Moderna

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Gena Wang: Good morning, everyone. My name is Gena Wang. I'm SMID Cap Biotech Analyst at Barclays. Welcome to Barclays Global Healthcare Conference. It is my great pleasure to introduce our next presenting company, Moderna. With us today we have Lavina Talukdar, SVP and Head of Investor Relations. Lavina, we know we have tons of questions to cover and many different programs to cover. Maybe I'll just start with personalized cancer vaccine since you just announced you will have data at AACR. Maybe give us a little bit color on what we could see at AACR.

Lavina Talukdar: Sure. Thank you, Gena, for giving us this opportunity to be here at your conference. Yes, we just announced yesterday that we will have the full dataset for our PCV combination with KEYTRUDA Phase 2 trial data at AACR. As you recall, in December of last year, we only released the topline results which showed a 44% reduction in the recurrence of adjuvant melanoma as well as death in a 150+ study in Phase 2 against KEYTRUDA which is the standard of care. At AACR, you'll see more than just the topline data. As you can imagine, Kaplan-Meier curves is what most of these oncology trials strive to look at and so you'll see the Kaplan-Meier curves at this meeting.

Gena Wang: Very good. We will see the same hazard ratio but with more detail and actual Kaplan-Meier curves at the AACR. I think you mentioned in the past you will continue presenting the data as data is more mature. Should we also expect this data say in the upcoming 2 major medical conferences I can think of, ASCO and ESMO? Will we also see update data from --

Lavina Talukdar: That's a really good question and an important one to cover because we are following these patients out multiple years. As the data continues to mature, we will be collecting data on that tail of that Kaplan-Meier curve. As you know, the durability of the response is something that we're very interested in, particularly given that this is potentially intent to cure, where you're not seeing the recurrence of this cancer coming back. We will continue to monitor those patients, collect that data, and if possible, show it at upcoming medical meetings throughout the year.

Gena Wang: I think giving ASCO -- actually, submission deadline is February. Do you have a sense already, like you will be at ASCO?

Lavina Talukdar: We haven't obviously said anything about whether or not we submitted before the ASCO deadline. But as you know, ASCO also has late-breaking abstracts as well. We will take every opportunity we have to make sure that that data is available as it does mature.

Gena Wang: Let's say if we see data at ASCO, what could be incremental differences versus AACR what we will see already?

Lavina Talukdar: Between AACR and ASCO, there will be multiple months that will have passed. And so looking again at that tail end of the curve and what is happening with the combination of PCV and KEYTRUDA versus KEYTRUDA alone and whether or not it continues to show a separation in those Kaplan-Meier curves is really what we will be looking for. And that is, as Stephen Hoge, our President and Head of R&D, has alluded to, the strengthening of that data also puts us in a very good position to then go to regulators and speak to them about the potential for an accelerated approval.

Gena Wang: Should I interpret that as the hazard ratio should go further down from current 0.56 when the data becomes more mature later this year?

Lavina Talukdar: Depending on what that data looks like, and we're hopeful, because time has to accrue and we have to see what that data looks like, you could see a difference in the hazard ratio, yes.

Gena Wang: How many more months' follow-up we will see at ASCO versus AACR? How many more months of data we will see?

Lavina Talukdar: I believe at least 6 months.

Gena Wang: That could be very meaningful. Okay. What about ESMO? There will be additional maybe 10 months?

Lavina Talukdar: With ESMO being in the fall, it would accrue some additional data, but there will be a cutoff so it may not be exactly on the data because as we're collecting the data, there will some cutoff time period. That's what we would likely want to show.

Gena Wang: You mentioned that you are thinking about submitting to the FDA with accelerated approval path. Is that something that you already have in discussion with the FDA or is that based on the enthusiasm from the physicians? Like where does this thought process come from regarding accelerated approval based on the current data?

Lavina Talukdar: We rarely ever speak to discussions that we've had with regulators, but it really is rooted in precedence in this space where you have seen accelerated approval on strong datasets. I'll remind everyone that this is a randomized study against an active comparator arm that is the standard of care. It's a 2:1 randomization so we do have quite a number of patients on the combination of PCV and KEYTRUDA. The safety profile is something that we're also very excited about just given what we've seen with other IO/IO combinations in the space. When you look at the totality of that picture, precedence in the oncology space for accelerated approval, and how excited we and our partners Merck are with this dataset, with the potential to continue to show advantage in the durability of response here, of survival without the cancer coming back, all of those things put together we think give us a strong position to have those conversations with regulators. But obviously, it's a decision that's made by the regulators.

Gena Wang: How soon can we hear back from you regarding this decision?

