GSK plc

GSK plc presents at Citi 18th Annual BioPharma Conference

Thursday, September 7, 2023 8:50 AM

Event Participants

Analysts 1
Andrew Baum

Executives 1
Phil Dormitzer

Andrew Baum Analyst

So delighted to introduce our next speakers from GSK, Phil Dormitzer. Phil is Senior Vice President, Head of Vaccines Research and Development. I got that more or less correct?

Phil Dormitzer Executive

Yes.

Andrew Baum Analyst

Excellent. I've also got Jeff McLaughlin from GSK IR. So thank you for joining us today.

Unsurprisingly, and Phil will be reassured, this conversation is going to be about vaccines. It would be a surprise if there was anything else. Obviously, from a commercial point of view, GSK is in a very important point because you're just launching Arexvy now. And Shingrix has obviously been a great success. You've got supply ongoing.

Andrew Baum Analyst

Maybe to kick off just into the future expansion of GSK's vaccines. We can talk about the Affinivax transaction you did.

Phil Dormitzer Executive

Sure.

Andrew Baum Analyst

And the MAPS technology. Now from the outside, there's obviously enormous race going on with the number of valencies with strep pneumonia vaccines. And I've lost track of where

we're up to. I know what you have, but I've had 30 valencies and so on and so forth.

Could you talk to the regulatory mindset and the ACIP mindset in differentiation between invasive and community acquired? And then separately, how -- for a surrogate endpoint, which is effectively what we're talking about, how neutralization are tighter?

Because this concept of interference as you increase the valencies is something which has made by your competitors. And there's a point of differentiation, and tie those together and say, why the Affinivax is different? Why does it uniquely enable you to achieve this lack of interference, the expansion of coverage? Why is that expansion significant? And will that be recognized by the ACIP and FDA in their respective recommendations?

Anyway, long, long question, lots of things in there.

Phil Dormitzer Executive

Sure. Sure.

Andrew Baum Analyst

But it's a nice place to start.

Phil Dormitzer Executive

Sure. So it is true, still at the levels of valencies where we're achieving now that increasing serotype coverage really does increase the overall coverage of invasive disease. At some point, when you get into the -- well into the 30s, there may be a point of diminishing returns. But at the point where we are now, going from 13, 20, 24, 30 and 30-plus, you still really do get better coverage of existing disease out there. Now why the MAPS technology allows you to get to higher valencies?

Andrew Baum Analyst

And maybe just before for those of you who're unfamiliar if you just give a little bit of background about the MAPS technology and just the Affinivax transaction.

Phil Dormitzer Executive

Sure. Absolutely. So currently, you have vaccines that require carbohydrates [indiscernible] proteins, [indiscernible] an example and Hib being another, rely on a conventional glycoconjugation technology, in which the carbohydrate is activated and then undergoes a chemical reaction with the protein.

And what we've seen is as you go to higher valencies, say, from 13 to 20 or so, although you do increase the level of coverage, the response to each individual serotype tends to decrease. The MAPS technology is not a conventional glycoconjugation which you chemically activate the individual carbohydrates, rather the carrier proteins are genetically fused with rhizavidin. The covalents are biotinylated just as a very simple non-covalent, but very strong interaction.

And it does appear that as you get to the higher valencies, the MAPS technology, which is

this non-covalent, but strong technology, does appear to allow you to get to higher valencies without the same degree of diminution of response against individual valencies. Scientifically why that is? It's not as entirely clear. It sort of an empirical observation that we see indeed the original interest in the MAPS technology was because it made manufacturing so easy.

It turns out that it also allows you to get to these higher valencies with continued good coverage. There's another potential advantage of the technology, and that is that the carrier proteins themselves or pneumococcal proteins, against which immunity maybe elicited. We currently judge our -- these vaccines on the basis of anti-carbohydrate immunity, the potential additional benefit of anti-protein immunity is potentially additive to that.

