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Flu viruses: Our combat measures

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Influenza viruses belong to the family of Orthomyxoviridae and are one of the leading causes of respiratory tract infections in humans. Influenza in general terms is mentioned as Flu. Communicable by mode of transmission has drastic after-effect both on individual and its society. Symptoms of influenza infection can many a times be confused with common cold except for the severity of the symptoms. The current strain of influenza circulating in India (2014-15) could be more virulent than the 2009 North American strain, highlighting the need for greater surveillance. Influenza viruses on infection in humans trigger both innate and humoral immune responses. Though, they are able to escape these immune responses by their ability of Antigenic Drift and Antigenic Shift. Influenza is a major threat to high risk persons which include children below 2 years, elderly (>50 years), immunocompromised individuals as HIV infected, chronic disease as heart, lung, blood or metabolic diseases as diabetes, obesity. Hence develops the need to handle influenza viruses tactfully by implementing strategies already developed or developing new strategies. National government along with international support from US Centre for Disease Control and Prevention (CDC) in coordination with other US government agencies developed initiatives like Development of Influenza Surveillance Networks in India, addressing emerging infectious diseases in the republic of India: Influenza disease, direct and indirect protection by influenza vaccine given to children in India and understanding host innate immune responses against influenza A virus. Other strategies which can be applicable are to get yearly/periodically (as per recommendation) shots of influenza vaccines by use of appropriate measures of hygiene, pertinent infection control practices, adoption of proper safety measures at patient care centres, sample collection and handling units. Proper biosafety and biosecurity measures should be taken into account and followed religiously for any aerosol generating processes. By adhering to these guidelines/strategies we can majorly control infection spread and prevent further devastation.

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Use of recombinant influenza viruses as vaccine vectors against intracellular parasites

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Vaccines are considered one of the most successful and effective medical interventions to prevent infectious diseases. It is estimated that up to 3 million human lives are spared through vaccination per year. The use of recombinant viruses as vectors is one of the most viable strategies for the development of new vaccines. In 2010, our group has demonstrated the feasibility of the generation and use of recombinant influenza (Flu) viruses in combination with recombinant adenoviruses (Ad) to protect against *Toxoplasma gondii* infection in mice. The potential of Flu-Ad protocol led us to the search of an experimental model in which the CD8 T cell response has a pivotal role in protection. In this context, an important model is the mice infection by *Trypanosoma cruzi*. This protozoan parasite is responsible for the Chagas disease in humans. The treatment has higher efficacy in the acute phase of the disease, yet causes undesired side effects. There are currently no vaccines against Chagas disease in humans, which makes the study and development of an optimized vaccination protocol an important research subject. Using reverse genetics we generated recombinant influenza viruses encoding the C-terminus and Medial portions of the *T. cruzi*a mastigote surface protein (ASP2) and further characterized the phenotype and genotype of those viruses. Immunization using Influenza-ASP2 as prime and Ad-ASP2 as boost induced a potent CD8+ polyfunctional T cell response, which was mostly immunodominant. This immune response was able to protect C57BL/6 and C3H/He mice challenged with Y strain of *T. cruzi*. Despite the level of protection reached in the effector phase of immune response, a significant reduction of survival was observed when vaccinated mice were challenged 130 days after boost dose. Accordingly, the production of cytokines and number of immunodominant cells in splenocytes of vaccinated mice dropped in this time point, explaining the reduced memory protection.

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