



Barbara J. Natterson-Horowitz, M.D., is a cardiologist at UCLA Medical Center and Professor of Medicine for the UCLA Division of Cardiology. Dr. Natterson-Horowitz completed her undergraduate studies at Harvard College and received a Master's degree from Harvard University. She received her medical degree from the University of California, San Francisco. In addition to her expertise in cardiology, Dr. Natterson-Horowitz completed her psychiatry residency and served as Chief Resident at the UCLA Neuropsychiatric Institute.

In June 2012, Knopf published Dr. Natterson-Horowitz and Kathryn Bowers' book: "[Zoobiquity: What Animals Can Teach Us About Health and the Science of Healing.](#)"



Dr. Cohen:

Hello, everybody. My name is Dr. Charles Cohen. I'm a veterinarian, have been in practice for 35 years, and was one of the founders of the New Haven Central Hospital for Veterinary Medicine in Connecticut. For the past eight years, I've been practicing in California.

I would like to interject here that many years ago I started attending grand rounds in the anesthesia department at Yale. Lots of veterinarians there and lots of physicians, and we had wonderful dialogues. It would be nice to see us use today's forum to help grow that.

Anyway, welcome to the Pets on Time Conference Center. PetsOnTime.com is an evolving web service providing a forum for intellectual exchange and for helping pet owners keep track of their pets' health records and services needed.

Be sure to visit <http://PetsOnTime.com> to get on our email list so that we can help pet owners guide their pets' healthcare and so that we can perhaps work with various affiliate groups to keep providing these online discussion sessions or webinars.

Today we're talking with Dr. Barbara Natterson-Horowitz, cardiologist in the UCLA healthcare system and author of the now famous book, *Zoobiquity*. Dr. Natterson received her MD at the University of California, San Francisco and accomplished her residencies in psychiatry and internal medicine, and her fellowship in cardiology all at UCLA.

Little did she know that when she was called to the Los Angeles Zoo in the spring of 2005 to consult on a heart operation on a tamarin monkey that it was a visit that would change her life and possibly change how medical care is delivered throughout the world.

Her work, including *Zoobiquity*, has set the human and veterinary medical communities on fire by articulating similarities and many physical and behavioral disorders among animals and human beings. As a result, veterinarians and physicians are beginning to collaborate in an unprecedented way, opening up new thinking about medical care for both animals and people.

Although laboratory animal veterinarians have worked closely with physicians in research design and implementation for years, this is the first time that they have all begun to approach clinical diagnosis and therapy in a more organized basis.

Welcome, Barbara.

Dr. Natterson: Thank you. So excited to be here.

Dr. Cohen: So tell us how you became connected with the Los Angeles Zoo and how that resulted in *Zoobiquity*.

Dr. Natterson: Well, I was a regular practicing cardiologist at UCLA, and it turned out the LA Zoo was interested in getting some imaging assistance – I do cardiac ultrasounds – and there is a long tradition of zoos in the U.S. reaching out on occasion to academic medical centers for subspecialty assistance.

Of course, I was working under the supervision of the zoo veterinarians, but I was asked to come out to the zoo and basically do a transesophageal echo on one of their animals. At that point, they had kind of an old-fashioned ultrasound machine, but they were not doing a TEE, so that was my opportunity.

I remember the first time I went there and did a procedure. I was just amazed that the procedure was performed in a nearly identical way, and I began listening to the conversations between the veterinarians, discussions of diabetes and cancer, and systemic infection, and sepsis, and behavioral disturbances. I had an actual “aha” moment that there was this parallel universe of clinical care that I knew nothing about, and that just sparked a lot of interest.

At that time, I had started working with Kathryn Bowers, who's a science journalist, and we began having lengthy conversations about what we learned with this extensive overlap between the diseases of animals and humans and the remarkable ignorance on the human medical side about that fact.

So we became extremely interested in what might happen if we as physicians looked at human medical concerns through the lens of veterinary medicine and evolutionary biology. And we were looking for a kind of term that would describe that, and that's actually how we came up with the term "zoobiquity."

Dr. Cohen:

I think in the book and also in person and various discussions, you have – there's a couple of terms you have used that I think are outgrowths of what zoobiquity is. One is "species-spanning medicine", and the other is "evolutionary medicine", and I thought perhaps you might, if you think it's appropriate to, delve into that a little bit and see how that relates to this overall concept.

Dr. Natterson:

Kathryn and I really love the term "species-spanning medicine". Again, as you've pointed out, the field of comparative medicine is alive and well, but in recent history, really, in academic medical centers such as UCLA, comparative medicine has mostly been laboratory animal medicine and collaborations between investigators and the lab animal vets.

The piece that seems to have been missing was the clinical piece. In 20 years plus of being on rounds in ICUs, in clinics, on the wards in VA hospitals, general hospitals, tertiary medical centers, I had never once heard – when we were talking about a human patient with Hodgkin's lymphoma or dilated cardiomyopathy or OCD, I had never once heard anyone bring up a case of a spontaneously occurring disorder in an animal.

And so as Kathryn and I realized that this was kind of incredible that that dialogue doesn't happen at all, that there's no kind of consciousness of that, we wanted to come up with a term that really helped to point out that these disorders were not unique to humans. That's where species-spanning came up, and it kind of stuck. People kind of like the way it sounds.

So that's been a helpful term to use with physicians when we're trying to point out what we're talking about because, as remarkable as it sounds, it's not uncommon to talk to a very senior, very

accomplished physician, wonderful physicians, and to have them be bowled over that the disorders they've spent their lives taking care of in patients happen in animals. So it continues to surprise me that this idea of species-spanning medicine is so new on the human side.

There's a growing recognition that evolutionary biology can tremendously inform how human medicine is practiced, not only in terms of a clinical practice, but in terms of investigation, and so a number of the most prominent evolutionary biologists in the country are teaming up with some pretty heavy hitters in internal medicine to try to see what kind of novel hypotheses can be developed by kind of creating evolutionary medicine.

We actually see zoobiquity in a sense as bringing together evolutionary biology, human medicine, and veterinary medicine because truly it is evolutionary biology that connects the pathologies of humans with animals.