Andrew Baum Analyst

So just in terms of the -- because when you're referencing immunity, you're talking about neutralization titers of monoclonals to that particular...

Phil Dormitzer Executive

Opsonophagocytic antibodies typically. Yes.

Andrew Baum Analyst

Okay. So then obviously, this is a surrogate.

Phil Dormitzer Executive

Yes.

Andrew Baum Analyst

But then what I'm trying to get at is how much diminution of response is proportionate to a reduction in clinical efficacy in terms of infection.

Phil Dormitzer Executive

Yes.

Andrew Baum Analyst

And whether that is consistent across different serotypes and whether it's consistent across different ranges. And has that been fully mapped and predicted and taken into account by the agencies?

Phil Dormitzer Executive

Yes. There's actually pretty intensive -- attention paid to the individual serotypes. So for example, Serotype-3 as an example of a serotype that causes a considerable amount of disease. It is not that well covered by current vaccines.

Some of these new generation vaccines do appear to elicit better responses against serotype-3. So you do need to get into the details there a little bit because depending on what are the prevalent serotypes and what is the individual coverage on the individual serotypes does the tumor that aggregate that potential efficacy.

Andrew Baum Analyst

I meant for any individual serotype.

Phil Dormitzer Executive

Yes.

Andrew Baum Analyst

Whether a diminution of 10%, 15%, 20% and from what level and whether the impairment on efficacy is identical by serotype?

Phil Dormitzer Executive

Yes, it is not. And that's why, for example, serotype-3 is particularly important.

Andrew Baum Analyst

Because it makes relatively little...

Phil Dormitzer Executive

Exactly. It can cause a lot of disease and it does appear that immunity against serotype-3 antibody immunity, the [bacteria] appears to be able to escape more easily. In fact, serotype-3 appears that it can shed that carbohydrate more readily than it can shed some others.

So there are some means of biological differences between these serotypes. They're not all the same in their behaviors, and serotype 3 is a particularly tricky one, at least in the data we have thus far. We do see quite good serotype 3 responses, which is important.

Andrew Baum Analyst

And this is particularly relevant for invasive disease. Yes?

Phil Dormitzer Executive

Correct.

Andrew Baum Analyst

Okay. And so let's talk from a competitive scenario where we are currently with Prevnar 20 and with Merck's equivalent brand name that I forget, but you'll remember.

Phil Dormitzer Executive

It is a 15 valent conjugate.

Andrew Baum Analyst

I can't remember what the brand name is. And also with Merck's new -- well that's Merck's new entry.

Phil Dormitzer Executive

Yes.

Andrew Baum Analyst

V116, I think it is, the code number. So just taking three, how do they compare? Do they address the problem or they're still deficient in terms of what you think you could offer with Affinivax?

Phil Dormitzer Executive

There are some different strategies that are being taken. The Merck part is really targeted specifically at older adults in its selection of serotypes whereas both Prevnar 20 and the vaccines we're developing are developed -- are targeting against the entire range. In fact, the highest primitive disease remains at this point still in infants.

What we are seeing is that with the conventional glycoconjugation technology at about 20, you're really starting to see this diminution. I think the MAPS technology enables us to get beyond 20. And even at 20, there's still a considerable burden of disease left. So I think what we're really looking at with the MAPS technology is the ability to target both adults and children and to go to the higher levels of valency above 30, where we think a conventional glycoconjugation technology will have a real difficulty going.

So I think we're going to be highly competitive and say, the 24-valent space. I think we'll really start to really go where others can't go as we go up to the 30-plus space. And that doesn't take into account the potential role of anti-protein immunity added to anti-carbohydrate immunity.

Andrew Baum Analyst

And the goal would be not only to provide vaccination to naive adults, but also to adults who have been previously vaccinated with an existing vaccine because of the breadth of coverage. And the question is, would ACIP -- do you have an indication that ACIP would buy into that? Because obviously, if you want to capture that the prevalent patient population is much greater than the incident patient population?

