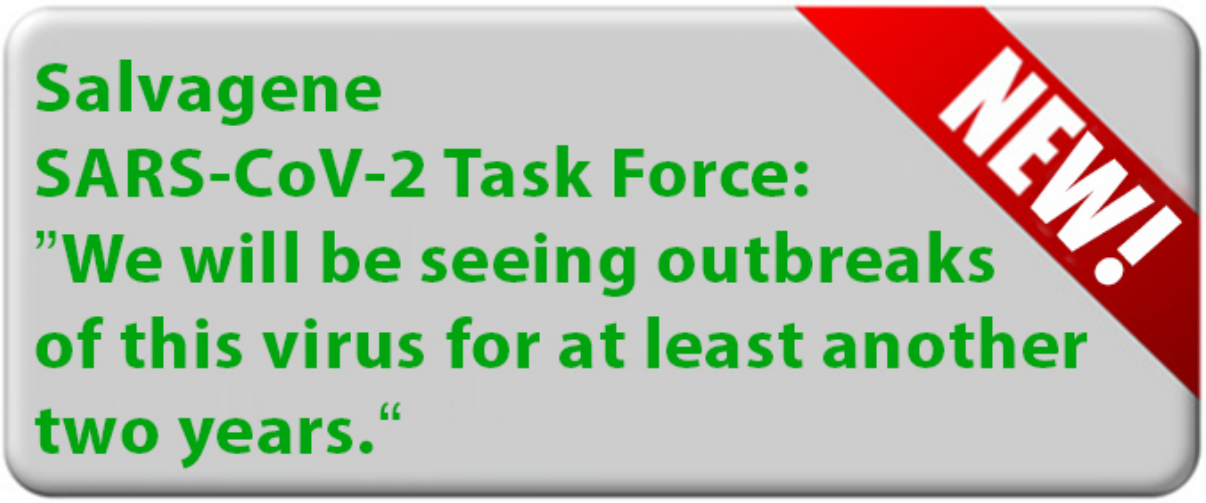
Salvagene GROUP

Business Unit: SARS-CoV-2 Task Force
Keynote: #19

May 2020



Dear Premium Customers,

Salvagene is expecting outbreaks of varying severity and in different locations around the world for at least the next two years. Consequently, the Salvagene Group will be adapting the further development of all products and services to this scenario.

Our SARS-CoV-2 Task Force was set up very early on – in mid-January to be precise, i.e. a full eight weeks before the World Health Organization (WHO) officially declared a pandemic. We have always been very cautious with our forecasts, but these have so far proven to be highly accurate, including our suggestion that an interim bridging solution would be found in an existing drug. Remdesivir, which we nominated as our lead candidate two weeks ago (Keynote 17), received emergency approval from the American regulatory authorities two days ago as the first medication for the treatment of Covid-19 patients.

We will soon be publishing a Guideline on the cases in which remdesivir offers the best chances of success and on the appropriate dosage of this drug, which unfortunately is not without some undesirable side-effects.

We are looking at several other existing drugs in addition to remdesivir that will hopefully turn out not only to be complementary in their effect but also serve as a bridging technology to a globally viable vaccine.

As we have already reported in our various Keynotes, there are currently more than 100 projects underway worldwide.

Seven of these projects have already entered Phase 1 of drug approval and testing on volunteers. We are closely monitoring all seven projects, each of which is adopting a different approach. The two exclusively Chinese projects and the one at Oxford University are very strongly regulated by the state. From a scientific as well as corporate policy angle, we consider Moderna (USA), BioNTech (Germany) and CureVac (Germany) to be of particular interest in the global search for a solution, as we are firmly convinced that this is a battle that no single company or state institute can win on its own.

The increasing politicization of the WHO as well as the unhelpful use of the veto by members of the World Security Council – the most powerful decision-making body on the planet – are worrying distractors from the development of a global solution.

We discussed the way ahead with Salvagene SARS-CoV-2 Task Force spokesman Dr. Sinclair.

Question: Of the more than 100 Covid-19 vaccine projects, only seven are at the stage where they can be tested on humans. The BioNTech project is one of them. How did they do it so quickly?

Answer: They steadily mobilized all available resources in the company from mid-January onwards. This has certainly given them a head start. It is clear to everyone that the search for a vaccine against Covid-19 is a joint project for the entire human race.

Question: What alerted you to the danger so early on? The WHO did not get around to declaring a pandemic until mid-March.

Answer: The configuration of risk factors was already looking extremely ominous in January. It was a new strain of coronavirus, so you have to start from the assumption that there is no basic immunity within the population. A study was published in January showing how Covid-19 progressed in a family that had gone to Wuhan on a short visit. From the description, it was clear that the virus is rapidly transmitted from person to person and that travelers can carry the virus to other urban centers. The study also detailed a case of illness in a child who was showing no apparent clinical symptoms but who nonetheless tested positive. These are all unfavorable factors that make regional control of an outbreak immensely more difficult. When you then consider that the epidemic had already broken out at least six weeks previously and that Wuhan is one of the best-connected megacities in China in terms of its transport links, the further course of the outbreak can be extrapolated relatively reliably on the basis of subsequent information that was forthcoming.

Question: Nevertheless, it took rather a long time for governments to react …

Answer: Most people find it difficult to imagine something that is outside their prior experience, and it was no different with this pandemic.