Dr. Cohen:

I wonder if you can't bring Mohammad to the mountain, if you can bring the mountain to Mohammad, in that in talking about evolutionary biology and many of the – or evolutionary medicine – and many of the lecturers and professors who lecture in that environment at maybe the larger medical schools – and I guess this all enters into the translational medicine aspect of life – if the interaction between veterinarians and physicians could be enhanced by bringing the MDs to the veterinary schools to talk about these things, and in doing so maybe give them a day or two there to really delve in and see what they've been missing.

I wonder if you or Roger Mahr or anybody have had any experiences on that aspect of it.

Dr. Natterson:

I'll just jump in. That is precisely what we're really interested in doing here at UCLA. The Zoobiquity Conferences have been a boots-on-the-ground attempt to physically bring together high-level academic DVMs and MDs around topics that are of mutual interest to them. So we focused on sub-specialty cases specifically.

Literally, the physical introduction of these individuals needs to happen because they are peers. They're clinical peers, and they're in the same field. They don't know each other, so that means quite literally bringing – so the conferences have been one effort.

The other thing that we're trying to do is to bring veterinary students to the medical center and to begin thinking about developing a veterinary component to some human clinical rotations.

The area where I think it's the most promising early on is in the area of psychiatry. I spoke to the chief of psychiatry here at UCLA, who's quite interested in this idea, about the possibility of having psychiatric residents spend time working with animals with a veterinary behaviorist since disorders, such as OCD, separation anxiety, self-injury, those kinds of things happen in human and animal species, and the ways that veterinarians approach the problems are unique and highly effective.

So I love the idea of not only bringing DVMs and MDs together through conferences, bringing vet students onto medical campuses, and bringing medical students and physicians-in-training at the postgraduate level – that is interns and residents – into veterinary settings for subspecialty training.

Dr. Cohen:

I remember years ago, when I got out of the Army, I did an anesthesia residency in the veterinary school at Penn in Philadelphia, and one of my two-week rotations was in the anesthesia department at the hospital of the University of Pennsylvania.

My eyes were quite awakened when I saw orange tanks of cyclopropane there, and I was warned that we don't do this anymore because although the patient goes to sleep in three or four breaths, every once in a while they blow up, so that was an eye-opener, as was they gave ether to somebody, which they did for their own anesthesia residents. I'm sort of glad I wasn't the candidate for that.

If we move on, do you want to give some discussion perhaps about – I know the thoughts, the realms that you deal with in the book quite a bit are cancer, behavior, obesity, OCD, etc. Do you have some thoughts about discussing those areas, and maybe some people who are listening can hit *2 and contribute to those discussions?

Dr. Natterson:

I guess the overarching idea is – everybody on this call is obviously aware of the connections between pathology in humans and animals, and I think we all kind of have a sense that there's

tremendous – we're not leveraging connections that could be easily made. There's just tons of opportunity.

So when we look at the area of comparative oncology, I think in some ways that's more advanced in terms of the collaborations than some other fields, say comparative oncology, programs for the NCI.

We tell the story of Dr. Bergman and Wolchok, and, of course, Melissa *[audio]* and Shaun Kana and all these folks. I think the good news is that there's an awareness of these shared cancers, I think more than other fields, but still there is a lot of ignorance on the human side, which is not good. We have to sort of think strategically about how we can change that.

One of the most exciting discoveries for us in the cancer chapter was learning about the osteosarcoma story and the malignant melanoma story and how there are these opportunities for this bidirectional translational exchange of information, but that can be augmented and amplified only when human oncologists really become truly aware of what's going on. So we have some ideas about how to create conferences, send fellows to veterinary conferences – so human oncology fellows to veterinary conferences.

The other areas that we deal with a lot – that we're particularly interested in - is the obesity question. There are some wonderfully interesting environmental and ecological questions it brings up in terms of whether there are environmental factors that are contributing to what appears to be a multi-species obesity epidemic, not just a human obesity epidemic.

The question of behavioral disturbances, again, I'm really, really interested in. I did grand rounds at the Neuropsychiatric Institute a few days ago here at UCLA, and there's a tremendous interest among the psychiatrists there. I've gotten lots and lots of emails since then about companion animal psychopathology and why psychiatrists don't know more about it.

Dr. Cohen:

In the Zoobiquity presentations at UCLA in September, there was a presentation by Jaana Juvonen, which focused on bullying among school children. I wonder if you've had any experiences with psychiatrists, pediatricians looking at the animal realm and the various forms of dominance, and submission, and bullying that

may go on and if any of that has been relevant to potential benefits in the care of or dealing with bullying in people.

Dr. Natterson:

That was exactly the point of having that case. We had Jaana present a really interesting case of human bullying, and then we had Victoria Voith and Melissa Bain there. Melissa Bain is from UC Davis, and Victoria Voith here from Western U., both prominent animal behaviorists.

We were looking for similarities in animal aggression. One of the definitions that's used for human bullying is "aggression by a dominant upon a subordinate," and if you apply that definition to the animal world and ask "Does that happen in the animal world?", of course it happens all the time.

Once you acknowledge that, it opens up a lot of opportunities for asking what is the purpose of that aggression? How is the victim selected? How does it change the social structure? What kinds of interventions, again, in the animal realm, can be effective?

Jaana was very intrigued by this opportunity, but just had never really thought about whether bullying could happen in the animal kingdom.

Dr. Cohen:

Some might view this as a far leap, but certainly none of us can turn on the evening news these days without being confronted by Piers Morgan or the discussions and the inflammatory discussions taking place with regard to weapons in this country.

I've been exposed to horses quite a bit over the years, and some retired racehorses, and you can get some horses that come off the track and go into these retirement facilities or places where they're going to be reconditioned and hopefully found new homes, and their rifles are their hooves and their mouths. Some of these animals are as deadly as somebody with a rifle, at least one on one.

I'm wondering if there's been any attention paid to the abuse that maybe some of these horses have received versus maybe an individual in a family or whatnot, and if any of that translates into this national discussion going on and potential therapeutic or diagnostic modes.

Dr. Natterson:

I love that we have Phil Arkow on the line because there's no one better to speak to this probably than him. But I have to say this question almost identically come up at the NCI grand rounds, and

the idea that trauma, that either physical abuse or psychological abuse, can result in epigenetic changes that inform an individual animal's behavior for the rest of their life is very – it was very exciting on the human side.

