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Short Communication

Covid-19: Vaccine Effectiveness and Risks-Where Do We Stand? Julian Schlubach-November 2021

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Abstract

With the prospect of collective immunity receding, the vaccine may no longer be the ultimate solution that we would have liked to get out of the Covid-19 pandemic. The logic, the vaccines offer a solution for persons who didn't develop any immunity. However, the absence of nuances in the vaccination campaigns pushing people to get vaccinated whether they got already natural immunity or not and for all age categories, is questionable. The multiplication of injections may not either help stopping a virus we should rather learn to live with.

Introduction

The Covid-19 pandemic poses an unprecedented public health problem in recent history. The relatively high complications rate for a summer period in 2021 shed a worrying light on the pandemic perspective at the winter eve. The vaccines offered are helping to mitigate the crisis. However, the available vaccines are not as effective as hoped, especially in regard of the now predominant delta variant. The comments made in this publication are part of the public opinion debate in light of the analysis of available data and the measures taken to date to face of the Covid-19 pandemic. The worldwide pandemic statistics may not be subject to a proper interpretation while they reflect very different situations. The local climate, the seasonality between the South and the Northern hemisphere as well as the accessible health services per country are to be considered. Data analysis makes mainly sense on a relatively homogeneous geographic area. The present publication is focusing on data available for the United States of America and for France.

State of the pandemic

Worldwide data related to the Covid-19 pandemic can hardly be interpreted while half of the planet is entering the winter period and the other half the summer period. Even though the virus is spreading in summer as well as in winter, the symptomatic cases, hospitalizations and death are likely to be higher during cold days. The communication over new infections rather than over serious cases requiring intensive care is also misleading.

However, even though the number of deaths in July 2021 in France, with 17 deaths on July 16, fell to a level equivalent to that which prevailed in July 2020 [1], the virulence of the Covid-19 delta variant remains worrying. Thus, on August 24, 2021, the number of hospitalizations in France reached 11,066 for 2,221 people in critical care, practically double the situation that prevailed on September 28, 2020. This situation was especially worrying for a summer period.

According to data collected by the United States' Center for Disease Control (CDC), the number of hospitalizations, in relation to the number of cases detected, at the time of the contagion peak on January 9, 2021, was 0.6% for the age group of 0-4 years, 1% for that of 5-17 years, 20.7% for 18-49 years, 26.1% for 50 64 and 51.6 % for 65 years and over. On August 14, 2021, the prevalence among 18-49 year increased significantly to 37.1%. The number of cases recorded on August 14 in the United States

is half that which prevailed in January 2021, but it remained high for a summer period. According to the CDC [2], as of July 12, 2021, the hospitalization rate was nine times higher among people aged 65-74 compared to a reference population of 18-29 and 15 times higher in people 85 and over. This rate is respectively 230 and 600 times for the same population groups with regard to the mortality rate. People 65 and over represent 80% of cumulative deaths on July 12, 2021, in the United States [3]. According to two studies, the co-morbid factors prevalent in the United States [4] in adult populations are hypertension at 46.7%, obesity at 28.9%, diabetes at 27.9% and chronic respiratory diseases at 16.1%. Overall, 29.9% of hospitalized patients presented no comorbid factors. Thus, age and comorbidity factors increase tremendously among populations aged 65 plus, while the risk remains limited for young populations.

Collective immunity perspective

The prospect of collective immunity is receding. It would have required reaching a vaccination rate of over 60%, with a vaccine that made it possible to stop the spread of the virus outright [5]. Even though the vaccination rate is now rather high in the United States and France, the vaccines are not effective enough to stop the virus from spreading further. Howe effective it might be preventing bad cases remains to be assessed over the December January 2021 winter period. The delta variant is a further blow to the prospect of herd immunity with a relative loss of vaccine effectiveness [6]. In addition, neither the United States, nor France, nor Israel are isolated from the rest of the world; the emergence of new variants around the world is a recognized risk that should be taken into account. Thus, with regard to vaccines which do not achieve the level of efficacy hoped for against the virus, in particular in terms of reinfection, and the global aspect of the pandemic, the vaccine solutions currently proposed are not likely to allow to circumvent the pandemic. Whatsoever, the vaccine stimulates immunity allowing to reduce the caseload in hospitals and death which is what in principle is the objective to be achieved.

