OPINION

Molecular virology and translational research

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Viruses are exciting organisms for research. They are structurally simple, but functionally complex. The mechanisms involved in the replication of DNA and RNA viruses, strategies used to subvert the host machinery, the transcriptional and translational controls unique to each virus family and strategies employed for virus assembly, invasion and spread are all exciting aspects for investigation, elegantly covered in the workshop. Underlying all these phenomena is their incorrigible ability for destruction of life forms, be it plant, animal or bacteria.

Although retrovirals are available for the treatment of HIV and a few ailments, in general, a viral infection is left alone, hoping that it would be a self-limiting one. This may be alright for common cold or even flu, but considering that viruses can cause a range of afflictions from cancer to respiratory disorders to immune deficiency, I believe that studies on molecular virology should lead to optimal strategies for diagnosis, prevention and cure. With the availability of PCR, diagnosis as such may not be a technical hurdle. But, for a developing country like India the real challenge is to make sensitive diagnostic kits available and affordable. The recent episode of diagnosis of H1N1 virus is a case in point. The cost of diagnosis ranges from Rs 5000 to 10,000. To get a yes or no answer, a real time PCR analysis is not required and the test should not cost more than Rs 500 for the use of three sets of primers followed by electrophoresis or fluorescence-based measurements. But, then we have to import the kits (perhaps to satisfy the WHO) and provide real time PCR machines to each private entrepreneur!

The real challenge is to develop viral vaccines to afford protection. India produces cell culture-based viral vaccines against rabies and measles. We have also been able to do reverse engineering to develop recombinant hepatitis B vaccine that brought down the price from Rs 500 to less than Rs 50 for a single dose. But then, a vaccine against hepatitis C is a challenge. There is considerable discussion on the HPV vaccines developed by GSK and Merck to protect against cervical cancer. There are recent efforts mounted in the country to develop this vaccine so that it becomes affordable. We have had difficulty in the country even to produce a JE (Japanese Encephalitis) vaccine and continue to import inferior versions of flu/dengue vaccines. I hope India would become polio-free sooner than later, despite all the setbacks. Again, indigenous development of a vaccine against H1N1 has become a priority. Instead of always reacting to episodes of viral infection-mediated deaths year after year, we need to be pro-active in research priorities. I feel a brainstorm on such issues should be followed up by actual implementation of the strategies to develop vaccines on a priority basis. The country is slowly building capabilities for manufacture under GMP conditions and there is an opportunity for India to become a hub for the manufacture of affordable vaccines. It is also a matter of pride that a prime-boost candidate vaccine against HIV developed in India has been taken up for trials. In terms of drug development, it would be relevant to use all the molecular studies to develop anti-virals for hepatic viruses. In that context, screening of herbals and natural molecules for anti-viral activity against specific targets can lead to newer strategies. I am aware of at least one study where a molecular virologist and his group have teamed up with clinicians, NGOs and traditional medicine experts to assess the efficacy of Siddha medicine treatment of HIV patients. The study has given encouraging results. I do feel that such efforts to assess efficacy of traditional medicines to treat cancers with viral etiology would be very relevant. With significant government support available to industry for R&D, I think that the time is ripe for academia–industry collaboration to bridge the lab-to-land gap and make translational efforts meaningful.

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