

**Health Radio**

**Melanie Cole**

**Monday August 13, 2007 - 2:00 p.m.**

Hey, how are you and welcome to Health Radio. We're screening live worldwide as we always are and I'm so glad to be with you today. And, I'm glad you're with me. If you want to be a part of the show today, you can call into the listener line at 877-711-5611. Or, you can send me an e-mail [Melanie@healthradio.net](mailto:Melanie@healthradio.net). I love to get your e-mails before, during and after the shows. And, I imagine I'll get plenty of them after today's show, because I'm sure the questions are going to come rolling in. I must say I've been studying and I don't want to sound like a complete nimrod, but I am telling you this is going to be a very interesting show. And, I hope you'll follow me and take your pencils out and - and we can learn a lot together as that is what Health Radio really is. We're taking complicated medical information. And, we're making it understandable and accessible to the public and hopefully, even a little entertaining. If you've listened to my show, you know that sometimes it can be quite that. My guest today and I'm definitely honored to have him on is Doctor Nick Landekic. And, he is the President, CEO, Director and Co-Founder of Poly Medix. Welcome to the show Doctor Landekic. How are you?

DR. L: Melanie, it's a great pleasure and honor to be

here. I deeply appreciate your interest in Poly Medix. And, I appreciate the opportunity to tell you a little bit about our work. Thank you very much.

INT: Well, thank you. And why don't we start with that so that my listeners can gain an understanding before we get into the products that you - you know are out there doing for us. What is Poly Medix? And, what are you guys doing?

DR. L: Well, from a big picture thirty thousand foot perspective, Poly Medix is based on proprietary computational drug design technology and are used in computer based models to design new types of drug compounds. This technology is specifically focused on creating small synthetic organic molecules, just like any other small molecule drug, but that mimic the action of large biological proteins. We acquired this technology from the University of Pennsylvania, where it was developed over many years in the laboratories of Doctor William DeGrado, Doctor Michael Klein, and Doctor Gregory Tew, members of the National Academy of Sciences and the American Academy of Arts and Sciences. We've taken this computer based drug design technology and applied it to our own commercial focus, which is focusing on serious life threatening acute disorders that are also significant market opportunities. Specifically, one of the primary areas that we've been focusing on is developing new antibiotic drugs. In particular, antibiotic drugs which have a completely different mechanism of action from current antibiotic

drugs, to work in a way that would make bacterial resistance unlikely to develop. And, we also developed polymer formulations of these compounds for biomaterials to make paints, plastics and surfaces of self sterilizing.

INT: Now, I - I want to get into all of that. And, we're definitely - I have a lot of questions about your self sterilizing polymers. And we're - we're going to talk about that now. Just tell me is Poly Medix is - is obviously global. And, that technology is fascinating to be able to use a computer to synthesize these biological proteins. So, explain to my listeners, what's been the past problem with these marketed proteins that - that have been on the market before?

DR. L: Sure. It's actually a very complex science, but I'll try to make it so hopefully somewhat easily digestible.

INT: (laughing) That's good.

DR. L: It's complicated for us in the industry as well. Basically, proteins are the machinery of life. Living creatures, people, animals, we make things out of proteins. We build ourselves out of protein. Proteins turn things on, they turn things off, proteins make things happen. So, proteins are the natural chemicals that basically all life is based on. Everything that happens in a living creature, everything that you or I do, everything that we turn on or turn off in our bodies are based on proteins. Now, our bodies are able to build things out of building blocks called amino acids. You can think

of them as the like the Lego building blocks of life. And, these amino acids are strung together in a very complex three dimensional shapes. And when they're put together, they're called proteins. Now, even though life uses proteins to build things and turn things on and off, our proteins are actually very, very complicated molecules. To make them artificially, to make them synthetically is very complicated. To try to use proteins as drugs is also very complicated. Some pharmaceutical companies, such as Amgen and others, have done a very good job of using proteins as drugs. Some of the largest pharmaceutical products in the world such as Epogen and Neupogen are protein products. But proteins themselves have a lot of limitations. They're very difficult to make. They're very, very hard to make synthetically. It's very hard to trick bacteria or used to make proteins. And, they're also very difficult to use as drugs. You can't give them orally. They wouldn't be active as a pill. So, you can only give them by injection. And many proteins, even when you inject them, are still very difficult to get as drugs, because the body recognizes them as foreign proteins and will reject them and break them down.

INT: You know that was a - well, I'm going to let you finish. But, that was a very good explanation of amino acids.

DR. L: Thank you.

INT: And - and what the - how we could use our proteins. And, I'm sorry, finish what you were going to say about them.

DR. L: So basically, the last part of the story is since proteins are so difficult to manufacture and to use as drugs, one of the greatest challenges, and also one of the greatest opportunities for many years in medicine, has been to make small synthetic organic molecules that are cheap and easy to make and have good drug like properties. Like any other drug that one takes as a pill or as an injection, but imitate and mimic the action of these proteins. The challenge has been is that proteins are very, very big molecules, because they're large. Small molecules, as the name implies, are very small, so in making something small to do the job of something big is very, very hard. Some people have likened it to try to create a grain of sand that will have the same action as a sheet of newspaper. So, it's wonderful if it can be done. But, it's very difficult to do. And it's very difficult to do unless we have the assistance of some pretty complex and sophisticated mathematical models and computer based drug design approaches, which is what Poly Medix is based on from the work at the University of Pennsylvania.

