Neonatal Cooling with Dr. Seth Langston

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IN THIS EPISODE

Neonatologist Dr. Seth Langston joins Dr. Elliot Berlin, DC to explain one of the most remarkable therapies in newborn medicine: neonatal cooling. Born and raised in Houston, Seth traces his path from a childhood dream of veterinary school to a type 1 diabetes diagnosis in the middle of medical school that pulled him toward pediatrics — and the Cedars-Sinai mentors who drew him into neonatology. He defines what neonatologists actually do in the NICU, for sick full-term babies as well as the preterm babies most people picture, and what the unit can offer a brand-new human, from breathing and nutrition support to heart and lung support. Then the conversation turns to the therapy at the heart of the episode. Dr. Berlin recounts a birth he attended where a baby with a strong heartbeat simply would not take her first breath — and later learned she had been treated with neonatal cooling. Seth unpacks the diagnosis behind it, hypoxic ischemic encephalopathy (HIE): what each word means, why it can affect the baby from head to toe, and how clinicians piece together the diagnosis from the circumstances of the delivery, umbilical cord gases, and the baby's neurologic exam. He explains why seconds seem to count yet clinicians have a six-hour window — the injury comes in two insults, and cooling is designed to stop the second one. How cold does the baby actually get, how is the cooling applied, and what happens over the 72 hours that follow?

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DR. ELLIOT BERLIN, DC: Welcome to the Informed Pregnancy and Parenting Podcast. I'm your host, Dr. Elliott Berlin. In this episode, we're talking about a life-saving innovation in neonatal care called neonatal cooling or therapeutic hypothermia. My guest today completed his pediatric residency and neonatology fellowship at UCLA and is currently practicing neonatology at Cedars-Sinai Medical Center in Los Angeles. And he's trying to learn Italian. Dr. Seth Langston, welcome to the podcast.

DR. SETH LANGSTON: Thank you so much, Dr. Berlin. Thank you for having me.

DR. ELLIOT BERLIN, DC: Oh, my pleasure. I don't speak a word of Italian, but I did mean and I forgot to do it to look up on Google Translate how to say, Dr. Seth Langston, welcome to the podcast.

DR. SETH LANGSTON: Oh, man, I don't think I even know how to say that at the moment.

DR. ELLIOT BERLIN, DC: Okay, good. Then I'm glad I didn't go there. I think what you do is amazing. I think of all the fields of healthcare, neonatology in medicine has incredible advances over the past couple of years and decades and really amazing things that we can do to help newborns and babies when they're struggling. I'd love to learn more about neonatology in general and about neonatal cooling, which I find extremely fascinating. And I know three cases personally where it did the magic, where the magic worked and helped these babies. But let's start at the beginning. Where are you from and how did you get into medicine?

DR. SETH LANGSTON: Yeah. So I am originally from Houston, Texas, born and raised, spent the first third of my life out there. And after medical school, I thought it was time for a change. So I packed my bags and headed out west to Los Angeles and haven't looked back. So I've been out here for the last umpteen years.

DR. ELLIOT BERLIN, DC: And does it only take umpteen years to lose the Texas accent?

DR. SETH LANGSTON: You know, my parents are both New York born and raised, so I never really had one. But you don't have that accent either. You have like no accent. Yeah. You know, Houston, very urban, very non southern. You will catch me saying y'all every so often.

DR. ELLIOT BERLIN, DC: Ah, well, I'm trying to put together New York. What would you do in y'all? What are you up to? You're New York. Okay. Anyway. So how did you get into medicine? Did you always know?

DR. SETH LANGSTON: Had no idea. You know, I actually wanted to be a veterinarian back in the day and spent all of high school pursuing that dream. And somewhere along the way, I think I just realized that personally, I felt I could contribute more to pursuing a career in medicine and even more so in pediatrics. And here I am. Best decision I've made.

DR. ELLIOT BERLIN, DC: Wow. So you decided against veterinary school and went to medical school.

DR. SETH LANGSTON: Yeah.

DR. ELLIOT BERLIN, DC: And when did the pediatric piece come into play?

DR. SETH LANGSTON: The pediatric piece actually came into play while I was in medical school. I actually was diagnosed with type one diabetes myself in the middle of medical school. Oh, wow. And that was quite the shock. And truthfully, when I got to the pediatric rotations and specifically managed children with type one diabetes, it was something that we had in common. And it was a struggle that I could now personally connect with and help families try and navigate this disease together and have that unique relationship. So that's sort of the inspiration.

