

Rabies Vaccine Effective for at Least Five Years: A Special Interview With Dr. Jean Dodds

By Dr. Karen Shaw Becker

Dr. Karen Becker:

Hi, I'm Dr. Karen Becker, and due to overwhelming demand, we have had a lot of people ask for an update, not only about the Rabies Challenge Fund, but interest in knowing what Dr. Jean Dodds is doing in terms of new vaccine protocols, titers and what we need to be doing when it comes to immunizing or making sure that we are effectively protecting our pets. So I've asked Dr. Dodds to join me via Skype and she's here today to give us an update. So welcome, Dr. Dodds, and thank you so much for joining me.

Dr. Jean Dodds:

Thank you Karen and our listeners.

Dr. Karen Becker:

So good. So, Dr. Dodds, for the people who have not tracked this long project that you have been intimately involved with, if you went back up to the very beginning of how the Rabies Challenge Fund originally was instituted and thought up and then organized and then executed, I think that that's a good place to start.

Dr. Jean Dodds:

Good. Well, actually, Kris Christine, our friend from Maine, and Dr. Ronald Schultz, the eminent immunologist, and I got together and we thought, "We have to do something about the fact that more and more animals seem to be reacting adversely to the mandated legally required, appropriately required rabies vaccine." And so we decided, what we need to do is we need to ask the public to fund a study to determine how long the current rabies vaccines that are licensed actually last and protect the animals that are vaccinated. So even though the rabies vaccines now after the first two doses are licensed for three years, it's conceivable. And we believe that at that time that their rabies vaccines could last from five to seven years, for example.

Dr. Jean Dodds:

And so we started collecting money from all over the world, not from the vaccine industry now, but from private individuals and groups who wanted to support the study to find out how long do these vaccines really last? And we raised one-and-a-half million dollars, people giving as little as \$10 to larger amounts. And some kennel clubs gave us money and some foundations gave us some money. And when we had enough money, we did the study with the University of Wisconsin in a privately owned veterinary breeding facility that kept Beagles.

Dr. Jean Dodds:

And we decided to use Beagles because the average vaccine is tested for dogs in animals of that size. And then they have some field testing before it's actually distributed for public use. And the field testing is not very large. And so you don't tend to see statistically significant reactions when

you do a small group of field testing. So we decided we would start with the Beagle. We would follow the exact protocols required by the USDA (U.S. Department of Agriculture) Title 9 to license a rabies vaccine, remembering that every licensed rabies vaccine at the time we started followed these exact guidelines and requirements in order to get their license. And we realized it was important to follow those requirements in order to prove the validity of our study. And that's how it started.

Dr. Karen Becker:

And so circa what year did you originally get this project started, and then walk us through what the research entailed then to ultimately end up with the results?

Dr. Jean Dodds:

Right, we started collecting the money in 2009. We knew that we needed at least 20 animals, control animals, and 20 exposed, and it was rabies virus-exposed animals, in order to meet the requirements of the USDA regulations. So we knew we had to start with 40 animals. We knew we had to start with a particular vaccine because obviously we weren't going to test all the licensed rabies vaccines. And so we selected one particular vaccine to start with, and then that vaccine went off the market because the company was bought by another company. Boy, so we had to start with an equivalent vaccine from the new company that bought the first one, and start.

Dr. Jean Dodds:

So we knew we had to have more than 40 animals because over a period of five to seven years, some of them may drop off the protocol for something unrelated entirely to the study. So we actually started out with 92 Beagles. And when the study was completed, Karen, we had 35 beagles left. These were all kept in an isolated veterinary facility with free-ranging exercise and whatever. They were all puppies. They were given two doses of rabies vaccine, the second one we studied, and they were all females and none of them were spayed. They were intact females. And so at the end of the five-year study and the seven-year study, our plan was to challenge at least 20 of them with rabies virus to show that they were protected by this vaccination, and the others would be controls. So that's the way we started it.