INT: And, are these the non protein drugs that you're talking about?

DR. L: Yes. At Poly Medix, we don't develop proteins. What we're dedicated to doing is making small molecules, small synthetic molecules that imitate and mimic the action of these proteins. So, it would work like a protein, but are small

inexpensive, easy to make and have drug like properties. And, that's also what we did with our antibiotic program is that we used these tools to create a new class of antibiotic drugs that imitate a class of proteins called the host defense proteins.

INT: And - and I want to ask you about the host defense. Why don't you tell us? Because, is this the anti-infective drugs, the bacterial resistance that we're talking about?

DR. L: Yes.

INT: The antibiotics, right?

DR. L: Yes. Yes, exactly. Exactly.

INT: So tell - tell - tell the listeners what the - what the implications for these antimicrobial drugs that you're talking about, the new forms of antibiotics, right?

DR. L: Sure, absolutely. Absolutely. When Bill DeGrado and I started Poly Medix about five years ago, the first time we sat down to talk about what could we use these computational tools for? What kind of drugs should we create? There are many, many thousands of possibilities. But, over the course of the first lunch that we had over five years ago, we immediately settled on making small molecules that imitate these host defense proteins to make new classes of antibiotic drugs. Because, we recognized that that was a massive medical need, major clinical need as well as a very significant commercial opportunity. Everyone has heard about bacterial infections. But, many people are surprised to hear that bacterial infections

are now the fourth leading cause of death in the United States. After heart attack, cancer, and stroke, we all have a greater chance of dying from a bacterial infection than from any other cause, over a hundred thousand deaths per year.

INT: And - and I - I want - I want to stop you there, because we're going to take a break in just a minute. But, and - and I have a lot to talk about with the anti - with the bacterial infections and hospitals. But, this host defense proteins that you're talking, those were first what, found on frogs right?

DR. L: They were first discovered on frogs, that's right. And so what we've done at Poly Medix in this program is we've learned from the oldest and most effective antibiotic mechanism known, which is life itself. Primitive forms of live, things like molds and fungus, they secrete things like penicillin and tetracycline to protect themselves from bacteria. They produce antibiotics.

INT: So - so let me stop you, because we're going to go to break. But when we come back, I'm going to ask you about these antibiotic sort of replacement drugs and the anti-infective drugs. And, this is fascinating stuff. And, you're definitely making it very understandable. So, we'll be back in just a minute. You're listening to Health Radio. And, we are on with Doctor Nick Landekic. And, he's the President and CEO Director and Co-Founder of Poly Medix. We have a lot to discuss with

him. We'll be right back. Don't go anywhere. Stay tuned.

Ninety-eight, ninety-nine, one hundred.

When your child has a fever, the whole family feels uncomfortable.

One hundred and one.

How long will it last? How high will it go?

One hundred and two.

When should we go to the Emergency Department? If your child's fever reaches one hundred two point two, call your child's doctor. If needed, it's comforting to know there are Children's Hospital Boston physicians at a community hospital near you providing coordinated pediatric and emergency care.

One hundred and three.

Whether your child has a broken bone, the flu, or something more serious, Children's Physicians are at Winchester Hospital, South Shore Hospital in Weymouth, Metro West Medical Center in Framingham, Caritas Norwood Hospital and Beverly Hospital, and of course at Children's Hospital Boston. Great pediatric care has never been easier to get to. Go to [childrenshospital.org/locations](http://childrenshospital.org/locations) for more information.

(Music) Your teeth are connected to every other bone in your body. Having healthy teeth and gums is great for your entire body. For expert advice on the relationship between oral health and overall health trust your dentist. (Music) You dentist, part of your health care team, a message from the

Ontario Dental Association.

Little girls dream of being princesses in their fairy tales. But, a recent survey shows today's women cast themselves as more exotic and mysterious characters. I'm Amy Addison. Two modern fairy tales starring Kate Walsh, Doctor Addison Montgomery of Gray's Anatomy, produced by Koret's Body Wash to let you bring out your exotic mysterious side.

These modern day fairy tales are for all of the enchantment of the original ones, while allowing the princesses to show more a mysterious and exciting sides of themselves. And, I think that every woman has dreamed of doing that at one point in her life.

Unleash your mysterious side with these modern web versions of Cinderella and Beauty and the Beast.

Visit [koretsfairytale.com](http://koretsfairytale.com) to create your own customizable fairy tale. Design your virtual Prince Charming. Enter for a chance to win exotic real life experiences. And, get a free sample of the new Koret's Exotic Oil Infusions Body Wash.

Watch the drama unfold at [koretsfairytale.com](http://koretsfairytale.com).

Doctor Hirsch to Medical Records please - - to Admitting.

HEU members work in every area of health care, from caring for our seniors to sterilizing operating rooms. HEU members are essential to your care. But, despite growing workloads and increased training, they were singled out for deep wage cuts in 2004. It's not fair. And, it's not working for health care.

This year, let's find solutions that make health care better for everyone. We're the hospital employees' union. And, we're bargaining for better care.

