

DEPARTMENT OF DEFENSE BLOGGERS ROUNDTABLE WITH COLONEL ROBERT VANDRE, PROJECT DIRECTOR FOR THE ARMED FORCES INSTITUTE OF REGENERATIVE MEDICINE VIA TELECONFERENCE SUBJECT: STEM CELL AND TISSUE ENGINEERING RESEARCH TIME: 2:01 P.M. EST DATE: THURSDAY, NOVEMBER 20, 2008

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LINDY KYZER (Army Public Affairs): Again, this is Lindy Kyzer with Army Public Affairs, thanks so much everyone who dialed in. We are very pleased to have with us Colonel Robert Vandre -- did I pronounce your name correctly?

COL. VANDRE: Yes.

MS. KYZER: I tend to mess that up every time. But he's the project director for The Armed Forces Institute of Regenerative Medicine. I think most of you got the press kit. There's also information about what they're doing over there -- really compelling interesting stuff. So he's just here to talk to you a little bit about the work that they do over at The Armed Forces Institute of Regenerative Medicine. So I'll go ahead and turn it over to him for his opening remarks. Thank you again so much for joining us on the line, sir.

COL. VANDRE: Okay, well I don't know how much you all know or have read about The Armed Forces Institute of Regenerative Medicine but I'm going to call it "the firm" for the rest of the conference because it's a lot easier to say.

But essentially I would just like to let you know that, you know, this is a first-of-its-kind kind of a thing. I don't know of any other collaboration where we've had the Army, Navy, Air Force, Veterans' Administration and the NIH all working together on something. I've never heard of that before. So that's a first. And really what our goal is, is to take -- essentially the DOD is putting in -- with the help of the VA and the NIH we're putting in about \$100 million in funding for the next five years, and then the universities that are receiving this funding are putting in about \$80 million of matching funds, mostly from their schools and their states. And essentially what we're doing is building on the foundation that the NIH has made.

Over the last five years or so the NIH has spent between 500 (hundred million dollars) and \$600 million a year on stem cell and tissue engineering research; mostly basic research. And what we really want to do is to help our injured warfighters by taking that research and pushing it into clinical trials so that we can actually get something that can help somebody sooner. So that's essentially the goal of the firm and we have about 27 universities and about two dozen companies altogether, working together, in the firm -- and two consortia. And the Institute of Surgical Research is an Army lab and also a burn unit and a

trauma unit at Brooke Army Medical Center are all working together to find these solutions.

So at that I'll open time up for your questions.

MS. KYZER: Okay, great. We'll go ahead and, like I say, take some questions from folks. We'll start out with Kat. Did you have a question?

Q Yes actually I did. And since I'm guessing one of the things that we're hoping to move towards is assisting with amputees or reattaching limbs, what are we looking at for success rate over like nerve damage or regenerating muscle tissue?

COL. VANDRE: Right now we have a different thrust in all those areas. So we actually are working on regenerating peripheral nerves -- which is obviously a big problem. We're working on regenerating muscle tissue and bone tissue, cartilage, all of those separate things.

Of course our goal is, you know, in a few decades to actually re-grow a limb. But at this point, you know, a doctor, when they get a severely injured limb, they have the immediate decision do I amputate or not? And we have guidelines, you know, that they follow to kind of -- you know, like if you have a limb that won't move and it hurts a lot, you're probably better off having it removed, but -- you know, so there's always this how much functionality and stuff. And if you could -- you know, maybe you're missing just a piece of bone or, say, a peripheral nerve. If you're missing a nerve you might have no movement of the limb even though everything else is perfect, but you amputate it because it can't move. But if you could regenerate that nerve then of course you could save the limb.

So at this point the things that are nearest to the clinical trial stage are things that are small things, like re-growing pieces of muscles that are gone or pieces of bone or sections of nerve. And of course those things are things that will save limbs from being removed. And the actual taking all of those building blocks and building an actual limb is much more complicated because you have to put all those things in layers -- and you know how complicated limbs are. So I hope that answers it.

Q Yes thank you.

MS. KYZER: Okay. And Brian, did you have a question?

