Racing Toward An Ebola Vaccine, But What About A Cure?

In the absence of a proven cure for EBOLA, researchers across the country are in a frenzy to get the one vaccine which can prevent the spread of this deadly disease and also provide people offering medical care to the infected, protection from contracting the infection themselves. When are we getting this vaccine and why is there a greater buzz on prevention than CURE! Join us as we discuss EBOLA, its prevention and probable cure.

Full Transcript:

Priya Menon : Hello, everyone. I am Priya Menon, Scientific Media Editor at Cure Talk, joining you from India and on behalf of the Cure Talk team, I welcome everyone here this evening This is Cure Talk's 75th episode. We are excited to inform our audience the launch of our new website. Please do visit us at www.curetalk.com and do send in your feedbacks to priya@trialx.com Today, we are discussing Ebola – A race towards a vaccine and the other big question, what about a cure? Media's sheer coverage of the Ebola outbreak, as we all know, has been extensive. The quarantines, the deaths, survivors – we are all the time hearing about this but just to give a quick background about Ebola for our audience, here goes Ebola is a very infectious virus that transmits from person to person. It may kill 60% to 90% of all infected humans. The virus can damage blood vessels and can cause internal bleeding, shock, and eventual death. According to the World Health Organization, the current Ebola outbreak has recorded over 17,000 cases and over 6,000 deaths. Currently, there is no FDA-approved Ebola vaccine available. Now, because of this there is concern that the outbreaks will continue and spread into other countries. So, there is a lot of activity towards development of a safe and effective Ebola vaccine. The National Institute of Health is supporting many experimental vaccines and some of them are moving to clinical trials. One of NIH's collaboration is with Thomas Jefferson University which is developing a vaccine based on the established rabies vaccine, and today we have with us Dr. Matthias Johannes Schnell who leads the rabies virus Ebola vaccine efforts at Thomas Jefferson University to discuss the subject. Dr. Schnell is Director, Immunology and Microbial Pathogenesis, Ph.D. program at the Jefferson College of Medical Sciences, and Director, Jefferson Vaccine Center, Thomas Jefferson University. Welcome to Cure Talk, Dr. Schnell.

Dr. Matthias Johannes Schnell : Hello

Priya Menon : The technology used in the vaccine developed by Dr. Schnell and his team is licensed to Exxell BIO, Inc and we also have with us today Dr. Leonard Ruiz, the CEO of Exxell BIO to discuss the business side of this effort. Welcome to Cure Talk, Dr. Ruiz

Dr. Leonard Ruiz : Thank you and it is a pleasure to be with…, with you tonight.

Priya Menon : My co-host for the evening today is Julie Dulude. Julie is a professional writer. She has been writing professionally for over 15 years as a journalist and as an advertising copywriter. Welcome to the show, Julie.

Julie Dulude : Thank you, Priya. I am honored to be co-hosting with you.

Priya Menon : With that, I now hand over to Julie. She will begin with the talk. Julie, you are on air.

Julie Dulude : Yes. Thank you again, Dr. Schnell and Ruiz, for being here today. Since our time together is limited and we have a lot of ground to cover, we will dive right in.

Dr. Matthias Johannes Schnell : Okay.

Julie Dulude : Dr. Schnell, for the purpose of getting our audience on the same page, let's review some basic Ebola facts. Could you please tell us how Ebola is transmitted and what are its symptoms?

Dr.Matthias Johannes Schnell : Yeah. In general, between person…, I mean we have to decide between how you initially get infected. Its probably a virus in fruit bats where humans get initially infected and then it actually gets transmitted between humans by contact with infectious body fluid which can be basically blood, urine, and things like that.

Julie Dulude : Yeah, correct. I remember reading some articles and, you know, people were all in a frenzy about transmission, but really you have to be…, the chances are but that low. So…

Dr. Matthias Johannes Schnell : – Yeah, I mean it is…, the most dangerous thing actually to get infected is during…, when people have the highest viral load is actually at the end of the infection. Then they are highly infectious, but its not an air-borne disease. That's very clear, but you can easily get infected if you handle such patients without protection

Julie Dulude : Right. If I remember correctly reading, its really…, especially medical records who, you know, are at extremely risk.