(Thumping noise) To call in and be part of the show, ask a question or make a comment, call toll free 877-711-5611. That's 877-711-5611. (Music)

INT: Hey, here we are. Genesis, I love them. I'm going to go see them here in October here in the Chicago area. I'm telling what they're charging for tickets. Sorry. This is not Music Radio. It's Health Radio. And, I'm Melanie Cole. Welcome back. And, we're on today with Doctor Nick Landekic. And he is, as I said before, the President, CEO, Director and Co-Founder of Poly Medix. Fascinating, we are learning right now about they've - they've developed anti-infective drugs, which bacterial resistance is unlikely. As we all know, we keep hearing about the - the fact that antibiotics have stopped working in so many instances. And that, they found these host defense proteins on frogs. That's where we left off at the break. And, Doctor Landekic, now you were saying that the antibiotic problem in this country is that really we've had so many infections that are unable to be controlled and that this anti-infective drugs will - will make it so that the bacteria don't develop a resistance. Am I right about that?

DR. L: Well, we prefer to say resistance is unlikely to develop.

INT: Yes, unlikely.

DR. L: In life, unpredictable and strange things happen, so we prefer to say unlikely.

INT: That's good, I'll say that from now on.

DR. L: So, as you said Melanie, that bacterial infections are a massive problem. Bacterial infections actually are the fourth leading cause of death in this country, after heart attack, cancer and stroke, about a hundred thousand deaths a year. And, it's one of the fastest growing causes of death the Centers for Disease Control tracks. In the United States, literally, someone dies from a bacterial infection every six minutes. And, the death rate has increased sevenfold over the past ten years. So, it's a massive problem. And, the problem is only getting worse, because more and more bacteria are becoming resistant to known available antibiotic drugs. What we have done at Poly Medix is we've learned from and imitated the oldest anti-infective mechanism known, which is life itself. The primitive simple forms of life, things like mold and fungus, they produce things like tetracycline and penicillin. They produce the antibiotics that we now know to protect themselves against bacterial attack. And this forms the basis for all currently known antibiotic drugs. But, what they have in common is that they target what's called a biochemical target, which means they often need to cross the outside membrane of the bacteria and get inside the cell to work. Now this works for a

short while. But, the problem is that bacteria have ways of just developing resistance, of avoiding this kind of attack. Bacteria can sense when a foreign chemical has penetrated through its outer layer, through its skin, if you would have it. And, they can pump it right back out in a mechanism called efflux. So, the chemical is neutralized, because as soon as the bacteria senses that something foreign has come in, it gets pumped right back out. The other way that bacteria develop resistance to antibiotic drugs is they change the shape of the target that the antibiotic drug binds you. And that can happen very, very quickly. Bacteria can divide every ten to twenty minutes. If you start with one bacterial cell, in twenty-four hours you can have a million cells. So, beneficial mutations evolve very, very quickly. So, all the bacteria has to do is slightly change the shape and structure of this target that the drug is seeking to bind to. It's similar to slightly changing the shape and structure of a lock. So, the key no longer fits into it. And again, you have resistance.

INT: That is just absolutely amazing what you just explained. So, these drugs would go inside the bacterial cell. But, the bacteria can either shoot it back out or multiply so that it just doesn't have any effect on that one particular cell.

DR. L: Exactly. And it can happen alarmingly quickly. About two months ago, a group of researchers from Rockefeller

University published a study looking at the case of what's been called Patient X, a poor person that died of a drug resistant Staph infection. And, that's seven years ago. Many, many people die of drug resistance Staph infections. But, what they found when they looked at this one patient, this one patient was treated over the course of twelve weeks with every known antibiotic and every possible combination. And, they still died. And, what they found was that in this one patient the Staph bacteria underwent thirty-five different mutations in just twelve weeks. It literally mutated every other day. That really rocked a lot of people back on their heels. People knew that bacteria divide very quickly. But, to have a bacteria in a single person be able to evolve so quickly, so rapidly, thirty-five times in twelve weeks was astonishing. It's impossible to fight that with conventional antibiotics that act on biochemical targets. You need something completely new. You need something completely different. You need essentially a nuclear weapon of a drug.

INT: A nuclear weapon, that's what it sounds like you're describing is something that would go in there and not have the efflux reaction and be able to sort of blow away this bacteria without it giving it time to you know mutate, and - and to continually grow. And, I know that Staph infections, we keep hearing in the hospitals about Staph infections. And - and from hand washing, and all of these things. So would these be

targeting specific bacterias like Staph? Or, would it be something that is more general that is going to be able to stop the bacteria even - even different kinds? Do you know what I'm asking?

DR. L: Yes, Staph is a big problem. More than half of infections in hospitals are Staph infections. But this mechanism can target many types of bacteria. Staph is the key target for us and a key problem in the world. But, these are broad spectrum drugs that can target many things. So what these drugs do, and what you had mentioned a few minutes ago before the break, the link to frogs. What we've done is we've imitated the antibiotic mechanism that is found in all animals and people and all higher forms of life. That mechanism is called host offense proteins. And, as you mentioned, that mechanism was first discovered about twenty years ago by Doctor Michael Zasloff in frogs. Doctor Zasloff found that frogs that he was working with would get cuts on their skin. And, he would put them back in these filthy disgusting aquariums that were just teeming with bacteria. But instead of getting infections and dying, the frogs healed. Their skin cuts healed very quickly. And they survived just fine. He was very curious about. What was happening? How could this be? So, what he found was the first discovery of the first host defense protein. Frogs produce something in their skin called magainins, and that is something that attacks bacteria in a very different way.

