

## A Promising Update On The Vaccine We Are All Waiting For

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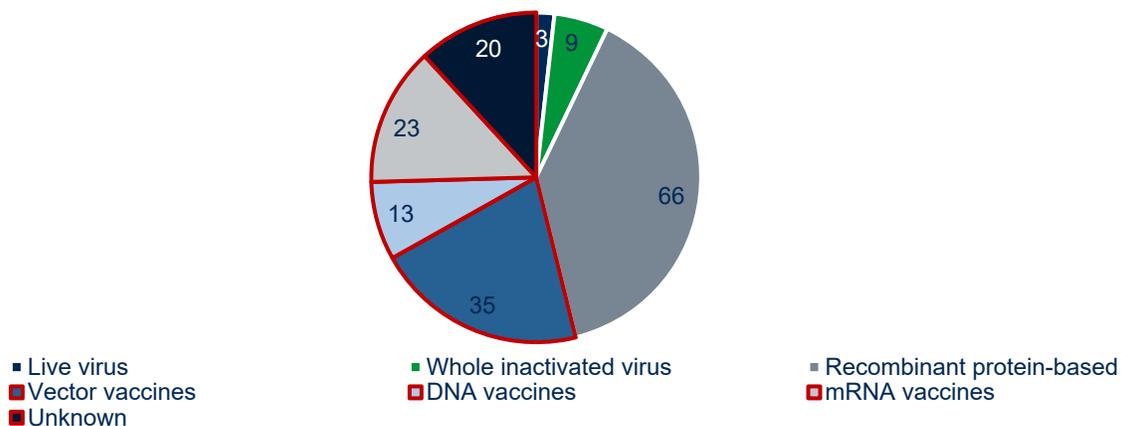
The global effort to develop a vaccine for COVID-19 has progressed at an incredible speed and is breathtaking when put in the context of typical vaccine development, which can take around a decade. This has been enabled by companies and their governmental and organizational partners investing significant sums at risk and running many processes in parallel that would usually be sequential.

When we consider the likelihood of success for any single vaccine program, the analysis is perhaps a little sobering. Drug development is an intensely complex process where any single effort is much more likely to fail than not; a common rule of thumb is that only 1 in 10 drug development projects that enter the clinic ultimately produce an approved drug. That said, we should be encouraged that vaccines for infectious diseases seem to enjoy substantially higher success rates than other areas, such as oncology. A 2018 study put the vaccine success rate at 33% vs. 13% for all areas.

We believe there is good reason to be optimistic. The pipeline of vaccine candidates is impressive, with over 160 programs and counting, including 13 that are in the clinic, several of which progressed into large late-stage Phase 3 trials in July. Three companies are also discussing the prospect of an emergency-use approval by the end of the year.

One encouraging feature of the pipeline is the diversification in approaches, as highlighted below. The benefit here is that if any one candidate fails, it is less likely to be for technological reasons that might throw doubt on similar projects. However, we should note that nearly half of these efforts are coming in novel areas (such as genetic vaccines) that have limited or no prior use in large-scale vaccine programs.

NUMBER OF VACCINE PROGRAMS BY APPROACH



Source(s): Sanofi and Barings. As of August 1, 2020.

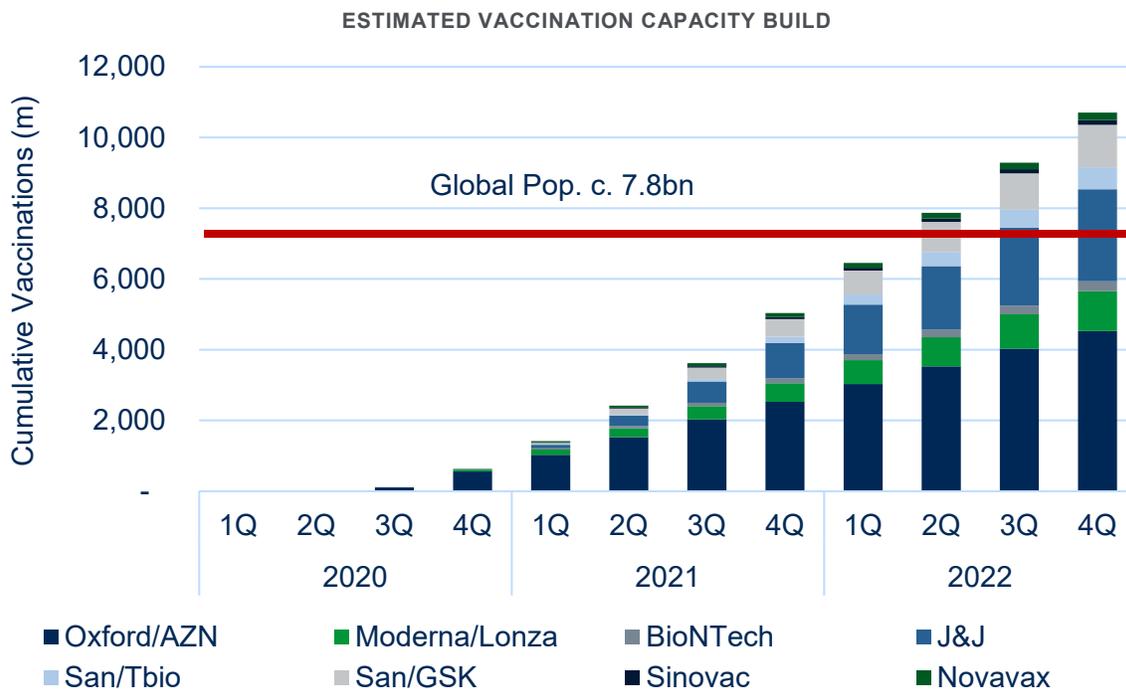
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Looking at this question another way, the track record in developing vaccines against viral diseases looks pretty strong. Our analysis found 23 viral diseases with an effective vaccine (e.g. measles), and only seven where we would state that despite considerable effort no vaccine has yet been developed, such as HIV or RSV. Furthermore, several of these have features that make them particularly intractable, which thankfully COVID-19 does not possess.

It is also worth considering what a successful vaccine may look like. Vaccines can range from highly effective—near 100% protection that persists for many years—to something more akin to the annual flu vaccine, where effectiveness ranges between 40-60% annually and has to be administered each year. While we are hoping for something that is highly efficacious, we should be prepared for the fact that the first few vaccines available may not be silver bullets. Nevertheless, even a partially effective vaccine that reduces the risk of severe disease and dying would be a great success.

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Even with a clinically proven vaccine in hand, significant challenges remain, including the manufacturing, financing and procurement, distribution and also public acceptance. Many companies have talked publicly about plans to scale-up manufacturing. The chart below illustrates how this capacity might evolve. Beyond the vaccine material itself, there is a limited global capacity of vials and other fill-finish components, and we are seeing many of the suppliers here working hard to bring up additional capacity.



Source(s): Credit Suisse, Bernstein, Companies, \*assumes dosing (amount & frequency) do not change & companies hit prod.

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