Dr. Matthias Johannes Schnell : Yeah, they had high risk because they take care of the patient and the conditions are not always the one we are used to. So, that's the issue and you asked for symptoms. Symptoms are basically not very specific. I mean its One symptom is certainly high fever, vomiting, diarrhea, but there are lot of other viral infections where you can this kind of symptoms. So, its not very specific, like high fever is actually the best diagnostic symptom and you still don't know if its not one of the other diseases in this area.

Julie Dulude : Uhmm And are there any current treatments for Ebola or what methods are currently being used to prevent its spread for people at risk?

Dr. Matthias Johannes Schnell : So, there are two given things. First was what methods are available to prevent the spread? Its really tough to follow the guidelines from the CDC. How you have to dress? You know, you need some eye protection, probably eye shield. You need, you know, gloves and booties and protective other gears and if you really follow these instructions, then you certainly shouldn't get infected by taking care of patients. Umm… The other thing you asked are there any therapies and, you know, there are some therapies, but they are all experimental. I mean, we have to realize that before that current outbreak, there were a lot of things in development, but there was really not the support you need to get such things. There was only a limited number of approaches in the clinic. So, yes, there is some therapy, does it work? We really don't know because it was very limited tested in patients. So, the answer is perhaps we don't know yet.

Julie Dulude : Uhmm… And for populations where Ebola is endemic, for example, West Africa. Are there any ways to just prevent the general population.., prevent the spread among the general population?

Dr. Matthias Johannes Schnell : Yeah, I mean there are certain methods. A lot of… A lot of the spread is probably also caused by cultural things like they take care of people who, you know, pass by the disease. You know, the funerals are certainly the biggest concern because of people who die. They have the highest viral load and culturally, they start washing the bodies and things like that. That's certainly something which shouldn't be done and is not done anymore. So, safe burial of this people is certainly very important and then just educational things certainly help too. So, I think this is now more in place than it initially was.

Julie Dulude : – Well, let's turn to Dr. Ruiz now and hear from him. Dr. Ruiz, is it correct to assume that the Ebola vaccines will in largest numbers be needed in poor countries, specifically West Africa?

Dr. Leonard Ruiz : Oh, definitely. You know, while there is a lot of emphasis now on a therapeutic product that could be used to treat this current outbreak or the next outbreak, what's needed long term to prevent this type of crisis from occurring again would be a vaccine, a prophylactic vaccine, and for that to be effective, it would have to… Once an effective vaccine was developed, it would have to be widely used in areas that would be at risk for Ebola infections in the future

Julie Dulude : Okay. So, the vaccines that are bring developed, it sounds like they are…, would mostly be used in areas, in countries, in populations where the Ebola is endemic. We are not talking about mass vaccinations, you know, in other parts of the world

Dr. Leonard Ruiz : – You… You are not really talking about mass vaccinations in other parts of the world, but you are talking about the vaccine used in other parts of the world, healthcare workers as an example that could be sent from the US to areas in Africa. You are talking potentially about laboratory workers that could be located outside of Africa that may be doing blood and tissue samples. I believe various military organizations have an interest, potentially companies that have operations in Africa, their workers that would be sent from Europe or the US would probably be vaccinated. So, I think overall you could see a reasonable amount of vaccination occurring outside of Africa, but the majority of doses would definitely be within regions at risk in Africa itself.

Julie Dulude : Uhmm I see and, you know, its not…, its not like we would be giving out vaccines here in the US for Ebola like a flu shot. It would be for health workers and people who have reasonable risk to be exposed to it.

Dr. Leonard Ruiz : Ah, yes. I mean once an Ebola vaccine was licensed by the FDA, in principle anyone could go to their physician and get a prescription for that to be immunized for it, but I assume the physician would ask, oh, you know, why would you want to be immunized against Ebola unless you are planning to travel to Africa or you work with laboratory samples here in the US that may originate in Africa or some valid reason, so I think that the use of a vaccine, an Ebola vaccine, for the general population in US would probably not occur unless they was a outbreak in the US. That is very unlikely

Julie Dulude : Now, I remember reading in the newspaper that the first vaccines were, at least had started being developed some 10 or 20 years ago and were put on hold because I think, if I remember correctly, they weren't profitable. So, is the production of an Ebola vaccine now, will that be profitable for pharmaceutical companies?