DR. ELLIOT BERLIN, DC: That's a side topic. But is it rare to be diagnosed with type one diabetes at the age one, one as in medical school?

DR. SETH LANGSTON: It's certainly not the norm, typically. more of a childhood onset.

DR. ELLIOT BERLIN, DC: Does it run in your family?

DR. SETH LANGSTON: It doesn't. And it's not even, um, genetically inherited. So kind of a left field.

DR. ELLIOT BERLIN, DC: How did you know?

DR. SETH LANGSTON: Uh, I had the pretty classic symptoms. So drinking all the time, eating all the time, losing weight.

DR. ELLIOT BERLIN, DC: And I have two of those symptoms, but not the third one. Um, I would love, uh, actually at a different point to do a whole, uh, episode on type one diabetes. That's another area where I feel like we're making a lot of progress, medically speaking.

DR. SETH LANGSTON: Absolutely.

DR. ELLIOT BERLIN, DC: All right. So pediatrics makes sense that it would appeal to you there, but you didn't become a pediatrician and you didn't become a pediatric endocrinologist. What led you to neonatology?

DR. SETH LANGSTON: I think for starters, the decision I came to was in part needing the separation between my personal life and my work life. And so dealing with my own struggles with diabetes and then helping treat other patients with diabetes, I think was little too much. And so for that reason, I made the decision not to pursue endocrinology. And I, you know, did a three year residency in pediatrics, but decided to specialize further in neonatology and not just stop there because while rotating at Cedars-Sinai, I met some of the most amazing mentors that were all neonatologists. And the work that they did was just so amazing. I just found the right leadership, the right mentorship, and decided to pursue it myself. And babies are so resilient.

DR. SETH LANGSTON: I think in general, kids can go through so much and come out the other side just fine, newborns even more so, it's just incredible. And it's such a rewarding career to help newborns.

DR. ELLIOT BERLIN, DC: And it takes someone, especially big hearted and kind to be able to do that kind of work. Can we define neonatology?

DR. SETH LANGSTON: Yeah. I mean, if you want to break it down, neo brand new, and really neonatology is the practice of newborn medicine, and that applies to sick full-term newborns or what a lot of people more commonly think about preterm newborns.

DR. ELLIOT BERLIN, DC: So is neonatology always hospital oriented?

DR. SETH LANGSTON: Always hospital oriented. Specifically, we work in the intensive care unit and we've got a physician covering 24 hours a day.

DR. ELLIOT BERLIN, DC: So NICU, neonatal intensive care.

DR. SETH LANGSTON: Exactly.

DR. ELLIOT BERLIN, DC: And then you said sick full-term babies and preterm babies. I mean, also babies with birth trauma.

DR. SETH LANGSTON: Yeah, exactly. So I think when you talk about neonatology, most people, including my family, they assume all you're dealing with are babies born too early. When the reality is, especially at a medical center like Cedars, where you have such a high volume of deliveries, you also see full-term babies that need help for whatever reason, like you mentioned birth trauma. So if there's a shoulder dystocia or emergency delivery, for whatever reason, there's a good chance I'm going to see that baby in the ICU. Or if the baby just needs a little bit help breathing after delivery, again, full-term babies can wind up in the NICU just as much as the preterm ones can.

DR. ELLIOT BERLIN, DC: What kind of remedies do you have or diagnostic tools do you have for brand new humans in the NICU?

DR. SETH LANGSTON: I mean, it's always a little bit more challenging when you're managing newborns, but we can offer what any adult would receive in the ICU, we can support babies breathing through a variety of methods, we can support babies nutrition, if they're unable to eat for whatever reason with IV fluids, we can provide antibiotics. If there's a concern for infection, you name it. We can do it all the way down to heart and lung support all the way down to heart and lung support.

DR. ELLIOT BERLIN, DC: Wow.

DR. SETH LANGSTON: We don't think about it, but our newborns can be just as sick as anybody else.

DR. ELLIOT BERLIN, DC: That's incredible. I have a side topic question before we get to our first break, just because we're still sort of in the middle of this pandemic and people commonly say, you know, kids and babies, not that affected by COVID. Is that what you found also?

DR. SETH LANGSTON: Yeah. You know, we haven't seen many babies actually test positive for COVID, which is great. That being said, we do take the precautions when we have a newborn born to a COVID positive mother to screen that baby and isolate them just in case, but we actually haven't seen a newborn in my unit, at least test positive for coronavirus.

