

INTERNATIONAL SOS WEEKLY SCIENTIFIC UPDATE

Focussing on immunity and vaccine development

Produced by Dr. Doug Quarry

8 January 2021

1. EU regulator approves Moderna vaccine

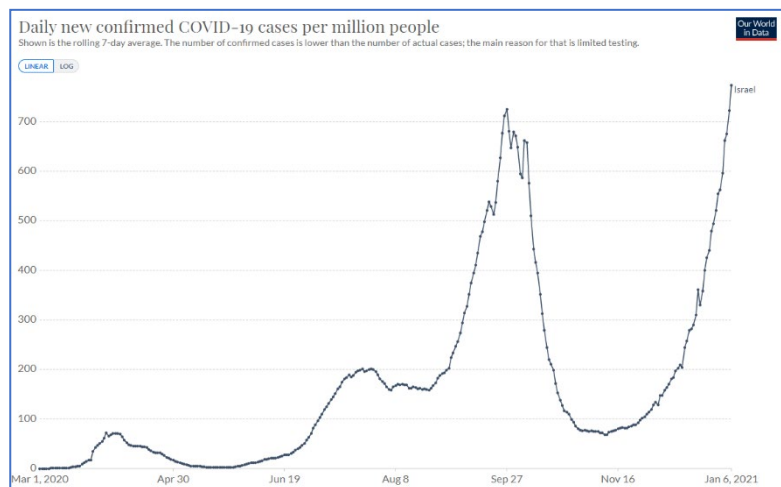
[Reuters reports](#): “EU countries could begin rolling out Moderna’s COVID-19 vaccine as soon as next week after authorities approved the region’s second shot on 6 January.”

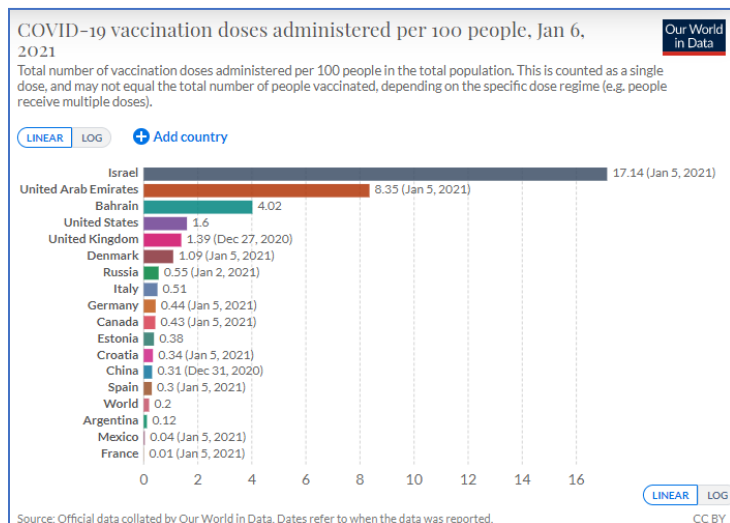
“With the Moderna vaccine, the second one now authorised in the EU, we will have a further 160 million doses. And more vaccines will come,’ European Commission President, Ursula von der Leyen, said.”

2. Israel to vaccinate all over-16s by April

Israel’s Prime Minister, Benjamin Netanyahu, said supply agreements with Pfizer meant that all Israelis over the age of 16 would be able to be vaccinated by the end of March, or perhaps even earlier,” reports [The Guardian](#).

Meanwhile, Israel is in the grip of its fourth COVID-19 wave, with cases rising rapidly.





At the same time, Israel is leading the world in vaccination its population, with over 17.14% vaccinated by 5 January 2021.

International SOS Comment

The combination of rapidly rising case numbers AND a rapid vaccination program makes Israel a case study to monitor the effect of the vaccines and, by implication, if the vaccines are reducing or stopping viral transmission.

As Israel is at the moment only using [the Pfizer/BioNTech vaccine](#), with an effectiveness of around 95%, herd immunity should be reached when about 60-70% of the population has been vaccinated. We are hoping to see a rapid drop in new cases after that – indicating that herd immunity has actually been achieved.

In addition, as Israel has [centrally-stored medical records](#), further analysis of this medical data will be invaluable.