Phil Dormitzer Executive

Well, I guess, I don't want to try and predict [indiscernible] but someone's precedent for that with the -- as the valences have gone up on other pneumococcal vaccines that reimmunization has been recommended.

Andrew Baum Analyst

Okay. And then the separate last question was on the immunity to the protein separate from the carbohydrate.

Phil Dormitzer Executive

Yes.

Andrew Baum Analyst

So in terms of immunologic mechanisms, are we delineating between B-cell and T-cell or just a broader innate-adaptive? Or is there something -- what are you thinking of? Because obviously, your comments were underpinned by some...

Phil Dormitzer Executive

Yes. I mean it could potentially -- against the protein, it could potentially be either. And I think -- certainly, it's directionally positive. How positive, the addition of anti-pneumococcal protein immunity will be -- is to be determined to what degree that will add to the anti-carbohydrate immunity. I think it's going to be a good thing.

How good a thing is going to be is it's going to have to be determined.

Andrew Baum Analyst

All right. Okay. I got it. If there are any questions in the audience, then please raise your hand. I'm more than happy to take them.

Otherwise, I'll just keep going with my list.

So Shingrix.

Phil Dormitzer Executive

Yes.

Andrew Baum Analyst

So this is launching very successfully. There has been some recent data on prevalence of dementia in patients who have vaccinated or not. It's not entirely surprising. It's consistent, perhaps what one might expect. The problem is what you do with it.

Because you're never going to be able to run a trial in order to demonstrate this prospectively. And so it's a kind of interesting observation that fills in to our evidences that viruses of the pathogens have long time implications, but what you do with it.

Unless I'm missing something, I was going to stop there and say, "Well, then let's segue to the different targets, but also with long-time -- long-term sequelae, like Epstein-Barr virus." And that would seem a more interesting prospect.

Phil Dormitzer Executive

I think they're both interesting. First thing we want to do is understand the effect with dimension, which was actually observed initially with Zostavax rather than with Shingrix. Shingrix is a much more effective anti-varicella zoster vaccine. So certainly, we now want to extend the observations that were made with Zostavax to make sure and confirm that they are there with Shingrix as well.

Andrew Baum Analyst

Has that -- it was a preprint from memory. Has it been subject to peer review yet? Or is it still

preprint?

Phil Dormitzer Executive

I don't know who said it is peer reviewed. I see there is a lot of interest in. So actually, there are multiple studies looking at existing databases. Dementia takes a while to develop. So it's still interesting looking at surrogate markers that may be able to get indication earlier.

Trying to understand what is the mechanism? There's an association goes from [indiscernible] results back to try and understand the mechanism is very important.

Certainly, looking at the principle of Shingrix, which is different from that of most antiviral vaccines. Most antiviral vaccines target the entry apparatus, whereas Shingrix appears to target the immune evasion apparatus. And we're certainly very interested in seeing to what degree can that principle be extended beyond just current Shingrix to -- other pathogen including Epstein-Barr virus as well.

So we're very interested in understanding what we see with the current candidates as well and also about generating additional candidates that can target other herpes viruses using the same basic principles.

Andrew Baum Analyst

And do you have the herpes simplex virus in your portfolio or not currently?

Phil Dormitzer Executive

Yes. In the Investigational, but yes.

Andrew Baum Analyst

In which phase and like...

Phil Dormitzer Executive

And I would say that would be an immunotherapeutic. So that will a little bit different in that -- we'll be looking at -- we are looking at people who already have genital herpes and [indiscernible] recurrences, which gives you unlike trying to [indiscernible] in fact the people who have herpes -- genital herpes, it comes back a lot, so much more power to be able to show an effect.

Andrew Baum Analyst

Yes, it's much more manageable.

Phil Dormitzer Executive

Yes.