Dr. Leonard Ruiz : – Well, let me address the first part about the vaccines being put on hold because they weren't profitable. Really, the vaccines that have undergone clinical trials initially over the years were put on hold because they weren't effective at least in the types of testing that had been done on those vaccines. So, there really has not been a very promising Ebola vaccine that has moved forward in clinical trials, historically passed the phase 1 clinical trial testing which is mainly a safety evaluation of the vaccine, but the issue of profitability, there had been very little research in the past related to developing Ebola vaccines, you know, in the major pharmaceutical companies, vaccine companies, because the perception prior to this current outbreak is that an Ebola vaccine would not be a very profitable vaccine. It would be limited to use in certain regions of Africa, probably small numbers of patients being immunized or subjects being immunized if historically, you know, what we don't hear a lot about in the current crisis is that there's been Ebola infections in Africa going back to 1976 and those infections usually have involved a handful of patients to a few hundred patients Previously, as an example as recently as 2012, there were several countries in Africa where Ebola was identified. Total number of cases were less than a hundred. The number of deaths were less than 25, I believe. So, that doesn't really represent a very exciting market opportunity or did not represent a very exciting market opportunity for a pharmaceutical company that would have to spend literally hundreds of millions of dollars to develop and get an Ebola vaccine through regulatory approval. Well, the whole world related to Ebola vaccines have changed with the current crisis. Its been over 30 billion dollars of economic damage done due to the economy in different parts of the world directly related to the Ebola outbreak. So, there is a definite need to immunize a large number of people and I think

the pharmaceutical industry is recognizing that need where two of the major pharmaceutical companies, GSK and Merck, are currently working in the Ebola vaccine area and last week the GAVI Alliance, which is the non-profit organization funded by the Melinda Gates Foundation to provide vaccines to developing countries, pledged 300 million dollars to purchase Ebola vaccines when they are available. So, I think the market has finally been quantified as a very significant market opportunity for the pharmaceutical industry.

Julie Dulude : One more question for you before we turn back to Dr. Schnell and find out specifically about the vaccine his team is developing, but for us can you tell us briefly how many vaccines are in the pipeline right now?

Dr. Leonard Ruiz : Well, there really… In this popular press and the media if you will, there only seems to be two vaccines in the pipeline and that one is being developed by GSK and the other by Merck and NewLink, but in actual fact obviously we have our rabies Ebola vaccine that was developed by Dr. Schnell in the NIH and also there are several other vaccines that are at various stages of early development, but I think that, you know, Dr. Schnell can provide a lot more detail, but even though the media is only really covering two vaccines because they are in phase 1 clinical trials, there really are a half a dozen other vaccines in the pipeline, including our Ebola vaccine based on the rabies factor.

Julie Dulude : We will move to Dr. Schnell. So then, now is a good time to get some more detail from you about the vaccine your team is developing and how it differs from the ones in the past?

Dr. Matthias Johannes Schnell : Yeah, okay. So… So, our vaccine is actually based on an established rabies virus vaccine for humans. Its not that well known, but currently used rabies vaccine is actually an inactivated vaccine, so what we call the killed vaccine. So, its not a live viral vector like the GSK and the Merck vaccine which comes with their own problems. Its a deactivated one which is based on an established human rabies vaccine and what we did, we just put into this rabies virus one gene which encodes important antigen of Ebola virus that surface glycoprotein and we engineered the virus in such a way that now the variant which we normally use to vaccinate against rabies can be also used to be vaccinated against Ebola. So, its basically one vaccine against two diseases and what is perhaps important to know is this also addressed the previous problem with the marketability of Ebola vaccine. Because rabies is a huge problem in Africa and we thought including an another pathogen would be very helpful to make this a more attractive vaccine for these areas where we have both of these problems.

Julie Dulude : Uhmm… And what about… What is the expected efficacy of the vaccine?

