

LOOKING BEYOND JUST DIAGNOSIS AND QUARANTINE

Relevant for: Science & Technology | Topic: Indigenization of technology and developing new technology

A pandemic is upon the world and [coronavirus](#) is not the last word. Ebola, Zika, Nipah, SARS, MERS, H1N1 and now COVID-19 — the viral onslaughts will continue. Mutations of known viruses will periodically cause havoc, whatever be the reasons. While the Zika virus is spread by *Aedes* mosquitoes, the main reason for these viral infections seems to be the proximity and contact with animals including wild animals, either as exotic food menu or the use of animal parts as aphrodisiacs. Bats seem to be another constant source of new viruses. Seafood has also been stated to be a cause for the Wuhan outbreak.

In India, given the population density and unsatisfactory hygiene conditions and awareness, citizens can face serious situation even though the disease may have originated elsewhere. Bacterial infections such as cholera, typhoid have drug and vaccine options. Some of the viruses listed above do not have a vaccine or drugs available as yet. In India the options are always limited to diagnosis as per World Health Organization protocols and seem to be the exclusive domain of the National Institute of Virology (NIV), Pune and its designated centres. I feel that it is important for India to be able to do much better in terms of therapeutic options, although prevention is the best option. But, there are always leakages as can be seen with COVID-19 cases in the developed countries. India does have the expertise to put a team together to respond much more than just diagnosis and quarantine.

[Coronavirus](#) | [Interactive map of confirmed coronavirus cases in India](#)

What can be done? The first requirement is to sequence the genome of all the isolates from infected patients in India. COVID-19, for example, is an RNA virus. This would require conversion to DNA and then the sequence of the alphabets (ATGC) worked out. COVID-19 is less than 30kb (30,000) alphabets in size and can be sequenced in 24 hours in India. There was a suggestion in the article, “How is India containing COVID-19?” (‘FAQ’ page, *The Hindu*, March 8, 2020), that the virus in India is different from that in China on the basis of genome sequence made available by NIV, Pune.

The virus is evolving rapidly and the mutations seen in the virus isolates in the United States, for example, are different from those in China. There was also a hint that this could also be due to sequencing error. It needs to be realised that the copying mechanism of RNA to DNA can make errors.

In any case, it is important to sequence the virus isolates in at least three different institutions in India to ensure that sequencing errors are eliminated. A knowledge of genome sequence is essential to design drugs and vaccines.

[Coronavirus](#) | [India shares two SARS-CoV-2 genome sequences](#)

A quick response is to evaluate repurposed known drugs (a drug development strategy predicated on the reuse of existing licensed drugs for new medical indications) including natural products, for therapy. For example, in the case of COVID-19, anti-HIV drugs are being evaluated. Even hydroxy chloroquine, an antimalarial, is suggested as an adjunct drug option, since it can make the acidic endosome compartment in which the virus replicates alkaline to prevent the process. One other option is to try passive immunisation with plasma derived from

convalescing patients, who have completely recovered. Yet another strategy is to clone B cells from such patients to make therapeutic antibodies. All these would require informed consent from patients and policy decisions.

A long-term approach could be to clone the genome, make recombinant antigens and then test for vaccine potential and new drug design. A phage library expressing all possible human antibodies (single chain) is available for screening. The virus, or its mimic, needs to be cultured for drug screening. All these approaches would eventually need clinical trials to be taken forward on fast-track with the cooperation of the office of the Drug Controller General of India.

[Coronavirus](#) | [Infecting healthy people with coronavirus can speed up vaccine trials](#)

My estimate of a quick response is three months, and long term is 18 months. In my opinion the expert team should represent the following areas with institutions listed in parenthesis as examples: clinical virology (NIV, Pune; Translational Health Science and Technology Institute, Faridabad, Haryana), molecular virology (Regional Centre for Biotechnology, Faridabad; the Indian Institute of Science, Bengaluru), scale-up of vaccine production (Serum Institute of India, Pune; Genova, Pune; Bharat Biotech, Hyderabad), clinical trial and drugs (Sun Pharma, Ahmednagar, Maharashtra; Reddy Labs, Hyderabad; Drug Controller General of India), DNA/RNA sequencing expertise (National Institute of Biomedical Genomics, Kalyani; Centre for Cellular and Molecular Biology, Hyderabad; Institute of Genomics and Integrative Biology, New Delhi).

I want to emphasise the point that the institutions listed in parenthesis are only examples and there are many others and with over-lapping expertise, that includes the private sector. Such an expert committee can be overseen by an independent expert committee comprising senior, experienced scientists and administrators. The committees should cut across the territorial integrity of government science and technology departments and include the private sector.

[Coronavirus](#) | [India to join WHO's COVID-19 trials](#)

The bottom line is to make use of the expertise built in the country over the years to scientifically respond to such challenges in terms of therapeutic options that are at least as important as sending up satellites into space or landing a man on the moon.

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