Editor's word

In this editorial I will focus on one of biggest challenges which scientists are facing … vaccines. Actually vaccines represent one of the most successful cost-effective medical advances of all time.

Nowadays recent advances in biotechnology (as well as the understanding of the inductive and effector components of immune responses) are invigorating the whole field of vaccinology. In fact other illnesses are now slowly but steadily becoming the new targets in this field, with the dual possibility of marketing either therapeutic vaccines (ex. oncology) or prophylactic vaccines (ex. HPV).

These new advances are basically based on either innovative antigens or the introduction of new adjuvants. We are already seeing several new plant-made vaccines being manufactured for veterinary purposes such as the Newcastle disease. However it is in this area that researchers are also eyeing what I call 'virgin platforms' …. the application of plant recombinant technology to the field of human medicine. The former has already brought about major advances in plant biology, allowing production of genetically modified (GM) plants. To be truthful, such progression has also meant headaches for key political champions … just a few weeks ago we have seen uproars surrounding the decision of our European Commissioner for Health and Consumer Policy, John Dalli to lift a 13-year ban on the cultivation of a GM potato, called Amflora, to be used for starch by industry.

Nonetheless, such newer technologies have also enabled the development of noncrop plants (tobacco) to produce pharmaceutical molecules. This approach has major advantages in terms of speed, costs and safety. And this goes beyond the much advertised US creation of the lycopene-rich GM tomatoes which presumably protect against prostatic cancer, way back in 2002 … and six years later, the development by the Brits of the purple tomato, which is also rumoured to reduce cancer risk ….

However, an innovative application of plants as bioreactors is their use to express antigenic molecules to be administered as vaccines. Major potential advantages of producing immunogens in plant systems include the possibility of enabling the participation of less developed countries in pharmaceutical production, with an obvious emphasis on addressing local health issues. Examples of such scientific breakthrough are the recent production in tobacco of a H1N1 2009 vaccine based on the hemagglutinin (HA) protein and the initiation of clinical trials with a recombinant, plant-derived, idiotype vaccine to treat B-cell lymphomas.

In case you are just saying … Well, this is just an editorial for all its worth! … scientists' grapevine has it that the next pandemic may quite likely be the Chikungunya virus. The virus, usually transmitted by Aedes aegypti mosquitoes, has now repeatedly been associated with a new vector, Ae. Albopictus (Asian Tiger Mosquito, seen in Malta during the past few weeks). Analysis of full-length viral sequences reveals an extremely rare phenomenon, known as evolutionary convergence. In virology, convergent mutations have been reported under the extreme selective pressure of antiviral therapy during the treatment of acute (ex. neuraminidase mutations of influenza virus) or chronic (ex. reverse-transcriptase/protease mutations of HIV) viral diseases. Apparently the selective pressure exerted on Mosquito-transmitted Chikungunya virus through the constraint of having to replicate in a new vector, is similar to that cited for antiviral therapy.

And since the dispersal of the Asian Tiger Mosquito from Asia to Europe is largely the result of human activities (such as the commercial transportation of scrap car tyres), the adaptation of Mosquito-transmitted Chikungunya virus to the Asian Tiger Mosquito provides an incredible demonstration of how viruses can readily circumvent the impact of human interference on the ecosystem. Obviously this means that we are far from immune from future emerging arboviruses that infect humans.

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