DR. ELLIOT BERLIN, DC: And there's a lot of babies coming through there.

DR. SETH LANGSTON: So a lot of babies, thousands of babies a year at the hospital.

DR. ELLIOT BERLIN, DC: So that's a good sign.

DR. SETH LANGSTON: Yes.

DR. ELLIOT BERLIN, DC: In terms of a pandemic that sadly seems to be pretty deadly or harmful for adults and especially older adults for people with pre-existing conditions, it's nice to see that it's being kinder to the young ones.

DR. SETH LANGSTON: Exactly.

DR. ELLIOT BERLIN, DC: All right. We're going to take a quick break. When we come back, we're going to talk about neonatal cooling. We'll be right back with Dr. Seth Langston. Welcome back to the Informed Pregnancy Podcast. We're talking to Dr. Seth Langston, neonatologist, and the topic today is neonatal cooling. So the first time I ever heard about this was a birth that I attended as a doula. And the baby came out with a really strong heartbeat and just would not take the first breath. They did all the things that they normally do to try to stimulate the baby to breathe. It kind of looked like a car that wanted to start, but wouldn't turn over. She kept making these advances towards taking that first breath, but just wouldn't take the first breath.

DR. ELLIOT BERLIN, DC: So, you know, the last I saw of her before she ended up in the NICU, they were doing some rescue breathing for her. And again, her heart was beating strong the whole time. She just needed some way to get oxygenated air in there. What I heard after that is that they did this thing called neonatal cooling. And now the baby's a couple years old, has zero notable deficits. So tell me about neonatal cooling. What is this magical remedy that you have?

DR. SETH LANGSTON: Yeah, it is a phenomenal therapy that we have in the NICU. And another term for it is specifically therapeutic hypothermia. And the sole purpose of this technique is to help treat something called hypoxic ischemic encephalopathy, also known as HIE.

DR. ELLIOT BERLIN, DC: Okay, let's break that down for a quick second. Hypoxic is not enough oxygen.

DR. SETH LANGSTON: Exactly. Decreased concentration of oxygen in the blood.

DR. ELLIOT BERLIN, DC: Ischemic decreased blood flow?

DR. SETH LANGSTON: Exactly. Decreased blood flow.

DR. ELLIOT BERLIN, DC: Encephalopathy is inflammation of the brain.

DR. SETH LANGSTON: Possibly. But what we really mean with encephalopathy is just an alteration in the newborn's mentation. They're not acting like a normal newborn would.

DR. ELLIOT BERLIN, DC: Okay, so they've decreased oxygen and decreased blood flow. And as a result, they're having notable signs of deficit brain function.

DR. SETH LANGSTON: Exactly.

DR. ELLIOT BERLIN, DC: Okay, so that's HIE. What are the signs of HIE?

DR. SETH LANGSTON: Yeah, HIE can actually be what we call multi-systemic. it can affect the baby from head to toe. Specifically, we really think about the central nervous system or the brain. That's our number one concern and why we perform therapeutic hypothermia. But when it's significant enough, if you really think about it, this baby who's having some impairment in blood flow and oxygen delivery to their body will potentially have many other organ systems affected for the same reasons. And so that could be the heart doesn't get enough blood, the liver, the intestines, the kidneys. So there's so many aspects of HIE that can negatively impact the baby.

DR. ELLIOT BERLIN, DC: I mean, because it can be so multifocused, how do you make the diagnosis? Is there anything specific that you look at and say, oh, that's HIE?

DR. SETH LANGSTON: So the diagnosis of HIE is a very involved one. And it's involved because you wanna make sure that you're selecting or at least identifying the most appropriate candidates for this quite truthfully life-saving procedure. So the first aspect of diagnosing HIE is really what were the circumstances of the delivery? And I'm talking, was it an emergent delivery? And what did the baby's heart rate or at least status look like on the monitors prior to delivery? If there's a concern, the obstetricians are probably going to send what are known as umbilical cord gases. So every baby has an umbilical cord with two arteries and one vein. And those are coming and going to the placenta which is what's providing the baby's oxygen and blood

DR. SETH LANGSTON: while they're in mom. And these cord gases can tell us was there evidence of stress or interruption in that vital blood flow or oxygen delivery to the newborn at the time of this stressful delivery. Then as the neonatologist, we have to look at the baby's clinical status. What does their physical exam look like with, as you can probably imagine, the neurologic aspect of that physical exam being the most important. So is the baby holding his or her arms and legs like a normal baby should? Do they have a vigorous suck if you were to put a finger or pacifier in their mouth? Do they respond to being irritated? And how is their cry? So there's so many aspects that go into it. And if the baby sort of meets criteria

DR. SETH LANGSTON: with evidence of stress at the time of delivery, an abnormal neurologic examination, then there's a good chance they could be diagnosed with HIE.