3. WHO recommends two doses of Pfizer COVID-19 vaccine within 21-28 days

“COVID-19 patients should take two doses of the Pfizer and BioNTech vaccine within a period of 21-28 days, the World Health Organization (WHO) said on 5 January,” [Reuters reports](#).

However, WHO also said that a delayed second dose may be considered for countries with exceptional supply constraints.

4. Major US Airlines Back “Global” COVID-19 Testing Requirements

[Nasdaq.com reports](#): “A group representing major US airlines on 4 January backed a proposal by public health officials to implement a global testing program requiring negative tests before most international air passengers return to the United States.”

5. Stanford single-dose nanoparticle COVID-19 vaccine candidate

Stanford University has developed a vaccine candidate using ferritin nanoparticles studded with SARS-CoV-2 spike proteins.

The goal is to make a low-cost, single-dose vaccine that does not require a cold-chain for storage or transport. The vaccine would be suitable for low- and middle-income countries.

Initial animal testing (mice) has shown mean neutralizing antibody titers at least two-fold greater than those in convalescent plasma from COVID-19 patients.

The vaccine is detailed in a paper [published 5 January in ACS Central Science](#).

6. Canadian care home residents challenge delay of second COVID-19 vaccine shot

[Reuters reports](#) that: “Residents of a Canadian long-term care home who received some of the first COVID-19 vaccine shots administered in the country have threatened to seek a court injunction if they do not get the second recommended shot in the coming days.

“If the second doses are not administered within three days...the residents will seek a court injunction to force health officials to deliver it.”

7. Greater Brisbane to enter a three-day “stay at home” lockdown from 6:00pm tonight

The lockdown follows a cleaner at a quarantine hotel in Brisbane testing positive yesterday (7 January) to the UK B.1.1.7 more infectious UK strain of SARS-CoV-2 after having been in the community for five days.

All residents must stay at home except for essential work, providing healthcare for a vulnerable person, essential shopping, or to exercise in their local neighbourhood. Masks are mandatory if leaving home.

Background

Australia has an extremely low level of community transmission of COVID and Australia’s borders are virtually closed to inbound and outbound passengers.

There are over 20,000 Australians overseas waiting to return to Australia. About 2,000 Australians are allowed into Australia per week, however, all must undergo two-weeks of self-paid, government-supervised quarantine in a nominated hotel.

Australia has previously had several cases of the B.1.1.7 in people in quarantine, however this is the first time that it has been found to have spread to a quarantine hotel worker and possibly further into the community.

6 January 2021

1. South African variant probably still susceptible vaccine-induced immune

Various recent reports have suggested that the South African variant of SARS-CoV-2 may be able to escape vaccine-induced immunity.

On 4 January 2021, Bloom Laboratories released a [non-peer reviewed paper](#) mapping how convalescent serum antibodies are impacted by mutations to the spike’s receptor-binding domain (RBD), the main target of serum neutralizing activity.

Among the implications presented in the paper were:

- E484K (South African lineage) worrying for immune escape
- RBD mutations in UK lineage less so

Here we present tweeted analyses of the paper by Dr Ali Nouri and Dr Scott Gottlieb*****

Dr. Ali Nouri

- The emerging variants in South Africa and Brazil that harbor the E484K mutation have "greatly reduced susceptibility" to neutralization by polyclonal serum antibodies derived from some individuals. This may have consequences for vaccines.
- The "Receptor Binding Domain" on the spike protein of the virus is a critical site for antibodies to bind to because those antibodies can block the virus from binding the ACE2 receptor on our cells. Mutations at that site are allowing the virus to escape antibodies.
- Report shows neutralizing activity of convalescent sera (rich in polyclonal antibodies) was reduced >10-fold because of single mutation in RBD domain. They also found some sera samples that still neutralized, perhaps through antibodies binding other critical regions of spike.
- This is worrying but the fact that neutralizing function was diminished, not eliminated, suggests a strong vaccine response will protect against the variant.
- However, failure to control the pandemic gives the virus more opportunities to evade vaccines.

