

Recommendations Based on Real World Data of COVID-19 Pandemic and HBV Infection in Chimpanzees

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Description

Near three years since cases were first reported, the COVID-19 pandemic remains an acute global emergency. Although over 12,782 million COVID-19 vaccine doses have been administered [1], some reports have not obtained that full vaccination played any significant role on prevent the transmission of the Omicron COVID-19 variant (for example see [2]), Delta SARS-CoV-2 variant can be entirely substituted by the omicron variant [3].

In two recent articles on the COVID-19 pandemic in China [4,5], numerical simulations suggest:

- For the first five waves of pandemic in Shanghai [4], about 95% blocking rates of symptomatic infections could not prevent effectively the spreads of the pandemic. Over 99% blocking rates of symptomatic infection could make rapidly the ends of the pandemic [4].
- For the recent pandemic in mainland China [5], about 92% and 46% blocking rates, and about 0.08 and 0.06 recovery rates of the symptomatic and asymptomatic infections could not prevent effectively the spreads of the pandemic. Over 93% and 61% blocking rates, and about 0.12 and 0.10 recovery rates of the symptomatic and asymptomatic infections, respectively, could reduce rapidly the numbers of the current infected symptomatic and asymptomatic individuals [5].

“Dynamic Clearance” is a basic principle and goal that China adheres to in the prevention and control of the COVID-19. “Dynamic Clearance” means that when a local epidemic occurs, all government departments act quickly to discover and extinguish together, quickly cut off the transmission chain and keep the society free of infected cases. The “Social Clearance” indicates that the community transmission of COVID-19 has been initially blocked, which is a prerequisite for the gradual closure and the primary goal of epidemic prevention and control [6].

The last COVID-19 pandemic in mainland China has not ended after one year's prevention and control [5,7]. The main reason is that some symptomatic and asymptomatic infected individuals could not be confirmed before generating transmissions. This means that the CT value of SARS-CoV-2 nucleic acid testing should be higher than 40.

In an experiment on acute Hepatitis B Virus (HBV) infection in Chimpanzees, Asabe, et al. observed that low dose (1 genome equivalents per animal) inoculum primed the CD4+ T cell response, allowing infection 100% of hepatocytes and requiring prolonged immunopathology before clearance occurred, and causing prolonged infection [8]. Theoretically, the virus infection models show that if one infected individual's basic virus productive number R is >1 , the individual will be obtained symptomatic or asymptomatic continued infection even contacting only one virus. Otherwise if $R < 1$, the infected individual will recover finally even contacting high dose virus [8,9].

It can assume:

- When the numbers of symptomatic and asymptomatic infected individuals decrease significantly, the full vaccination and the infection caused herd immunity make most people's $R < 1$ to the presenting COVID-19 virus infection.
- To coming new COVID-19 variant, most of the people had $R > 1$. After their specific immune functions were activated, they showed $R < 1$.

Therefore it recommends:

- For the people who come from the countries or regions appearing new COVID-19 variant, using more accuracy SARS-CoV-2 nucleic acid testing (CT value >40) confirm whether they are infected.
- For the regions appearing new COVID-19 variant infection, suggest people to implement more strict personal prevention measures. Suggest administrations to adhere “Dynamic Clearance” and “Social Clearance”.

It is expected that spreads of new COVID-19 variant infection can be stopped soon if the recommends are implemented.

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