INT: That's a Hebrew word, right? That's a Hebrew word for shield.

DR. L: For shield, exactly. That's exactly what it is.

INT: I knew that.

DR. L: And, what's been found in the twenty years since Doctor Zasloff's discovery is that basically any multi cellular life, plants, insects, fish, birds, animals, people, we all have host defense proteins, no just frogs. In people, these are called defensins. They're very similar to the magaimins in frogs. With insects, they're called cecropins or mellitins. Many different names for many different host defense proteins, but they all work the same way.

INT: And, where do they reside in humans? Where do the defensins reside? Where are they in us? Are they in our skin, in our blood, proteins? Where are they?

DR. L: We have them largely in our skin. We also make them in our mouths, in our mucosal tissues, in our genital tracts. We produce them at the point of infection. We produce them at the point where bacteria would get into our bodies. For example, we cut ourselves all the time. But, we usually don't get an infection from it, because our bodies make host defense proteins at that point of a cut to kill the bacteria before they can get in to cause a system wide infection. All of these host defense proteins work the same way, whether they're from people or from cockroaches. And, they all work completely differently

from classic antibiotics. The host defense proteins don't need to get inside the bacterial cell to kill a cell. They directly attack the cell's membrane. It's like a needle poking a hole in a balloon or a corkscrew going into a balloon. They directly attack the membrane, poking holes through it, forming what are called pores.

INT: So, they're not trying to enter the membrane. They're just poking a hole in it.

DR. L: Exactly. That's exactly it. They disrupt the membrane. They associate with the membrane. Disrupt it. Form pores in it. Poke holes in it. And basically, it's just like a needle can blow up a balloon while attacking the membrane with a bacteria and poking holes in it, you can blow up the bacteria and kill it very quickly and very effectively. So this mechanism works very well. Most of us don't get infections. And, this mechanism has been around for, give or take, five hundred million years. And, it's allowed higher life to evolve on earth.

INT: That is - that is absolutely amazing to me. And, the fact that you were able to computationally figure this out, right, this all came from being able to use computers for this technology?

DR. L: Exactly. This is all based on work by Doctors Bill DeGrado and Mike Klein figuring out how really do these host defense proteins work. And, building on the work of the great

Doctor Michael Zasloff and others.

INT: So hang on, Doctor Landekic, because we are going to take another break. And, the show's half over. It goes very quickly, especially when I'm so interested in a particular subject. Wow. And we'll be back. You're listening to Health Radio. And, we'll be back talking more about this very interesting subject and Poly Medix. So, don't go anywhere. Stay tuned to Health Radio.

(Music) Houston, what a great view from space today.

From space you can see a world of possibilities. I'm NASA Astronaut Jeff Williams. I spent six months on the International Space Station. But, something like that used to seem a little out there for me. So, if a kid from a tiny Wisconsin town can grow up to reach to those heights, who knows what's possible? What's your vision? Imagination and education can take you anywhere. Learn more at NASA.gov and stock up on math science, because America needs you to be the innovators and explorers of tomorrow.

I'm a paramedic. And, it may sound silly, but a lot of people are afraid to call me when they're experiencing chest pain, or to call 911 if they're with someone experiencing chest pain. You know why? Because, they think it would be embarrassing if it were a false alarm. Instead, people risk permanent damage or death, because they're afraid they might get a lecture. That's ridiculous. So, if you have an uncomfortable

pressure, fullness, wheezing or pain in the center of the chest that lasts more than a few minutes, call me. If you have a pain that spreads to the shoulders, neck or arms, call me. If you have any discomfort in your chest with lightheadedness, fainting, sweating, nausea or shortness of breath, call me. If you have any of these symptoms, or are with someone who does, dial 911 right away. And, if it is a false alarm, I'm not going to give you a lecture. I'll be happy to see you. To learn more about heart attack warning signs, call the American Heart Association at 1-800-AHA-USA1. Or, visit us on the web at [americanheart.org](http://americanheart.org).

(Music) If you needed surgery, the words minimally invasive might sound reassuring. But, would you be a candidate? It's all about life, love and health.

Patients are thin, very motivated and healthy and active will tend to benefit from minimally invasive approaches the most.

Doctor Joshua Jacobs, a Chicago orthopedic surgeon, specializes in hip and knee replacement.

Not only do incisions tend to be smaller, but also there tend to be alternative approaches to try to minimize soft tissue disruption during the procedure of implanting artificial joint replacement components, using minimally invasive techniques. In fact, you do bounce back quicker. That is, you're able to do more, sooner after the operation.

Doctor Jacobs believes in matching the patient to the right procedure.

It's also about a whole system of approaching the patient that involves pain management and also alterations in the way we're conducting physical therapy and post operative rehabilitation. There are some surgeons that would suggest that by using these new techniques, that even with conventional surgery you can get them moving and more functional faster.

Are you a candidate for minimally invasive surgery? Or, would a more conventional joint replacement procedure be a better match for you needs and condition? For more information, talk to your doctor or visit the American Academy of Orthopedic Surgeons website at [orthoinfo.org](http://orthoinfo.org). I'm Christopher Springman. And, it's all about life, love and health.