Dr. Karen Becker:

And what did you, I won't ask about hiccups, because I can only imagine with that timeframe there had to have been a lot of unforeseen, we'll just call them unforeseen circumstances. There had to have been things happen, but then ultimately speaking, then what? Then at the five to seven year, then what?

Dr. Jean Dodds:

Well, what happened was by the time we got to five years of age, five years after the vaccinations, we needed to get a challenge virus. And the only source of challenge rabies virus is the USDA, and they didn't have any. So here we were with our study with our Beagles at five years out, and no virus to challenge with them to go the next phase of the study. So it wasn't until they were nearly six and a half years old before we had the actual virus for challenge studies. And that was very frustrating for all of us. And it was nobody's fault. It was just one of those things that the USDA forgot they didn't have any.

Dr. Jean Dodds:

Now, at the meantime we were having a lot of concerns from mostly animal activist groups that didn't understand why we had to challenge some of the dogs with live rabies virus and they had horrible visions of these animals suffering and seizing and dying of rabies unattended in the dark, all of these overly emotional things. And I can understand that, but quite clearly that was not the case. The animals were in a pathogen-free facility. They were monitored 24 hours a day. And even the first sign of ADR, ain't doing right, they were automatically treated, and then if necessary, put to sleep. So none of these animals suffered from clinical rabies.

Dr. Karen Becker:

Yeah, good, good. And so, when you finally got the challenge, when you administered the challenge, what did you find?

Dr. Jean Dodds:

Okay, well, the first thing we need to advise our listeners is that in order to license a rabies vaccine, only 88% of the animals have to survive challenge.

Dr. Karen Becker:

Oh, I didn't know that.

Dr. Jean Dodds:

Yes, still the case. And it's quite remarkable. That means that 12% of the animals didn't survive, but that's still okay to license a rabies vaccine for these. I mean, I guess it's unrealistic to assume that all 100% of the animals will survive or not survive. So, that was what we had to do. And when we actually challenged these dogs, we found at the period of time that we challenged them, that 80% of the animals that had been vaccinated six and a half years earlier survived, that's still acceptable to the USDA. So all we could say is that, and to be conservative, what we can say is that at five years, without any question, all of the animals, 80% of the animals that we challenged survived, okay? And of course the rabies non-vaccinated animals, those that were used, obviously were put to sleep.

Dr. Jean Dodds:

Now what we did, Karen, because we were very concerned about that. Remember, you have to have 20 dogs in each, for the license, in each source. We decided we would not challenge 20 dogs at the same time. What if we were wrong and it didn't work, God forbid? So we decided we would take five dogs at a time. And if they survived, we would do another five until we had 20. And there were some discussion about that with the other investigators because they didn't seem to think it mattered. And I said, "Absolutely not. For ethical reasons we're going to get a cohort of five and five and five, and then we'll see what happens." So that's what we did. So was 80% okay? Absolutely.

Dr. Jean Dodds:

The question is, and what we did by the way, we actually took another group of the animals and we vaccinated them with a recombinant feline rabies vaccine, no recombinant canine vaccine for

rabies at this point. So we used recombinant feline vaccine, and we wanted to see if their preexisting – they had antibodies to the rabies virus and they had memory cells, okay? They had immune memory cells that were prepped against rabies virus, but could not be detected in the antibody test.

Dr. Karen Becker:

Now, were you doing titers every year, Jean, on all these dogs? Like how? Okay.

Dr. Jean Dodds:

I remember doing a memory cell immunity all along. So what we did was we gave these animals the recombinant feline vaccine and their titers went sky high, 12 or 15 international units, as opposed to what's necessary for protection, which in our country is 0.1. We had hundreds of fold increase in protection, which meant that these animals, even though their rabies antibody, serum antibody titer, fell below what was accepted like 0.5 for WHO (World Health Organization), or 0.1 by the CDC (Centers for Disease Control and Prevention), they were protected with their immune memory cells. And that's very comforting to us as veterinarians. And for people that have stray animals that have been vaccinated, but they don't know if they're still within the period of protection or not, we can assure them that they have good memory cell immunity.