Andrew Baum Analyst

Monetizable asset. MenABCWY. You're also doing a gonorrhea. So there was some interesting data that I hadn't previously seen that regardless of the gonorrhea antigen that I

think ABC or one of the serotypes in that is associated with a reduction in gonorrhea. MenB component which is interesting and unexpected.

So could talk to that and whether there is any indication that the regulator is going to consider that? Or whether that's just an interesting anomaly and the focus should be on gonorrhea? And then maybe talk to -- because obviously, MenB is available as a vaccine including one of yours, and ACWY is available as a vaccine. So the merits in terms of commercial uptake of having an all-in-one and how that fits into the schedule, so two things.

Phil Dormitzer Executive

So the epidemiological observations that link receipt of Bexsero to reduction in gonorrhea are very interesting. Now those are not randomized to control [indiscernible] to look at the outcome on gonorrhea. But we do have an actual gonorrhea vaccine that is targeted.

And that's another one of these cases where if we go into a high-risk population, attack rates can be high enough that you can start to generate efficacy data. So it is certainly of interest that we see reductions in gonorrhea associated with Bexsero, but does not randomize placebo control trials in general. And I -- maybe...

Andrew Baum Analyst

Well before moving on to that, from a translational medicine approach, why should MenB need to have apart from that overall general immune response specifically, is there any reason why that should translate into a reduction in rates of gonorrhea?

Phil Dormitzer Executive

The component of the vaccine is thought to be most biologically plausible to bring the [indiscernible] called the OMV, outer membrane vesicle component. And that's a component of bacteria that has multiple antigens that you can come up with other reasons why there might be associations as well, both biological and behavioral in terms of who gets immunized against Bexsero, who's most likely to get gonorrhea.

So certainly interested in - this is actually a little bit analogous to what we talked about before. there is certainly interest in pursuing the association. I'm most interested in more controlled trials that actually demonstrated [designation]

Andrew Baum Analyst

Your antigen -- and so you've got breakthrough designation for gonorrhea. Where are we in terms of the clinical development plan? And would the idea be to displace the existing or the soon to be approved ABCWY with the gonorrhea component? Or would it be left out there as [indiscernible] option or would you be using to target high-risk groups? And obviously, you have your [ViiV] franchise, which means that you have an access into -- patients who may have a high risk.

Phil Dormitzer Executive

I mean the MenABCWY vaccine could be tremendously important. Ultimately, both for adolescence, going off to college for example but also in infants as well. So I'd say that the

value of the gonorrheal vaccine is separate and potentially superimposable on the value of MenABCWY. In other words, it's possible that association with gonococcal production could be an added benefit of MenB or MenABCWY immunization. But specifically gonorrhea targeted vaccine as well an independent merit and potentially separate price points as well, potentially.

Andrew Baum Analyst

One thing I can ask on Shingrix is this issue of revaccination and when and which patients, in particular. Now from the follow-up we have, I think we have 10-year follow up with very high levels, right.

Phil Dormitzer Executive

Very high.

Andrew Baum Analyst

So are there subgroups of patients that we can identify either by function, age, or they're on anti-retroviral therapy or whatever that argues for boosting.

Phil Dormitzer Executive

So I mean, eventually immunity will [fade] at a point while boosting is likely to be necessary. It is impressive that we get up to 10 years after primary immunization series that we still have such high immunity. But eventually, chances are which will be required, likely to be sooner in those who are immunocompromised than those -- in those who are not.

There is some degree of a trade-off between going for boosters, going for broader indications in terms of the age range. So right now, we have ongoing studies where we continue to monitor people. And from the original trials for longer and longer periods of time that will inform those decisions about how much you prioritize re-immunization? How much you prioritize expanding age ranges? At this point, one of the things we do is continuing to monitor because you just don't see a very rapid drop-off in immunity yet.