Dr. Matthias Johannes Schnell : We would, you know, so that's an important point. So, actually for Ebola vaccine, there's not really any good model accepted on human primates. So, what you normally do is you immunize non-human primates with your vaccine and then you challenge them with Ebola and so efficiency of this vaccine should be that you can protect monkeys to get into the next phase which would be humans, and we can do this with our vaccine. We know that.

Julie Dulude : So, its expected to be pretty good than pretty high, the efficacy based on the trials.

Dr. Matthias Johannes Schnell : Yeah, I mean in the sense the problem, what means the problem. You really have to test it in humans. What you see in monkeys is just a hint that it may work and then you go into the area of safety. Do you have unexpected issues which we just heard from the Merck vaccine, which happened already into phase 1. So, we don't know if its serious or not, but you know, and then you have to see do you get the same immune responses which you see in monkeys, in humans. So, that's normally how you do that.

Julie Dulude : Well, that's a good sure way into safety, then how safe is the or will be the Ebola vaccine and what side effects or risks are you anticipating?

Dr. Matthias Johannes Schnell : Yeah, I mean with the rabies vaccine, with our rabies-based vaccine, we know from the million of doses which got used in humans that you really don't have major side effects except, you know, some pain at the inoculation time, but we have to see if it included our antigen if the change we don't expect it, but therefore you do a small phase 1 study to really confirm that what you expect is really true. So, I mean vaccines in general have to be very, very safe because especially for Ebola you shouldn't forget the current outbreak is certainly horrible, but we had for almost certainly only small outbreaks, so you most likely will immunize a lot of people which never will get infected, which also makes it really difficult to see if your vaccine is efficient, right? So… That's also issues and we feel because the death rate in Africa's rabies is very high, probably 20,000 people a year, we at least will protect against that and we can see efficiency of the rabies infection. So, there is a lot of, you know, justification to use this vaccine.

Julie Dulude : What will be the suggested administration then in terms of doses and population? Would… Would this vaccine be for children as well as adults?

Dr. Matthias Johannes Schnell : Yeah, that's another good question. So, the rabies vaccine is certainly…, you can use in children. You can use. So, it can be used in pregnant women. There is no age restriction because its such a serious disease. You certainly have to test it. You probably test first. The usual group of volunteers which is, as far as I know, 18 to 49 healthy adults with no so far any unexpected side effects because that's a population which can best deal with side effects. Like we had in the first phase 1 of the GSK vaccine, we had one volunteer who developed, she or he I don't know, developed a fever of about 40 degrees that certainly for healthy person is something not too bad but for older person or very young one that may be too risky. So, all that has to be evaluated step by step.

Julie Dulude : So, you are saying that there is a chance that even though this Ebola vaccine seems so promising that it still yet might fail once, you know, once we go through all the safety precautions and that even then we have to, you know, we have to see how it works with an actual human population as opposed to, you know, the non-human primates.

Dr. Matthias Johannes Schnell : Yeah. Yeah. Absolutely, I mean I just want to remind you about the HIV which was based on adenovirus, the Merck HIV vaccine, which actually failed in phase 3 and looked promising before. So

Julie Dulude : – And this vaccine is currently in phase… In which phase?

Dr. Matthias Johannes Schnell : No, I mean we talk about HIV vaccines now, but just as an example that vaccines can fail at phase 1, at phase 2, at phase 3. So, currently what we have for Ebola is only phase 1.

Julie Dulude : Okay.

Dr. Matthias Johannes Schnell : And I think most of these vaccines will move on probably to phase 2 because there may be some concerns but not that make sure that you can't move on, but then when you are done with the safety you have to show it is efficient too and it really… It uses good antibody and nobody looked so far how long will they last, right? If you give a vaccine, you need protection. You should have protection for years. That's something we just don't know because nobody looked into it except we know the GSK vaccine really doesn't provide long-term protection in monkeys. So, if that is the case in humans, then you also have to think about what you will do afterwards.

