

Pure Dog Talk 488 – Congenital and Hereditary Definitions

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Laura Reeves:

Welcome to Pure Dog Talk. I am your host, Laura Reeves, and I have with me today, as always, my favorite person to talk to, Dr. Marty Greer. And today we are going to talk about something that I haven't ever really heard well explained on a large platform like this. So Marty, we're going to talk about the concept of congenital defects in our puppies and what is hereditary and what is not hereditary, what may or may not be genetic and what is environmental.

Dr. Marty Greer:

Those are really great questions. And I think the more we understand about DNA and DNA testing, the more complicated it gets so..

Laura Reeves:

There are no easy answers. Is this what you're telling me?

Dr. Marty Greer:

There are no easy answers.

Laura Reeves:

I just knew that was...

Dr. Marty Greer:

That's exactly.

Laura Reeves:

I just, knew that was going to be what you told me.

Dr. Marty Greer:

Yeah, well, here's the problem is sometimes we don't really know. And the more we know about genetics, the more we don't know about genetics.

Laura Reeves:

Right.

Dr. Marty Greer:

So congenital is something you're born with, not necessarily inherited, but something you're born with. Genetic is something that you carry the DNA for. And then we have to ask the question, what is epigenetics and epigenetics are kind of a blend of those where your parents or the parents of your dog, whatever parents you want them to be had some environmental experience during the time that they were developing, that potentially changed their genetics. So if your parents grew up during the depression, they may have a tendency to pass on to you the tendency to save stuff that

other people wouldn't save, because they were deprived of the opportunity to have as much food or as much, there just wasn't affluence during the depression.

So it'll be interesting to see if epigenetics plays a role after COVID. What happened to us during COVID. What happened to the babies that were conceived and born during and after COVID, is that going to change anything? My daughter had a COVID baby. She has a three year old and she has an infant now. So is that going to make a difference in the way that they express DNA? So yes this is the C generation, the COVID generation or the confinement generation or the whatever you want to call it. So it'll be kind of interesting. So genetics, stuff that's genetic is stuff that you have the DNA to inherit. Does that mean that it shows up right away at birth? No, it doesn't. It may not show up until you're 15 years old. Your dog is 15 years old and they develop degenerative myelopathy.

It might be something that you see as early as birth or within a short time after birth, like an umbilical hernia. So that's where it gets to be difficult. And so there's all this discussion, well, is an umbilical hernia inherited or is it caused by trauma? Did the bitch pull too hard on the cord during the time that the puppy was being born? Did she bite the cord too short? I can assure you when we do C-sections at our practice, no one takes the puppy out and swings it around by the placenta. So there's no trauma to those puppies at the time that they're born, but there's still umbilical hernias that occur. We have dogs that are born, for instance, with a full open abdominal wall and we actually had one, a few weeks ago that the chest wall was open on too.

So the heart was exposed, the liver was exposed. The entire underside of the dog was incomplete. And there wasn't any way to put it back together because there wasn't enough puppy to go around. So if it's a small opening, you can frequently fix it. If it's not a small opening, you can't. But is that inherited? Probably not. There's a tendency in women that have that condition in their babies, that they are women under 30, that are smokers. So there's probably an environmental segment to it, but it's probably not genetic. So could you breed those two dogs again to each other? And the answer is probably yes, because I don't think that's a continuation of an umbilical hernia. I think Jerold Bell would probably argue with me on that point, because there's no question umbilical hernias are inherited, but the question is, is that the same as gastroschisis, which is the full abdominal open wall.

So there's varying degrees of things and that's where it starts to get really muddy. So are retained testicles inherited or not? Well, we don't really know. So, if you're born with something it's congenital. So if you're born with the umbilical cord wrapped around the puppy's leg and the leg doesn't fully develop that's congenital because they were born with it, but it wasn't genetic. It was an accident that the cord wrapped around the leg.

So that's kind of where this thing happens. So just because you see it at birth doesn't mean it's genetic. So then I go on to say, all right, what about things that we don't even think are genetic? So anytime someone says to you, we see more of this in one breed of dogs than another it's genetic period.