Q Yes, hi, Brian Jordan.

(Cross talk.)

Q When I got on the phone it was already 2:00 p.m. but the conversation seemed to be well into it. So yes I do.

I was wondering, when we ran a story on something like this a few months back some of the comments from people were to the effect that they know this is where very, very small children might lose a finger and it had grown back naturally. Is that urban legend or is that something that very small children are capable of doing?

COL. VANDRE: Newborns -- it's possible, I guess, with newborns. I've never heard of it much older than that. In the womb you can do all kinds of

stuff to fetuses in the womb and they'll re-grow. But I've heard of newborns re-growing fingers.

Q Mm hmm. Okay.

MS. KYZER: Okay. We now have two Brians on the line so I have to be more careful. (Chuckles.) So Brian Carroll, did you have a question?

Q Yes Lindy.

Hey, sir, thanks for taking the time out to do this. And one of the questions I have for you deals with the burns. And I know -- unfortunately, when I was down at Brooke a few years ago some of the stuff they were doing -- I see within some of the pre-slides for the briefing that Lindy sent out a lot of the talk you guys were having about the burns and the inkjet printing and stuff like that with it. What are you seeing right now as far as where you want to go in the next year, two years, three years on where -- what are the goals that you guys have on trying to address the problems that we're having with a lot of the severe burns that are coming out of theater?

COL. VANDRE: Sure. We have essentially two technologies that -- actually three.

But -- there are three -- we're working, one, with artificial skin and we actually have -- one of our members had actually just finished a clinical trial, Phase II clinical trial, where they take the patients stem cells and grow skin. And they have the feeling that if they were to ramp up with really a big production they could actually grow enough skin in two weeks to cover your whole body.

That's a big problem. If you have, say, a 70 percent burn, that means you only have 30 percent of your body left with skin on it. So you have to graft and the only way to cover it -- usually they'll initially cover it with maybe cadaver skin or something, you know? But that all falls off because it's not you and it's dead. So that's just like a Band-Aid kind of immediate covering. But they have to do these skin grafts where they just take, you know, some skin off the area that's good and then they patch it on to a spot that's bad. And over a period of time that sort of looks like -- you know, if you're flying in the air and you look -- go over part of the Midwest where it's all farms and you see all these rectangles of different colors, you know? The skin just -- you can see where each separate graft was put on, you know? And so the ability to grow in two weeks enough skin to cover the whole body with your own cells so there's no rejection looks very promising. So that's one of the things we're working on.

We also are looking at reducing scarring with two different methods. One is using dermal stem cells and there's some actual small number of clinical patients who have been helped. You know, when you get a bad burn you get this really thick scar, and a lot of people it makes it so you can't move a joint, you know, because it's got so much scarring on it. Maybe you can't even move your hand because there's so much scarring, you know, of the soft tissue. And they've found with these dermal cells if they inject them into the scar that it loosens it up over a period of a month or so. And so we're looking at that and also fat. Believe it or not fat -- injecting fat into scars appears -- your own fat, obviously, so it won't be rejected -- tends to reduce scarring as well. So those are the things that we actually think we can get into the clinic within the next year.

Q Okay, great. And if I could, one follow-up question for you.

MS. KYZER: Yeah, that's fine. Q Okay. Looking at a lot of the stuff too with both the re- growth and reattachment for amputations and, you know, that whole host of the side of things, are we going to see something where in-theater medics can treat with something that will begin that process or hopefully prevent the situation where, you know, 12, 18 hours go by and reattachment of the limb is no longer feasible because it wasn't packed in ice or something along those lines?

Is there anything that you guys are seeing that either powder form like I talked about with some of the powders that get put in the fingers or anything of that nature that could help that process so that possibly you wouldn't have the loss of a limb that could be reattached, even forward in-theater sort of thing?

COL. VANDRE: Really the -- from what I gather from the theater, most of the limbs that are lost aren't reattach-able, they're just mangled. And --

Q I saw a lot of that but I'm just thinking of two instances I know of -- you know, situations happened where it would have been possible, you know if we had ice -- things that you would see in domestic U.S. sort of thing where it was a possibility. Is there any research going down that one, not really?