Yeah, I would love to hear what Phil has to say. We definitely are intrigued that there seems to be more – there's significantly more psychopathology in animals, we understand, who have experienced early traumatic disruption, the physical or psychological abuse.

Dr. Cohen: So let's look to – we do have Cheryl Stroud in the audience, who I think has her hand up. Cheryl, do you have some thoughts for the conversation?

Dr. Stroud: I do. Can you hear me?

Dr. Cohen: I sure can. Why don't you tell people who you are and what you do?

Dr. Stroud: Okay. I'm wondering if maybe Caroline's also on the line and we just had her muted. So I chair the North Carolina One Health Collaborative here in North Carolina and also serve as a representative for the AVMA on the One Health Commission.

I pretty much eat, sleep and breathe One Health because I'm so passionate about this whole idea of bringing us together, not just for the comparative aspects that Barb and Kathryn so eloquently discuss and bring forward, but for the very many aspects, all the way from zoonotic diseases to the comparative research aspects, of One Health.

I say this to a lot of people. I don't really care what we call this "movement," as long as we make it happen, this multidisciplinary conversation, creating the opportunity for us to come together and talk like we're doing today.

I'm really excited that you guys are doing this conference because it's one of the first examples that we have of actually connecting us all with the similar interest and then being able – you've created a forum here today for us to come here and talk, and there's really a huge community of people who are very much on board with this whole idea.

We're all looking for ways to further it and make it stronger, so I thank you guys at [PetsOnTime](http://PetsOnTime.com) for doing this, and Barbara and Kathryn, it's so good to hear you guys.

Are you there, too, Kathryn?

Kathryn Bowers: I am. Hi.

Dr. Stroud: Hi.

Dr. Cohen: Hearing you talk, there's – and, again, I do believe we have Caroline Zeiss someplace back in the background there. Years ago when Lyme disease came out, Lyme disease, I think, first started getting recognized in dogs, and those of us in Connecticut, where I was for many years, started wondering why are all these German shepherds coming in with ruptured anterior cruciate ligaments? And little did we know that they all ruptured because the joint was infected with Lyme disease.

There was a tremendous collaboration that took place, one of the best, I think, that medicine and veterinary medicine have ever gone through, and that was with Lou Magnarelli from Connecticut Extension, and Allen Steere at Yale in rheumatology, and Ed Breitschwerdt down in North Carolina.

So the Yale/North Carolina access over the years, and some folks from Long Island, did tremendous jobs in the infectious disease component of this, so I wonder, Cheryl and Barbara, if any of you have other examples in healthcare and diagnosis where this has really worked well.

Dr. Stroud: Well, it needs to work better than it has, and part of the problem that we are experiencing is that some of these, what I call “orphan One Health issues”, such as Lyme disease, which is still very much a disease process that is evolving in both the human and the animal arena, and part of the issue surrounding it is the robustness, both sensitivity and specificity, of the diagnostics.

To me, one of the huge things that could come out of this conversation that's happening is to be able to open the conversations all the way up to the policy makers and people who decide funding streams and put into place a way that some of the diagnostics for things like Lyme disease could be enhanced, to the point that we could feel confident that if we've – that we can't actually rule it out in a situation, all the way from some of the

arthritic situations in both humans and animals to some of the degenerative neurologic situations that could be related to Lyme disease, and that's very much an emerging situation right now.

There was a paper not long ago about the borrelia organism existing in the brain, and it's pretty well documented that there can be degenerative neurologic situations from both Lyme and things like Bartonella, which is very much an emerging arena in the human – significance in the human health situation.

To me, it's all about connecting us and knowing who to call to get involved to look for the kind of collaborations that you just mentioned with Dr. Breitschwerdt and Dr. Magnarelli.

Dr. Natterson:

One thing that I think we should think about – because we want to get, I think, as granular and specific as possible in terms of if we all realize that there's this need to pull the fields together – one really incredible thing – when Kathryn and I were doing research for the book, going to as many veterinary conferences as we could, just how few MDs were at these conferences – they were so interesting, from the NAVC and the AZV and others – and I just couldn't believe that I was sitting in a room hearing these fascinating, very clinically relevant cases and discussions and that I was the only MD.

If I were thinking about, “Okay, how can we really roll up our sleeves and do something to advance what you're talking about,” I think one step is figuring out how to get MDs to participate as presenters or as audience members – but I think both is ideal – at veterinary conferences, and clinically, not just through lab animal or *[audio]* investigation. And I think it probably will happen, if we can do it, probably at the level of the young physician or the physician in training.

These things are really – by the way, my experience at UCLA is we have a lot of medical students who are very interested in One Health and want to get involved. They love animals. Many of them were not sure whether they wanted to become MDs or DVMs and sort of struggled with it as prehealth undergrads, and the idea that there's this spectrum in the continuum that there can be meaningful professional connections for them as physicians, they're very excited by that.

So I think that's our target audience, and getting them to vet conferences is another way of allowing them to see across that

species divide, that it's the same field and that the same diseases, the Lyme disease, Bartonella, whatever it is, it's literally making the physical introduction in some cases.

Dr. Cohen: Phil, you're there. Go ahead.

Phil Arkow: Hi there. Yeah. Barbara had mentioned a couple of things – yeah, a number of things. This is very, very helpful. I think I first got interested in this whole issue way back in 1976 when Michael McCulloch, a psychiatrist in Portland, Oregon, discovered that people see more veterinarians than they see physicians and that physicians see more human clients than they see animal patients.

At the time, I was in animal shelter work, and, of course, we were concerned with epidemiology and zoonoses, but as we moved along the spectrum – and disaster medicine – veterinarians obviously have a huge role in that as well – we're really beginning to see more of the psychological aspect of the human/animal bond work connection coming into veterinary medicine.

I'm on the board of the American Association of Human-Animal Bond Veterinarians, and we're all looking at this as well. I've spoken to several physician groups in Connecticut, actually, doing some grand rounds training there, and they're fascinated by this whole topic.

But as somebody mentioned at the very beginning, trying to get the human medical community involved in this is a bit of a challenge, as it is with human services. We found that, for example, the Domestic Violence field is embracing this whole issue, but the Child Protective Services field is quite cold to it, and I don't know whether it's because the domestic violence issue is seen as more of a women's issue as opposed to a human services issue. I'm not really sure what the bias is for there, but I'm sure we're seeing the same thing with human medicine.

