Biotechnology

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India becomes vaccine powerhouse by contributing 60% of world's vaccines

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Experts have hailed India's efforts towards becoming a vaccine powerhouse by contributing 60% of the world's vaccines besides being home to half a dozen major manufacturers.

India has capabilities to produce around 4 billion vaccines per year. Indian companies like Bharat Biotech International Ltd (BBIL) which are producing up to 700 million doses per year and Serum Institute of India (SII) 600 million doses per year are already scaling up production to meet the demand.

At present, India has two vaccines for human use and has received emergency authorization use from the Drugs Controller General of India (DCGI) – Covishield by AstraZeneca/Oxford/SII and Covaxin by BBIL.

The premier research agency led by Dr. Krishna Ella, developed Covaxin, India's first vaccine candidate for Covid-19, in collaboration with ICMR-National Institute of Virology (NIV).

DCGI granted permission to BBIL to initiate phase I and II human clinical trials after BBIL submitted results generated from preclinical studies, demonstrating safety and immune response.

According to Ahmedabad based pharmaceutical consultant Dr Sanjay Agrawal, "Covaxin is a completely safe vaccine as it is an attenuated vaccine, making it safe to be injected into the body. Besides, the Oxford-AstraZeneca vaccine manufactured locally by the SII with a weakened version of a common cold virus from chimpanzees is also safe and efficacious."

Echoing similar views, pharma consultant Anshu Yadav said, "Prior to authorization by the US FDA, the Covid-19 vaccines have undergone rigorous safety protocols. The vaccine contains effective ingredients to keep the human safe and secure."

Adding to the Covid-19 vaccine development perspective in the country Dr Sujay Shivaji Patil, clinical researcher, medical affairs and pharmacovigilance consultant explained, "To protect humans from this deadly virus undergoing mutations, it is important to understand both humoral and cellular immune response. An ideal vaccine is one capable of initiating both these responses. An important safety concern in SARS-CoV-2 vaccine or antibody development therapies is potential risk of vaccine enhancement of disease known as antibody-dependent enhancement (ADE) and enhanced respiratory disease (ERD)."

Antibodies that can bind to a virus without neutralizing activities can cause ADE via Fc? receptor-mediated virus uptake, allowing subsequent replication of the virus or Fc-mediated effector functions of the antibody–virus immune complex, allowing immunopathology. In addition to ADE, vaccine-induced enhancement of disease can also be caused by T helper 2 (TH2) cell-biased immunopathology, leading to ERD."

"An ideal Covid-19 vaccine target would be expected to induce high titres of neutralizing antibodies (NAbs), reduce non-nAb production to minimize ADE potential, elicit robust TH1 cell-biased responses but low TH2 cell-biased responses to lower the ERD potential, maintain long-lasting immunological memory and provide cross-protection between Coronoviruses (CoVs)."

Commenting on the clinical trial developments in the country, Dr Chirag Shah, senior director, business strategy, Cliantha Research Limited, a leading global clinical research company said, "Ideally both mRNA and Plasmid DNA vaccines are effective against Covid-19. But more effective results are seen with DNA based vaccine. Only large and longer duration comparative studies will also help prove the efficacy."

As per WHO data, Covid-19 vaccine candidates generally fall into three broad categories: first, protein-based vaccines that generate target antigens in vitro such as inactivated virus vaccines, virus-like particles and protein subunit vaccines; second, gene-based vaccines that deliver genes encoding viral antigens to host cells for in vivo production such as virus-vectored vaccines, DNA vaccines and mRNA vaccines; and, third, a combination of both protein-based and gene-based approaches to produce protein antigen or antigens both in vitro and in vivo, typically represented by live-attenuated virus vaccines.

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