

HPV immunisation: A significant advance in cancer control

The global public health burden attributable to human papillomaviruses is considerable. More than 5% of all cancers worldwide can be attributed to persisting infection with these viruses. Cervical cancer, the most common papillomavirus-associated cancer, kills young women in developing countries during their childbearing years and constitutes a significant economic burden for emerging nations. Recognition of the association between cervical cancer and a subset of “high risk” genital papillomavirus infections, first postulated by Zur Hausen and colleagues, was confirmed through painstaking research over 25 years by epidemiologists. During the same period, our understanding of the mechanisms of papillomavirus-induced carcinogenesis and the factors predisposing to viral persistence have been clarified through extensive research efforts.

Vaccines have been the single most effective public health measure after assurance of clean drinking water, and continue to protect us from a wide range of infections responsible for epidemic disease. Vaccines recently developed to protect against some high-risk sexually transmitted human papillomavirus infections are conventional in their mechanism of action, but are rather different in intent to the routine childhood vaccines, as they are primarily designed to protect individuals against cancer, a rare consequence of a common infection which is largely sexually transmitted. Effective introduction of these vaccines will require an understanding of new paradigms in infection and in cancer control. This issue, a collection of reviews written by experts in the field, is designed to inform health care professionals about human papillomaviruses and the clinical problems associated with papillomavirus infection, and to explain our current knowledge of the utility of papillomavirus vaccines as part of a program to help prevent cervical cancer. Such knowledge will be essential to explain the benefits and limitations of vaccination to potential recipients of these vaccines.

The key messages are that the available vaccines are effective and safe, and can protect against the HPV infections responsible for about 70% of cervical cancer. They need to be given before infection occurs, and are, for countries where cervical cancer screening programs are already in place, an adjunct to, rather than a replacement for, these existing screening programs. Their general introduction will prevent a considerable amount of surgical intervention to treat precancerous lesions and should substantially reduce the economic and social burden of cervical cancer in the developing and the developed world.

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Dr. Ian Frazer is Director and founder of the Diamantina Institute of Cancer, Immunology and Metabolic Medicine at the University of Queensland, Brisbane, Australia. Dr. Frazer's current research interests include immunoregulation, and immunotherapeutic vaccines for papillomavirus-related cancers. Dr. Frazer is president of the Cancer Council Australia. He is regularly invited to speak at international meetings, and is also an advisor to the World Health Organisation on the papillomavirus vaccines.

In 1985, with colleagues in Melbourne, Dr. Frazer demonstrated, at a time when the extent of the association of papillomavirus infection with cervical cancer was contentious, that papillomavirus infection also contributed to precancerous anal lesions, particularly in men with immunosuppression as a result of HIV/AIDS. In 1990, with the late Dr. Jian Zhou, he developed a technology for producing human papillomavirus virus-like particles. Virus like particles are now the basis of vaccines (Cervarix and Gardasil) for the prevention of cervical cancer.

Dr. Frazer has also contributed to the development of therapeutic vaccines for chronic HPV infection, currently in Phase 2 clinical trials. He has researched technology for improving the immune response to polynucleotide vaccines, based on differential preferences for codon usage between cells of different lineages. This technology is currently being used to develop improved polynucleotide vaccines for Herpes viruses.

Conflict of interest statement

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