I think the key to it is going to be getting – there's always going to be marginalization. Animals are always going to be perceived as being subservient to human issues, and I think the more that we can portray this as being a human welfare, human health, human safety issue, and of relevance to the human services, the human medical community's needs, I think the better response we're going to get.

Rebecca Johnson, I think she's on the call, doing the same thing in Missouri with the "Walk a Hound, Lose a Pound" approach, by putting animal-assisted therapy in the guise of obesity control. That's something that funders in the medical community can understand.

Dr. Cohen: When you mention that, there was a – I believe he was a psychologist, although he could've been a psychiatrist. His name was Sam Corson.

Phil Arkow: I knew Sam, yeah.

Dr. Cohen: I remember reading – you've heard of this story.

Phil Arkow: I know him, yeah.

Dr. Cohen: You know him? Really? Is he a psychiatrist?

Phil Arkow: He was a psychiatrist at Ohio State, and he did some of the early research on this back around 1970 – '71.

Dr. Cohen: And I remember that the way they discovered that there was a link was a German shepherd, or a dog, in the research colony in the laboratory animal division of the hospital got loose, ran around the hospital, ended up in the psychiatric ward and hopped in bed with a child.

I can't remember how old this kid was – I think something like five – and interestingly enough, this young man had never spoken a word in his life, and after the dog hopped in bed with him, they couldn't shut him up, which was his terms, not mine. But what you're saying is quite good.

Do we have any other folks out there who would like to chime in on this and offer some thoughts on their own? I'd like to seed one thought out there, and maybe some people have some experience, and that is public health.

It seems to me that in every state, county, region in this country that there would be room for a veterinarian on the public health boards along with the physicians and nurses, etc.

And sort of a basis for this, one can go back and read John Barry's book, *The Great Influenza*, and buried in there one finds that veterinarians did some of the key research that helped understand

the great influenza as it happened. Can some folks chime in about that perhaps?

Dr. Stroud: This is Cheryl Stroud. I'll chime in there. Most states do have a public health veterinarian in their state offices. I think what you're suggesting is trying at more the community level to get veterinarians involved in some of the public health issues. Is that what you were thinking of?

Dr. Cohen: I'm thinking that I think there are veterinarians who would be involved, and I think the universities would help educate veterinarians better and bring them back for some CE to get them there, but I think it's a question of recognition by the physicians, and by those people who run public health boards in general, that a veterinarian has more of a place than just on the veterinary side of the ledger, as far as animal diseases themselves, but that they interact with people and they could help contribute, especially with regard to parasitism, infectious disease, contagious diseases, etc.

Dr. Stroud: Well, two thoughts come to mind, in that we just have – well, I haven't even told you guys – here in North Carolina we run a monthly, and in January through April we take it to weekly, where we've actually set it up as a course cross-listed at Duke, UNC, and NC State.

We had a session last night. Marguerite Pappaioanou spoke for us – and it wasn't last night. It was Tuesday night – and she made two points. She has dealt with veterinary students a lot, and when she's talking – a huge issue for us – I'm a veterinarian, by the way, guys, and when she's talking to veterinarians, a lot of veterinarians don't really realize or fully comprehend that what they're really doing is public health. They don't recognize it. They get so focused on each individual animal patient.

But a huge thing for us as veterinarians – whether we're on boards in local communities, on health boards – a huge thing for us is to really take hold of this idea that we're doing public health, and to take every opportunity – Phil just made a really good point that veterinarians actually see more clients than they do patients. *[Audio skipping]* standing in the exam room around one patient. And there are huge opportunities for us as veterinarians in a clinical private practice situation to educate people, so that is a huge thing that we as veterinarians have to take forward.

The other point that Marguerite put out is that sometimes veterinary students and veterinarians themselves don't realize – not only do they not realize that they're actually doing public health, but they don't realize that they're poignantly trained and in a position to educate the clients.

And she's actually had students ask her – as they're standing there talking about a case of sarcopties, scabies in a dog, that it's kind of their responsibility to point out to the people that this can be a zoonotic condition, and the students will say to her, “Well, can we legally do that?”

They don't realize that they can at least tell the client, “This is a zoonotic situation. It could affect your family. You need to go see your physician.” That's an educating and teaching moment that – you're right. The vet schools are maybe not – some of the vet schools anyway are not doing a good job of really making the vet students aware just how much they are practicing public health, and not only is it legal for them to point this out to clients when there are issues that are zoonotic – maybe you're talking about roundworms, or you're talking about finding Lyme disease in a pet, or you're *[skipping audio]* are so many things that are passed back and forth between people and pets – is it's really our responsibility to make it our business to carry our public health end of it.

You said some really good points, and this whole educational conversation is the way we need to do with these kinds of conference calls.

Phil Arkow:

I was just gonna say – can we flip that around? In medical school, do physicians routinely get training to think about zoonotics when they're doing a differential diagnosis? When a new patient comes in, are they routinely asked, “Do you have any pets?” You might find you have a hoarder there as a patient, and that may be the basis of a medical issue.

Dr. Natterson:

In the ideal case they are. One of the interesting questions that I have is what we can do at the medical school level to advance our mission here.

In fact, almost all education about the connection between animal and human health in medical schools centers on zoonotic infection, and maybe now on emerging pandemic threats, so it's all infectious-disease related.

Yes, in the perfect case, a patient comes in with a rash or a fever of unknown origin, whatever it is, and definitely when a diagnosis is being generated, there should be inquiry about exposure to animals, travel, that sort of thing. Whether that actually always happens or not is probably questionable, but that's the ideal.

But it sort of is an interesting point because obviously the issue of zoonoses is extremely important and a great opportunity for collaboration and engagement. But one of the things that Kathryn and I discovered early on, I was giving a lot of lectures on One Health and starting by talking about all the zoonoses and all these kinds of things, and most of the students had already encountered that. What they were not aware of, and definitely most of the senior physicians weren't, are the overlaps that were noninfectious disease.

It's an interesting idea that when we're talking about public health that we can talk about zoonoses in terms of human and animal medicine, but we can also look at the noninfectious public health concerns, such as obesity – which I love the “Walk a Hound, Lose a Pound” – and domestic violence, where animals are sentinels for *[skipping audio]* and that sort of *[skipping audio]*. I love the idea of expanding beyond the infectious diseases the importance of public health approach.