Dr. Karen Becker:

So many questions for you. The first one, just as a pet parent, as a pet parent I would say, it's so awesome that you have access to be able to check for memory cell immunity. Why isn't that available to the rest of us? That would be excellent. That would be question number one.

Dr. Karen Becker:

And then question number two, actually question number two then is, because there is this anamnestic memory cell response, which means if the body hasn't seen this virus and circulating number of antibodies dropped down low enough, it doesn't necessarily mean that your dog or cat is not protected, it means that they haven't seen the virus. And so far in the study you demonstrated that. But if your dog or cat, let's say me as a pet parent titer my dog and he's below one, I don't have the option to have the memory cell test done. Do you foresee that that would ever be a possibility for those of us not doing research?

Dr. Jean Dodds:

Well, it's 0.1 actually. And I remember WHO is 0.5 and there's a big confusion there, because if you send in a rabies titer to say the federally approved, to Kent State University Rabies Lab, if you don't say that you want it not for export to a country that requires 0.5 units, international units, but within the United States, they'll measure it and they won't go below 0.5. So [inaudible 00:11:51] it'll fail.

Dr. Karen Becker:

That's what I was saying.

Dr. Jean Dodds:

Just dumb. Not dumb, but misleading.

Dr. Karen Becker:

Misleading, yes.

Dr. Jean Dodds:

Do memory cell immunity, because it's much too complicated immunologic, several assays. And you'd have to hold the individual somewhere for five to seven days before you got the results.

Dr. Karen Becker:

Right, but if I'm titring my own dog and I just want to know – we're not anti-vaxxers, but we don't want to be over-vaxxers. We're developing a community of wise vaxxers. Those of us that are wise vaxxers, if my dog needs it, fine. But if my dog doesn't need it, why would I give it? This particular step of being able to determine memory cell immunity would be hugely beneficial, and that isn't yet available generally speaking to most of us. If we could hold our animals for five to seven days and determine if they have enough memory immunity, that would be a step in the right direction. Would you ever foresee that being a possibility 10, 20 years down the road as an option or no?

Dr. Jean Dodds:

Yeah, I think you could, but you know, there's another way. You could just vaccinate all those animals that are healthy with the feline and, see, we don't have a canine.

Dr. Karen Becker:

Exactly.

Dr. Jean Dodds:

We need the canine, okay? So let's say we do the feline one and then you measure the titer, and if it goes sky high you know have memory immunity. That might be more efficient and less expensive in the long run.

Dr. Karen Becker:

Okay. So, my next question would be, would you consider those of us vaccinating animals for rabies to just, all of us may be consider using the feline recombinant?

Dr. Jean Dodds:

Yeah, sure. But the problem is the government doesn't accept it. I mean, the government doesn't accept titers in lieu of the booster anywhere. You can get case-by-case medical justification with [inaudible 00:13:40] exemptions in some places, but where we are, for example, in Southern California, the public health veterinarian will not approve any exemptions of any kind. Even if the animal is 16 and has terminal cancer, they won't approve it. So what do the people do? They're in a dilemma, either vaccinate with a mercury-free vaccine and detox with homeopathy, or fly under the radar. And of course we can't recommend any of those.

Dr. Jean Dodds:

But we do take over animals in our area that have had that problem. And I must tell you that we vaccinated everyone with a thimerosal-free rabies vaccine, and we've given them both Thuja and Lyssin detox for seven days, and none of them have had a reaction. The problem, Karen, is you can't reduce the volume of rabies vaccine for a Chihuahua and a St. Bernard. So if it's enough to protect a St. Bernard, it's got to be way too much antigen for the Chihuahua.

