

Robert Connors: [00:01](#) Hi, this is Dr. Robert Connors. I'm the medical director here at Pinnacle Care, and I am with Dr. Miles Varn, our chief medical officer. And our subject today that we're going to discuss is stem cells. There's lots of discussion in the news, you kind of see an article in the paper or on the news fairly frequently about stem cells. So we thought we'd take this opportunity to kind of clear up some of the nomenclature and the data so that people could have a good understanding. So thanks for joining us today.

Miles Varn: [00:30](#) Yeah, thank you.

Robert Connors: [00:31](#) So let's start at the beginning. What are actually stem cells, and how are they different from just blood?

Miles Varn: [00:38](#) So stem cells are the early stages of cells, and they have the potential to differentiate into different things. And there are even different types of stem cells. So I think most people are aware of bone marrow transplants for cancer. Those use a certain type of blood-based stem cell that can differentiate into white cells, platelets, red cells.

Robert Connors: [01:01](#) Sure.

Miles Varn: [01:02](#) So what we're focused on in this discussion are what are called mesenchymal stem cells. So they are derived from fat or tooth pulp or blood or bone marrow, and they have certain markers. But the key thing to remember is, they have the ability to differentiate into all kinds of different tissues. So neuro tissue, they can differentiate into bone or connective tissue. So they do different things. They have more potential in terms of possible therapeutic uses.

Robert Connors: [01:41](#) Okay. So what are the reasons why you would want to store your stem cells?

Miles Varn: [01:48](#) So obviously this is the early stage of research. And so with that caveat, there are people who believe that you should store your stem cells when you're younger to be used later in life. And the reason is, we all know that with aging stem cells become maybe less effective. They become less numerous in the blood and bone marrow, but they may not be as good later in life. So in theory, if you can take those cells at their best state and then use them if necessary to treat certain conditions later in life, then they're going to be better cells, I guess, is the best way to describe it. So companies have developed, and they have processes to process your blood and to extract out the stem

cells, and then to cryogenically freeze them and store them for long periods of time. And so that market has created sort of a consumer-based market in terms of at least the opportunity to take advantage of this.

Robert Connors: [03:00](#) Okay. Do we know how long those stem cells are going to last once they're frozen?

Miles Varn: [03:03](#) Well, we know from bone marrow studies and transplants that they at least can last 30 years and still be effective. But that's kind of where the research is. The research started 30 years ago, so we know that.

Robert Connors: [03:20](#) Okay.

Miles Varn: [03:21](#) There is some evidence that they deteriorate over time, and we know that blood, whole blood, meaning what comes out of your arm initially, not stem cells, but whole blood, only lasts about 45 days max. After that you have to throw it out. Stem cells that are frozen certainly have the potential to last longer. And that's why when we talk about storing blood for later use, you're talking about storing stem cells. You're not talking about storing the bag of blood that you would see transfused in a MASH episode, or that you would see donated when you donate blood. It's a process to take those cells out and then store them purely as stem cells.

Robert Connors: [04:07](#) Okay. So then how does the storage process actually work? Like what would a patient do?

Miles Varn: [04:12](#) So again, there are different sources, and there are companies that do all of these, but one method is simply to have blood drawn. The company uses an extraction process to pull out the stem cells. In some cases they actually culture them, so they grow them until they get to a certain number, and then they freeze them. In other cases, they just freeze them after they're processed. So there's blood, there's bone marrow. You can have a needle in your hip generally. That sounds terrible, but it's ...

Robert Connors: [04:49](#) Sounds painful.

Miles Varn: [04:50](#) It's not so bad. And people who do bone marrow donations, that that's what they go through. But you extract out the cells from the bone marrow. Again, sometimes they culture them out into a certain quantity, and then you freeze them and use them later. Then finally the other two sources are fat. So you have a mini liposuction under sedation and so forth. Or for people who

are having fat extracted anyway, so maybe they planned a liposuction, you can take those cells, you go through a process of stripping out the fibroblast and non-useful material, and then you, again sometimes play them and culture them, and sometimes you just store them. But either way, at the end you store them and freeze them. There are facilities that store tissues of all sorts for medical use, and so most of the companies use these bio centers where the cells are frozen and stored. And they have backup generators and so forth.