(Music) You can hear this show again. Or, listen to the all new online interactive talk radio, All About Health, Wellness, Fitness and Medicine. Log on to [healthradio.net](http://healthradio.net), entertaining hosts, expert guests and important information about every aspect of your health, live Health Radio or On Demand Pod Casts. It's compelling talk radio for everybody. [Healthradio.net](http://Healthradio.net). That's [Healthradio.net](http://Healthradio.net).

(Music) What is it about Saint Joseph's that makes us the best choice for all your cardiac care needs? Is it the fact that your Saint Joseph's physician can guide you through a full continuum of cardiac services, including prevention, diagnosis,

acute care such as angioplasty and rehabilitation? Is it the fact that we have one of the most successful coronary artery bypass surgery programs in the state? Is it the fact that we're the only hospital in Upstate New York to be named a Magnum Hospital, a designation award for exhibiting the nursing excellence that results in lower mortality rates and greater patient satisfaction? Or, is it the fact that more people choose Saint Joseph's for their cardiac care than any other hospital in Central New York? We'd like to think it's all these things. Working together to deliver the one thing everyone wants from a hospital, a higher level of care. To find out more about our cardiac expertise, call the Saint Joseph's Resource Line at 315-458-2222. (Music)

(Music) Northwestern Memorial Hospital's Health Learning Centers are designed to help you find the information you need, when you need it and in the format best for you. Northwestern Memorial's medical librarians, health educators and information specialists are on hand to assist you with your unique research needs. All services are free of charge. And, everyone is welcome to use this comprehensive service. Visit the Health Learning Center on the Internet at [www.nmh.org/hlc](http://www.nmh.org/hlc).

(Thumping) (Music) This program provides general information relating to health. Listeners should not individually rely on the information given here, because we're all a little bit different from one another. This program is

definitely not a substitute for a consultation with a qualified medical doctor. We encourage you to make an appointment with your own doctor in order to resolve any of your health concerns. Now, back to the show. (Music)

INT: Hey, here we are. Welcome back. And, I'm Melanie Cole. You're listening to Health Radio. And send me an e-mail, [Melanie@healthradio.net](mailto:Melanie@healthradio.net). I love to get them. We're talking with Doctor Nick Landekic. He is the President, CEO, Director and Co-Founder of Poly Medix. Poly Medix - he gave us an explanation of this biotechnical company at the beginning of the show. And, right now, we are talking - we have been talking about the implications of the antimicrobial drugs or the new form of antibiotics. And, now Doctor Landekic, these are the antimicrobial peptides that you were talking about on - are defensins, right?

DR. L: That's correct.

INT: So - so how are these going to now be put into application? You put them on computer. You make - you make these things that make these holes in the bacteria and - and go in for Staph and that sort of thing, and maybe some other bacterial - bacteria as well. How then, does it go from what you do to the pharmaceutical companies where they make these and do their clinical trials?

DR. L: Very good question. What we have done is used our computer drug design tools to design small artificial chemicals

that imitate and work just like these host defense proteins. We synthesized and tested them in many, many animal experiments. And, at the end of this year, we hope to file our first what's called an IND, an Investigational New Drug application, which will then allow us to start human clinical trials early next year. Now that really is the start of the FDA Regulatory and Review and clinical process to taking the drug through human clinical trials, so that ultimately it gets registered and available for marketing and for human use.

INT: Now, you're not a pharmaceutical company. But, you partner with them, right? Is that how that works the biotech companies come up with this? And then, the pharmaceutical companies produce the drug? Is that how it works?

DR. L: Quite often. At PolyMedix, we're already engaged in discussions with pharmaceutical companies for licensing of these antibiotic drugs as well as their polymer derivatives for biomaterials uses. What we plan to do at PolyMedix is to license all of the polymers, all of the non drug applications of these inventions. We also plan to license outside of North America rights to other pharmaceutical companies to market and sell these drugs. In North America, we hope to keep the rights of these antibiotics and sell them ourselves. We'll hire and build our own marketing and sales capability and sell these ourselves. The first antibiotic drugs which we're developing will be intravenous - will be IV drugs for use in hospitals to

treat serious infections that are treated in hospitals, such as Staph infections. It's not practical for a small biotech company to try to build a huge marketing and sales organization to reach every doctor in America to sell all antibiotics. But selling IV antibiotics to the hospital market is very doable and very practical. There are other companies out there doing that right now. So, we hope within a few years that we'll have our own North American sales force selling our own IV antibiotics in this country. But, at the same time, partner with big pharmaceutical companies to sell them overseas as well as to sell oral formulations of our products for the primary care market.

INT: Now, you were saying that - that the - that the - these are the drugs you have to go through these investigational you know drug programs and, but for the polymers that you - that you mentioned. And, I wanted to ask you about them. So what are the applications for the antimicrobial polymers? These are for sterilization of surfaces and so because I know we were talking about Staph infections and the nosocomial infections that can go in like through - I worked - I worked at Northwestern Memorial. And you know when you do a central line or something like that, one of the big problems would be infection, right?