Dr. Karen Becker:

And I couldn't agree with you more. I also have instituted homeopathic detoxification post-vaccine for the last 25 years. And I can subjectively tell you, I just don't have the vaccine reactions that other clinics do. And I do believe that there is an aspect of detoxification that could be incredibly beneficial. But that being said, being that we don't have an appropriate canine-licensed recombinant and being that like, as you mentioned, that exemptions are not viable in all 50 states, could practitioners just move to vaccinating dogs with a feline vaccine as a workaround?

Dr. Jean Dodds:

Well, but what about the liability if someone claims that something happened from it?

Dr. Karen Becker:

I know. I guess that – exactly.

Dr. Jean Dodds:

People can make a comment. I mean, we have a client whose dog got a rabies vaccine and a gastrointestinal supplement at the same time. And she was sure that the rabies vaccine given with the gastrointestinal supplement killed her dog. What can you say?

Dr. Karen Becker:

Exactly.

Dr. Jean Dodds:

The emotions and the frustration and, oh my God. And you know, some of these animals are 21 years old.

Dr. Karen Becker:

Yes. And I mean, that's the piece. I mean, there are so many moving parts with this. Part of this is the fact that vaccinating any 21-year-old animal right there, unfortunately we don't have the options in place to be able to use titer exemptions as a viable option. Because in some of these situations you have animals that may titer just below 0.1, as you mentioned, and they're going to be viewed as requiring a booster. And that just is what it is. That's a legal law, and in many areas we can't circumvent that. So, then going back to your study, then what? So you vaccinated these animals, I'm sorry, you challenged these animals, you got the results. And then, has there been any follow-up from that?

Dr. Jean Dodds:

Well, no. We wanted to go back to the USDA and ask them if they would agree for this one particular vaccine to extend the licensing for five years. There are two problems with that. Number one, all the other vaccine companies are not going to be happy about that.

Dr. Karen Becker:

Of course.

Dr. Jean Dodds:

Although they could have done their own in-house studies at the same time in parallel knowing what we were doing. I mean, we didn't keep it a secret. And we published updates on where we were. The other thing is, unfortunately with the pandemic and all, the USDA has a lot of other things to worry about and to get a priority, to get my concerns and those of our community and people like you listened to seriously. I'm sort of waiting till maybe the end of the year, if the pandemic wanes enough that and the other things USDA is struggling with, with the rabbit issue, the hemorrhagic fever issue and the wildlife issue with wasting disease. If some of those things could get less priority, then maybe we could get heard. I mean, there's no point in asking them when they're too busy to take this seriously, because the easiest thing to do is say, "Sorry, we can't do that yet. Or we don't have time to look at it," or whatever, you know?

Dr. Karen Becker:

Well, and I think in addition to that, what you're bringing up is the fact that now we have other corporations, vaccines are big money. And I guess from my vantage point I would think that one vaccine company being allowed to potentially license their product for five years, I can only foresee the pushback as you mentioned from all the other vaccine companies that say, "Absolutely not." So then taking a 10,000-foot view picture of what's happening. We can deduce that rabies vaccines probably last longer than three years, but that doesn't change the law.

Dr. Jean Dodds:

They do last more than three years for sure, and it's [inaudible 00:18:46] the law. But you know, one of the things, I mean, I love my profession as much as you do, but what's really frustrating is we still have veterinarians selling the flea and tick products that the government has said are not safe. They've required the labels. Biggest moneymakers, the warnings are on the label. EMA (European Medicines Agency) and Europe has just banned some of them, we're still waiting for that. The animals are getting that along with over-vaccinations and other things.

Dr. Jean Dodds:

And then secondly, we still have veterinarians telling people not to feed grain-free foods, because if they do, they're going to get [inaudible 00:19:18] healthy. Even though the FDA has said they still don't know what the heck is going on with that now, except in predisposed breeds. So for me, well and you as well, it's a frustration in that our colleagues don't know what to do. I think they're just sort of paralyzed right now and they don't go forward because they're really, really afraid if the animal doesn't come in every year and get a vaccination, they won't see them. So measuring serum antibody titers could theoretically and should give them more income. So I don't know.