Dr. Roger Mahr:

This is Roger Mahr, CEO of the One Health Commission, and certainly want to first commend you and thank you for providing this opportunity for this significant interchange, and again thank Barbara and Kathryn for what they've achieved here through their efforts, particularly in reaching out to inform the various audiences.

Those audiences not only are the public, but particularly focused on our own professions, creating an awareness of the importance and value of this interdisciplinary connection. And I'll refer to that as the One Health approach because that is the essence of the One Health Commission.

What Barbara and Kathryn have achieved here is significant recognition and appreciation for the importance of this interconnection, particularly related to clinical medicine demand, the interrelationship between our health professions. And this is particularly focused on the commonality of diseases, the species-

spanning medicine, as they refer to, and that's a significant part of the One Health concept.

One Health simply is – what it simply means is healthy people, healthy animals, healthy plants, and a healthy environment. Thereby, One Health is really, as we've been discussing, the collaborative effort to bring together all of the various health professions, together with all their various related disciplines, working locally, nationally, globally to attain optimal health for people, animals, plants, and the environment, and as it has been alluded to, focusing particularly at that local aspect, the local practitioner level is a significant part of it.

Related to public health as you had mentioned, as I was preparing to enter the presidency of the AVMA, the American Veterinary Medical Association, in 2006, I reached out to the late Dr. Ronald Davis. Dr. Davis at that time then was president of the American Medical Association, and he was a public health physician. He was the first public health physician ever to serve as president of the AMA.

As we were contemplating our responsibility in our positions, we saw this emerging environment populated by interconnected animal and human contact and the significant integrated challenges that were being created. And we recognized that these challenges required integrated solutions, and there was a need for this collaborative leadership, so probably the most significant personal collaborative relationship developed for me personally was with Dr. Davis as I revealed the vision for the One Health initiative, a re-emergence of an old concept, but the recognition of the professional imperative that existed.

So through our respective leadership roles, we were able to bring the AVMA and the AMA together into a collaboration to essentially re-emerge focus on this interdisciplinary collaboration, and, hence, the initiative was established, and ultimately the One Health Commission was established then as a nonprofit organization in June of 2009.

Obviously, this has taken a great deal of patience and persistence to continue this effort, but the commission is now excited here in the fact that it now is entering what we consider a next phase of this development towards One Health, or essentially spanning the broad scope of our health professions and related disciplines.

I guess I want to really emphasize the importance of the scope of it, as particularly bringing together the commonality of diseases, as Barbara has so well focused on, and then, also, the significant value of the human-animal bond and the significance of that interconnection because as we recognize a change in environment, part of that change in environment is the fact that over sixty percent of all households have companion animals living within those, and also the relationship of people connected with their health professionals, whether they're veterinarians or they're human physicians.

I'd just like to emphasize the importance of student educational outreach programs. The students are significantly important as far as informing, engaging, soliciting their support, and we certainly are recognizing how this concept resonates with the students. So I can't emphasize what has already been emphasized enough, the importance of that outreach.

Dr. Cohen:

I think one of the aspects that you sort of touched on, again, getting the physicians to interface with the veterinarians, and Barbara referred to it, that in academia it's real easy because, (a) they're forced to in a way, but they respect each other, and they understand that everybody wants to do a great job in research. And even though once in a while somebody may want to push something through, there are sort of checks and balances there, and I think they've gotten to respect each other greatly.

In the real world of clinical practice, away from the academic institutions, physicians have to manage offices. They have tremendous concerns about insurance. They have tremendous concerns about the evolving healthcare system, and I empathize with any physician trying to run their own office, not to mention hospitals are buying up medical practices as fast as they can around the country.

So I think there's some legitimate reasons that clinicians in private practice probably have a tough time fitting any more onto their agenda than they already do, so I guess the real question might be how does one get through there so everything is recognized and appreciated? Anybody who might have thoughts on that, please contribute.

Dr. Natterson:

I think there are three strategies that one could consider adopting, and obviously if you're at an academic medical school or veterinary school, you have an advantage.

By the way, I want to just take a second to say that one of the things is that once we establish proof of concept for the One Health approach in a way that is widely acknowledged, I don't think that we'll have difficulties at all. I think in a sense we're almost waiting for – I see us as waiting for that proof of concept moment around a very important species-spanning problem.

The work that Peter Rabinowitz is doing with the CDC One Health working group is trying to advance that sort of search for the – the sort of pillar app, shall we say, the ultimate proof of concept piece.

But in the interim I do think – our approach of having these conferences I think could be duplicated on a smaller level, and it's pretty exciting in its way of getting physicians engaged.

PacVet, the Pacific Veterinary's Conference, is now doing sort of a little, little – they're little mini Zoobiquity conferences. The idea is to reach into the medical community through friends who are physicians, maybe your own physician, and invite them to come to a dinner, let's say, that you put together between veterinary oncologists in the community and human oncologists, or cardiologists, or whatever because I feel like those little conferences are a good start.

Our zoo conference here has really elevated awareness of animal pathology a lot within the community here in SoCal, so that's one suggestion. Kathryn and I are happy to help anyone who wants to put on a conference like our conferences with the structural challenges and logistical issues because we don't want anyone to have to reinvent the wheel.

The second idea that I have to bring physicians in is to help develop courses on clinical comparative medicine for medical students. We have one. This is our second year at UCLA. I'm working with veterinarians in the community, and medical students are excited to go into veterinary clinics and watch interventions done – cardiovascular interventions done on companion animal dogs with congenital heart disease, or learn to treat dilated cardiomyopathy in a cat, or learn about kidney failure in cats. They love this stuff.

And all it requires, really, is – in most medical schools, there are these electives, which are these optional, sort of fun, ungraded classes, and if a veterinarian in the community is willing to reach

into the faculty – probably they know folks – those courses can be created. Again, I’m happy to share curriculum ideas with anyone anywhere who wants to do that.

The third idea is I think to find ways to explicitly invite medical students and house officers – that is interns and residents – to come to vet conferences, to think about whether there is a small amount of funding available that one could explicitly dedicate and target medical students because I think these things are pretty low-hanging fruit, but I think they’re pretty high-yield interventions. So those are three thoughts about how to engage physicians more and what’s working for us out here.