(Cross talk.)

COL. VANDRE: -- I haven't heard anybody address that at all. So I hadn't heard that there were even that many, you know. So that's a -- you know, if there's enough of them to make it worth -- you know, medics can only carry so much stuff. And if the probability that any given medic is going to run into something like that, you know, is really small then they'll never carry the stuff, you know? But, you know, of course in Iraq right now -- and probably in Afghanistan too -- most of our medics are mounted in a vehicle where they have more room. But it will all boil down to what is the chance -- you know, what's the probability that somebody is going to have a limb be detached that could actually be saved? But you're right, limbs, if you can get them on within four hours they can be saved. There's no doubt about that.

One thing I didn't mention on the other question, the very first question, is we are working with transplants. Limb -- we're looking at limb transplants and face transplants. And right now -- at least that's in our plan for right now. We're going to ask -- actually our board of directors is made up of general officers from all of our funding agencies. And we're going to ask them if it's okay to stay working on transplants.

But at this point we are -- transplants are a little bit controversial because, you know, with standard transplants you have to have anti-rejection drugs. And those drugs are pretty toxic really. I mean, they have a lot of bad side effects. And so you get somebody young -- most of our injured war fighters are young and so then, you know, somebody that's in their 20s and you have to have these drugs, it's -- like 90 percent of the people that have to take the triple drug therapies develop diabetes -- that's kind of tough. The rate of cancer is way higher and stuff like that. Infections are higher. So in the past, people have only wanted to do lifesaving transplants, like hearts and kidneys and livers and stuff -- and lungs -- but they always thought hands and faces were a nice-to-have rather than -- although, you know, if you lose both hands, dang (chuckles) you can't do much with both hands missing.

But they always felt like, wow, should we subject somebody young to this for -- with all the bad side effects? Actually within our consortia, there are two different methods right now of what they call reducing these drugs. They actually take bone marrow from the donor and put it in the recipient's bones so that it coincides with the bone marrow that you -- say you're going to get a transplant. They would take some of the marrow out of the person that's giving you the organ, the arm or the face or whatever, and they stick that in your marrow and they suppress your marrow with either chemicals or radiation. And so your marrow doesn't attack this new marrow.

And what happens is that over a period of time you can actually get what's called chimerism and the person becomes tolerant of the new marrow. And of course if they're tolerant of the new marrow they're tolerant of the limb or the face or whatever they've got. And they've actually used this kind of technology in some kidney transplants and other solid organs. And they've had patients that have actually had to have no anti-rejection drugs whatsoever. They become completely tolerant of their donated organ. And the other ones that don't become tolerant, most of them are reduced from triple therapy to maybe one of the drugs every other day kind of a thing so that the effect of those drugs is greatly reduced.

So we have thought that if we were going to look at transplants, we ought to look at transplants where the drug therapy's less so that there's not as big a --

Q Mm-hum.

COL. VANDRE: -- controversy over it.

Q No, that's awesome.

And thank you sir, and thank you for all you guys are doing also; it's vitally important and it's great to see.

COL. VANDRE: Thanks.

MS. KYZER: Great and Davi Morrison (sp), did you have a question?

Q I do. When you're talking about organ regeneration I was wondering if there has been any talk about using that technology to possibly cure diseases, say, like diabetes by creating a new pancreas. COL. VANDRE: Actually there's a lot of work going on in that. We're not doing that in the firm because we're just doing the five areas that are listed in our packet. But the NIH is spending a lot of money on that, because you know, that's huge, I can't remember what percentage of the U.S. population has diabetes but it's like over 10 percent or something. It's a huge number of people -- millions and millions.

And yeah, stem cells, they actually can grow these cells in your body and I would expect that stem cell therapy for diabetes to come out within the next decade.

Q Okay. Very cool. And with the burn repair, I've never heard of this spray gun that was in the presentation that was sent out.

COL. VANDRE: Mm hmm.

Q How does that work exactly?