Dr. Karen Becker:

And would you say, so I agree with you that on top of the confusion between the legalities, the vaccine companies fighting about what share they get, we absolutely have a broad range of colleagues in our veterinary community, ranging from brand new graduates to excellent veterinarians who are not yet, they are, next generation above me, your generation, but not all of them, Dr. Dodds, have the education, the background, the bandwidth to have evolved their medicine practice as times have changed. You have done that and you have gotten some pushback and some heat from that. But the colleagues that you graduated with, probably for the most part do not understand or accept your particular vantage point. Because you have continued to evolve with the research. And oftentimes in veterinary medicine, our colleagues don't.

Dr. Karen Becker:

I just had a cardiologist write up notes on a referral and said, "Add rice to the food because your dog has a heart murmur and he's on grain-free food. And adding rice could potentially, grain-free foods could be bad, so adding some grains back in may fix the heart murmur." And I'm like, "Oh my." From a board-certified specialist, if we have this type of confusion happening in our profession, not just with internal medicines, with hearts and with livers and with kidneys, but with immunology, we have mass confusion among practicing veterinarians, but we also have an additional component. The veterinary-teaching hospitals may or may not be clarifying these issues for our current veterinary students. So my question to you would be, do you believe that your Rabies Challenge Fund information research and what we've all gleaned from this is being potentially taught in immunology schools around the country or the world, or probably not?

Dr. Jean Dodds:

Probably not. But gosh, I have to tell you, we do not teach veterinary students in school or in graduate education how to apply clinical pathology along with their wellness exams. There is no applied understanding of what the lab test mean. "Oh my gosh, your dog is 10 and it's got a BUN (blood urea nitrogen) of 50, even though the creatinine's normal, and the bilirubin is normal, and the urine is normal, he's in renal failure. He's going to live two or three months only." And these people are terrified, not because the veterinarian tries to be incorrect, they don't [inaudible 00:22:18].

Dr. Karen Becker:

That's just it. I think that that's a really important piece that we have to stop and just do a PSA right now. Your veterinarian is not dumb. He's not an idiot. She's not trying to deceive you. She's not trying to get money out of you. Our colleagues, exactly as you said, Dr. Dodds, were not taught how to marry all of the different aspects of physiology and what we've learned to be able to clinically diagnose and treat, or my pet peeve and soapbox, actively prevent. If we've got genetic predispositions and we know that there are no predispositions, why on Earth are we not doing everything we can to prevent the disease from occurring? If you have a midlife cat, and we know that 3 or 4 cats die of kidney failure, why aren't we doing things to actively prevent kidney failure from occurring?

Dr. Karen Becker:

Or if you have a climbing ALP, alkaline phosphatase, at a five-year-old dog and then a 10-year-old dog and a 15-year-old dog, if your alkaline phosphatase is 2,000, your dog probably is having adrenal disease. And most of us have figured that out as a veteran practicing veterinarians, but I was not taught that in vet school. And I can't tell you the number of younger veterinarians who have said, "I had no idea that a climbing ALP meant I should be evaluating adrenals." We don't learn that in veterinary school, you learn that in the trenches when you're out and practicing. And if by chance you don't keep up with current literature, you're not in round table discussions with other veterinarians. You're not going to active conferences to be able to glean this information, you end up not having it.

Dr. Jean Dodds:

Well, the ALP goes up with age too, [inaudible 00:23:50] just for an adult, it doesn't even apply to it.

Dr. Karen Becker:

Yes, and so all of these things come together to make it incredibly confusing and frustrating as a pet parent, as a guardian, to try and navigate these issues. I think another big confusion within the pet wellness space, Dr. Dodds is, rabies vaccine is a killed vaccine, which acts entirely differently in the body than modified live vaccines. So another question I would have for you, and a question that many, many people are asking is, talk a little bit about why we have to continually boost rabies. Other than the fact that of course it's a life-threatening zoonotic fatal disease for people, but talk about the difference in this potentially lifelong protection with certain vaccines, while other vaccines, let's say Lyme disease, is not. If you could just give a brief explanation about why different vaccines, how they're made, have different physiologic effects and immunologic effects in the body. That's a big point of confusion.