Andrew Baum Analyst

You have a deal with CureVac, the German mRNA company. Could you talk and bring us update with your efforts, both through influenza? And I can't remember whether you're still engaged with -- I think you're actually with COVID?

Phil Dormitzer Executive

We are, on both.

Andrew Baum Analyst

So just bring us up to speed in where you are versus your somewhat behind the two other mRNA late-stage sponsors?

Phil Dormitzer Executive

Yes. So we are in the clinic at this point with CureVac, with both influenza and COVID-19 vaccine. So that testing is ongoing, going well. We've also introduced into the clinic now an internal mRNA platform, COVID vaccine, largely with the notion that we're benchmarking against COVID, not so much because, in that case, we're after the COVID target, in particular.

Andrew Baum Analyst

And is it self-amplifying or not?

Phil Dormitzer Executive

It's not self-amplifying.

Andrew Baum Analyst

Okay.

Phil Dormitzer Executive

We have a long history in RNA at GSK as we -- of course, we have for our collaborative efforts as well. So through the Novartis acquisition, GSK is actually on the original RNA vaccine company. So we -- while I was at Novartis many years ago, we started playing them primarily with self-amplifying RNA. We have found that the reliability of nucleoside-modified RNA makes it a very attractive candidate for additional vaccines.

Andrew Baum Analyst

So the data from these agents, in influenza, they're in Phase I now. The no-go decision to take forward into registration trials will be when?

Phil Dormitzer Executive

We haven't released a specific date. What I can say is that we are very pleased with the Phase I data that we're seeing, and we do intend to progress these candidates.

Andrew Baum Analyst

And given -- so I know CureVac initially had not modified their RNA for memory.

Phil Dormitzer Executive

Right.

Andrew Baum Analyst

And then there's a next-gen, which was modified, which is the one you're talking about.

Phil Dormitzer Executive

That's right.

Andrew Baum Analyst

And so when we think about the immunogenicity and comparatively, on the basis of if the

modification is what may be contributing to the immunogenicity or not, I mean, where I'm going is basically -- is there any reason to believe that the profile -- the AE profile is going to be differentiated from BioNTech and Moderna in terms of the flu vaccine?

Phil Dormitzer Executive

Nucleoside modification is a huge step change in terms of being able to immunize tolerably with RNA. And that certainly remains true. Beyond that, the details of sequence optimization, the details of LNP composition, production, details of mRNA, manufacturing quality, you do have incremental -- additional incremental differences in terms of both tolerability and immunogenicity.

So there's no question moving from non-nucleoside modified to nucleoside-modified RNA made a huge difference. But there's further room for differentiation based on define both composition and manufacturing.

Andrew Baum Analyst

For both efficacy and safety?

Phil Dormitzer Executive

For both. And they're linked because it's the balance between tolerability and immunogenicity that you can adjust by really optimizing your RNAs.

Andrew Baum Analyst

And how much?

Phil Dormitzer Executive

And lipid delivery system as well.

Andrew Baum Analyst

And how much is volume? I mean, obviously, you were self-amplifying mRNA, the advantages you're getting less. But does that mean that you end up with less reactogenicity? Or is that -- I don't understand what are the drivers of reactogenicity.

Phil Dormitzer Executive

Sure. Sure.

Andrew Baum Analyst

Maybe you can help me.

Phil Dormitzer Executive

Yes. So it's a little different for self-amplified RNA and nucleoside-modified RNA. I like to think of nucleoside-modified RNA as kind of a sort of a plow horse, a very reliable technology. And although there are differences in terms of the ratio that you get of reactogenicity to immunogenicity, just depending on composition, in general, the more RNA you give, the more

immunogenic it is, but also the more reactogenic it is.

With self-amplifying RNA, certainly, in the laboratory, you can get tremendously potent, very small quantities of RNA in preclinical models, doing very well. The issue there is, can you scale it up, manufacture reliably at scale and keep it intact enough so that it really is a reliable product at a large scale? And so in the long run, I still have an interest in self-amplifying RNA, but for today, the nucleoside-modified RNA is much more practical.

