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## Mapping population and genotype/serotype diversity of viruses: Game changers in designing viral vaccines

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The development of vaccines is one of the most important achievements of science that has helped in improving human health, immunity and life expectancy. However, there are several pathogens for which vaccines are either not available and/or are known to have limited efficacy. Therefore, there is an ever increasing need to develop vaccines for viruses that infect humans and livestock. The reverse vaccinology approach has been proposed to rationally design vaccines starting from genomic sequences and using methods and approaches of bioinformatics, immuno-informatics and comparative genomics. One of the challenges in the rational design of vaccines, however, is the enormous genetic diversity observed between the populations of individual viruses. A systematic study of population diversity, stratification and evolution using genomic sequences appears to provide a distinct advantage, if it is incorporated in the process of vaccine design. In addition, the study of antigenic diversity within and between various geno- and sero-types is also playing a deterministic role in vaccine design. The impact of population diversification and genotyping studies of viruses in the development of vaccines in the future will be discussed using suitable examples. The algorithm and methodological developments made in the area of typing of viruses using the alignment-free algorithm based on the concept of Return Time Distribution (RTD) will be discussed with case studies.

### Biography

Urmila Kulkarni-Kale received PhD in Bioinformatics from Savitribai Phule Pune University (formerly University of Pune) and holds the position of Information Scientist at the Bioinformatics Centre. She works in the areas of viral bioinformatics, comparative genomics, phylo-informatics and immune informatics. She has developed databases, algorithms and servers, some of which are the firsts in their respective categories. She has published 25 papers, 5 book-chapters and holds an international patent. She has several national and international projects funded by various agencies. She has >20 years of teaching experience and is a recognized PhD guide. She has been a faculty for ~80 national and international workshops.

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