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Gamma-ray Inactivated Vaccines: Concepts and Applications

Gamma-irradiation has been used widely to sterilize biological products. It can also be utilised as an inactivation technique to generate whole cell bacterial and viral vaccines with limited effect on pathogen structure and antigenic determinants. Importantly, mathematical concepts currently used to estimate the sterilizing doses of gamma-irradiation may not be applicable for virus vaccines, particularly when vaccine manufacturers use stringent sterility testing. We have previously reported our approach to develop a cross-protective influenza A virus vaccine using gamma-irradiation (gamma-FLU). The ability of gamma-FLU to induce strong innate immunity is associated with possible application as an adjuvant to co-administered antigens. In addition, we have recently utilised gamma irradiation to inactivate *Streptococcus pneumoniae* (gamma-PN). Intranasal -PN vaccination of C57BL/6 mice was shown to be protective in challenge models of pneumococcal bacteraemia, pneumonia and meningitis. Overall, gamma-irradiation is a highly reliable procedure to develop inactivated vaccines, with the advantage of minimal molecular changes to viral proteins and viral structure.

Biography

Alsharifi grew up in Babylon/Iraq and studied Veterinary Medicine at Baghdad University. He was increasingly interested in medical research and after coming to Australia he studied Biomedical Science at Monash University. He then moved to the Australian National University to take up a PhD scholarship at The John Curtin School of Medical Research, and investigated with Arno Müllbacher, Robert Blanden, and Mario Lobigs the immunobiology of an alphavirus infection. During his early years in research he discovered a period of exhaustion in type-I interferon response following an acute viral infection, which may explain the clinically known observation that virus-infected patients are at increased risk to a more sever secondary viral and/or bacterial infection. Following the completion of his PhD studies, he investigated with Prof Müllbacher the possibility of using gamma-irradiated influenza virus as a universal flu vaccine. In 2008, he was awarded the Hanson Fellowship to continue his research into the universal Flu vaccine and also to investigate the possibility of producing other viral vaccines using similar technique to that used for influenza. His flu vaccine research has been featured in the Catalyst program on ABC (http://www.abc.net.au/catalyst/stories/2613604.htm), and in many newspaper articles.

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