Dr Scott Gottlieb

- Elegant work at Bloom lab suggests mutation to receptor binding domain in COVID variant that emerged in South Africa and now Brazil could partially escape medical countermeasures and prior immunity
- Both countries are having dense epidemics in their summer

International SOS comment: We await further research into the South African variant. It appears likely that it is still susceptible to vaccine-derived immunity however the current epidemics in South Africa and Brazil may allow further mutation to occur.

** Dr Ali Nouri: Molecular Biologist; President, Federation of American Scientists; National Academy Science Diplomacy Roundtable.

*** Dr Scott Gottlieb: Commissioner of the US Food and Drug Administration (FDA) 2017-2019, Resident Fellow at American Enterprise Institute

5 January 2021

2. B.1.1.7 variant has a higher R^0

As England and Scotland move into Tier 4 lock-downs related to the B.1.1.7 variant, a [non-peer reviewed paper](#) has estimated that the variant - now designated Variant of Concern 202012/01 (VOC) - has a reproduction number (R^0) ranging between 0.4 and 0.7 higher than the non-VOCs.

The paper notes that these estimates of transmission advantage were calculated during a **period where high levels of social distancing were in place in England** (otherwise they may have been even higher).

Commenting on the paper, Dr Ali Nouri** [has tweeted](#) that:

- Current measures can't contain the B.1.1.7 variant in the UK. The highly transmissible variant is spreading rapidly among all ages, even more so among the under 20 group
- Reason for faster spread among youth is unclear
- The **current set of non-pharmaceutical interventions is not enough to control the new variant.** Moreover, plans to re-open schools in January should be reconsidered.

** Dr Ali Nouri: Molecular Biologist; President, Federation of American Scientists; National Academy Science Diplomacy Roundtable.

3. What does “Pandemic Level 5” in the UK mean?

The [BBC reports](#) that the UK's coronavirus alert level is expected to be upgraded to Level Five - the highest level. It means there is now a risk of the NHS being overwhelmed.

COVID Alert Levels	
Level	Description
5	As level 4 and there is a material risk of healthcare services being overwhelmed
4	A COVID-19 epidemic is in general circulation; transmission is high or rising exponentially
3	A COVID-19 epidemic is in general circulation
2	COVID-19 is present in the UK, but the number of cases and transmission is low
1	COVID-19 is not known to be present in the UK

4. What do the English COVID-19 intervention tiers mean?

A Tier 4 “Stay at Home” alert was issued for England earlier today. It is expected to remain in force until mid-February.

Tier 1: [Medium alert](#)

CORONAVIRUS TIER 4
STAY AT HOME
gov.uk/coronavirus

Around 1 in 3 people with Covid-19 have no symptoms so will be spreading the virus without realising. We must all take action to protect each other and our hospital capacity.

MEETING FRIENDS AND FAMILY No household mixing, aside from support bubbles and two people meeting in public outdoor spaces.	BARs, PUBS AND RESTAURANTS Hospitality closed, aside from take by takeaway, drive-through or delivery.	RETAIL Essential shops can open. Non-essential retail must close and can only open for click-and-collect and delivery.	WORK AND BUSINESS Everyone must work from home unless they are unable to do so.
EDUCATION Early years settings, schools, colleges and universities open during term time. Registered childcare, other supervised activities for childcare purposes, and childcare bubbles permitted.	INDOOR LEISURE Closed.	ACCOMMODATION Closed (with limited exceptions only).	PERSONAL CARE Closed.
OVERNIGHT STAYS You must not stay overnight away from home. Limited exceptions apply.	WEDDINGS AND FUNERALS Funerals of up to 30 people permitted. Wakes and other linked ceremonial events can continue in a group of up to six. Weddings of up to six can continue in exceptional circumstances.	ENTERTAINMENT Indoor entertainment closed. Some outdoor attractions may remain open.	PLACES OF WORSHIP Open for private prayer and ceremonial worship, but cannot interact with anyone outside household or support bubble.
TRAVELLING You must stay at home and only travel for work, education or other legally permitted reasons. If you must travel, you should stay local, and reduce the number of journeys you make. You must not leave a Tier 4 area or stay overnight away from home. Residents in Tiers 1-3 should not enter Tier 4 areas. Do not travel abroad if you live in a Tier 4 area unless an exemption applies.	EXERCISE You can leave your home to exercise by yourself, with your household or support bubble, or with one person from another household. Outdoor sport allowed but gatherings limit applies except for youth and disabled sport.	RESIDENTIAL CARE You can visit relatives in care homes with COVID-secure arrangements such as subclinical screens, visiting pods, and window visits.	CLINICALLY EXTREMELY VULNERABLE The Clinically Extremely Vulnerable are advised to stay at home as much as possible, except to go outdoors for exercise or to attend health appointments.