Julie Dulude : Well, let's turn back to Dr. Ruiz then for more on the business side of things. Dr. Ruiz, how rapidly can the commercial production of this vaccine take place if it successfully makes it through all the phases of the trial

Dr. Leonard Ruiz : Well, specifically for the Ebola vaccine that we are working on, we are already working with a commercial vaccine manufacturer in Germany, a well-established company that has the resources in

place that could scale up to manufacture millions of doses of this viral vaccine in a very short period of time The key is getting through the regulatory process first – the phase 1, phase 2, phase 3 clinical trials and while you are moving through that regulatory process, particularly as you get in the latter stages of the phase 2 and then the phase 3 trial to really have your manufacturing capabilities lined up and I said we have already started on that with a well-established vaccine manufacturer and I am sure the same would be true for GSK and Merck. I mean these are large vaccine manufacturing companies. They have resources available, but those resources, those plants, manufacturing plants also have to have the capacity to manufacture their particular Ebola vaccine at this point in time. So, usually a manufacturer tries not to have their plant sitting idle. They are manufacturing potentially other products. So, the changing over to Ebola vaccine requires a planning process, but both the GSK and Merck vaccines are in phase 1 trials. Normally, it would take another two years to get through a phase 2 and phase 3 trial and that would be a very abbreviated trials for regulatory approval. So, we are really looking at a two-year time frame to organize manufacturing, to continue organizing manufacturing for commercial production.

Julie Dulude : And what is the projected cost of producing vaccine

Dr. Leonard Ruiz : I am sorry. I didn't hear the first part of your question.

Julie Dulude : What's the projected cost of producing vaccine

Dr. Leonard Ruiz : Well, we really won't know that until we are actually running the final formulation through a plant, but fortunately for us with the history of the rabies vaccine and the product, the Ebola rabies vaccine that we will be manufacturing, we can extrapolate cost that have been established for manufacturing rabies vaccines literally in a number of countries around the world. Currently, a half a dozen plants produce existing rabies vaccine. So, we are quite certain we can manufacture a relatively inexpensive vaccine, potentially the least costly of any of the Ebola vaccines in the pipeline, but the thing that I think is important to mention here is that even though long-term vaccine manufacturing may be quite inexpensive, but initially that scale up for a new product in manufacturing in a plant could be quite costly. Its very unusual to produce any new product and not have some of the lot not meet your specifications and so that goes into the overall cost of the product. You know, it doesn't matter whether you are manufacturing a vaccine or any other pharmaceutical product. You know, each lot that one produces has to go through very stringent release and safety testing and during that first ramp up in manufacturing into the plant, any plant, is operating very efficiently. Some of those lots do not meet those criteria and have to be destroyed

Julie Dulude : Do you anticipate that the cost per person would be feasible enough that it would be able…, the vaccine would be able to be distributed to, you know, such large populations in Africa, in poor countries such as Africa?

Dr. Leonard Ruiz : Definitely, as well as GAVI has already guaranteed 300 million dollars to purchase vaccine initially. So, that should allow for quite a broad vaccination program in Africa.

Julie Dulude : So, how How would the vaccine be distributed? Would it be through the local health systems or there are plans for that?

Dr. Leonard Ruiz : Well, this… I don't believe anyone has a plan in place, but fortunately there is already good infrastructure for vaccine distribution in Africa for vaccines in general. In most of the national healthcare systems in the African countries have resources for vaccine delivery and then you have UNICEF and Doctors Without Borders and other organizations like that that are involved in vaccine distribution systems. So, I don't think we will need a new vaccine distribution system for Ebola. We will go to use existing vaccine distribution, but probably they will have to put in place some priority immunization programs to make sure that as many high-risk individuals in certain geographical areas get immunized as quickly as possible.

Julie Dulude : – Let's turn now to the title of the show today, which is racing towards a vaccine but what

about a cure and this is posed to both of you, so feel free to enter into discussion and the question is there seems to be a lot of work being done on an Ebola vaccine but not so much about a cure. Is prevention the only way? Are we looking into cures? What are efforts spent on a cure than prevention?

