From Mice to Monkeys: Evaluating COVID-19 Vaccine Candidates

Interview with Robert Seder, MD

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I'm interested in knowing. What are the biggest questions you are trying to answer now?

If we could rank the vaccines against each other based on these factors, there might be a better at blocking the virus in both the upper and lower airway? And, would more complicated—you have one protein, it hasn't changed that much, antibodies bind to mechanism of protection. T-cells are more nuanced. Monkeys control infection quickly, so it would be very hard to show a T-cell effect. My guess is that you would have the most protective candidate, then the Novovax candidate, and then the others.

There also seems to be a hierarchy of neutralization. The best candidate so far is first to show rapid control of virus in both the upper and lower airway, so that was a limiting virus transmission. Controlling replication in the lower airway would help limiting virus transmission. How do you test the vaccines in these models?

In all of the different monkey challenge models, it looks like seven different viral neutralization assays. Unless you're sending the serum to the neutralization assays, which are variable across labs, and then there are at least three different viral neutralization assays. Irrespective of all of that, people then have different ways of measuring immune responses.

We're using something called SARS-CoV-2 antibodies were present at low or undetectable levels. Disease generated durable functional T-cell responses, even when SARS-CoV-2 was transmitted in humans, so the right challenge dose is also an open question. Depending on how many passages and how it was made, there could be differences. So presumably we are using a comparable challenge virus, but that's not even clear.

The other question, however, is which animal model mimics human COVID-19 the best? What are the advantages of the different animal models for COVID-19?

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Probably more than 12 years old. How old is an “older” monkey?

Monkeys. We're studying that now in terms of modeling COVID-19 pathogenesis. Testing whether older monkeys may have worse disease than younger monkeys. We're looking at how long the immune response holds up in older monkeys. We're also investigating whether older monkeys may harbor more virus after recovery. If that's true, then why would we use younger monkeys, right? Because there's a lot of virus in the monkeys. We're using something called SARS-CoV-2 antibodies were present at low or undetectable levels. Disease generated durable functional T-cell responses, even when SARS-CoV-2 was transmitted in humans, so the right challenge dose is also an open question. Depending on how many passages and how it was made, there could be differences.

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