Lavina Talukdar: As we've been very transparent in the past about the path forward, when we know, we will make sure that our stakeholders know as well.

Gena Wang: Is it fair to assume sometime 2Q/3Q we will know the answer from FDA?

Lavina Talukdar: Very hard for me to pin down an exact timeframe because those discussions have to happen, we have to get responses back. You do also want to have a stronger package with as much data on that duration as possible as well.

Gena Wang: Okay. 2023 we will hear back from the FDA regarding the regulatory path?

Lavina Talukdar: Likely towards the end of 2023, possibly even early 2024 is the way I would think about it.

Gena Wang: And then you do plan to start a Phase 3 as soon as possible in adjuvant melanoma. Maybe a little bit more color there and how that will help you say accelerated path there?

Lavina Talukdar: Absolutely. We are committed, both ourselves and Merck, to move into a Phase 3 study in adjuvant melanoma. We've also talked about adjuvant non-small cell lung cancer as well and moving into that setting in a Phase 3 study. That brings up another very good point because regulators also do want to ultimately see a confirmatory study in Phase 3 for the indication if there is an accelerated approval. We are very committed to starting that study as soon as possible, so that also would give us a strong position for this accelerated approval should it happen.

Gena Wang: I think previously it was saying start Phase 3 in 2023. Is that still on track? Do you have a little bit more like clarity on timeline regarding initiation? And I don't know if you can share some color on the Phase 3 trial design?

Lavina Talukdar: Sure. We did say it will start in 2023, and I don't think we've given any additional color in terms of what quarter, but we're committed to starting those 2 Phase 3 adjuvant studies in 2023. In terms of the trial design, it'll be similar to what we did in Phase 2 as well as looking at potentially even earlier lines. In Phase 2, it was mostly stage 3 cancer patients. Could there now be a possibility to add in earlier lines, maybe possibly even stage 2? This is something that's been discussed with Stephen Hoge and he's made these comments in the past. We will be looking to possibly include other patients in that study that are earlier in stage as well.

Gena Wang: Regarding non-small cell lung cancer, I think that's also Merck announced, right? Can you help us understand the path forward? You have a validation in melanoma, but lung cancer and melanoma are very different cancers. Based on what you've learned, how would you start in non-small cell lung cancer and how would that help you accelerate the path?

Lavina Talukdar: Sure. Really, the way to think about what we believe we've demonstrated through developing PCV is a mechanism of action that's synergistic with KEYTRUDA. In the Phase 1 study for instance, we showed that there is an increase in specific T-cells that we are targeting with our vaccine, with the 20 neoantigens at the time in Phase 1, that were upregulated if you will. The clones of specific T-cells we were targeting were up more

than threefold in some of the patients that we apheresed. Because of that synergism in the mechanism of action, we think that will actually readthrough into other settings, other cancer and tumor types.

In the adjuvant setting, what we then showed through our Phase 2 study is that that mechanism does in fact translate into clinical efficacy and that's what the Phase 2 randomized study showed. The thought process there is that that synergistic mechanism of action should also then work in other cancer types, non-small cell lung cancer being one that we're targeting first here this year. Our partners Merck have a lot of experience in that non-small cell lung cancer setting, so it is really advantageous for us to be partnered with them. We will develop the Phase 3 study based on their expertise as well and we're excited about moving forward there.

Gena Wang: With lung, will you start with Phase 1 or Phase 2 first and then jump to Phase 3? Or you will just --

Lavina Talukdar: It will be a late-stage study.

Gena Wang: Okay, and would that be pivotal study? Or you will run one study first and then run the say Phase 3 study?

Lavina Talukdar: We haven't given a ton of detail on that, but you should think of it as a late-stage study. Whether it's a Phase 2 that rolls into a Phase 3 or outright Phase 3, we haven't given a tremendous amount of detail on .

Gena Wang: Okay, very helpful. Then quickly, one last question on this topic, so far, all the focus is adjuvant setting and I know I think BioTek also has something in a metastatic setting. What is your view in your future development in terms of a metastatic study?

Lavina Talukdar: We do think that where KEYTRUDA works, it's fair game for the combination to work as well given the synergistic mechanism of action that we just discussed. However, when you stratify which tumor types and indications to go after, we do have a significant amount of data now in that adjuvant setting because of this Phase 2 study. If you're thinking about stratifying where you go first based on the amount of data as a potential for risk reduction, i.e., we have a lot more data in adjuvant, it then is logical that adjuvant is where we would want to go first.