Miles Varn: [06:02](#) You're never going to have a perfect system. There's always a chance that the power fails and your cells are gone. But for most of these companies that have been in business and accredited, they have procedures that are in place to allow the cells to be frozen for long periods safely without contamination, without risk of loss because of a natural disaster.

Robert Connors: [06:27](#) Okay. Do we have any sense of which of those methods works better? Are the cells better from one or the other, or is the data not there yet?

Miles Varn: [06:37](#) You know, it seems that what the data shows today, and again, we're early, is that bone marrow and fat work better than peripheral blood stem cells. However, the theory of using younger cells in treating conditions later in life, you may find that you can get enough stem cells out of the younger blood as opposed to older blood, where again, marrow and blood have fewer mesenchymal stem cells later in life.

Miles Varn: [07:08](#) Fat, we all have plenty of fat. Whether you're thin or fat, you have plenty of fat and plenty of stem cells that are stored there. So there are other people who believe that those are the infinite source of stem cells, and that they're kind of stored in a primitive form anyway. And so that you're not losing that efficacy over time. But it's a hot debate.

Robert Connors: [07:31](#) Okay, excellent. So can you touch on a few of the advantages of doing stem cell storage?

Miles Varn: [07:38](#) Well, again, if you develop a condition later in life, an autoimmune condition, even potentially a condition like multiple myeloma, then you already have cells that theoretically were pre-disease, and you may be able to treat yourself, it's your own cells. It's not foreign tissue. So in that regard you're not at risk of infection if you didn't have infection then. Rejection, having to take drugs, and so forth. So there are conditions in the early stages of research that seem to respond

to stem cells therapeutically. Those conditions are autoimmune conditions, some orthopedic problems, and some neurologic problems. There's evidence to support that MS may respond well to stem cells. So if you have your own, you have a source that may be more reliable.

Robert Connors: [08:39](#) Okay.

Miles Varn: [08:40](#) So that's really the theory today. Again, no one in the pure academic science world is saying you should go store your stem cells. This is all really the consumer market for people who are looking for advantages otherwise.

Robert Connors: [08:57](#) Yeah. So it doesn't seem like there should be that many disadvantages, right? I mean, it's not that hard to get stem cells. I mean, yes, if you do a bone marrow aspiration, that's painful. But it's kind of a one-time thing. So why wouldn't everybody do this? What are the disadvantages to storing them?

Miles Varn: [09:13](#) Yeah. Well, again, the liposuction always has a risk of infection and sedation and so forth. For bone marrow, again, you could get infected and so forth. But what I would say that, the disadvantages that's out there in the science community is that if you're going to develop a disease later in life, then those cells were predisposed to that anyway. So are you really doing yourself any good by using cells that may have already been in the early stages of developing these diseases?

Robert Connors: [09:46](#) Got the same genes in them.

Miles Varn: [09:47](#) Exactly.

Robert Connors: [09:48](#) Yeah.

Miles Varn: [09:48](#) And no one knows for sure. And different studies have shown different results in that regard. You know, the other thing is that stem cells are not immunogenic. In other words, they don't cause your immune system to react. So you can take stem cells from an unrelated donor and use them to treat your condition later in life. So maybe those cells are better than having your own cells. And in fact, the folks at the University of Miami, Josh Hare, have gone through phase two studies where they've used younger people's donated stem cells from bone marrow and infused them into older, unrelated people, and found improvements in cognition and gait and other measures of frailty. And so maybe those cells are better.