Laura Reeves:

Mm-hmm (affirmative).

Dr. Marty Greer:

So I got a phone call yesterday that there's a Corgi that has a corneal ulcer that doesn't want to heal. We see that in Boxers and Corgis, indolent corneal ulcers, therefore there's a genetic basis for it. So if anybody says, we see more of these in Great Danes, we see more of these in St. Bernards. We see more of these in Schipperkes. It's genetic.

Laura Reeves:

There is a genetic basis.

Dr. Marty Greer:

Exactly.

Laura Reeves:

Is there a trigger? Is this where we're talking about maybe an epigenetic or an environmental trigger that sets some of this off?

Dr. Marty Greer:

Exactly. Is there a nutritional component to it? Was there some exposure to a chemical that predisposed a patient to it? So that's where it starts to get muddy and not everything that's genetic is easy to figure out the inheritance pattern for. So the things that we can DNA test for now are pretty much autosomal recessive genes. So it's the Punnett square, the Mendelian genetics, where you have the big B little B and you breed that to the big B little B. So you get 25% big Bs that are all normal, 50% carrier big B little B and 25% little B, which are going to be affected. So that's simple autosomal, recessive. But most genetic diseases are probably not that easy to figure out. So you get something like hip dysplasia, there's almost got to be an environmental component to it. Was the dog overweight? Was the dog on a slippery surface when it was a puppy?

So those are environmental. Was the dog fed incorrectly? And then there's probably people are estimating around 14 genes that play a role in the development of hip dysplasia. So how do you go about figuring out the DNA tests for that? And that's why we still don't have DNA tests for a lot of these diseases. And some of the DNA tests... I'm just going to say it right out here in front of everybody, some of the DNA tests that we have right now are probably wrong. And we are banking heavily on those tests being accurate, either laboratory error or they haven't figured out quite the right gene, they might have figured out a gene next to the gene that affects it and they don't always travel together or they may take two genes and we think there's one. Or there may be a second gene that's protective or a second gene that causes it to express differently.

So things are not black and white. They're not easy autosomal recessive diseases and I'm worried that there are a lot of people that are doing DNA tests, meaning well being pressured by the American public who doesn't understand genetics because they want their puppies to be perfect. And there is no perfect dog. So are we throwing dogs out of our gene pool because they have something that's genetic and we don't have the right test for it. And we may never have a test for it or not genetic or have some genetic and epigenetic and environmental component to it. So, as much as we think we understand this stuff, it's not easy. You take something like a long coated Corgi, which is called a Fluffy. There's a long coat gene in German shepherds, a long coat gene in Malamutes. It's a long coat gene in Corgis they are all the same DNA test. That's easy.

Laura Reeves:

Same thing.

Dr. Marty Greer:

Yeah. It's easy. You do the DNA test. It tells you if the dog is normal or long coat and that's easy and you can see it. And if it's wrong, nobody dies because they have long hair. Nobody screwed up a genetics program really badly because they have long hair. But then you look at some of these other things and I've seen, and I'm sure you have as well, people that intend to do well, take something like a DNA test. They hang their hat on it. They plan their whole genetics program around it, for instance, DM, or some of these other things.

Laura Reeves:

Right. DM I think is sort of the...

Dr. Marty Greer:

The poster child?

Laura Reeves:

Yeah. Poster child was what I was going for of the boogieman that has shredded breeding programs unnecessarily.

Dr. Marty Greer:

Well, and I think Von Willebrand's disease. I think there's others that we can classify the same way that we don't understand well enough. And then I'm going to throw this at you and say, okay, is Parvovirus genetic? Is Pyometra genetic?

Laura Reeves:

Parvovirus.

Dr. Marty Greer:

Parvovirus, is that genetic?

Laura Reeves:

Speak to me. We know that some breeds don't titer as well to it. Rottweilers, Clumber Spaniels.

Dr. Marty Greer:

That's right.