Also, there's a tremendous amount of value to the patient's ecosystem to actually not have the tumor return. That's one of the other reasons we're moving into the adjuvant setting. But we are excited about metastatic and we will move into the metastatic. And we did have some metastatic cancer patients in the Phase 1 study, head and neck is one of those. But the data that we have there is not as robust as we do from the Phase 2 study which was, again, a randomized study. It was a single arm study. We did show response, overall response rates that were strong and we did have a PFS rate in the 9, almost 10-month range. But again, in a small subset of patients.

We did expand that study from that signal finding that we found and are now waiting for additional data. It is something we will target. Adjuvant, in the adjuvant setting, we just have way more data which is why we're moving there first.

Gena Wang: That makes sense. Now switching gears to flu, I want to mention we have mixed data, the immunogenicity, and now we're waiting for efficacy data. Maybe walk us through, and I

think the last time on the earnings call was saying by the end of 1Q which is like 2 more weeks. Should we see the announcement regarding the first interim, whether we move forward or alternative steps?

Lavina Talukdar: Sure, great question. You're right that we have 2 Phase 3 studies ongoing with mRNA-1010 which is our first flu product that we want to get to market. In that very first study where we looked at safety and immunogenicity, we were very pleased with the safety profile. And on the immunogenicity, we showed superiority in the A antigens, but did not meet noninferiority in the B antigens.

This is something that really the field, even before mRNA vaccines, has really struggled with, with the B antigens. We have identified, or Stephen Hoge and his team have identified a fix for those B antigens in order to bring those titer levels higher. And in parallel, he's working on starting a study there should we need that in the data package when we move forward with the regulators.

In the meantime, we do have a Phase 2 story that's ongoing looking at vaccine efficacy. And as you know, vaccine efficacy is the gold standard in vaccinology. We're waiting for that first interim analysis from the DSMB when they actually look at that data. We did say that by the end of the first quarter, they will have looked at that first interim analysis. And once we know what that dataset looks like, we will have a better understanding of what the path forward is. A total data package is what we're really seeking to go to regulators with and so that piece of information, the vaccine efficacy, is going to be very critical for our conversations with regulators on the path forward.

Gena Wang: Let's say the DSMB, this is positive, first interim you hit. How soon will you be sharing that information? Whether a hit or not, like how soon will you be able to share with the investors?

Lavina Talukdar:

We understand that flu is an important piece of the Moderna outlook. We do plan to tell you guys what the path forward is, so if it doesn't happen by March 31 at the end of the first quarter, it will come relatively soon. I will remind everyone that we are putting on Vaccines Day which is in the middle of April which makes for a good venue for us to update you on the path forward for flu.

Gena Wang: I see. Basically, at Vaccines Day, we will know the answer based on the flu program? Like whether --

Lavina Talukdar: We should have more information by then that hopefully we can share.

Gena Wang: And then if you miss the first interim, what would be the scenario? How soon we can see the second interim regarding the data update?

Lavina Talukdar: That really depends on the number of cases. As you know, typically in the northern hemisphere, the number of flu cases really starts to dwindle in that May timeframe, so by the end of April. Depending on how many more cases have accrued, it could be relatively soon or we may have to wait for another uptrend in cases for flu which may be in the fall.

Gena Wang: Okay. Kind of thinking why the design this way. Usually, you try to have all the events in the same season. Kind of thinking like initial design, why the second interim may -- if not enough event, we will have to wait late 2023 in order to have a second interim readout?

Lavina Talukdar: As you know, it's always very hard to predict whether or not you're going to have a robust flu season or not and what the vaccine efficacy is going to look like when you're starting these studies. We haven't released the powering of the study or how many events are needed. All we've really said is that 200 events is what we've reached thus far. And that that first interim will take place before the end of the first quarter. But typically what you do see is many of these studies do go into a couple of seasons before having the full results out.

Gena Wang: If your first interim is positive, would that be sufficient? And you do have mixed immunogenicity data. If we have these 2 data packages together, would that be sufficient for approval?

Lavina Talukdar: That's really going to depend on our discussions with regulators. But one of the things to note in the flu space is that there also is precedent where B antigens have been missed in other flu vaccines, traditional flu vaccines, and yet they are on the market or approved. It is s something that I think the field is actually also grappling with. WHO has questioned in the past if B antigens are necessary in the older adult vaccine regimens for flu. And that's mainly because in that population., which will be that population that we're targeting with mRNA-1010 here, A antigens are the driver of infections and severe disease. And as you know, we've show superiority in the immunogenicity profile for both A antigens that were in our mRNA-1010 program. That discussion will be something that we have with regulators and the precedent I think helps us. It will also help us to have that vaccine efficacy data, which again, is so critical before we take that total data package to the regulators.