Dr. Matthias Johannes Schnell : I mean the cure is…, sort of a cure is, as far as I would say, not very visible because just of cost and infrastructure. I mean if you look… So, just let me address point number 1. If you really want to cure viral infection like polio or measles or pox virus where we did that, you have to make sure that has no animal host or its hopeless and actually that's the problem with Ebola virus. You probably have, you know, natural hosts which don't get sick and carries the virus around. So, you probably can't prevent re-infection of humans from time to time by only human disease if you can vaccinate everybody and even that is a huge problem. So, it will be very difficult and to cure it from already infected people, will be working on that, everybody works on that with antibody and you know, but that is just very, very costly and I don't think that this country has this resources. I mean we heard already that just by better taking care of people you can increase their survival rate by about 10% to 15% by providing them with fluids and things like that, but all that would require better health infrastructure. So, I actually think in the short run the vaccine is the only chance and even in highly developed countries like, you know, the US or Europe, a vaccine is always the best way to prevent disease and its relatively cheap. So, you know, its a little bit hard to imagine the cure by drugs or treatment. You certainly need to have better treatment option. You probably There are some things out there which are very likely to work like antibodies if you have the right one. We know that serum from people who were infected, if you transfer that to lot of people they actually have a good chance to survive, but as I said this all requires relatively good health system and especially its probably not practical if you have, you know, thousands of cases. It may work with if you have 10 or 100 cases.

Dr. Leonard Ruiz : Maybe I can add some comments there. There are actually quite a number of companies working on treatments for Ebola and for whatever reason they haven't caught the media attention in the way vaccine development has. You know, maybe GSK and Merck have better public relations departments to publicize what they are doing, but right now as an example, the World Health Organization is sponsoring clinical trials to look at the convalescent serum that Dr. Schnell was just talking about, meaning they are taking blood from patients that have recovered. They are processing that to remove the red blood cells and then they are giving that serum to patients that need treatment and historically these types of products have been effective in some cases with patients with other viral diseases. They are usually more effective if the serum is concentrated to concentrate what's called the immunoglobulin fraction where you actually deliver an immunoglobulin concentrate, but that's timely and costly to do that. – A great example of that has been treatments for hepatitis B and also treatment for rabies. Immunoglobulin fractions concentrates have been used historically and have been very effective, but we are talking about usually thousands of dollars per dose or per treatment rather. Here in the US, the use of antibodies, monoclonal antibodies, probably the one product that's gotten quite a bit of press is ZMapp, which was used in one of the physicians that was treated at…, one people that was treated at the CDC, but currently there is no evidence that the ZMapp, which is a mixture of three monoclonal antibodies, has worked because there really wasn't enough material available to really test it in any sort of clinical trial, but several groups are working on making more of that material and then a number of companies, drug companies, are working with any viral compound to try to treat Ebola, but again if you look at the success of chemical compounds that have been successfully developed to treat viral diseases, there are basically almost none in the market place. Its been very difficult for medical science to develop compounds that will effectively treat viral diseases versus bacterial diseases, you know, antibiotics being a great example there. So, again, a lot of activity going on but no major or actually no success was logged in the treatment area to date.

Julie Dulude : Do either of you have an opinion on government and forced quarantine?

Dr. Matthias Johannes Schnell : Pardon me. I I didn't hear the

Julie Dulude : Yes. Do either of you have an opinion on government and forced quarantine?

Dr. Leonard Ruiz : I don't because I really don't understand the logistics of what will be involved in that type of area, but historically quarantine in infectious diseases has been used. So, it not, you know, some new proposal, but I think that at least from my perspective, it would…, we will need to know a lot more details about how that would be applied.

Dr. Matthias Johannes Schnell : Yeah, I mean it can be used if its based on facts and not on elections, I would say. It certainly is effective to prevent spread, but you always have to be careful, you know, analyse and make it effective. If you tell people its area where it is, you know, if you tell people just to stay home, that may work or not, it will depend on the case. I mean, with the big flu outbreak, people stayed home and got infected through the mailman, post, you know, when the mail came. So, I think it was a little bit overdone, overstated, but it certainly can be effective. So, I mean if you come home from an affected country and run a high fever, I mean its in your own interest probably to isolate you from other people. It really depends on the case, but it has been done and it certainly would be done if there would be a larger outbreak here, I am sure about it.