Dr. Jean Dodds:

Right. Well, of course the rabies vaccines, the killed vaccines have to have adjuvants in them. And that's the issue with, was it going to be mercury? Is it going to be aluminum? What is it going to be? And only two of the current canine-licensed rabies vaccines do not contain mercury salts. So of course they have Gentamicin, so you could argue that's an antibiotic instead, but there are other issues with that. I mean, certain viruses produce immune memory cells that lasts for a long time, basically lifelong. And they would be feline panleukopenia, which is a parvovirus, canine distemper, canine hepatitis and canine parvovirus.

Dr. Jean Dodds:

They produce sterile immunity. And that means once the animal has immune memory and circulating antibody, they cannot be reinfected. They can have the virus enter their body and then leave in the urine or the stool and infect others potentially, but they cannot be reinfected. So those vaccines are excellent because they produce sterile immunity, but rabies doesn't. Leptospirosis, influenza, Lyme, all those things are relatively short-lived and they live only about a year. And so, even though they tell you that immune memory cells will last longer than that, again, we're in this bind of not knowing what the immune memory cell is doing in a particular pet. So again, you've got to look at the animal's nutrition, the animal's other clinical signs, are they immunosuppressed? Are they debilitated? Are they more likely to succumb to a mild

exposure? We don't know that. And remember that 80 to 90% of the immunity in the body lies in the gut, in the microbiome.

Dr. Karen Becker:

And I've not been to vet school in 25 years, but I do wonder what, in your internal medicine classes around the country as a veterinary student, what are you being taught about the microbiome? Undoubtedly they're being taught it's important, it's the gateway to the rest of the body. The immune system, the vast majority of the immune system lies in the gut, but are they being taught that one round of metronidazole can knock out your microbiome for at least a month, if not months down the road? Probably not. Of course, are they being taught that one week of NSAIDs (nonsteroidal anti-inflammatory drugs) will obliterate a dog's microbiome, potentially with subclinical asymptomatic erosions, enough to create leaky gut and dysbiosis? Probably not.

Dr. Jean Dodds:

No, of course not. Maybe they don't even understand the difference between dysbiosis and symbiosis and all of the different things that the bioses do. I mean, every single week now you can read on the free websites, science websites, about how beneficial bacteria have to outweigh harmful bacteria in the gut, or you have a big problem. You have a leaky gut and that goes on and on and on. And what do we do? We stuff the animals with metronidazole, and steroids and whatever. Probiotics and the wrong food and hot foods and all these other things that are not right. I mean, the food industry for pets is huge, right? What is it? \$16 billion, isn't that what the-

Dr. Karen Becker:

And growing, and growing exponentially. Right, right, right.

Dr. Jean Dodds:

[inaudible 00:28:01] with that? I mean, how could these colleagues learning in veterinary school have time to understand all of that?

Dr. Karen Becker:

And then if they are out and go into a large practice or even a practice being mentored by a veterinarian that possibly didn't continue with ongoing, continuing education that allowed their mentor to put these pieces together, they are then being mentored this, I don't want to say close-minded perspective, but it is not an entire picture of how to best serve our patients, and the cycle then just continues.

Dr. Jean Dodds:

Right. I don't think its close-mindedness. I think they're overwhelmed. I think all of the medical and health care professions are overwhelmed with the pandemic and that's just made it worse, hasn't it? I mean, more and more people were at home when they're realizing what their pets do, both good things and bad things.

Dr. Karen Becker:

Dr. Dodds, you've had a very vast, colorful, enlightened, wonderful career. I put myself in your shoes, and as you watched the veterinary profession evolve and grow and change, when you think back on all that you've learned, and all that in turn is being passed down to the rest of the veterinary community. If you would shed some thoughts or some ideas about where you could see our profession going in terms of best serving our patients, you're a good person to ask because you've lived this multi-generational evolution of veterinarians coming into the fold, and you've seen it for half a century. What would be some of your best advice as a mentor to many veterinarians around the world when it comes to how we can do it better?