COL. VANDRE: It's -- what they do is they take your own cells out -- pretty much all of these use a similar kind of thing -- you know, you always try to use the patient's own cells to get rid of the rejection problems. But they take your own cells, grow them in culture and get a bunch of them. And then they stick them in that gun and spray them onto a fresh wound bed and the cells differentiate in there and to different -- you know, into the different layers of skin. Because they put on stem cells rather than, you know, more mature cells so that -- stem cells kind of are able to -- you know, your skin has a dermal layer that's underneath and then the epidermis on the top.

Q Right.

COL. VANDRE: And there's blood vessels in there to keep everything alive, you know, keep it all fed, and the dermal stem cells can actually form all those layers, you know. And so that's essentially -- the guy named Gurlock (ph) is the German that's doing that. And he sprays it on and then to make thicker layers he's actually putting a nutrient bed over the top of it until the blood vessels can grow in.

Q I mean, does that -- does it result in, you know, like hair follicles and you know sweat glands and things of that -- does that also get regenerated in that process?

COL. VANDRE: As far as I know no. No, it doesn't, I don't think so and I'm not -- I'm not sure about -- what are they called -- melanocytes I'm not sure about melanocytes either. I'm just not up enough on that, how that's working. But you know you have melanocytes that give you your skin pigmentation, too.

MS. MORRISON: Right.

COL. VANDRE: And of course obviously if you have a big area that's all white because it has no melanocytes and of course melanocytes I think are the parts that tan, too so you don't have any of those, you have white patches all over that's -- I'm not sure if it's got that all in there -- really if those all regenerate or not.

Q Okay. Thank you.

MS. KYZER: Okay. And Chuck Simmons, did you have a question?

Q I sure do. Thank you Colonel, Chuck Simmons from America's North Shore Journal.

COL. VANDRE: Mm hmm.

Q In the cover e-mail that came with the material, it talks about a powder made from the urinary bladder of pigs to attract and hold cells at the amputation site. If I understand the process, it requires multiple layering of the cells as the new growth comes in.

COL. VANDRE: Yeah, you have to keep applying it.

Q Okay. Does this also require the use of immunosuppressants?

COL. VANDRE: No.

Q So, the pigs cells are not going to cause an immune response?

COL. VANDRE: Yeah, there's no cells. See, what they do is they take a pig bladder --

Q Yeah.

COL. VANDRE: -- and they take all the cells out of it, but leave what's left and --

Q Okay.

COL. VANDRE: -- and what's left is this ooze of growth factors that are left. And the growth factors actually are what cause your own skin cells that are there to differentiate and grow. You saw that probably you saw the picture of the man who --

Q Yeah. COL. VANDRE: -- cut his fingertip off. We're actually doing that with some patients right now, trying it out with some burn patients at DISR (PH). There was a press conference --

Q So this is basically cell contents that's being spread, not the living cells themselves?

COL. VANDRE: It's not even their contents that they're surrounding, but it's --

Q Okay.

COL. VANDRE: -- all stuff that was secreted by them.

Q Okay.

COL. VANDRE: Yeah. If all the growth -- and they also find out that, you know, you can get -- you know you've got bladder -- what they're using I think is pig bladder, but there's pig intestine and there's different parts of the body that can be decellularized and they all have major season and what we're finding is that each one of those has a different effect on the growth. And so part of the science is not just how to make the -- you know, to decellularize the bladder -- the different body parts but to actually know which parts make the kind of growth you want on, you know, which part of the body you put them on and -- you know, so there's a lot of mixing and matching going on right now. It's still in it's pretty early stages.

Q Now did this fellow that's in the picture, did he have a bone grow back too?

COL. VANDRE: There's no knowledge of that.

Q There was just the end of the fingertip?

COL. VANDRE: Yeah, there's some conjecture that he had bone because it was quite a bit. I mean -- and I know on me the bone goes further than that.

If you feel your finger you bone looks like -- like I'm feeling my finger right now and it goes almost to the end of my finger.

Q Right. But unfortunately the picture of the before picture and - (inaudible) -- shot and you --

COL. VANDRE: Yeah.

Q -- can't really tell what the amputation was.

COL. VANDRE: Yeah. What I was told was it went right to the -- almost to the beginning of the nail bed.

