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THE EVOLVING ADOLESCENT IMMUNIZATION SCHEDULE: A NEED FOR ACELLULAR PERTUSSIS BOOSTER IMMUNIZATIONS

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Routine use of pertussis vaccines globally has led to dramatic declines in the incidence of whooping cough in young children. Yet pertussis is incompletely controlled and causes about 300,000 deaths per year worldwide.¹ Most pertussis cases now occur in the unimmunized, young infants prior to completing their initial pertussis immunizations and importantly in adolescents and adults with waning immunity. In developed countries, infections are now transmitted predominately from older individuals (reservoir of infection) to younger infants who suffer greater morbidity and mortality.

There are several acellular pertussis vaccines for children (variations of DTaP) and lower dose booster formulations for adolescents and adults (Tdap). These vaccines are effective, generally well-tolerated and have clinically acceptable safety profiles, especially in comparison to the whole cell vaccines. However, protective immunity to pertussis wanes over 5-10 years after immunization.²

In addition to preventing pertussis, tetanus and diphtheria, there are multiple reasons for instituting a routine adolescent immunization visit between 10-15 years of age. It also provides an opportunity to immunize with meningococcal and HPV vaccines and for selective use of vaccines such as HBV, MMR, varicella, influenza and hopefully in the near future, vaccines such as herpes type II. Importantly it is also an opportunity to reach adolescents for health screening, education and counseling.

This presentation will review the formulation, immunogenicity, and safety of aP vaccines as well as the rationale for pertussis boosters in the current epidemiological context. The ultimate control of pertussis will require routine pertussis booster immunizations for adolescents and adults as well as for the parents of young infants (cocoon strategy).

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SUCSESSES AND REMAINING CHALLENGES IN MENINGOCOCCAL DISEASE PREVENTION

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Neisseria meningitidis is a leading cause of invasive meningococcal disease (IMD) with a high case-fatality rate, causing 50,000 deaths worldwide annually.¹ Five serogroups of *N. meningitidis* (A, B, C, W-135 and Y) cause the majority of human disease.² Prevalence of each serogroup varies temporally and geographically,^{2,3} and new strains can spread rapidly around the world. Protection against IMD can be achieved using monovalent (A and C only) and multivalent (A, C, W-135 and Y) polysaccharide (PS) meningococcal vaccines, which have demonstrated efficacy and a clinically acceptable safety profiles in children >2-years-old.⁴ However, in infants < 2 years, these vaccines are poorly immunogenic and do not induce immunological memory. Furthermore, duration of immunity is short (3-5 years) and hyporesponsiveness can occur after repeated doses.⁴ Effective protein-polysaccharide-conjugate vaccines are licensed for use in children < 2-years-old,⁵ but only provide protection against serogroup C. GlaxoSmithKline is developing a tetanus toxoid-conjugated tetravalent serogroup A, C, W-135, Y vaccine (MenACWY-TT), which potentially could address some of these issues. In clinical trials, the candidate vaccine demonstrated similar immunogenicity against serogroup C (seroresponse rates >94.8%) to MenC-conjugated vaccines in children aged 1-10 years.⁶⁻⁹ Additionally, immunogenicity of MenACWY-TT post-vaccination was non-inferior to MenACWY-PS vaccines against all four serogroups in adolescents/adults aged 11-55,^{10,11} with significantly higher MenA, MenW-135 and MenY geometric mean antibody titres 1 year post-vaccination in 11-17-year-olds.¹¹ In clinical trials, MenACWY-TT has shown a clinically acceptable reactogenicity and safety profile.^{12,13}

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THE IMPORTANCE OF ROTAVIRUS DISEASE PREVENTION IN EUROPE

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Rotavirus (RV) is the leading cause of severe diarrhoea in children, annually causing >500,000 diarrhoea-related deaths in children aged < 5 years worldwide.¹ Since young infants can acquire the infection, there is a need for early protection.² In addition to the substantial burden of mortality (especially in developing countries) RV gastroenteritis (RVGE) has a considerable impact on the morbidity and quality of life of both affected children and their parents in Europe.³

The RV1/monovalent vaccine is an oral G1P[8], live-attenuated human rotavirus vaccine. RV1 has a two-dose schedule that can be completed by 10 weeks

of age and offers early protection against circulating RV strains. The vaccine has demonstrated efficacy against severe RVGE (90.4% [95%CI: 85.1-94.1]).^{4,5} Heterotypic cross-protection is the mechanism underlying the efficacy of RV1 in non-vaccine strains (79.2% [95%CI: 8.9-96.5]); including the fully heterotypic G2P[4] strain.⁶ In trials and post-marketing surveillance (including 69 million doses), RV1 has demonstrated a clinically acceptable safety profile and has been generally well tolerated in healthy infants; furthermore, studies have shown no specific safety issues in high risk populations such as HIV-positive and pre-term infants.^{4,7,8}

Routine RV vaccination - mainly with RV1 - was implemented in Belgium in 2006, which resulted in a 53% decrease in peak incidence by 2007, with the highest decline in children aged < 1 years (81% reduction).⁹ In Austria, a 74% decrease in hospitalisation rates due to RVGE was observed compared to the era before the introduction of the vaccine.¹⁰ Similar trends were also observed in US with the RV5/pentavalent bovine-human reassortant vaccine.¹¹ New data from EuroRotaNet show the dynamic nature of rotavirus infection with the emergence of G8 and G12 strains.^{12,13}

Widespread implementation of RV vaccination would effectively reduce the European burden of RVGE and support the WHO recommendation for its inclusion into national immunisation programmes in countries that can afford the vaccine.¹⁴

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