DR. L: That's absolutely right. That is one of the very significant medical needs and commercial opportunities is for IV

tubes and catheters. That was one of the other reasons we picked the antibiotic area to work in as our first product development program. In addition to developing the antibiotic drugs which we believe bacterial resistance is unlikely to develop, there are also polymer derivatives of these. So, our idea is to have more shots on goal. To have more ways of applying our same basic invention of the synthetic chemicals we've created to imitate these host defense proteins. With the polymers, the biomaterials applications, what we've done is we've shown that we can take polymer forms of these drugs and we can add them to paint, plastic and textiles to make materials and surfaces self sterilizing an antimicrobial. There are many, many potential applications of that. So, if we look at the world around us and think, where would it be good to have a surface that would be self sterilizing, that would kill bacteria on contact? It's many places. There are many medical applications. As we've mentioned, catheters and IV tubes, bandages, surgical gloves and masks, many industrial applications, like coating the interiors of hospitals, restaurants, schools, many consumer products, such as soaps, lotions, cosmetics, contact lenses and contact lens cleaning solutions. The idea is to take these polymers and add them to these types of plastics and coating. So then that could make the material itself self sterilizing an antimicrobial.

INT: Now, do we know if these - if this polymer that

you're talking about is - I mean because we hear about different things that come. Is this going to be something that we'll know is non toxic, is not - you know won't - if you put it into a central line and - and we're getting medications and blood and such through this, it's not going to be toxic to our systems? Or you know do you understand what I'm asking?

DR. L: Those are very, very good questions. That's something that through either an FDA or EPA process, one needs to evaluate and carefully study to look at the potential safety risks - what the potential toxicities would be? All drugs are toxic. There's no such thing as a non toxic drug. They're all toxic. The only thing that matters is, what is the ratio of the dose that works versus the dose that hurts? And, in this case, what we have to look very carefully at is; what is the ratio of the concentration that we need to kill bacteria versus what is the concentration that's needed that would start hurting human cells? Using our computer based design tools, what we've done is we've created synthetic chemicals that not only imitate the action of these host defense proteins, but are actually more selective than our actual host defense proteins themselves.

INT: Well, Doctor Landekic, let me ask you. If these are synthetic, how do they mimic, if they're self sterilizing polymer, it's not live. Right? Like our defensins are. So how is that continue - how does it continually self sterilize?

DR. L: Now I understand. Our compounds work the same way

as the defensin proteins. And, the way that they both work, to get into a little bit of the science, if you look at what the chemical structure of any host defense protein looks like, on one part of a molecule there are positive electrical charges. The other part of the molecule has chemical groups that are called hydrophobic, meaning they hate water and they love fat. It's this combination of positive electrical charges and water hating fat loving properties. This is called facial amphiphilicity, that makes all of the host defense proteins have the ability to poke holes in bacterial cells. So, our compounds, both our small molecule drugs and our polymers, have that same kind of facially amphiphilic structure, the positive electric charges on one side of the molecule and these water hating fat loving properties on the side of the molecule. And, just like our natural defensin proteins, that gives them the ability to break bacterial membranes and poke holes in them. Because we've used computer based tools to design these compounds, we've been able to come up with compounds that are as much as a thousand times more selective and less toxic than even our natural host defense proteins. So, the safety and toxicity is something that we pay very, very close attention to, to make compounds that are safe and as selective as possible.

INT: And, what would be the shelf life on something like that? I mean if you - if hospitals were to use these polymers on things, it - would there be a limited time that they - you

know you'd open the wrapper for the catheter. And it would be good for just so long?

DR. L: Well, there probably would be some lifespan. Nothing lasts forever, except maybe love.

INT: Yes, not even that all the time Doc, not even that. But so - so - so they would have a certain life to which that polymer would be effective?

DR. L: That's right. And how long that would last would in large part depend on how it's attached to the surface. Is it attached to the surface of, for example a catheter, an IV tube? Or, is it mixed in throughout the plastic, so that even if the surface wears away there's still a polymer in there. And part of it also would depend on what is this material exposed to? Plus, self sterilizing doesn't mean self cleaning. So, if the surface got covered over, whether it's with mud or dirt or something like that, the surface is covered up. The surface wouldn't be available to interact with bacteria. So, it would have to be cleaned and renewed somehow. But, in our experiments, we've shown that when we add polymers to these types of plastics and coatings, in fact is long lasting. It does withstand repeated exposure to bacteria and keeps on killing. We can even store these materials in water for many weeks, and it keeps their activity. So, it doesn't dissolve out of the material.

INT: Wow, that is - that's amazing. That is amazing. I

mean in one way it's a little Howard Hughes-ish. Do you know what I'm saying? There's a little bit of this wow; we're going to really sanitize everything.

DR. L: Well, Howard Hughes wasn't crazy. He was just ahead of his time.

INT: There you - that's a great statement. Well, we're going to take another break, the last break. I told you it goes fast. And when we come back, we're going to get a little more information from - about Poly Medix. And, I'd like to ask Doctor Landekic also about the low molecular weight heparin that they are also working with. So, we'll be back. Don't go anywhere. This is really interesting. Stay tuned.

(Music) A short quiz from the Ontario Dental Association.

Bad oral health can lead to heart disease and even heart attacks. Myth. Gum disease can make your diabetes harder to control. Fact. Poor oral health during pregnancy can affect the baby's health. Myth.