Laura Reeves:

So is there a genetic component to the severity? Or speak to me about what you mean by genetic?

Dr. Marty Greer:

There's probably a genetic component to how a patient responds to the vaccine. So I have had clients that have had titers done on their breeding dogs and they've come back, not protected after an appropriate series of vaccinations and the lab that runs the test, the veterinarians at that lab have recommended that those dogs are not included in a breeding program because they don't have the genetic capacity to develop the antibodies and the immunity that it takes to be protected. So when you start throwing something like Parvovirus in the mix, you always thought Parvo was a virus. Right? But you just listed the dogs that are increased at risk Pit Bull Terriers, Rottweilers, Dobermans and I graduated from veterinary school the year Parvo became a thing. And I wore boots in the basement taking care of oodles of puppies that were critically ill with Parvo.

Laura Reeves:

Mm-hmm (affirmative).

Dr. Marty Greer:

I'm not proud to tell you this, but I'm going to tell you, anyway, I vaccinated dogs with Feline panleukopenia virus vaccine, because we didn't have Parvovirus vaccine and that was the only thing we had. And as a vet student, I was handed a tray of vaccine and told to go out to the parking lot and start vaccinating dogs because we had to do something. We didn't have anything else. So you can't just say that Parvovirus is viral. Yes. It has to require a virus. Yes, it has to require other environmental conditions like the dogs GI tract is upset by parasites, but it probably also has a genetic component. So when you can list breeds that are at increased risk, it's genetic. The same thing with cancer, do we see increased risk of osteosarcomas in giant breed dogs? Do we see increased risk of hemangiosarcomas in... we were taught German Shepherds, but Golden Retrievers and Labradors.

Laura Reeves:

Spinone. Hemangio in some breeds is just endemic.

Dr. Marty Greer:

Terrible. Yeah. It's terrible. We hardly ever see it in little dogs. Never. Corgi size dogs, Poodle's that kind of thing. We don't see hemangiosarcomas, we see them in large breed dogs. And I can almost tell you if I get a phone call from a client that the dog's not feeling well, and they haven't been quite right. And they were kind of slow to get up and you know, they haven't been eating real well and they're a 10 year old Lab or a 10 year old Golden Retriever. We just march them straight to the ultrasound room because we know exactly what we're walking into. Most of those dogs...

Laura Reeves:

That spleen's about to explode.

Dr. Marty Greer:

Yeah. Or already has, and the dog's been bleeding and weak as a result of it. So you want to think really hard about the things that you put in and we're going to cross the line here in the next rabbit hole, which is contracts. But if you say in your contract, I'm going to guarantee against any genetic disease. And then I come back to you now and say, Parvovirus has a genetic basis or five years from now. We say, there's some other disease that we thought was infectious. What are you going to say? If your contract said, I'm going to guarantee against this. And now we have proof that it's something different that it's not just entirely a viral disease. And I'm going to say that same thing about Pyometra. And again, people think of Pyometra as being a bacterial disease of the uterus and breeders have a few things that you say one word or even a syllable...

Laura Reeves:

And they all just lose their minds.

Dr. Marty Greer:

Yeah.

Laura Reeves:

Yeah.

Dr. Marty Greer:

Bloat.

Laura Reeves:

Yep.

Dr. Marty Greer:

Pyo. These are the things that bring breeders to their knees.

Laura Reeves:

Mm-hmm (affirmative).

Dr. Marty Greer:

Well, there's a genetic basis. There has to be a genetic basis to Pyometra because we know 48% of Bernese Mountain Dogs that aren't spayed end up with Pyometras and then it drops significantly from there. So there was a study done in 2012, published in Sweden, and I can send you the link to it so we can put it on the website that came out of Sweden because in Sweden, the dogs, there are they're required to be insured. So they have data on intact dogs in a way that we don't in the United States. In the US most of our data comes from Banfield animal hospital and everything is spayed and neutered there so we don't have this kind of data, but you can look right down that list and see at what risk your dog is now, overall females, over the age of nine, have a 25% risk of Pyometra if they're not spayed, but Bernese Mountain Dogs are 48%.