Q So the whole -- so the whole first phalange got -- COL. VANDRE: Well, no, the first phalange goes clear to your knuckle, your first knuckle.

Q The third phalange.

COL. VANDRE: Or third phalange, whatever it is. (Laughs.)

Q Right. (Cross talk.)

Q No I don't, I don't --

COL. VANDRE: I'm a dentist, you know, I took that stuff 30 years ago in dental school. (Laughs.)

Q Well then -- all right, let me speak to your expertise. What are we doing for teeth in this regard?

COL. VANDRE: In this regard we're, it's in the area of facial reconstruction and we're not really -- you know right now teeth can be replaced pretty well with implants -- you know, that's very mature technology, it has a 98 percent success rate. So it's extremely -- now some -- you know, the NIH is actually paying scientists to actually figure out how to regrow teeth completely, you know, with stem cells. But we're actually looking more at regrowing the underlying structures like the bone and the cartilage and the muscle and then for teeth once you get that regrown, you just stick in some implants. Well, that's our short term right now. That's how we're working it.

Q Well -- and having been born with a split left cleft palette, that also holds promise for some necessary repairs that very young children are having surgery for.

COL. VANDRE: Oh, yeah, I mean there's pretty much they know how to regrow that bone now. I don't know if they're trying to regrow the bone in palettes or not but that technology exists right now, although it's pretty wild stuff still but I wouldn't be surprised if within a decade they can regrow all that bone back. The lip -- you know, the being able to regrow muscles is not as far along. But we are working on that. But it isn't as far along as bone.

Q Thank you, Doctor.

COL. VANDRE: Mm hmm.

MS. KYZER: Okay. Great. And it sounded like we had a couple other people join us on the line after we got started. Is there anyone else on the line who hasn't asked a question yet who would like to?

Q Yes, my name is Brian Wong (sp) I'm with nextbigfuture.com, and my question was in regards to the -- (inaudible) -- if the work on being able to get people to generate -- (inaudible) -- and beyond what they've done there?

COL. VANDRE: What was the -- (inaudible) -- I can't remember?

Q Hang on a second, let me pull up -- actually I think the person that actually -- part of the consortium that you guys have, let me just --

COL. VANDRE: Is that the ear on the mouse?

Q Well ear on the mouse because they cut off the tail and got the tail regrew (sic) and they had that regenerative capability --

COL. VANDRE: Oh yeah, that's the one knockout mouse that really regrows back everything. Yeah.

Q Yeah, yeah, well and they were able to transfer the regenerative capability by transferring liver cells --

COL. VANDRE: Mm hmm.

Q -- to -- between different mice. (Inaudible) -- like, you know, beyond most mammals.

COL. VANDRE: Mm hmm.

Q Scarless healing -- let's see here, it's, abdola (sp) lapor (ph) Epstein (ph) paramac (ph) gruber (ph) University Hospital of Pennsylvania is where they were working on it.

COL. VANDRE: All right. I don't, I'm really not familiar with that so I'm --

Q Okay.

COL. VANDRE: You know DARPA is investing -- they have a program in regenerating limbs.

Q Mm hmm.

COL. VANDRE: Are you familiar with that?

Q No, I'm not.

COL. VANDRE: They, and one of our people that the Steve Battalack (sp) the guy that did that, the pig bladder stuff -- Q Mm hmm.

COL. VANDRE: -- e was a first round recipient of money from them. And essentially what DARPA -- you know you have salamanders that can regrow their arm or their tail -- if you cut it off, it forms a blastema and then that just regrows the limb. They're actually working on -- they have, I think, two universities that they're working with to try to take the cell, the gene

expression that happens in a salamander and force it into a mouse to get a mouse to regrow their leg.

Q Mm hmm.

COL. VANDRE: So I know DARPA's spending many millions of dollars on that right now. And of course if they do anything on a mouse that looks good, you know, we would probably take that over into the firm and use that technology on a higher level animal -- you know, possibly to transform into Klinkatrus (ph), hopefully someday.

Q Okay. So let me just ask a couple of, hopefully, quick separate questions here.