DR. ELLIOT BERLIN, DC: Okay, and is this whether it's vaginal delivery or cesarean delivery?

DR. SETH LANGSTON: Exactly, whether vaginal or cesarean, if there's evidence, you gotta call it.

DR. ELLIOT BERLIN, DC: But it could have nothing to do with the delivery also. Like it could be something that was happening before the baby came out.

DR. SETH LANGSTON: Exactly, HIE is very complicated in the sense that historically, when you delve into the, what we call literature of neonatology, all the science we have on this diagnosis, historically, we think that something happened immediately at the time of delivery. Again, whether vaginal or cesarean that caused lack of oxygen and blood flow to get to the baby's body and again, brain being the most worrisome. However, there is no doubt that there are instances that may have occurred remotely, something that may have been building up before the delivery, rather than something that happened right at the time of delivery. And we don't always know when that happens and why it happens.

DR. ELLIOT BERLIN, DC: Is it something that can happen and then obstetricians notice something's happening and do an emergency C-section because something's happening? Can you diagnose it before they're born?

DR. SETH LANGSTON: You can't diagnose HIE before the baby's born. You have to have that physical exam with the baby. But as the neonatologist, we actually have to put together the puzzle pieces. So going back to sort of the problem at the time of delivery or there's a concern that there's a

problem at the time of delivery. We typically associate very specific events at placing the newborn at risk for HIE. So specifically a placental abruption, a uterine rupture, umbilical cord prolapse where the umbilical cord delivers before the baby. These are very serious life-threatening events that can affect blood flow and oxygen. delivery to the newborn. And so mothers who are experiencing these very significant events are potentially placing the infant at risk of HIE.

DR. ELLIOT BERLIN, DC: Two things swirled through my head. One of them is, just going back to what you mentioned, the gases of the umbilical cord vessels. When I had COVID, I was at Cedars and all of a sudden I was just in a regular unit and all of a sudden my oxygen level was dropping rapidly and a whole bunch of people ran in. And I know one of the things that he was trying to do was get an arterial blood gas. Was that the same thing that you're talking about?

DR. SETH LANGSTON: Yeah, very similar. You're just looking at other markers. So, again, specifically when you're dealing with HIE, you're looking at the umbilical cord gases for the amounts of acid in the baby's blood. And the higher the amount of acid, the more likely that there was some sort of impairment in blood and oxygen delivery to the baby.

DR. ELLIOT BERLIN, DC: Oh, I see. What about seizures?

DR. SETH LANGSTON: Seizures are huge in HIE. And specifically, if the baby has evidence of seizures, so abnormal movements of their arms or legs, and again, you have the other pieces of HIE, then yeah, absolutely, very likely that baby has HIE.

DR. ELLIOT BERLIN, DC: Okay, so to find what HIE is, hypoxic ischemic encephalopathy, so many users say HIE, some of the signs of it and how you piece together a diagnosis for HIE, all the puzzle pieces that lead you to make that diagnosis. Now, in the meantime, the baby, I assume, like seconds count. So neonatal cooling, which we'll get to in the next segment, like how it's actually done and why, I assume that takes some time. So while you're piecing together the diagnosis, what else are you able to do to stabilize these babies?

DR. SETH LANGSTON: It really depends on what the baby needs. So a few answers. The first is the good news about cooling is we actually have a six hour window to start the process. Okay. And so to briefly explain that, because I'm sure a lot of people have the same question, this seems very serious, we should start right away. And that's true, but we have a six hour window and that's because HIE is caused by two insults. The first insult is when the baby suffers that lack of blood flow and oxygen delivery, because again, some sort of emergency at the time of delivery, most common scenario. Cooling prevents the subsequent injury that occurs when the baby's body gets back to working effectively. So the baby suffers this insult,

DR. SETH LANGSTON: their brain gets deprived of oxygen and blood. And then when things start working, it releases all this inflammation and all that inflammation then causes additional injury. So that timeframe happens over six hours where the baby's body starts getting itself together and this inflammation really takes over. So the cooling is designed to minimize, if not altogether, get rid of that secondary injury from all this inflammation.