And then it drops down to other breed where it's 4%. So it's 25% if you look at all the dogs, but it's going to be 48% for some dogs. So those dogs are harder to get pregnant. They have cystic endometrial hyperplasia. They're harder to get large litters out of. By the time they're six their fertility is in the toilet. And many of them by the time they're six, they already have a Pyometra. And we see a lot of Pyometras in our practice because we take care of dogs that aren't spayed and neutered.

And if we medically manage one, we know that Malamutes are really hard to medically manage a Pyometra on. They just don't respond well because their uterus is so affected. So it's interesting, but be careful what you wish for when you start putting things into your contract that say, I'm going to guarantee against a genetic disease because is a Pyometra now a genetic disease and Parvovirus is blasto. I mean, what happens in blasto are there certain breeds of dogs that are at increased risk because they can't get rid of the fungal component of that disease. They're more likely to pick it up. So those are kind of interesting things and like I said, at the very beginning, this is more muddy than it would like to be.

Laura Reeves:

I know. And so I just want to remind listeners that Dr. Marty Greer is also Dr. Marty Greer, JD. So she put on her lawyer hat there for you for a minute.

Dr. Marty Greer:

It fell back off it's okay now.

Laura Reeves:

I think that's awesome.

Hang tight guys got a little bit of information for you.

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Laura Reeves:

We started off on the congenital versus hereditary, and we're just down some rabbit hole somewhere. Again, I know. Talking about what we don't know, the Canine Health Foundation's work that they're doing on lymphoma and tickborne disease.

Dr. Marty Greer:

Mm-hmm (affirmative).

Laura Reeves:

Freaking fascinating.

Dr. Marty Greer:

Yeah. Yeah. There's been information circulating on this for a couple of years. It's Edward, I want to say Breitschwerdt. I'm probably saying his last name wrong, but yes, there are probably components of some of the tickborne diseases and other rickettsial diseases that put patients at increased risk for certain blood cancer. So it could be spleen cancer, hemangiosarcoma. It could be lymphoma. It could be some of the others like multiple myeloma. They think that so on the human side as well. So it's not just, you should put tick preventive on your dog to keep those little creatures off of the dog, because they're icky. It's probably more serious than that. We really need to take this seriously as the group of people that we are right now because we can do such a good job of controlling some of these parasites. So yes, it's going to be interesting and so the more we know the less we know, because as we start adding this information to our knowledge base, it's going to become evident to us that what we thought isn't really true.

So it's interesting. It's fascinating, but be really, really, really careful what you do with your gene pool when you're banking on a DNA test to be 100% accurate because it's not. We see things happen at the lab. We see dogs that aren't made up genetically of what we think they were. We've had people think that they have a dog and a female that were together and then they turn out that it was really a multiple sire litter because the Beagle in the next pen...

Laura Reeves:

Slipped in there.

Dr. Marty Greer:

Got in there, bred her and you didn't know because it's still a purebred dog, but you didn't know that it wasn't made up of the genetics that you thought it was. So, there's a lot of places that things are going wrong. And then we also see a couple of other things and I don't want to sound like I'm bashing the DNA labs because they're really important to us. And there's a lot of value in what they're doing but we may be jumping ahead.

Laura Reeves:

Well, and I think that one of the things that I like about the DNA labs is they're getting us this information, and they're giving it to it as best they can.

Dr. Marty Greer:

Right.

Laura Reeves:

They're trying just as hard as they can to get more answers, but they either don't have enough dogs or they don't have enough... The same problem. The more we learn the less we know.

Dr. Marty Greer:

And I think we're also seeing them running panels on dogs. And so they're testing dogs for diseases that we don't know occur in that breed. And maybe they're right, that they are going to start to pick up those things, but maybe they're wrong. Maybe these are dogs that are never going to have this disorder and so we're starting to see people that are backing off on their breeding programs and tossing dogs genetically out of a gene pool, when we don't even know if that disease occurs in that breed of dog. So we have to be really careful how we interpret it. And I've told people for a long time, things like DM, I talked to the boxer club years ago and they were very concerned about DM. When the test first came out and I said, your dogs die at three after they jogged down the driveway with you to get the mail and they die at seven of cancer.