Andrew Baum Analyst

As you think of novel targets that you wish to pursue, so we spoke about herpes simplex, recurrent genital herpes, you mentioned EBV...

Phil Dormitzer Executive

Sorry?

Andrew Baum Analyst

EBV. Do you have any...

Phil Dormitzer Executive

Very interesting EBV, yes. I mean, certainly, the link that's been shown with...

Andrew Baum Analyst

With MS?

Phil Dormitzer Executive

Yes, with MS. It's interesting. And of course, there are other -- nothing quite as big as MS in terms of total impact. The EBV has other potential...

Andrew Baum Analyst

Buckets.

Phil Dormitzer Executive

Yes, exactly. And cytomegalovirus remains a huge as yet undefeated challenge with tremendous disease burden.

Andrew Baum Analyst

And so where are you -- I think you've got an [indiscernible] for EBV. So that's good. But you have something preclinically, it sounds like?

Phil Dormitzer Executive

We have -- yes. So we have -- definitely, we have research efforts around EBV. CMV, we have one program in Phase II, also discovery efforts as well. Certainly, variances sort of principles that make Shingrix so effective, might work in other herpes viruses as well.

Andrew Baum Analyst

Okay. And Lyme disease -- if obviously, SKP had a Lyme disease virus that was withdrawn, and I seem to remember that the one that Pfizer licensed, which you'll remember, from Valneva that -- I think that one came from GSK originally?

Phil Dormitzer Executive

I think it was originally.

Andrew Baum Analyst

Yes. But this is still a major and growing and significant monetizable opportunity. So is there -- are you working in that space or not?

Phil Dormitzer Executive

It's not a current focus. Yes.

Andrew Baum Analyst

And when you look at the -- there are only a limited number of vaccine players because historically, the manufacturing, now mRNA is -- I'm not sure what the right word is maybe democratized that because the barriers to entry are somewhat lower than perhaps they were, although they're not low. But still, you need to have a certain amount of CapEx and skills.

Phil Dormitzer Executive

Certainly.

Andrew Baum Analyst

And therefore, the number of bidders is less, and therefore, it's been an attractive area to go fishing from a BD perspective, hence, you've got Affinivax. I'm not expecting you to give names, but are there novel platforms, targets, vaccines out there in the biosphere, which are of interest to you?

And are they increasing? Or is there a fairly stagnant shrinking pool, which means the growth opportunities with -- external growth opportunities of finite and therefore, all the innovation has really got to come from what you can attain internally?

Phil Dormitzer Executive

I think there's still lots of room for innovation, both internally and externally. Certainly, we think that one of our strengths is having multiple platforms. We're not reliant to any single platform. Of course, we've been discussing the most innovative vaccines.

We have over 20 licensed vaccines right now, many of which have life cycle management programs as well. So the fact that we have everything from conventional glycoconjugates to MAPS, bioconjugates in terms of the conjugation space, we have E. coli express and [indiscernible] express sub-units, extensive structural engineering subunits, adjuvant portfolio as well.

Historic live attenuated vaccines, which -- some of which actually still have life cycle management possibilities is that breadth that I think remains important. And even within categories, such as nucleic acid-based vaccines or carbohydrate-based vaccines, there remain many opportunities for innovation within the categories as well.

Andrew Baum Analyst

And then one area that we get questions on is the Vaxcyte. You obviously decided you want to go to Affinivax.

Phil Dormitzer Executive

We do.

Andrew Baum Analyst

So why -- what was the rationale? Was it the platform value of Affinivax? Was there some other -- please bear in mind, this is not my core area of confidence or I suspect many other people in the room. So maybe just give us a little bit of detail on why you went for Affinivax rather than the Vaxcyte approach?

Phil Dormitzer Executive

Sure. And I'll focus more on Affinivax rather than Vaxcyte.