DR. ELLIOT BERLIN, DC: That makes a lot of sense. What are some of the things that you do immediately in the more urgent

DR. SETH LANGSTON: phase? Exactly. In the more urgent phase, you're really supporting the baby and what that baby needs. So going back to how this HIE can affect the whole baby, if there's any breathing difficulties, we're going to support that baby's breathing, whether that's plastic tubes in their nostrils to just push air in their lungs and make it comfortable to more significant respiratory support with placing a breathing tube. If the baby has any sort of issues with how their heart is working or if their blood pressure is too low, we can provide medications known as vasopressors to support their blood pressure. HIE can affect how the baby's blood clots. So sometimes in more significant cases, the babies will need blood transfusions or blood

DR. SETH LANGSTON: transfusions. It's a very significant disease when it's severe. And our role as the neonatologist

DR. ELLIOT BERLIN, DC: is to support that baby through this process. I'm just trying to picture how delicate it must be to intubate a newborn or to even just to start an IV in one of those tiny little veins.

DR. SETH LANGSTON: It has its challenges, but we have skilled team members, you know, they know what they're

DR. ELLIOT BERLIN, DC: doing and this is all we do. It's incredible. The work you do is incredible. And I'm sure everyone else listening too, but I'm just so grateful for the developments that you have. in your field and for people like you that spend a very big chunk of your life learning how to implement them to help our little newborns. In the next segment, we'll talk specifically what neonatal cooling is, how it's applied. It's pretty fascinating. Don't go anywhere. We'll be right back with Dr. Seth Langston. Welcome back to the Informed Pregnancy Podcast. We're talking to Dr. Seth Langston about neonatal cooling. Okay, tell me how this works. Basically, you've explained to

DR. ELLIOT BERLIN, DC: us already that there's a primary insult and there's some sort of major trauma. You put together all these pieces that indicate HIE. And then you have this task. It sounds almost like the computer surge. Is that like the power goes out and then all of a sudden comes on and the big surge zaps the whole computer system? Absolutely. Fair analogy. So you have this method of protecting that surge from creating a second insult to the baby. How does it work?

DR. SETH LANGSTON: Yeah. So the therapeutic hypothermia sounds exactly like you think it does. You are making this baby hypothermic. So when we talk about temperatures, the lowest the baby's temperature should be is probably 97.7 Fahrenheit or 36.5 degrees Celsius. Therapeutic hypothermia is taking this baby's body temperature from normal to 92 degrees Fahrenheit or 33.5 degrees Celsius. So a dramatic decrease in the baby's body temperature. And the reason is you're putting this baby's brain to sleep, if you will. You are minimizing the metabolism of what's going on in the brain to negate this secondary insult to turn off the computers from going haywire once they've rebooted.

DR. ELLIOT BERLIN, DC: Mm-hmm. I mean, when you think about hypothermia, you're thinking about freezing temperatures, but this is not really freezing temperatures. It's enough temperature to slow

DR. SETH LANGSTON: the metabolic processes of the brain. Exactly. So tons of studies were done on animals back in the nineties, and they basically showed that this temperature is really one that is safe to the baby and two is effective to preventing and or healing that brain injury. How is it

mechanically applied? Like you kind of pictured this

DR. ELLIOT BERLIN, DC: baby going to a little freezer, but that's not really how it works.

DR. SETH LANGSTON: Yeah, it's great. So the baby has to come to the neonatal ICU, of course, and is placed in an isolate. What's different about this baby's isolate is that they actually are placed on top of this large cooling mattress that's connected to a machine that sort of sits at the foot of their bed. And through the movement of water and this machine, this mattress cools the baby's body temperature to the goal of, again, 92 degrees Fahrenheit or so.

DR. ELLIOT BERLIN, DC: Yeah. Is it cooling the whole body or just the head?

DR. SETH LANGSTON: Typically, it's the full body, but some institutions will do selective head cooling known as cool cap. The outcomes are the same, but sometimes more generalized cooling is preferred rather than the selective head cooling, but you may see either or.

DR. ELLIOT BERLIN, DC: So when they're cool to that temperature, are they still breathing?