There is a relationship between oral health and overall health. Trust your dentist to help you separate the facts from the myths. Your dentist, part of your health care team, a message from the Ontario Dental Association.

After I learned that I needed abdominal surgery, a lot of things were going through my mind. When you're a working Mom, you can't just call in sick.

Faster Mommy, faster.

(laughing) Okay; honey. Luckily, I met with a specialist at University Hospitals of Cleveland. He told me about some techniques and treatment methods that could really speed up my recovery. I suppose it would have been nice to have a little more time out to rest and relax. But, it sure does feel great to be able to take my daughter for bike rides again, and just one week later.

At University Hospitals of Cleveland, we're doing everything possible to help our patients get their lives back, from routine surgeries to complex procedures like brain surgery. We have the expertise and advanced technology to help our patients feel like themselves again.

Yes, (laughing) there's no slowing me down.

To learn more, call 1-800-800-8447 or visit [UHHS.com](http://UHHS.com).

When the diagnosis is cancer, you need answers. Ask MD Anderson is ready to help. Our staff of health information specialists can advise you about the process of becoming a patient and answer questions about new technologies and treatments. We're here to help guide you through this difficult time. Call toll free 877-MDA-6789, or visit [mdanderson.org/ask](http://mdanderson.org/ask).

Business sense. I'm Mark Chase. These days the ability of businesses to respond dynamically and quickly to any shift in the market place is critical. One company is offering small and medium sized businesses. A new solution designed to help them succeed. IBM's Paul XX explains.

Pre-packaged at an affordable cost, IBM's express wholesale distribution solution gives small and medium sized businesses the power to potentially improve inventory control, create operational efficiencies, and enhance collaboration with suppliers, employees, and customers.

This solution's adaptability means that you pay only once. And, your investment for the future is protected even after your business expands.

Working with SAP, we offer small and medium sized companies the flexibility they need to grow their businesses through the SAP all in one solution.

For more information, please go to [www.ibm.com/express](http://www.ibm.com/express) advantage\insights. That's business sense from IBM. I'm Mark Chase.

(Thumping) To call in and be part of the show, ask a question, or make a comment, call toll free 877-711-5611. That's 877-771-5611. (Music)

INT: Hey; welcome back. You're tuned to Health Radio. And, we're streaming live worldwide as we always are. We're on today with Doctor Nick Landekic. And, we're talking about his company Poly Medix. And, before we go on about some of the other scientific things, Doctor Landekic, why don't you tell people maybe where they can find out more about Poly Medix or any websites, things that you might you know find interesting for people to look for?

DR. L: If anyone is interested in learning more about Poly Medix, the best first spot probably would be visit our website, which is [www.polymedix.com](http://www.polymedix.com). Poly Medix spelled P-O-L-Y M-E-D-I-X. There are also links and phone numbers on the website, both with our public relations group and internally at Poly Medix. We always welcome any inquiries from anyone that's interested in learning more about us.

INT: Well, I would certainly think you're going to get millions and millions of responses now (laughing) after this show. Well, I hope that you do. It is very interesting. So, people can go to [polymedix.com](http://polymedix.com) and find and scroll around on there. Because, I was on there for a long time. And, there's a lot of information. And, pretty much what - what Doctor Landekic has been telling us today, but - but he certainly has gone into it so that we can understand more about it. And, for people that are out there suffering from infections or working in hospitals, or any of these kinds of things, this would seem to be a place to go to find out your information. Now, also you - one of the products that you guys have is the low molecular weight heparin. Now, I know about heparin, you know because that's the antithrombotic for clotting. So, what is that you are talking about when you say low molecular weight heparin? What's the difference?

DR. L: Actually, what we're developing is a reversing agent for both heparin and a low molecular weight heparin.

That's our second drug program. We believe that to be a company, you need to do more than just one thing well. So, this is our second drug program. It's very simple. Heparin and low molecular weight heparin, which many people are probably familiar with, are blood thinners. They're used to prevent blood clots from forming. Heparin is used during many types of surgery, surgeries in the heart, lung and chest cavity, where you need to have heparin on board, because there's a very high risk of a clot being formed during the surgery. And, that's bad if a clot forms. It can lodge in the brain or the heart and cause a stroke or a heart attack, which can be fatal. Cardiothoracic surgeries have heparin being given to the patient. Now after the surgery, the heparin has to be reversed. Once the patient has been essentially cut apart and sewn back together again, they have to be able to clot and heal normally.

INT: Now, I understand this. I understand this and I - I don't mean to interrupt you. But, because, I was part of bypass surgeries. So, you know and when we were - when I was working in Northwestern, and we - they always had to do that when they would take the vein. They would use the heparin. And then when they would take somebody off bypass, they had to reverse it. And, I guess I never really understood the implications of that. But, they had to stop - make sure that it would clot back up, so there wouldn't be a bleeding.

DR. L: That's correct. And, the only agent that's

available anywhere in the world to reverse heparin is something called protamine. Protamine has to be given so the patient can clot and heal normally. Otherwise, there would be a very significant risk of potentially fatal post surgical bleeding. Now protamine has been around for about fifty years. It's been widely used for many, many years. But, it's still a very difficult to use drug. There's a lot of well known limitations. It's very difficult to adjust the dose of protamine. If you overdose it, instead of reversing bleeding, you can make bleeding even worse. Even after clotting time has been normalized after protamine, protamine can still reverse its effect and have rebound bleeding. A significant overdose of protamine can be fatal. Protamine is a foreign animal protein. It's made from of all things, the sperm of fish.