Dr. Cohen: Those are great, Barbara. If any other folks have some good thoughts or ideas, there’s a lot of people online, and I know a lot of people want to listen, but all of you have had some really good professional experiences, so it would be nice to hear from a few more folks.

Dr. Engel: This is Jeff Engel, and I am CSTE in Atlanta, so I apologize again for my accent.

Dr. Cohen: What do you do, Jeff?

Dr. Engel: First of all, I’m a human doctor, an MD, and I am the current executive director for the Council of State and Territorial Epidemiologists in Atlanta, Georgia, and a great believer of One Health. And Cheryl, who’s on the line, can vouch for me, because I’m formerly from North Carolina, on my devotion to this topic from the human health side.

I just wanted to thank Barbara for her comments. I’m also a former faculty at a medical school and realize how difficult it is to get anything new in the medical school curriculum, just because things are so jammed tight already.

The elective idea is a wonderful one, but my guess is you’ll get a handful of students a year, not significant numbers, but to move it into the basic science core curriculum I think would be very difficult to do in any systematic way.

Also, you described the challenges that human health docs have, just in practice now, an average of seven minutes per patient in the primary care realm. They don’t have time to ask about the blood

pressure, let alone whether or not you've been in contact with animals.

Nevertheless, I did want to comment, as an infectious disease doc, the major public health benefit of One Health, but what I'm having increasing frustration with is moving words into action, vis-à-vis the recent H3N2 variant swine flu virus that was transmitted in state fairs across the country this year with over 300 human cases, mainly in children, where the – I won't say the veterinary community - I will say, however, the swine industry community knew about this, and it was totally preventable.

The reason it wasn't prevented is that the swine and other livestock industry people keep their surveillance very, very protected and private and proprietary. And I think this is going to be a big barrier in moving the One Health agenda forward for both human and animal health.

Nevertheless, I think livestock is the low-hanging fruit and is the natural overlap because when things go bad, and if your food supply is threatened, whether it be poultry, or swine, or what have you from a food virus, believe me it gets worldwide attention.

So I would just love –

Dr. Cohen: Could you elaborate a little bit on why the swine group – I'm not sure whether we're talking about the National Hog Raisers Association or what it is – why would they keep this private? Are we concerned about individual farmers or ranchers having their lots culled, or what's the problem here?

Dr. Engel: It's not culling in the swine industry. The poultry people are much more open because they do cull, and they want all these viruses out of their flocks.

In the swine industry, my understanding is that there are these international embargoes, and once a flu virus is announced in a product line they'll just shut down imports. Even though there's no way that flu virus could be transmitted in processed meat, nevertheless, that's what happens, so they keep this data very private because of legitimate business concerns.

Dr. Cohen: Are you saying, though, that this H3N2 affair that we're going through now – especially last night on the news, they announced that Boston is in an emergency situation with 18 deaths – are you

saying that in fact that could've either been prevented or minimized if a notification had been granted?

Dr. Engel: Well, the Boston issue is the current circulating human virus, H3N2. It's an early and severe flu season for just seasonal human flu virus. I was referring to the H3N2 swine variant that was transmitted to children at state agricultural fairs last summer. These were 4-H'ers who were showing their swine in competitions.

Dr. Cohen: Interesting.

Dr. Engel: The industry clearly knew that that virus was circulating, and from a human health public health perspective it was preventable. So I think we have a long way to go in terms of taking real action and getting the public health surveillance act between the animal species and the human species working, but I will say that the natural avenues are with influenza viruses and with our food supply.

Dr. Engel: My name is Jeff Engel, E-N-G-E-L.

Dr. Cohen: And, again, who are you with, Jeff?

Dr. Engel: I'm the Executive Director of the Council of State and Territorial Epidemiologists, for also the organization that represents the National Association of State Public Health Veterinarians.

Dr. Greeley: This is Kerry Greeley. I'm in Portland, Oregon. I'm a veterinarian. My interest is in mental health and animal behavior. I sent an email question.

Recently we had a number of suicides among high school students in the area, and one of the things that came up in a lot of the discussions that students posted was how much shame they had over their mental health needs, and were not able to seek help, and so some of these kids that committed suicide didn't get the help they needed.

My question is do you think that if people understand that mental health problems do occur in animals – we call it behavior, but really it's similar – that it would help reduce the stigma that mental health is a character flaw and help people understand it more as a illness?

Dr. Natterson: Dr. Greeley, this is Barbara. I love that question, and Kathryn and I deeply believe that there's tremendous potential for that to happen.

Psychiatrists – and I know a lot of psychiatrists – that were trained as psychiatrists are not aware that self-injury happens in animals, how common it is. They are not aware that obsession – excuse me – compulsive behaviors are common. They are not aware of the number of animals that suffer from different forms of anxiety - separation anxiety, generalized anxiety, phobias, etc.

I deeply believe that there is an opportunity here to help patients suffering from mental illness, and mental illness including depression, psychotic disorders, and even substance issues. There is so much shame, so much self-recrimination, so much stigma associated with these disorders that patients sometimes don't get help, and they suffer not only from the burden of disease, but from the burden of these other factors.

Just knowing that these disorders are species-spanning, that they are not uniquely human, to me, has the potential to be a real game changer for some patients, so I am passionately committed to advancing that opportunity.

Just to extend that for a second, I actually think that there are even some nonmental health issues like, for example, cancer. I think there are human cancer patients who might find some comfort in some cases knowing that the diseases that they are suffering from they share with dogs and horses and cats, and frankly animals that have lived in the past.

None of us have talked yet about the issue of what the meaning for all of this is for One Health for patients, and I think *it's [audio skipping]* and it's unexplored and a tremendous opportunity.

Dr. Currier: Yes, hello. This is Russell Currier, and I met Barbara and Kathryn out at California in the AVMA meeting, and I just wanted to –

Dr. Cohen: Are you a veterinarian, Russell?

Dr. Currier: Yes. I'm the retired state public health veterinarian for Iowa. I guess my distinction and contribution to One Health has been on scabies. I'm the only person in the state of Iowa that went to a nursing home to take a diagnosis and outline a plan of treatment.

I have studied a great deal on history, and I would just point out that when the proprietary veterinary colleges closed and new ones opened up under the land grant system, veterinarians became more – and education became more isolated in rural areas away from cities, and that kind of hurt the collaboration.