DR. SETH LANGSTON: Yeah. So a lot of the time, again, in more moderate cases, the babies are able to breathe on their own. They may need a little help because their breathing may be a little slowed down. So they may need some oxygen, but in general, it's very well tolerated. Of course, the more significant cases of HIE will require more support like we've discussed, but a lot of the time these babies are doing everything on their own.

DR. ELLIOT BERLIN, DC: And does it slow down the heart rate?

DR. SETH LANGSTON: It absolutely will slow down their heart rate. So we typically think of newborns having a heart rate of 100 to 150 beats per minute with therapeutic hypothermia. It could be as low as 70 to 80 beats per minute.

DR. ELLIOT BERLIN, DC: Oh, significantly slower. So does that create a problem with not enough oxygen circulation?

DR. SETH LANGSTON: It shouldn't, you know, these babies are on a monitor during the duration of the cooling and we keep a very close eye on their oxygen levels, certainly the heart rate.

DR. ELLIOT BERLIN, DC: And with the heart rate, does their blood pressure drop? So we are keeping a very close

DR. SETH LANGSTON: eye. Again, sometimes if the heart rate's low enough, the baby's blood pressure can also drop. So it's always a fine balance.

DR. ELLIOT BERLIN, DC: If those things happen, do you just warm them back up or do you have to do interventions to counter those issues?

DR. SETH LANGSTON: Because therapeutic hypothermia is the standard of care, we want to treat that injury to the brain. And so we will just support the baby. and continue with the therapeutic hypothermia.

DR. ELLIOT BERLIN, DC: Okay. Are you able to, I mean, I'm trying to picture what they look like. Do they wake up? Are they sleeping through the whole thing?

DR. SETH LANGSTON: Yeah. So that's a really good question. And one that I'm sure a lot of families would be concerned about, you know, they do have to stay in place and cooling itself takes 72 hours. And so what you see is this baby on the mattress, they will wake up, they will cry. It's not gonna be as vigorous as you would expect because they're cooled, but you will see movement and you will sort of see normal baby actions. Everything's just gonna be a little slower and minimized.

DR. ELLIOT BERLIN, DC: Do they eat?

DR. SETH LANGSTON: They unfortunately can't eat because you are just slowing down the entire body's normal processes. It's not the safest to feed them. Again, you're potentially reducing blood flow to the intestines, which is needed for digestion. And so we actually don't let them eat during this process and instead support them with IV fluids.

DR. ELLIOT BERLIN, DC: Is it special fluid with nutrition? Are they getting the macronutrients somehow?

DR. SETH LANGSTON: So we're definitely giving them dextrose, the biggest carbohydrate that we do for newborns. And really it's gonna be dependent on the neonatologist or the institution that you go to. Some providers will start TPN, which is IV nutrition that has fat and protein. But because we're anticipating this to be a relatively short duration of withholding feedings, we usually just get away with the dextrose IV fluids.

DR. ELLIOT BERLIN, DC: Even though it's not freezing, it's cold. I think when most of us are cold, even not quite that cold, we shiver, it's uncomfortable. Do the babies get uncomfortable?

DR. SETH LANGSTON: Yeah, the babies can absolutely get uncomfortable. We certainly wanna keep them as comfortable as possible. So for that reason, we do our best to manage their cold stress, if you will. And morphine is actually amazing to help minimize shivering and keep the babies comfortable while they're being cooled. And so that's gonna be our go-to.

DR. ELLIOT BERLIN, DC: You said the cooling is 72 hours. Does that mean that you keep them cool for 72 hours or it takes 72 hours to get to that temperature?

DR. SETH LANGSTON: They get cold real fast within the first few hours of starting the therapy. We then just keep them at that hypothermic temperature consistently for 72 hours.

DR. ELLIOT BERLIN, DC: Why that specific amount? Is it the same for all babies?

DR. SETH LANGSTON: Same for all babies, same for the severity of HIE. We do that based on what we know from all the studies that have been conducted in animal models and in the newborns, when it was first released in the early 2000s.

DR. ELLIOT BERLIN, DC: And then when it's time for them to come off of the cooling, do you just shut it off or do you actively warm them?

DR. SETH LANGSTON: We have to actively warm them and it's a very controlled process. So we turn their body temperature down very fast within a matter of hours. But when we rewarm the baby at the end of the 72 hours, we actually do it very slowly so that everything's as stable as can be. And it can take upwards to 12 hours sometimes.

DR. ELLIOT BERLIN, DC: And at the end, how do you know if it worked or not? Does it always work?