And you're going to worry about DM when they're 15.

Laura Reeves:

Right.

Dr. Marty Greer:

God help you that your dog lives to be 15. I'm not saying DM's a good disease because it's not my very first beloved little Corgi died with DM, but you have to balance everything. And that's where this becomes very complicated is there is no perfect dog. Everybody has something and you have to figure out how to best use this genetic information that we have and not every genetic disease or congenital disease is equally serious. I think there are some problems that are fairly minor, like an extra eyelash. I'm not going to throw a dog out of a gene pool for that. A retained testicle. It's not supposed to be bred. I get that, but you don't generally die from it even if they're retained and the dog develops a tumor, it's not usually malignant. Let's look at the things that are killing our dogs first and killing our dogs young first.

And to me that doesn't just include seizures and orthopedic diseases that includes bad temperament. So we have to really balance how we do these things, allergies and the thyroid disease require medication so I kind of classify that in the middle. I don't like to see dogs with those things bred, but if I'm holding a dog up that tore its cruciate ligament and

I'm holding it so that it can breed the female because he just had surgery. Do I really think it's a good idea to use him in a gene pool, because there probably is a genetic component to cruciate ruptures as well?

Yes. There's definitely a link to the age at which they are spayed and neutered and obviously if the dog's intact, he still has his testicles and I wouldn't be using him for breeding if he didn't, but I don't want to sound like, I don't know how babies happen, but because I got that down, but...

Laura Reeves:

Right.

Dr. Marty Greer:

We have to really make a pretty difficult decision here when we're making these genetic decisions. Should I vWD test my dog if this is not a disease that's ever happened in my breed. So that's where it starts to get complicated.

Laura Reeves:

And I guess I'm going to come down on the side of all information is useful.

Dr. Marty Greer:

Yes.

Laura Reeves:

So for example, when the CHIC program first started the German Wirehaired Pointer club of America's initial application to the CHIC program included vWD.

Dr. Marty Greer:

Mm-hmm (affirmative).

Laura Reeves:

Despite the fact that the only place we saw vWD was in dogs, imported from Europe. We were not seeing vWD in the United States in American lines of the German Wirehaired Pointer, but we included it. And everybody that got a CHIC number had to run a vWD test and they were all clear. Five years of not a single vWD being turned in to CHIC.

Dr. Marty Greer:

That's cool.

Laura Reeves:

Yeah. So good. So we know now more than we did five years before that. And so I think from that perspective, I think it's really valuable whether you're embarking, whether you're paw printing, whether you're... Whatever you're doing, the information is valuable, but the next step of that is what you do with it.

Dr. Marty Greer:

Exactly. And I think we need to have some geneticists that are not affiliated with the companies that become available to breeders as counselors because as veterinarians we are not particularly well trained in this. There's so much that's changed in genetics since I graduated from vet school, there was no snip.

Laura Reeves:

Right.

Dr. Marty Greer:

We understood that DNA was a double helix and that's kind of where it stopped.

Laura Reeves:

You just dated yourself Marty, I'm just saying.

Dr. Marty Greer:

But I'm telling you the truth so much. We know now I've gone to these genetics meetings and I've sat through them and I'm just, in awe of even the language that's being used in the room, because these are words I've never heard before, but yes, all information is valuable, but if you don't apply it correctly, you're going to end up bottle necking your gene pool. You're going to throw good dogs out of the gene pool. And so here, I'm just going to put in this really micro plug for what AKC is currently doing. And that is that AKC is now going to allow dogs besides just the outer hounds to have breed clubs own and allow the use of semen that's been frozen. And so I think it's really, really important that people know that and they talk to their genetics person on their breed club because it's happening.

