

Novel Vaccines – What's in the pipeline?

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Scientists worldwide are striving without heed in order to develop new vaccines which protect the human race against old and emerging diseases.

However it is not only the menu of these vaccine preventable diseases which is being extended but the quality and efficacy of these vaccines are improving tremendously. Researchers are today studying vaccine adjuvants which improve the immunogenicity of the product, aiming to create a vaccine which provides lifelong immunity and which is well tolerated and free from side effects. The problem of the pin cushion effect with multiple injections during one and subsequent visits to the family doctor and pediatrician will soon be a thing of the past with the introduction of combination vaccines. Also in the twenty first century the use of edible vaccines, nasal sprays or skin lotions may eliminate the use of needles completely.

The following information will focus on three novel vaccines which should be stocked in pharmacies in Malta and Gozo in the very near future. These vaccines are against (1) Rotavirus, a common cause of gastroenteritis in children, (2) Human Papilloma Virus (HPV) which may lead to carcinoma of the cervix and (3) Malaria, a parasitic disease which kills more than one million people every year.

Rotavirus

The Rotavirus vaccines are a new generation of vaccines which are fast making their way into our clinics. These are already licensed in some countries and have been given the go ahead by the European Medicines Agency (EMA). These live attenuated vaccines will provide lasting protection when given in two doses as an oral preparation, with the first dose given at six weeks and the second dose given 14 weeks later. These new vaccines are not associated with episodes of intussusceptions, which had caused the only US-licensed rotavirus vaccine to be removed from the market in 1999. The three currently registered rotavirus vaccines are the Rotarix™ (GSK), Rotashield™ (Wyeth/Biovirx) and LLR™ (Lanzhou Institute of Biological Products, China). Rotateq (MSD) is in its phase III trials and is just about to be registered.

Human Papilloma Virus (HPV) Vaccines

HPV-Deoxy Ribo Nucleic Acid (DNA) is present in 90-100% of carcinoma of the cervix, with the most common HPV types being HPV 16 and 18. It is now well established that HPV is the leading cause of carcinoma of the cervix and the progression may take years or even decades, and it may even regress spontaneously.

Table 1: Basic table of main HPV types and the associated lesions.

Lesion	HPV type
Plantar warts	1,2,4
Hand warts	2,4
Genital warts	6,11
Cervical carcinoma	16,18,31,45



In fact 60% to 80% of CIN 1 dysplasia resolve spontaneously and only 1% of cases progress to invasive cervical cancer. However, carcinoma of the cervix is the second commonest carcinoma in women, after breast.

On the forefront in HPV clinical trials for the HPV vaccine are Merck and Co. (with a current clinical trial of 25,000 women) and GSK (with a current clinical trial on 30,000 women). The results are very promising where 100% antibody responses are being achieved to HPV types 6, 11 and 16, with a lower response to type 18.

The HPV 16 and 18 prophylactic vaccines are showing good tolerance and immunogenicity and it is recommended that prophylactic vaccination should start in young adults prior to, or at the time of sexual initiation.

Of course, cervical screening programmes will still remain as important as they are today and the vaccine is intended to complement, and not to replace cervical screening.

Malaria

An innovative vaccine whose mode of action is not to treat someone infected with malaria, but to make the infected person non-infective to others. Once the *Anopheles* mosquito feeds on the infected person, the vaccine blocks the replication of the parasite in the mosquito, hence blocking the life cycle and preventing infection in other hosts. Hence the use of this vaccine in controlling malaria disease will be invaluable.

Conclusions

We are currently enjoying a feast of new combination vaccines in the market, and these exhibit improved immunogenicity and tolerance. Many of these are already in phase III trials or registered for licence. However there are many other innovative vaccines in phase I trials (Human Immunodeficiency Virus, tuberculosis, zoster, breast cancer and prostate cancer) and Phase II trials (Epstein Barr Virus, Dengue, lung cancer and melanoma). Current pre-clinical trials include Cytomegalovirus, Respiratory Syncytial Virus, Chlamydia, SARS, *Staphylococcus aureus* and Avian Influenza.

With such extended menus for vaccine preventable diseases and the provision of better quality vaccines we are keeping our fingers crossed so that future generations will enjoy a better quality of life where the child who is still present as a foetus in utero may be protected against infections such as Group B Streptococcus and Respiratory Syncytial Virus by vaccinating pregnant mothers. ☑