For support and more information visit: gov.uk/coronavirus

HANDS FACE SPACE

Tier 2: [High alert](#)

Tier 3: [Very High alert](#)

Tier 4: [Stay at Home](#)

Posters describing each tier [can be found here](#).

5. Study to determine if vaccine reduces or prevents transmission cancelled

The [Wall Street Journal](#) reports that a seminal study designed to determine whether and to what extent vaccines prevent transmission has been cancelled. The study of more than 20,000 college students, using the Moderna vaccine, was due to begin in January.

“The researchers weren’t able to secure federal funding for the trial, which would have cost several hundred million dollars, and faced time constraints in getting the complex study up and running so it could yield results before students ended the spring semester.”

International SOS comment: Until we know whether the various vaccines reduce or prevent transmission, we cannot be sure that “herd immunity” can be achieved.

6. Having had COVID-19 protects healthcare workers for at least six months

The [Journal of Infection](#) has published results of a study in Newcastle, UK, which investigated whether previous confirmed COVID prevented re-infection of healthcare workers during the second COVID wave that occurred from July to November 2020.

The result was there were no symptomatic reinfections in a cohort of 11,000 healthcare workers and so it is assumed that the apparent immunity to re-infection was maintained for at least six months.

7. AstraZeneca & local COVID vaccines given urgent approval in India

The Drugs Controller General of India has [approved restricted emergency use](#) of the COVID-19 vaccines, Covishield and Covaxin.

- Covishield is the Oxford/AstraZeneca vaccine manufactured by the Serum Institute of India.
- Covaxin has been developed by Bharat Biotech, a company based in Hyderabad, with backing from the state-run Indian Council of Medical Research (ICMR)

[Reuters reports](#) that Bharat Biotech has submitted its data to the drugs controller, who is expected to share details about it at a news conference.

8. India bans export of AstraZeneca vaccine

[India today](#) reports the Serum Institute of India (SII) CEO, Adar Poonawalla, as saying that India has barred the vaccine maker from exporting the Oxford University-AstraZeneca coronavirus vaccine for several months. SII has also been barred from selling the vaccine on the private market.

“SII - the world’s largest vaccine manufacturer - has been contracted to make one billion doses of the vaccine for developing nations.

“With rich nations reserving most of the vaccines that will be made this year, SII is likely to make most of the inoculations for developing countries. The ban on exports, however, means that poorer nations will probably have to wait a few months before receiving their first shots.”

9. WHO lists Pfizer/BioNTech vaccine for emergency use

[Reuters reports](#) that: “The World Health Organization (WHO) on Thursday 31 December Pfizer and BioNTech’s COVID-19 vaccine for emergency use, in a move seeking to speed access in the developing world.

"The WHO established its Emergency Use Listing (EUL) process to help poorer countries without their own regulatory resources quickly approve medicines for new diseases like COVID-19, which otherwise could lead to delays.

"The WHO's review found Pfizer/BioNTech's vaccine met the 'must-have' criteria for safety and efficacy and that benefits outweigh its risks."

10. Which vaccines can be "quickly" modified for a new variant?

[Reuters reports](#) that "...an advantage of mRNA vaccine technology is that scientists can quickly re-engineer genetic material in the shot to match that of the mutated protein, whereas modifying traditional vaccines would require extra steps.

"In principle, the beauty of the mRNA technology is we can directly start to engineer a vaccine which completely mimics this new mutation," Mr Sahin, one of the developers of the BioNTech vaccine, said.

"We could be able to provide a new vaccine technically within six weeks. Of course, this is not only a technical question - we have to deal with how regulators ... would see that."

Pfizer/BioNTech, Moderna and CureVac have all developed mRNA vaccines.