Julie Dulude : Yeah. Certainly, Cuba, you know, is famous for using quarantine to spread the…, control the disease.

Dr. Matthias Johannes Schnell : Yeah.

Julie Dulude : Hello, Priya, I am going to hand the discussion back over to you then, in case there have been any questions submitted by our audience through email or the phone.

Priya Menon : Thank you so much, Julie. That was an amazing discussion, Dr. Ruiz and Dr. Schnell. Dr. Schnell, I was just listening to you talk about the immunity term period for the vaccine. Can you tell me how much.., how long would the vaccine which you are working on provide immunity? Are we talking about a one-time vaccine or are we talking about annual vaccines?

Dr. Matthias Johannes Schnell : Yeah, we talked…, you know, it really depends on what you use. If you use a live viral vaccine, you may get away with one inoculation. You actually need to get away with one inoculation because in the second branch you neutralize your vector. With our killed one so far, we go for prime boost, but it may be actually sufficient a single inoculation. Two inoculations, I think, are reasonable too, but if the vaccine which you have to apply yearly would be very, very difficult to make people to comply with, I think. I mean you know what happens with the influenza vaccine where you have to do that. The compliance rate is normally not that great, especially in countries which have not so good infrastructure. Normally, you have people going through the area and vaccinate people, so a single-shot vaccine would be certainly the best. The second best would be a long-term prime boost where you vaccinate with other vaccines which need two inoculations. There are plenty of them, but then you would hope for lost-lasting vaccine like rabies. Most people get immunized against rabies three times within a month and a lot of them have life-long immunity. That would be probably the best and if that would be possible to do that with a single inoculation, it would be even better.

Priya Menon : Yes. Thank you, doctor. I have… We have received quite a few questions from our listeners and I believe we have covered about half of them over the course of the discussion, but I think there are still some more that we can maybe touch up today. Dr. Schnell, this one I think is for you. There are quite a few issues being discussed regarding use of placebo in Ebola drug trials. What is your opinion on use of placebos and control groups?

Dr. Matthias Johannes Schnell : Yeah. This is difficult, I mean you actually can't really have a control group for experiment like that because you not even will know if its effective because hopefully you won't actually be exposed, for example. So, if you would go for a high-risk people like people which have a chance to get exposed to Ebola virus, you certainly ethically couldn't just. If you think you have a good safe vaccine, you certainly would need to give that to all the people and then you probably just would check by if in general the infection rate on first responder on nurses going down, which have a really high risk, but you

certainly wouldn't like with a regular drug design clinical trial to have control group which would be not vaccinated

Priya Menon : Thank you, doctor. Dr. Ruiz, I think you mentioned a three-year time period for commercial production of your vaccine. One of our listeners have something regarding that. He asks in the wake of testing of one of the experimental Ebola vaccine license work being stopped due to vaccine causing joint pain to vaccinated volunteers, how long would it take for vaccines to be tested and safe and made available to the public?

Dr. Leonard Ruiz : Normally before Ebola came along, a traditional vaccine testing went through phase 1 of 50 volunteers or that order of magnitude of individuals and that trial would normally take about one year and then a phase 2 safety study which may have been several hundred individuals, which would probably have taken, well safety and efficacy, would have probably taken several years, two years, and then a phase 3 trial which could have been a three-year time frame and this would have been a very exhilarated program again prior to Ebola. So, you really would be looking at, you know, a six, seven, eight-year time frame through Ebola trials. With Ebola, the regulatory agencies, both here in the US, the FDA, and in Europe, the EMA, European Medicines Authority, have agreed that they will fast track the clinical trials for Ebola. So, they will respond to all of the paperwork needed to move forward on clinical trials as quickly as possible. So, we really are seeing phase 1 clinical trials being done in very short time frames, literally six months type of time frames; the phase 2 trials that are going to be started shortly appear to also to be planned to be very short in length, approximately one year and then the plans for phase 3 trials haven't been completely disclosed, but again those tend to look like they will be a very short time frame. So, I would say from today there is a possibility that an Ebola vaccine wise could have completed a phase 2 and phase 3 trial in a little over two years. How long you would take for the regulatory authorities to review that information and approve that vaccine would probably be a very short period of time considering the urgency needed, but I mean there is a crisis going on today and there is really a need for a therapy or a vaccine today, but literally we are two years or more away from having that product at least approved by a regulatory agency