Andrew Baum Analyst

That's okay.

Phil Dormitzer Executive

I think one of the original things that appealed to us so much about Affinivax was the manufacturing practicality of it. Conventional glycoconjugation has been around for a long time. And clearly, Affinivax has been a very successful vaccine.

It's a very complicated technology. There's always a complication of having to make all those different carbohydrates. But in addition with convention glycoconjugation, you have a chemical reaction for each that then causes -- allows this covalent interaction with the carrier protein.

What process initially was, how simple MAPS technology was from a manufacturing point of view. You take your carrier and you directly fuse it with [indiscernible] of the carbohydrate added, which is -- then a quite simple reaction. We really mix the two and do a very strong noncovalent interaction. They come together.

You don't have to get into a very novel processes to make the protein itself. And -- although when the initial appeals was the manufacturing simplicity, the discovering -- that you actually get better responses per carbohydrate as you go to higher valences was not intuitive that, that would be the case, but it just turned out to actually be the case.

And that does not yet take into account the additional benefit of actually having a potentially protective immunity against the carbohydrates themselves. So it's the combination of the

ability to get to higher valences, have strong responses against the individual valences combined with a great degree of manufacturing practicality that made Affinivax so appealing to us.

Andrew Baum Analyst

And we anticipate the first data in terms of just a catalyst for seeing the strep pneumonia vaccine. Just remind us the time lines. And then when are we going to see the next project using that platform?

Phil Dormitzer Executive

So there are already some Phase II data in adults. We will be -- we're starting infant trials in 2024. And in 2024, we also anticipate -- so in the first in-human trials, the 30-plus valent vaccine as well. So these will be important. Although due to a fill finish issue, we ended up stopping the infant trial and allowed us to get a preliminary look.

We're very pleased with what we're seeing and encourages us to go forward, and also allows us to refine the way we're going forward as well. So in other words, being able to tailor as we pick up the infant trials and progressive adult trials.

Andrew Baum Analyst

So aside from the Affinivax strep pneumonia vaccine, what are the pipeline projects that maybe not be so well known to the investors in the room are you most excited about within your vaccine portfolio? And one thing I didn't mention, given the ownership or majority ownership of ViiV, HIV, is there still of live interest? Or is it in the backseat?

Phil Dormitzer Executive

Yes, yes, very, very much so. Now ViiV is primarily focused on antivirals rather than vaccines.

Andrew Baum Analyst

So I just meant just because the organization...

Phil Dormitzer Executive

Overall, there's a synergy of having ViiV for HIV. A very active infectious disease division that's producing both antibodies, antibiotics as well.

Andrew Baum Analyst

mRNA. HyperHEP B.

Phil Dormitzer Executive

HyperHEP B, chronic HEP B, RNA-based therapeutics as well. Of course, the vaccine portfolio, also global health portfolio as well, with Mosquirix as just one example. The fact that we have now sort of a quite comprehensive infectious disease offering across these areas gives us strength, and I think there is actually some deep subject matter expertise really does make a difference. And the fact that we can work together across the various modalities of anti-

infective treatments and prophylactics is important.

Andrew Baum Analyst

So on HIV, do you have anything in the clinic?

Phil Dormitzer Executive

For vaccine?

Andrew Baum Analyst

Yes.

Phil Dormitzer Executive

No. I would love to make an HIV vaccine. We do need to see something that looks more promising than the HIV vaccines that have been tested to date.

Andrew Baum Analyst

[indiscernible] to date.

Phil Dormitzer Executive

So we remain open-minded. I have not found an HIV vaccine to seize on at this point.

Andrew Baum Analyst

So I've exhausted my questions. I'm looking in the room if there are any add-ons. It seems not. On that note, Phil, I'd like to thank you and Jeff, for joining us today, much appreciated.

Phil Dormitzer Executive

Thank you. Nice speaking with you.