Within the first half of the 20th century, there were three individuals of interest – two veterinarians and one physician – that worked a great deal in the One Health area, and, of course, one was Theobald Smith, who was a legend.

He was an inspiration to Richard Shope, who did all the foundational work on influenza, that I might add that the University of Iowa, where he graduated from medical school, never has conferred an honor on him in terms of naming a conference room after him.

Then, finally, Karl F. Meyer at the Hooper Foundation was actually a veterinarian, and he developed the retort canning system to end botulism from mushrooms and this sorta thing.

Dr. Shope, for instance – I just add this as an anecdote – when the H1N1 virus reentered our society, there was a paper in the *New England Journal of Medicine* – I forget the author's names now – but they identified Shope as a veterinarian.

Most of all his research his whole life was on animal-based diseases. He was the author of two or three chapters in the early editions of *Dun's Swine Diseases*, so I just wanted to offer that perspective.

It's really refreshing, now that we have some spokespeople and advocates, to get this started because I think there's mutual benefit for everyone in this scheme of things.

Dr. Cohen:

I'd like to throw out to perhaps Cheryl and Roger and Barbara. I wonder if getting grand rounds, and various institutions and hospitals around the country to allow a community veterinarian with interest to attend those grand rounds and participate when appropriate so they're not just a bump on a log, would bring a lot into a community.

For example, let's say it was New Haven, Connecticut and Lyme disease was just getting recognized. Think of how much better that internal medicine grand rounds would be if the veterinarian said,

“Oh, we’ve just seen all these 20, 30, or hundreds of cases of problems evolving,” yet it had been barely recognized in people.

How could that effect some greater interaction? And, perhaps, again, anybody who has thoughts about that could chime in and hit * 2 so you can be heard.

Dr. Natterson:

We’ve had some wonderful opportunities. Emily Beeler, who’s a public health veterinarian here in LA County, she presented grand rounds to pediatrics on rabies a couple years ago. It was incredibly well received, so she is a little bit of a mini-celebrity for that.

We have invited community cardiologists, veterinary cardiologists, to present arrhythmia cases to our fellows on some other round situations.

So those things are doable and very exciting to the physicians, just kind of as a matter of, I guess, identifying champions within the medical communities to sort of do the outreach. I’ll bet there are more contacts and opportunities through that than people initially think about.

We’re planning our third Zoobiquity Conference, and we’re actually planning on another Zoobiquity Conference to focus on the mind. We wanna focus on psychopathology in humans and animals. We’re gonna call it Zoobiquity Mind.

But in looking at future Zoobiquity conferences, what we’re trying to do is help the veterinary community identify physicians that they know. It’s sometimes just a physician client who loves animals and who are excellent practitioners and maybe academics.

Dr. Cohen:

I see Roger and Cheryl and Phil all have your hands up, so if you want to chime in here, hit *2 and go ahead.

Dr. Stroud:

So here in North Carolina I struggle with this because we have several, like four major medical schools here, and we’ve been going now for almost three years with our North Carolina One Health collaborative, and I struggle with finding a way to connect with not only the med students but also with the very busy physicians in these medical schools because their plates are so full.

We have had some – at least one of our speakers we were able to take them over to a grand round session in one of our local medical

schools, but I really struggle with finding a way to get that kind of interaction to happen, Barbara. I'd love any of your suggestions.

I think your point is extremely critical. You have to know somebody within that system who gets this whole idea and understands it, but I find maneuvering the administrative realm of these institutions to be challenging. Even if you've got a few of supposedly the medical faculty who are supportive, it's just very, very difficult in my experience now with trying to do this here locally to get an opportunity to bring these topics forward.

Dr. Natterson: One kind of piece of low-hanging fruit, frankly, again, to reiterate, are physician clients. I got a little sidetracked. For Zoobiquity Three, one of the ways that we are identifying physicians to participate with the veterinary organization we're working with for the conference is to identify high-profile, well-established physician clients as ways in. I thought that was kind of creative. Sort of hiding in plain site.

Dr. Cohen: Phil, I see you've got your hand up. I think Dr. Greeley also has her hand up, so go ahead and hit *2, guys, and chime in.

Phil Arkow: Can you hear me?

Dr. Cohen: Yeah.

Phil Arkow: I'm tagging onto something Dr. Greeley was asking about before about mental health issues. One of the things we're seeing in the animal-assisted therapy field that has an immense amount of promise are a number of programs in which youth that are described as being at risk of violence or mental health issues are taking dogs with animal behavior problems from shelters in a 6 or 8-week, or 10-week training program and using positive reinforcement techniques to make them more adoptable. And the kids are learning that in fact the issues facing the animals' behaviors are quite similar to their own, that positive reinforcement works.

One of the best programs of this type is actually in the Portland area. The MacLaren School has had a program for years with Project POOCH, Joan Dalton's program out there, but there are any number of others around the country, and I think that's as good an analog for this issue as anything.

Dr. Cohen: That sounds interesting. Anyone else have any thoughts here? Yeah, I'm sorry. Roger, is that you?

Dr. Mahr: Yeah, this is Roger Mahr. Just kind of a final comment related to how do we take that next step and see success in our efforts. I think that Barbara alluded to that a few times, the fact that we do need some successes that show where collaborative commitment and coming together of the various disciplines, what it can accomplish.

And so that is one of the – the primary goal of the commission is to – essentially to transform the way that our various disciplines work together by leading, promoting, helping to be a catalyst for demonstration projects that tackle these high-priority health challenges that are within our society.

And we've talked about infectious diseases and chronic diseases. I also talked about food safety and security, and perhaps as we look at really the heart of the One Health approach and the importance of it – ensuring a safe, available, high quality, affordable food and water supply is really at the heart of the One Health approach globally. This is an area that relates to many different aspects.

Another area that relates to that is antimicrobial resistance, and the use of antibiotics and so forth, and new approaches to these type of challenges.

What the commission is striving to do, as it now launches its new effort here with engagement, is to bring together committed leadership and expertise from these various disciplines to come together to develop these projects, charter these projects that will tackle these high-priority challenges, and then work collaboratively to establish those as not only demonstration projects but models for moving forward.