For that pig bladder thing on a fingertip, people -- I understand, it was done by a guy who took photos of it. You guys confirmed that that absolutely worked, right? And have done some further tests?

COL. VANDRE: There's been two people that had that happen to them. And now we're trying it on some of our patients.

We're not -- as far as I know, we're not sure the bone grows at this point. So it's still pretty early.

Q Okay.

COL. VANDRE: It's not miraculous. It's not going to be the "be all and end all", it appears, at this point.

Q Right. And then in regards to making transplants less immune rejected, you know, that recent work in Spain where they had that trachea implanted into a person. They had taken the trachea and they had removed certain cells that would cause rejection, then they marinated it in the person's own stem cells.

COL. VANDRE: They took all the cells out.

Q They took all the cells out?

COL. VANDRE: Yeah, and then repopulated with the person's own cells and implanted that.

That's a real common strategy right now that's happening quite a bit. Can you hear me okay? Q Yes, I can.

COL. VANDRE: All right. My phone's acting funny.

They've actually -- they have been able to take mouse hearts and de-cellularize them and leave everything else -- sort of like what they do with the pig bladders and stuff. And then they repopulate it with cells from the recipient mouse.

And they've been able to make these hearts beat and plant them into mice.

So you know, that's essentially what they did with that trachea. They took a trachea out of a person who'd passed away, de-cellularized it so it

wouldn't be rejected; repopulated it with the lady's own cells and stuck it in her. So that's a common thing that they're doing with stem cells and different body parts until we can learn how to -- it'd be nice not to have to have a donated body part, because there just aren't very many of those around. There's way more people that need transplants than people that can give them up -- at least at this point.

And we're actually working with different kinds of biodegradable matrixes that would take the place of the actual heart, you know, that's taken out of somebody. I can actually see them being able to do that with hearts someday.

Q Okay, great. Thank you.

MS. KYZER: Are there any other questions from persons that haven't yet asked a question?

Okay. If that's the case, we'll go ahead and wind down. If anybody has any follow-up questions that we didn't get to, you can go ahead and send me an e-mail. I'll make sure to forward those onto Colonel Vandre and we'll get those answered for you.

Thank so much everyone for joining us.

Colonel Vandre, did you have any closing remarks?

COL. VANDRE: No.

MS. KYZER: Okay. Well, thank you.

Q Thank you very much.

COL. VANDRE: I'd be happy to answer any questions, though, if -- is there time for any more now?

MS. KYZER: Yeah. If there's only a couple out there and you have extra time, sir. Q Lindy?

MS. KYZER: Yes?

Q A quick yes or no.

Doctor, you're talking about adult stem cells for the most part, correct?

COL. VANDRE: Yes. Yeah, we do have some less mature cells. Like right now, we have umbilical stem cells and stem cells from placentas. And those appear to be extremely interesting, because one thing -- they're very plentiful. You know how many umbilical cords and placentas are thrown away every year. I don't know how many it is. It's millions.

Q Yeah. One for each birth.

COL. VANDRE: Yeah. I mean, they're all over the place. They're just essentially trash, you know. But those cells can be differentiated into anything.

They have -- appear to have as much potential as fetal stem cells, but the nice thing is there's no controversy over them. The other thing is that they're not as -- fetal stem cells are kind of wild in that they're very undifferentiated and they tend to form tumors. As a matter of fact, as far as I know, all fetal stem cells cause tumors, because they don't know when to quit.

You know, normal adult cells, they see next-door- neighbors and they say, okay, well, let's stop. When they don't, then you get things like cancer, you know. But the fetal cells tend to cause these tumors, whereas the umbilical ones seem to be less -- they can still -- they're not as differentiated as adult stem cells, but they tend to -- but they're not as wild as the fetal. So they're extremely exciting, actually.

Q Thank you.

Q Lindy?

MS. KYZER: Yes.

Q This is Cat from the Donovan.

This is maybe a little far out, but it just hit me a little bit: When we're talking about being able to re-grow skin and possibly even bones -- and considering the current -- (audio difficulty) -- in bionic-type arms. So are looking at a potential feature where we would have a bionic arm potentially covered by real skin and/or with nerves? COL. VANDRE: Actually, DARPA is looking at that right now. They're looking at -- in their advanced prosthesis program, they're looking at actually, you know, with dental implants, you can take titanium implants and embed them right in the bone and they're as solid as teeth.