Gena Wang: I do want to switch gears. I want to touch at least 2 more programs. One is RSV. I think we went through the FDA ADCOM about Pfizer and GSP RSV data. And I think given the amount of questions of safety and efficacy, I think more is on safety part, that make Moderna RSV vaccine so far the clinical profile standout. Maybe you walk us through, given the timeline, if you receive approval end of this year, which means you will miss this year winter season, so how do you see the commercial opportunity in terms of RSV?

Lavina Talukdar: You're right, Gena, we have committed to filing our application with regulators before the end of the first half of this year. And even with a priority review, which gives you an 8-month review time, we will likely not be ready for the fall 2023 RSV season. We hope to have an approval by the end of this year or early next to be ready for the fall of 2024. And in terms of having competitors already start a marketing campaign to really educate consumers and physicians about the benefits of an RSV vaccination I think will play in our favor. Because remember, this is the first, or these will be the very first RSV vaccines that come to market. We're looking forward to eventually coming to market in that 2024 season where we think because of additional education on part of the industry as well as ourselves when we get out there, will increase the awareness on RSV and its implications and could help once we are on the market.

Gena Wang: Lavina, what kind of steps could actually push this up a little bit regarding the approval timeline?

Lavina Talukdar: That's really -- it takes two to tango to get all of your approvals done. We can strive to get it in as soon as possible, the filings. But then it really is up to the regulators how quickly they move even on a priority review.

Gena Wang: Okay. I think I will save the price question for future. We only have a few minutes left. The COVID-19 vaccine, you did give guidance, $5 billion, $2 billion first half, $3 billion in second half. How should we think about each quarter regarding the revenue?

Lavina Talukdar: I wouldn't call it guidance, Gena, more of a framework. Because that $5 billion does not include some key markets that we can talk to in just a minute, but you're right, we did say in that first half of 2023 we anticipate $2 billion in revenues. And most of that revenue, actually all of that revenue, is coming from the deferred product that we did not deliver in 2022. The split beyond that first half on $2 billion and $3 billion in the second half, in terms of granularity on quarters, we have not given. The $3 billion however, is for the fall season. And those are from orders that 5 countries outside of the U.S., EU and Japan, the key markets, have made during the pandemic to really lock in pandemic pricing. You should think about those 5 countries as smaller, higher income countries, so it's not a lot of volume. The key drivers for that COVID revenue this year in addition to the $5 billion is going to be the U.S. market where we are moving commercial, where pricing will go up. As well as Japan and some in EU as well. Now EU, I'm sure everyone here is aware, is locked up with a pretty large order with another company in Pfizer in the marketplace. We're not anticipating a large share there just given the dynamics of what's going on in the marketplace. However, we do think that those countries will not want to just have a sole supplier.

Gena Wang: Two quick questions. One, it seems the first half is mostly deferred. Is it fair to think that the majority will be from first quarter?

Lavina Talukdar: We haven't given that much detail, but it would be in our best interest and in I think the interest of the countries to get some of that done in that first quarter. But again, we didn't give a lot of guidance on first quarter versus second quarter.

Gena Wang: Okay, that's fair. And the second question is regarding U.S. market. I believe FDA will announce the strain by May/June timeframe. How soon will we -- first, like how the private payor market work? And how soon will we see the initial order?

Lavina Talukdar: Yeah, that's a great question, too. A lot of these conversations, or the preliminary conversations with payors in the United States, started in earnest at the beginning of this year. And those conversations actually were catalyzed after the very first VRBPAC where they simplified the vaccines that are out there in the market to just one as opposed to having the original as well as the bivalents. The other thing that comes out of that VRBPAC is this May/June VRBPAC meeting where selection of the fall strain will take place. And that I think was really the catalyst that got many of the payors that we were speaking to thinking more like this is a flu type market where we're going to see an annual update.

The difference between flu and COVID is that this is the first time we're going through this annual endemic in the COVID market, and so those preorders and orders are a little bit later than what you would anticipate in flu. I think most flu contracts are pretty much wrapping up, the vast majority of them are wrapping up by the end of the first quarter, maybe the early part of the second quarter. Here with COVID, because that strain selection is taking place in that May/June timeframe, I would anticipate more of the preorders and orders coming in post that.

Gena Wang: Okay, very helpful. I know we are running out of time. Lots of updates and thank you very much, Lavina. We look forward to tons of update starting with AACR -- oh flu, your

Vaccines Day and then the AACR data update.

Lavina Talukdar: Yes. There's lots coming out form us this year. Thank you, Gena, for having me.

Gena Wang: Thank you. Thank you, everyone.