DR. SETH LANGSTON: It has revolutionized how we treat HIE in the sense that it's the standard of care. There are always going to be the cases that are outliers, especially those that are more significant HIE cases. But it has tremendously improved baby's neurodevelopmental outcomes and future development in general. And there are two things that we rely on, probably the most. The first is whether the baby had seizures. So we didn't really talk about it yet, but during this whole process, because we're dealing with this potential injury to the brain, the baby's at a high risk of having seizures. And so during the 72 hours, we're actually monitoring them for seizures. So they're connected to a device called an EEG that is looking at their brain activity

DR. SETH LANGSTON: during the whole process. Babies that have seizure activity during the cooling, that means a more significant injury. So that's one layer. The second aspect that helps guide us and helps guide parents prognosis of their child is the MRI. So after completion of the cooling process, we always get MRIs on babies, magnetic resonance imaging, highly. detailed image of the baby's brain that lets us know, was there injury that we can see with our eyes? And if so, again, probably more significant. But if the MRI is normal, that's good.

DR. ELLIOT BERLIN, DC: So after the fact, the MRI gives you sort of an indication of what to expect down the road?

DR. SETH LANGSTON: Yes, it can certainly help prognosticate, help give us an idea

DR. ELLIOT BERLIN, DC: what will this baby's development look like? All right. A couple of questions. Are there medical downsides, side effects for the babies from the cooling process, but it's worth it anyway

DR. SETH LANGSTON: because of all the benefits? Exactly. This is one of those scenarios where the benefits of cooling far outweigh the risk of cooling. So we've talked about maybe some problems breathing, we've talked about the lower heart rate. Really, those are the two biggest side effects the babies, you know, they can have issues with blood glucose problems. Sometimes it'll be too high, too low, we can fix that with IV fluids. Sometimes the cooling can make the baby's blood not clot as effectively as it could, again, just because you're affecting how the baby's blood moves. So that's also a side effect. However, benefits far outweigh the risk.

DR. ELLIOT BERLIN, DC: Are those risks or side effects just while they're on the cooling process, or are they things that can linger afterwards?

DR. SETH LANGSTON: Just something during the cooling process.

DR. ELLIOT BERLIN, DC: Okay. That's promising. So, I mean, I learned a lot here. My question is, does HIE happen in adults?

DR. SETH LANGSTON: So that's a good question. It's not really categorized the same. You can certainly have brain injury following like cardiac arrest, for example. The whole point of chest compressions is to help send blood to the heart and the brain if the patient's heart's not working. And so in adults, and even older children, sometimes institutions will perform hypothermia for the very same reasons that we're doing it for the newborn. It's just more of a different sort of development of that injury, as compared to what we deal with the newborns.

DR. ELLIOT BERLIN, DC: Oh, so there is adult cooling going on.

DR. SETH LANGSTON: Yeah.

DR. ELLIOT BERLIN, DC: Okay. That answers my curiosity. Dr. Langston, is there anything else? I asked all the questions that popped into my head. Is there anything that, you know, maybe families ask you or that you think people should know about therapeutic hypothermia?

DR. SETH LANGSTON: I think that it's so important to kind of reiterate the complexities of this diagnosis. And quite truthfully, there are so many moments where we don't have a satisfying explanation. But if the baby looks like they have HIE, we as neonatologists, because we do know the outcomes being so much better with this therapeutic hypothermia, we will err on the side of cooling the baby because it has revolutionized the outcomes of babies who have potentially suffered an insult to their developing brain. And most importantly, future outcomes are always going to be difficult to tell to families. We don't have crystal balls. And I wish that we did, but this is a therapy that works. It does improve outcomes. And once a baby has been diagnosed with HIE,

DR. SETH LANGSTON: they're watched like a hawk in terms of their development. And they get the services and support that they need if there's any question of their development. So it's a scary diagnosis. It can feel like the worst 72 hours of a brand new parent's life, but we do what we do for a reason. And I think you just have to sort of get through it and go from there.

DR. ELLIOT BERLIN, DC: Wow. And we're so grateful that you do it again. And I'm grateful that you came here to share and help us understand what this is and when it's necessary and how it works. So thank you so much for being here. I sure hope to have you back for at least a conversation about type 1 diabetes. And then I'd love to pick your brain on a whole bunch

DR. SETH LANGSTON: of other topics. Like the sounds of that. Let me know.

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