Question: The main thrust of Salvagene's research activities is into cancer preventive therapies and health improvements in general. Are you currently changing your customer strategy and now subordinating everything to the new SARS virus?

Answer: Our focus continues to be on health optimization and thus prevention of cancer, which remains the main threat to our health. We suspect, however, that SARS-CoV-2 not only causes Covid-19 but also many more illnesses besides. We will be saying more about this towards the middle of this month.

A solution therefore has to be found, or it will become more and more difficult to maintain our health. There are difficulties ahead in identifying such solutions.

We have to be realistic: the clinical trials that were supposed to start in 2020 cannot be conducted this year as planned because, for one thing, hospitals have other priorities attending to the treatment of Covid-19. The projects that have already started will, of course, continue. That is why some studies have been put on hold for a few months.

Question: How much should we fear this virus?

Answer: We are naturally affected when we hear that someone has lost a relative or friend to this pandemic. But we try to turn this personal concern into productive work. It is absolutely clear that this virus will unfortunately not simply disappear in the same way as a seasonal influenza – the biological characteristics are completely different. On a global scale, we will continue to see outbreaks of novel coronavirus for at least the next two years. The sooner an effective vaccine is available, the sooner we can all return to our former way of living.

Question: When will there be a vaccine?

Answer: We prefer not to speculate on a possible timetable for when a vaccine might eventually be approved. That depends on too many factors over which we have no control. We are waiting to see the results from the clinical trials. When we say two years, we are referring to the overall situation. We assume that we need an immunity of more than 90 percent in the population in order to get this pandemic under permanent control. It will take a long time before a program of vaccination reaches all corners of the globe.

Question: What if it is not possible to find a vaccine? It would not be the first time that a virus has confounded the best efforts of research.

Answer: There are indeed two other types of virus, namely HIV and hepatitis C, which mutate so rapidly in the human body that we still have no vaccine. This virus does not follow that pattern. It does mutate, but only relatively slowly. Moreover, the location at which it latches onto a human cell is quite stable. There have been successful vaccination approaches in animal models against the similarly structured SARS-CoV-1 and MERS coronaviruses. SARS-CoV-2 follows the same laws as the other members of this virus class. I am therefore very confident that there will be vaccines against Covid-19 in the foreseeable future.

Question: There has not yet been a single approved vaccine based on mRNA, a technology that is used by BioNTech, CureVac and Moderna. Research has been going on for years. Why should this prove successful now?

Answer: Every new technology in medicine takes about 15 to 20 years before it makes it to the market. In the case of monoclonal antibodies, which are among the most successful drugs today, it took more than 20 years before the first of its kind was approved for cancer. I am convinced that mRNA will be one of the key technologies of the 21st century. It has now progressed beyond its infancy. That is why the pharmaceutical industry is currently so interested in collaborative working. And in an exceptional

situation such as the present one, mRNA is in great demand because it can produce results a lot faster than the established methods of vaccine development.

Question: So, who decides which countries will be the first to have a vaccine if and when it becomes available?

Answer: This is a matter that is of great concern to us, and it is the reason why BioNTech, for example, has entered into partnerships with the US company Pfizer and Fosun Pharma from China. This gives us the opportunity to conduct simultaneous clinical trials at multiple locations around the world.

Question: BioNTech is testing four variants of BNT162. Why so many? Fewer would certainly be cheaper.

Answer: BioNTech is entering the race with multiple candidates because the company wants to diversify and optimize the probability of success. We do not yet know how strong an immune response is required to ensure optimal protection against Covid-19. It is known that different age groups react differently to vaccines. In older people, the level of protection afforded is often lower because of the weaker immune response. In their case, immunostimulatory candidates might be more suitable. In the case of children, on the other hand, vaccines are required that are particularly well tolerated. And we need vaccines that incur low production costs so that they can be rolled out quickly in low-income countries. So, in the end there will not be one vaccine, but possibly different vaccines for different population groups.

Question: Have you already thought about how much such a vaccine might cost in the future?

Answer: We do not know how much the clinical trials will cost in total, nor how high the dose for a vaccine has to be. We already

have an approximate price range in mind – we are estimating it at around the 200 US dollar mark.

Question: Moderna from the USA is currently the most advanced. How important is it to be the first to market with a vaccine?

Answer: It is important to be among the front-runners, but it does not mean that the first-comers will corner the market. In global terms, you will have to vaccinate about six billion people to immunize 90 percent of the population. Of the approximately 100 companies or institutes currently developing vaccines against Covid-19, each one of them would have to generate 60 to 120 million vaccine shots. This underlines the enormity of the challenge. To eventually vaccinate the entire world population is something that no single provider can manage. So, one way or another, the traditional vaccine manufacturers will definitely be involved in the supply chain.

Question: Some experts fear that Covid-19 vaccines could even make people sicker if they then become infected. What do you think?

Answer: There is indeed some evidence from trials on animals that certain vaccines exacerbate the disease. But other studies show the opposite. Nevertheless, it is a risk that has to be taken seriously, which is why we will observe this over a longer period of time as part of our clinical research. We will be looking to see whether the volunteers develop Covid-19 and whether this results in any severe symptoms. We will also investigate how long any vaccine protection lasts. This is why clinical trials are absolutely vital.

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