Dr. Jean Dodds:

I think the most important thing it would be to teach them how to understand all the different modalities we use to make a diagnosis today. And the biggest thing would be to have some kind of last year, or extra year after that, where they learn how to interpret the things that go together with all the other issues we were talking about today. And I think people should be skeptical about staying rigid with old ideas that we've had 10 or 20 years ago. And people say, "Oh, Jean is so annoying. She talks about these things that none of us understand, but just wait 10 years and what she's telling you will be true." Well, that's particularly funny, but in fact, you and I both look at what we see and we say, "We don't know why this is happening, but we know it is happening consistently and somebody needs to address it."

Dr. Karen Becker:

And talk about it. And you are correct, when you talk about things that we are seeing clinically that the rest of the profession either doesn't want to talk about, or it's inconvenient to talk about. My father often says that there's a Japanese proverb that says, "The nail that stands up will be hammered down by your peers." And that has certainly happened to you, but don't you think, Jean, can you begin to see a glimpse of a coming together of different veterinary thought processes in a way that could allow our veterinary community to instead of grow apart and more divided, that potentially there could be a way that we could become more unified?

Dr. Karen Becker:

If indeed we were able to begin, as you mentioned, A, having the clinical background and the training necessary to interpret, and then in turn prescribe proactive wellness protocols or a dynamically changing protocol that meets our patient's need where they're at, hopefully not just early in the diagnosis of the disease, but proactively preventively knowing that they don't have to get sick before we work on them. Big step. But do you believe that we could be in the process of coming together as a veterinary community to begin to embrace a broader, bigger picture that so many pet parents are desperate for?

Dr. Jean Dodds:

Absolutely, of course we can do that. We need to work together. We need to work with different colleagues, if not in the same practice, in the same area, so we can learn from each other. We need to look at alternative modalities. I mean, one of the most important things is looking at biomarkers of oxidative stress. And that's a huge area of our own clinical research right now. And we're developing supplements that will help bring that level down. Because oxidative stress causes cell damage everywhere, including promoting cancer. And one of the most exciting areas

in human and animal medicine now is predicting periodontal disease before it becomes serious and the animal is older and has got cracked teeth and horrible gums and secondary heart disease, et cetera, and can't really have the kind of dentistry it needs. We need to do that when they're two and three and four years old as pets and in ourselves having regular dentistry.

Dr. Jean Dodds:

And so the dental forum for animals and humans, One Health, tells us that we have to look at these markers and develop supplements and healthy nutrition that will keep them lowered so that the beneficial bacteria in the microbiome can keep the animal healthy. It's got to be nutrition. The basic has to be nutrition, and not necessarily by the big nutrition companies. I mean, they're doing their own research, that's fine. But we need to have a more open look at that and better teaching. And that's what I'm trying to focus on after 56 years as a veterinarian.

Dr. Karen Becker:

Wow, I will take this opportunity to say thank you for your 56 years of not just committed service to the pets that we so dearly love, but Jean, I am forever grateful for your role modeling to, especially sensitively women veterinarians, letting us know it's okay. If you have something that you need to say or that you're seeing something that it is A-okay to speak up and speak out about your vantage point, what you've seen, your clinical experience. It is A-okay to talk about that. It could be painful, but that you have given many veterinarians the confidence necessary to talk about issues that our profession generally may not be addressing. So I'll take this opportunity to say thank you.

Dr. Karen Becker:

But also, I love the fact that you are a perpetual student and that you will probably never retire. And you will go to your grave doing diagnostics, research, being a clinician, as well as continuing to evolve your thought process to meet and match the information you have at this particular time. And for that as a constant evolver, the entire world is forever grateful. So thank you so much, Jean, for everything you're doing.

Dr. Jean Dodds:

Thank you, Karen, very kind.