So much of our effort – probably the greatest challenge to One Health is the inherent sense of competitiveness and ownership of various aspects, and so we need to, as responsible interprofessional disciplines, come together with a collaborative responsibility to get into this precompetitive space where we can tackle these high challenges and bring together physicians, public health, veterinarians, but also animal scientists, social scientists, human scientists, plant scientists, all together to address this because blaming one and then blaming the other and going back and forth

in this competitive mode obviously doesn't get us to where we need to be. And so it really –

Dr. Cohen: I'd like to try to get Rebecca Johnson online with you, Roger. She's been trying to ask a great question. You're there. Ah, okay.

Dr. Johnson: You can hear me. Oh, wow. This is amazing! Thank you very much.

Dr. Cohen: Now where are you calling from, and what's your background?

Dr. Johnson: I'm a nurse PhD at University of Missouri. I am professor and director of the Research Center for Human Animal Interaction here at the College of Veterinary Medicine and president of the International Association of Human Animal Interaction Organizations, and I wanted to address a couple of points.

We do the "Walk a Hound, Lose a Pound" project as Phil mentioned – Hi, Phil. Thanks for mentioning that – but I wanted to comment a bit on this whole mental health issue. We are seeing a lot of explosion in programs for U.S. military veterans, engaging them in various capacities with companion animals and also in creating and placing PTSD service dogs with them.

Our center has a heavy research focus, and we are conducting a randomized trial with veterans around this notion of having veterans do training with shelter dogs and basic obedience as a way of ameliorating PTSD symptoms.

Thus far we are seeing some clinically meaningful outcomes. We don't have the "N" yet for statistical significance – the study's in progress – but we have clinically meaningful improvements.

We are also conducting a study with prison inmates who are doing the obedience training with shelter dogs, and looking at locus of control, self-esteem, and some physical health parameters among them.

So I think that while I'd like to say that I think it's very important that we focus on the preventive side of what human-animal interaction can do for both ends of the spectrum across species, it's very important, I think, for medical students and veterinary medical students to have an understanding of this.

But as our medical colleague who has spoken on this said, most of the time the curricula are so jammed that there is no space. Even in, I think, some cases for veterinary medicine, it's impossible almost to get any structured education on communication into the curricula.

So we are doing it through different creative ways, for example, by having veterinary medical students affiliate with us on our research. It gets them out of the exam room and into the community, gets them an awareness of how important it is to systematically look at these types of interactions to see how they might be beneficial for their future patients and also for their future clients.

Dr. Cohen: Wow. That's certainly contributory. Does anyone have some thoughts to add in with this?

Dr. Natterson: Rebecca, can you repeat the organizations? You said the International –

Dr. Johnson: Sure. Am I still online?

Dr. Cohen: Yes, you are.

Dr. Johnson: Great. Thank you. Yes, it has a very difficult name to get your tongue around – IAHAIO. It is the International Association of Human-Animal Interaction Organizations. We are the global umbrella group for all human-animal interaction organizations. We have over – well, close now to 50 member organizations, including the AVMA, and we are having our international conference in July 2013 in tandem with the AVMA's 150th convention in Chicago.

We generally have 800 to 1,000 attendees at our conferences. They are peer-reviewed conferences, and we have just created the schedule. We know that we will have 62 oral presentations and then, in addition, three plenaries and one keynote, and 75 poster presentations.

Dr. Cohen: I'd like to do a slight bit of housekeeping here. I don't want to interfere with you, Rebecca, but –

Dr. Johnson: That's okay.

Dr. Cohen: – I want us to make sure that those people who would like to be able to interact with each other know how to get in touch with each other. So although Mark has this set up through [PetsOnTime](#), I will give you all my email address so that if anybody wants to give me information they can, and I can disseminate it to others. My email address is CACohendvm@gmail.com.

I'm thinking that perhaps down the road we can develop these online sessions, if people seem to like them, and maybe we can target psychiatry and behavior in one of them alone. Maybe we can target oncology in another, etc.

Back to you, Barb.

Dr. Natterson: All right. Well, thanks, Chuck. I guess it sounds like we're wrapping things up, so I just wanted to, first of all, thank you and Mark for this opportunity. And for everybody who is interested, Kathryn and I are just interested in seeing how we can grow this, and we're particularly focusing on how to bring physicians increasingly into this – medical students, physicians and all levels of training.

So thank you for the opportunity. I wanted to ask Chuck to talk a little bit about what's going with [PetsOnTime](#).

Dr. Cohen: [PetsOnTime](#) was started by Julie Leonard and Mark. The idea was actually Julie's, and it resulted from her and Mark's adopting their second greyhound rescue animal. There was a lot of information to keep track of, vaccinations, physical exams, flea treatments, etc., and you run into this where other organizations have had the same need. Seeing Eye Foundation for people – and I can't get the right name out – but similar organizations have had the same needs, so it all gets very overwhelming.

So being a programmer and a website designer, Julie started writing this application to keep track of all these services that these dogs receive so that reminders could be sent when something was needed so that an owner could add comments in.

It turns out that this also can act as a central place where pet health records can be stored, for people who travel greatly around the world. If you have a pet that has to go to a veterinarian in Roda, Spain, they can access the records very easily through this, or will be able to.

The goal is to enable a pet owner to keep track of all these services, whether it's from a veterinarian, emergency facility, pharmacies, groomers, pet sitters, whatever it is. So, trends, if something is going on with their pet, anybody who looks at this historical record, as with human medicine, would be able to maybe detect some of their trends, whether it's the owner or another veterinary someplace.

So at any rate, I want to thank everybody for participating today. Think it's been tremendously pleasant to have Dr. Natterson-Horowitz online and Kathryn in the background.

We'll have a recording of this call available on the [PetsOnTime](#) website, where you'll be able to listen to it online, or I assume download the audio file.

We'll also get a transcript done over the next couple of weeks, and I'll review it. I will not make any substantial changes, except to get rid of "uhs" and "oohs" and "ahs" or whatever, and how that can be disseminated or used, if people have thoughts or comments on that, please jot me an email. Perhaps Cheryl and Roger might think of some ways that this transcript can get into one of the journals or whatever.

With that in mind, I want to thank everybody very much, and we look forward to doing this again in a specialty realm. Again, thanks, Barb, and thank you everybody else.

[End of Audio]