INT: Nice. (laughing)

DR. L: So many patients.

INT: (laughing) That's nice.

DR. L: Literally. So, many patients can have allergic reactions, immune system reactions to protamine. And protamine also does not work on the whole class of clot preventers called the low molecular heparins. So, what we have done at Poly Medix is again using our core computational drug design technology, is we've designed and created synthetic small chemicals that imitate the action of protamine, but are designed to not have the side effects and problems that protamine does, to be used as

agents that can reverse both heparin and for the first time low molecular weight heparin. But with a goal of not having to risk the problems of protamine, like bleeding. Not having allergic or immune system reactions. And, also being able to reverse the low molecular weight heparins, which protamine cannot do. So, it's basically makes cardiothoracic surgery easier and safer for physicians by having a drug that's safer and easier to use than protamine.

INT: Wow. And, who would have even thought that - that a drug like protamine would because of how it's produced, would have allergic, but a lot of people are allergic to fish and such. And, I imagine that's something if they're going to go in for cardiothoracic surgery, that - that they have to find out before they go in there?

DR. L: It's a problem. Now, we've spoken with cardiothoracic surgeons who have told us that for them the most difficult and dangerous part of the surgery is giving protamine, because you never know how a patient is going to react. And, even though the allergic reaction rate is low, it can be less than one percent, but when it happens, it can often be fatal. So that's a serious problem, which makes these surgeries much more difficult than they need to be. So, our goal is to have a drug that reverses heparin like protamine does, but doesn't worsen the bleeding, doesn't have these allergic reactions. And on top of that, can also be used for reversing the low molecular

heparins. So to make the practice of medicine safer and easier, and to save money at the same time as well.

INT: And, what about the clinical trials of this low molecular weight heparin? How - how would that be - I mean you wouldn't do it during surgery and since it's a - it's a sort of a surgical aid, how would you do clinical trials on that?

DR. L: Clinical trials would basically be to use our compound as an alternative to protamine. So, at the end of the surgery, at the end of a bypass surgery for example, a patient would be given our compound instead of protamine. So, the idea is to see if can we normalize blood clotting time. Heparin increases blood clotting. This makes the blood clot much more slowly, which is good during the surgery. But, afterwards, we want the blood to clot normally. The clinical study basically would measure blood clotting time when the patient goes into the surgery. Then, measure blood clotting time when they're on heparin. Then, administer our test compound. And see if we can normalize blood clotting time. Can we bring it back down to normal levels? We've shown in many animal tests in rats, and mice and other animals, what we can do is completely normalize blood clotting time with just a single injection. We've also shown we can do the same thing in whole human blood. And, the next step now, as with the antibiotic program, is file the IND, so we can start human clinical studies, which we also hope to do early next year.

INT: And, because this is synthetic, it wouldn't - it wouldn't have the reaction. Now, has there been any controversy, Doctor Landekic, about the fact that these things are synthetic, your polymers and - and the antimicrobial, the anti infective drugs, is there - is there an advantage to the synthetic that because it doesn't have allergic reactions, that sort of thing, or disadvantage, maybe I should ask you? We only have a couple minutes left. But, I wanted to ask you. Are there disadvantages to the synthetic versus the bio?

DR. L: The vast majority of drugs that we use, Melanie, are synthetic, whether they're oral or IV. The vast majority of drugs, probably over ninety-five percent are synthetic. Synthetic compounds are small synthetic chemicals are usually much easier and much cheaper to make than proteins. They're also generally much easier to give as drugs. One of the big problems with proteins is that the human body will recognize the foreign protein and reject it, which is what happened when people tried to use the animal host defense proteins as drugs. So, the human body rejected those. Proteins can be very specific, work in a very specific fashion. But, unfortunately, they also have all of these many disadvantages. So, on balance, because these are small molecules, synthetic chemicals are preferred because they're cheaper and easier to make. They're easier to formulate and administer as drugs, they're usually the formulation of choice and the path of choice for developing a

drug product.

INT: Wow; that's just amazing to me. And - and I can see the far reaching implications of everything that we have discussed today. And - and I want to definitely thank you so much for being on with us. I think we learned a lot.

DR. L: Well, Melanie, it's been such a privilege and such a treat and an honor to be able to talk to you and talk to your listeners about what we're doing at Poly Medix. Thank you so much for giving us this opportunity.

INT: Well, I - I really appreciate it. And, I - I hope my listeners will go on to [polymedix.com](http://polymedix.com) and scroll around and learn about what you're doing, because this is technology of the future. And, it absolutely and now I suppose and so it's absolutely fascinating to me. And, I hope my listeners enjoyed the show today. And, I want to thank again Doctor Nick Landekic of Poly Medix. And, you've been listening to Health Radio. So, thank you so much for listening. And, I hope that you will have a great day. And, we'll be back again tomorrow on Health Radio. And, thanks again for listening. So, have a great week - have a great day. And, we'll see you tomorrow. Thank you. Bye.

END OF INTERVIEW

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