- Robert Connors: [10:45](#) Okay. So it sounds like there's still a lot of science to be learned from this in the future. We're not quite there yet.
- Miles Varn: [10:52](#) No, we're not. But it's exciting.
- Robert Connors: [10:55](#) It is. So, but there are actually FDA-approved uses for stem cells, right? So can we go over a few of those?
- Miles Varn: [11:01](#) Well, today and now in the US, the only FDA-approved uses have to do with treatment of blood cancers, and everything else is in an experimental phase.
- Robert Connors: [11:11](#) Okay.
- Miles Varn: [11:12](#) And so there are two problems with that. One is because of the hype, consumer hype, there are centers that have opened all over the place that advertise stem cells. And because the FDA restricts what you can do with blood products, it becomes sort of a marketing racket. And you've got a strip mall center that's advertising stem cells when in fact they may be drawing some blood and spinning it down in a centrifuge, and you get whatever comes of that process. So the FDA moves slowly, and maybe from a consumer perspective, somebody who wants to get ahead of the game, they move too slowly. But at the same time, you got to be very careful about vetting what you're getting. Because number one, you could be getting sham product. Number two, you could get contaminated product, and either one is not a good thing.
- Robert Connors: [12:12](#) No, definitely not. So not all stem cells are the same.
- Miles Varn: [12:15](#) No.
- Robert Connors: [12:17](#) What are the therapeutic uses that are kind of out there on the horizon that look like they're actually showing some promise, that maybe the FDA will approve?
- Miles Varn: [12:25](#) Sure. So clearly cardiac, you know, infusing cells into the heart in people in heart failure, will probably be the first approved use in the US. Again, the folks at Northwestern have just concluded a trial for multiple sclerosis, and they've shown that compared to standard treatment, stem cell people do a lot better. We've seen a lot of good news in the autoimmune front, so lupus and rheumatoid arthritis seem to respond, and conditions like that seem to respond well. And then orthopedics, so joint issues, you may be able to at least delay a joint replacement or even avoid

a surgery if you are a responder. And no one knows exactly who's going to respond and who isn't, and why.

Robert Connors: [13:18](#) Even with stem cells to use, right?

Miles Varn: [13:20](#) Right. So, but if you respond, then maybe you save yourself a surgery.

Robert Connors: [13:23](#) Sure.

Miles Varn: [13:24](#) And then finally, very exciting is Josh Hare's work in frailty. You know, can we make people who otherwise who would have been more frail have a more robust later life? Very exciting.

Robert Connors: [13:38](#) That'd be very exciting indeed. You touched a little bit on this, but why does it seem like that most of the big treatment centers are actually outside of the United States? What's going on there?

Miles Varn: [13:48](#) Yeah, again, the FDA has restrictions, so you have to have a research-based grant to be treating people in an effective way in the US. And so the machines that process cells are either in the research labs or they're outside the US, because they don't, you can't sell them to centers in the US except for research purposes. So there's obviously a consumer market, people who have the money and they're not afraid of that risk, that have opened state-of-the-art centers that do it right, control everything. And I think they're giving people who want this, who may have been failed by other means of conventional medicine, an opportunity at least to try this.

Robert Connors: [14:40](#) Okay.

Miles Varn: [14:40](#) If they don't care about the money, then the risk in a good center outside the US, it's vetted, you know, it's not insignificant, but it's fairly low.

Robert Connors: [14:50](#) Yeah.

Miles Varn: [14:51](#) So we know there are people who, despite the best medicine, they have problems that we can't fix in our world, in the US, using conventional medicine. And I think for those folks, particularly those who have responded, it's life-changing, it's dramatic, and it's an opportunity.

- Robert Connors: [15:10](#) Okay. So I think kind of when I heard you saying is that this could be useful for a good number of people, but like everything, it really requires a good discussion with a doc who knows you, who can personalize this for you for a variety of reasons. One, the science is still young. It sounds like you've said that not all stem cells are the same. And also the processing of them is not the same. And I think we've got a little bit of work to see on which stem cells are best, how to process them best, and whether, like you mentioned earlier, is it better to even use someone else's stem cells so you don't have that same kind of genetics going on there? Did I get that right, is there anything else that I ...
- Miles Varn: [15:54](#) That's perfectly right.
- Robert Connors: [15:56](#) Okay.
- Miles Varn: [15:56](#) It's exciting, but we need to go cautiously. And if you choose to embrace therapeutic stem cells, then just be careful, don't be scammed.
- Robert Connors: [16:07](#) Absolutely. All right. Thank you.
- Miles Varn: [16:09](#) All right. Thank you.