researching to find solutions to help people they've never met before.

Wouter Potters 1:03:19
Yes, thanks a lot for having this podcast and for inviting me. And I hope that also a lot of I don't hope for future stroke patients, but I loved also that future stroke patients can find your podcast because I think they can find a lot of help there as well.

Bill Gasiamis 1:03:36
Thanks for joining us on today's episode, remember, grab a copy of chapter one of the book The Unexpected Way that a Stroke Became the Best Thing That Happened by visiting recoveryafterstroke.com/book. Take a look around and discover what the book is all about. Click the Download Free Chapter button. As always, to learn more about my guests, including their links to social media and other pages.

Bill 1:04:00
And to download a full transcript of the entire interview, please go to recoveryafterstroke.com/episodes thank you to everyone who has already left a review. It means the world to me. People are finding the podcast a lot easier these days. And they are telling me that it's one of the best things that happened to

them finding the podcast helps them to get through this stroke.

Bill 1:04:24
So if you haven't left a review yet, and you don't mind leaving a review, please do so on iTunes and Spotify. Just leave a few words about what the show means to you. And that was going to make a massive difference for somebody who is looking for this type of content. Now, if you're watching on YouTube, comment below the video I love seeing the comments.

Bill 1:04:48
I respond to all the comments. And to get notifications of future episodes. You have to subscribe to the show but also hit the notifications Bell. Thank you once again for began listening. I appreciate you see you on the next episode.

Intro 1:05:04
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Intro 1:05:21
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Intro 1:05:44
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Intro 1:05:58
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guidance from a doctor or other medical professional if you are experiencing a health emergency or think you might be called triple zero if in Australia or your local emergency number immediately for emergency assistance or go to the nearest hospital emergency department.

Intro 1:06:23
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