AKC is finally decided that it's important that we spare some of these important dogs that go way back. And if we do breed ourselves into a corner, because we bottleneck our genetics, if we throw out the wrong dogs, we can fall back on some of that frozen semen that preexisted before some of these genetic diseases happened or became so prevalent in our breeds. So if you have valuable frozen semen, and even if you don't think it's valuable, if you have frozen semen, it probably has value to someone.

Laura Reeves:

Save it.

Dr. Marty Greer:

So save it. And AKC is in the process of informing the parent clubs and working the logistics of it and having a tool kit put together so that the clubs can effectively put together these programs without having to figure out all the logistics and the legal fees and the way to set up a nonprofit and all the parts that go with it.

So it's super cool. And there will be breed clubs that are not interested, and there will be breed clubs who are falling all of themselves to do it just depending on the people that are involved. But you personally can make those decisions with or without your breed club. So please be aware of it and keep your ear to the ground. And don't throw out your semen just because you decided that you didn't want to spend the 100\$ this year to store the semen because within a year or two, we're going to have a really great resource for where this can go. So that's again another topic but I just want people to be aware of.

Laura Reeves:

Good plug.

Dr. Marty Greer:

Well, we've been working hard on this.

Laura Reeves:

I know. I know. You have mentioned it to me previously, and I think it's important that people know about it. And I 100% agree with you. I have my own frozen semen that I probably will not use in my own breeding program, but that could be useful to someone else.

Dr. Marty Greer:

Exactly. So circling back, what's genetic? What's congenital? Congenital means you're born with it. Genetic means you have the genetics for it, but it may not express itself until you're 15 years old. So how do you sort that out? Yeah, it's a little complicated, but if you understand some of the very basic information, it allows you to at least start to read the information that's out there and understand it well enough to be conversational in it.

Laura Reeves:

And back to umbilical hernias, because I actually think that's what started this conversation. I mean, I have heard both that it is entirely genetic and that it's entirely environmental. And so what you're saying is it's probably both.

Dr. Marty Greer:

I think there probably is a combination of it. We certainly know that any midline defect can occur from excesses of vitamin A and the use of certain drugs during the pregnancy. So there can be cleft palates, there can be umbilical hernias, open abdominal walls, open fontanel, Spina bifida, anything that happens down the center of the patient is a midline defect. So excessive amounts of vitamin A or excessive amounts of liver in the diet can cause it. Trimethoprim Sulfa, steroids, even topical steroids and eardrops and eyedrops can cause it. Griseofulvin which is an antifungal drug. We know that these drugs are drugs that can cause those kind of midline defects, if they're given at just the wrong point in the pregnancy. So there are definitely other things besides the genetics that cause that. And if it happens in an entire litter, if you have nine puppies out of nine puppies with midline defects, that's environmental, that is not genetic because the genetics just don't shake out that way.

But if you have one, then you need to be especially careful how you use folic acid, what drugs you use and the genetic counseling that you look at going forward. Because I think there are geneticists out there that can help you. If you're struggling with trying to figure out what to do with the DNA information that you have in front of you and how to go forward in a breeding program. And it may be that you don't use those two dogs together again, but each of them may be able to be used in a different portion of your breeding program.

Laura Reeves:

Different direction.

Dr. Marty Greer:

Or someone else's.

Laura Reeves:

Right.

Dr. Marty Greer:

So don't start spaying and neutering everything just because you had one umbilical hernia or one misstep someplace along the way, you have to be really thoughtful and well educated about how to manage that.

Laura Reeves:

Excellent. All right. Well, Marty as always your time and your knowledge is invaluable. And I appreciate you tremendously.

Dr. Marty Greer:

Thank you. It's always fun.

Laura Reeves:

That was totally fun. I'm going to put a little plug in here for those of you who are regular listeners, Marty and I mentioned a little while ago that we're going to have a first aid series. So just a little teaser here be on the look out, more information to come.

Like the NPR of dogdom, Pure Dog Talk is here for you to make sense out of everyday things, to add nuance, to your understanding and tools to your tack box, to bring history to life and propel the living history of purebred dogs into the

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