Priya Menon : Trials which normally take years and decades are being fast tracked on the time scale of weeks and months. Dr. Schnell, what could be some of the disadvantages of fast forwarding vaccine trials

Dr. Matthias Johannes Schnell : Again, I didn't What What would be advantage of

Priya Menon : Fast forwarding the vaccine trials since normally they take years and decades? So, the listener wants to know if we are fast tracking some of the trials and what could be some of the disadvantages of doing so

Dr. Matthias Johannes Schnell : I mean the advantage of doing that is that you just get a faster answer if its working and if its safe, especially if its safe and then you can go further into testing. So, it certainly is an advantage that we get a faster answer

Priya Menon : Are there any disadvantages of doing it so quick

Dr. Matthias Johannes Schnell : Disadvantages? Yeah I think I think if you follow your protocols you can get the answers just faster, you know. A lot is not only doing the clinical work, a lot is also to deal with the regulatory agency, that can take for months so, if they respond faster because they realize its really urgent, then you really can cut out months out of that process. So, it doesn't have to be a higher risk to do it fast and I certainly think the regulatory agencies will look into that that not unnecessary risks are taken.

Dr. Leonard Ruiz : – There is one… There is one area that has been shown in the past with vaccines related to risks and this is a rare risk that may show up only in very large populations. So, if one moves through quickly in small groups you may miss this rare adverse events or side effects that could occur with the vaccine, but again one has to measure the risk versus the benefit and I am sure the regulatory agencies also may have to look at that

Dr. Matthias Johannes Schnell : Yeah. Yeah. I mean if you look, you know, if you do a phase 1 and you have 50 people and you will say you get negative effect in 5, then its 10%, so that's something very obvious, you know. If you have a risk which, you know, based on our genetic which is quite different in different people, a risk which will only occur in 1 of 10,000, you know, you list only the 10,000 people, and that certainly can be easily done. So, therefore, we normally check also in vaccines in the long run and every side effect is reported and sent, its checked if that is actually related to the vaccine.

Priya Menon : Yeah. We are almost to the last question. One of our listeners write in asking that most people consider Ebola to be a disease that was happening in a far off country and now its knocking at our doors. What should people in America be cautious about?

Dr. Leonard Ruiz : Washing their hands. Washing their hands to prevent flu. You know, I think realistically the probability of Ebola occurring here, outbreak here in the US would be pretty minimal. It is like any other infectious disease and there are a lot of potential barriers in place to prevent the spread of Ebola. Even if we would have one or more individuals that would arrive in the US that would be carrying the Ebola virus, I think our healthcare infrastructure could quickly isolate and care for those individuals and prevent any type of spread that you have seen in Africa. So, I really I think that there's been too much media hype related to Ebola where it is generally lot of concern here in US and Europe and I think the probability of a spread in western countries would be very low at this point in time.

Priya Menon : Thank you, Dr. Ruiz and Dr. Schnell. We wish your team the very best in getting this Ebola vaccine ready to use and for saving other's lives. Thank you very much for being here with us today. Julie

Julie Dulude : I second that.

Priya Menon : It was great hosting the show with you. Thank you so much

Dr. Matthias Johannes Schnell : We appreciate.

Priya Menon : The broadcast link will be shared with The broadcast link will be shared with all the participants via email today and please visit curetalk.com for details on upcoming shows. Thank you, everyone

Dr. Matthias Johannes Schnell : Thank you for having us.

Dr. Leonard Ruiz : Yes, thank you for having us.

Julie Dulude : Yeah, there is a lot of hope and promise wrapped up in this. So, we wish you guys the best and lots of fast tracking.

Dr. Leonard Ruiz : Okay. Thank you very much.

Dr. Matthias Johannes Schnell : Thank you.

Dr. Leonard Ruiz : Bye.

Dr. Matthias Johannes Schnell : Bye

Julie Dulude : Bye, bye