Natural immunity, vaccination and effectiveness

The available vaccines presented a high effectiveness against the alpha and beta variants of the SARS Cov-2 virus responsible for Covid-19. For the delta variant early data indicate similar levels of viral RNA and cultural virus among infected persons whether vaccinated or unvaccinated. The vaccine is nonetheless effective reducing hospitalization and death [7]. The World Health Organization points out that the infection appears to confer strong immunity, although we still lack insight on the duration of the acquired immunity [8]. The reserve regarding the length of acquired immunity is due to the absence of experience over time, it doesn't mean that the immunity will not be effective over years or even lifelong. Natural immunity offers more comprehensive protection than vaccines that rely on recognition of the single 'Spike' protein [9]. However, the vaccine can actually boost the immunity of someone who has been ill by stimulating the acquired immunity. In that case, a strong response is however more a sign of good, acquired immunity than a demonstration of additional benefit from the vaccine. The fact that antibodies reduce over time doesn't mean that memory cells have not been developed and will thus be able to initiate an appropriate immune response if a new contact with the virus should occur. A study conducted in the state of Kentucky in the United States has established, on a small sample of people who have already had Covid, that one or two injections of the vaccine reduce the number of reinfections by a factor of 2.34 [10]. However, the size of the statistical sample analyzed does not allow a formal conclusion to be drawn as to the comparative advantage of one or two injections. The article also expresses a caveat about the bias that results from the tendency of vaccinated people, in early 2021, not to get tested for recontamination. Thus, the study states that a vaccine injection can potentially offer a stronger protection to persons having already a natural immunity. However, taking into account the reservations regarding the statistical sample, the factor of 2.34 is actually a high estimate of the benefit of the vaccine for people who have already contracted the disease. All in all, this factor is relatively low and only concerns the risk of recontamination and not that of hospitalization or death. In view of these results the advantage of an injection for people who have already contracted the disease is not conclusive.

Possible side effects of the vaccination

Unknowns remain as to possible side effects of the vaccine in the medium and long term. Just as science is careful not to give a clear opinion on the duration of the immunity conferred by the disease or the vaccine injections, in the absence of a representative sample of people followed in the long term, it is premature to conclude as to the possible effects of vaccines and the use of mRNA in particular, in the medium and long term. The opinions issued related to the absence of risks faced in the long term are a matter of opinion and not of science. Messenger RNA (mRNA), the lipid envelope that encapsulates the spike protein and possible vaccine co-products are elements that may have a biochemical interaction that may or may not be neutral. The mRNA technology refers to the same principle of recognition of the immune system as older conventional vaccines, what changes is the vector used. However, we will only know what kinds of interactions could be generated in the medium and long term. Integration of mRNA into the genome of some of our cells through reverse transcription may seem unlikely. However, the possibility of longer-term mRNA multiplication, with the risk of induced pathologies, including the risk of autoimmune

diseases cannot be ruled out a priori. Multiplication of doses in order to maintain a high level of antibodies over time is not neutral either. A high antibodies level over time would be something similar to a chronic infection which may also generate negative side effects over time. Although these risks may not be proven, the precautionary principle can legitimately apply. The benefit / risk differs in particular according to age and comorbid factors. The vaccination of young people and children is

Discussion

The Covid-19 pandemic is a serious threat which however should nonetheless be treated with pragmatism. The debate whether on social medias or by national authorities has been polluted by scientifically ungrounded opinions. The contradictory expressed opinions contribute to build distrust and are not either conducive to build mitigate the effect of the pandemic. It appears that the perspective of a collective immunity stopping the virus propagation may not be achieved neither through natural immunity, nor through vaccination, nor through a combined action. The aim to be achieved is thus to ensure that the populations at risk either have already developed their natural immunity or have a chance to do so through the vaccination. The focus on the contamination rate may not be the most appropriate indicator in this regard. Neither may worldwide statistics be subject to interpretation. The treatment of the information from those two combined points of view rather proceeds from disinformation. Medical studies regarding the immune reaction from a physiological, cell biology and biochemistry perspective is absolutely necessary to allow science to get forward allowing to better understand biological interactions. The mRNA introduces a new vector to stimulate the immune system. By the end the mechanism remains the recognition by the immune system of a pathogen. The mRNA vaccine asset has been the quick presentation on the market. It now requires further studies allowing to assess if it is systematically eliminated with the recipient cells or not and to identify possible longer-term interactions and side effects which could result from those. However, the data used from a public health perspective should rather rely on data related to the number of hospitalization cases, while also collecting data related to side effects. Thus, the vaccination of populations at risk makes certainly sense. The multiplication of injections is rather questionable and should be handled with caution.

Conclusion

The Covid-19 pandemic natural immunity remains the best possible protection against the Covid-19 pandemic. Vaccination provides a complementary protection preventing to the extent possible bad cases among population at risk. However, the end and the means should not be confused. The vaccine is a mean, the end is public health and the reduction of the number of hospitalized patients. Authoritarianism is not an effective way to deal with a very real problem. On the eve of the winter period and a probable increase in hospitalization cases, vaccinated or not, it would be advisable to act with pragmatism. The barrier gestures and tests remain the most effective way to reduce the virus propagation. The treatments announced will perhaps make it possible to envisage a calmer way out of the crisis, but the available vaccine are in no way a panacea. Developing a more nuanced strategy, reinstating dialogue and pedagogy, properly gauging the official statements made and their legitimacy would be fundamental in order to restore the trust that is currently lacking between the governments and their populations. Thus, in the absence of acquired immunity, vaccination is particularly justified for people over 65 years of age, especially if they present additional risk factors. Considering the possible long-term interactions of the mRNA vaccines it is advisable to refrain from vaccinating younger populations presenting no comorbidity factor. The same applies to persons presenting already a natural immunity. The multiplication of injections may not either be of great added value and in principle it would have required additional studies before being applied.

Acknowledgement

None

Conflict of Interest

There is no conflict of interest.

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