Well, they're looking at taking a prosthetic, and instead of having to strap it on, having a titanium rod coming out of it that is actually embedded right in the bone of the person and then having little motors that are hooked onto it to make the motions. And those to be actually moved by your thoughts. You know, they would actually have a grid array of wires embedded right in your brain or in a peripheral nerve, so that you think, "I'm going to close my hand" and it closes.

So there's actually work on that right now being funded by DARPA.

Q This is Brian, again, from -- (inaudible).

It sounds like that would be -- you know, the work that you're doing making muscles, skins and nerves and stuff like that, combined with DARPA, what you're talking about where you have some kind of bionic-type prosthesis, that's pretty much headed toward the terminator/cyborg-type thing, right?

COL. VANDRE: Yeah. Although we're not -- neither us or nor DARPA are working at putting the two together at this point. That's -- you know, putting -- we're working with re-growing the body using muscles, skin, nerves all that stuff; whereas they're looking at how to integrate a bunch of mechanical stuff into a body. There's no -- let's make a mechanical -- half-mechanical/half-alive kind of a thing like the cyborg things.

We're not at that -- there's no effort to take those two types of technology and fuse them; although, I could see that, you know, someday.

Q They have to look as good as the one on "Terminator" though.

COL. VANDRE: Yeah. (Laughter.)

MS. KYZER: Okay. Are there any other final questions out there?

Q I have another one for you.

One of the five areas that you're focusing on is scar and wound repair.

COL. VANDRE: Yes.

Q Can that technology be used for, like, reducing scars that are already there? I mean, like somebody who has maybe like a transplant -- or not a transplant. Like an artificial knee or hip joint?

COL. VANDRE: Actually, that's what we're working on first is reducing existing scars.

Q Okay.

COL. VANDRE: Yeah. And we'll probably go -- we're also working on, you know, the other direction of if you've got somebody that's going to end up with a scar, how do you reduce that too?

So we're doing both ends, but the one that seems the most -- closest to clinical trials at this point is reducing existing scars.

Q Okay. How is that being done?

COL. VANDRE: Well, these dermal stem cells and fat cells actually are very good about that.

Q Okay.

COL. VANDRE: I forgot. There's another one -- we've got this drug that you can put into -- that you can put into burns and the amount of burn -- the resultant scarring is much reduced. I forgot about that. That's another one that's real close to clinical trials.

Q Okay, great.

MS. KYZER: Okay. Any other questions?

Q Brian -- (inaudible) -- one more question for Bob.

MS. KYZER: Yep, go ahead.

Q At some point down the road -- and you think it's probably maybe a decade or more away -- to actually re-grow an arm or a leg. You're talking about having the science to know how to do it, but what about the length of time it would take to actually grow the thing? You're not talking -- you know, you take an arm off of an 18-year-old kid and you can now re-grow the arm, but you're not looking at 18 years to re-grow the thing, right?

COL. VANDRE: No. We're looking at growing it with scaffolds. I would guess it would take you close to a year to grow something like that.

Now, the DARPA thing -- if you can actually get a human do what a salamander does, which is what DARPA's -- you know, DARPA always tries for the homerun and that's a homerun!

Q Yeah.

COL. VANDRE: But it's also the scientific risk, meaning the chance of it actually happening -- anti-gravity would be nice too. That'd be a homerun too. Cold fusion -- they're all homeruns, but that one -- you know, salamanders can do that in a manner of weeks, I guess. So you know, but I'm not holding my breath on that one.

If they can make a mouse do it, that would mean something, you know?

Q Very good. Thank you.

COL. VANDRE: Sure.

MS. KYZER: Okay. And last call for questions.

Okay. Well, thank you so much everyone who joined us. And thank you, Colonel Vandre, for joining us on the line.

You can find the transcript at defenselink.mil/blogger. And this concludes the roundtable.

Thanks so much, everybody.

END.