GVIRF 2018 Workshop 7: New Vaccine Pipeline: Lessons Learned and Accelerating Progress	
Rapporteur: Birgitte Giersing (WHO)	
Session Outline	**Chair:** Jean-Pierre Amorij (Consultant, AH BV) **Presentations:** *The Global Vaccine Pipeline and Full Public Health Value Propositions*, David Kaslow (Vice President for Essential Medicines, Director of the PATH Center for Vaccine Innovation and Access, PATH) *Update on RSV vaccine and mAb development*, Ruth Karron (Director of the Center for Immunization Research, Johns Hopkins University) *A hepatitis C virus vaccine progress update*, Andrea Cox (Professor of Medicine, Oncology, and Immunology, JHSOM) *Human Hookworm Vaccine Initiative: A Public Health Value Proposition leading to Societal Impact and Positive Financial Returns*, Maria Elena Bottazzi (Deputy Director, TCH Center for Vaccine Development) **Additional Panelists:** Jean Lang (Associate Vice President, Sanofi Pasteur) Suresh Jadhav (Executive Director, Serum Institute of India)
Objectives of the session	*To discuss:* • progress towards licensure and launch of vaccines against non-vaccine preventable diseases • lessons learned from development of these vaccines • the role of value propositions in guiding investment decisions in vaccine research and development
Main outcome	• Value propositions for new vaccines are increasingly important given the limited resources, competing priorities, and the alternative interventions that may be available for treatment or prevention. Demonstrating impact beyond the direct individual level will be important in articulating the benefit of emerging vaccines. • The first RSV vaccine or extended half-life monoclonal antibody (mAb) may be available for global deployment in 2-3 years. Operational research is a priority. • A new prophylactic HCV vaccine is in trials in at-risk subjects, with data due out in fall of 2018. • The Human Hookworm Vaccine Initiative has advanced a candidate into a phase 2 study including a controlled human infection model (challenge study) and undertaken a full public health vaccine proposition for Hookworm vaccines.
Summary	**Introduction.** The Global Observatory on Health R&D, which tracks product development for 23 infectious diseases[a] and the WHO Vaccine Pipeline Tracker, which tracks clinical trials[b] show a substantial vaccine development pipeline. Two programs are using objective criteria to prioritize vaccines. WHO's Product Development for Vaccines Advisory Committee (PDVAC) prioritizes vaccines for WHO engagement according to need, feasibility, and WHO's potential role in accelerating development. PDVAC has prepared pipeline analyses for 32 pathogens.[c] Gavi, which funds access to

	vaccines, is considering new vaccines for funding upon their licensure and prequalification. In addition, FPHVP are being developed to inform decision-making and minimize the gap between vaccine licensure and routine use.[d] FPHVP move beyond the traditional approach based on individual health benefits to include indirect health benefits and non-health benefits to societies and economies. **Respiratory Syncytial Virus (RSV).** RSV causes ~33 million cases of acute lower respiratory disease and ~27,300 hospital deaths each year. Two strategies are in development for protection of neonates and infants: maternal immunization (MI) during pregnancy with subunit vaccines and infant immunization shortly after birth with mAbs. The RSV R&D pipeline is robust.[d] The most advanced vaccine candidate (RSV F protein, Novavax) is being administered to pregnant women in a Phase 3 trial with a primary end point of prevention of RSV lower respiratory tract infection in infants during the first 90 days of life. A preliminary analysis showed ≥40% efficacy. An interim analysis is planned in January 2019 and biological license application is planned for late 2019/early 2020. The most advanced mAb candidate (MEDI 8897, Medimmune) is completing a phase 2B study in preterm infants with full analysis expected late in 2018. As these products approach licensure, policy considerations such as the minimum efficacy, the effects of seasonality, the impact of morbidities such as HIV infection on effectiveness of MI, and the delivery capacity of health systems must be addressed. **Hepatitis C virus (HCV).** HCV prevalence is 71M infections globally, causing significant mortality from liver disease and cancer. HCV vaccines are needed as part of a comprehensive strategy of prevention, harm reduction, early diagnosis and treatment. The leading vaccine approaches target cell-mediated responses using heterologous prime boost strategies. A Phase1/2 study is underway to evaluate safety, induction of HCV-specific immune responses, and efficacy in preventing chronic HCV infection, with data expected in late 2018. Multivalent approaches may be needed to address the diversity of circulating HCV strains. **Human Hookworm.** Hookworm infects more than 470M people globally, causing anemia, malnutrition, physical and developmental delays and reductions in future earnings. The Human Hookworm Vaccine Initiative (HHVI) has defined a target product profile, evaluated 12 vaccine candidates, and prioritized 2 for clinical development. These have been found to be safe, well tolerated, and immunogenic in Phase 1 trials and are being evaluated for efficacy in a Phase 2 controlled human hookworm infection model. As part of a FPHVP, HHVI have analyzed target markets and socio-economic benefits, and showed positive return on investment starting 3 years after vaccine introduction. This component of the FPHVP is especially important for vaccines that lack strong commercial markets.

Key references or quotes	a. WHO Global Observatory: http://www.who.int/gho/en/ b. WHO Pipeline tracker: https://docs.google.com/spreadsheets/d/19otvINcayJURCMg76xWO4KvuyedYbMZDcXqbyJGdcZM/pubhtml c. Kaslow DC, Okwo-Bele J-M. The 2016 Vaccine Development Pipeline: A special issue from the World Health Organization Product Development for Vaccine Advisory Committee (PDVAC). Vaccine 2016;34:2863–4. doi:10.1016/J.VACCINE.2016.04.041. https://www.sciencedirect.com/science/article/pii/S0264410X16301955 d. Gessner BD, Kaslow D, Louis J, Neuzil K, O'Brien KL, Picot V, et al. Estimating the full public health value of vaccination. Vaccine 2017;35:6255–63. doi:10.1016/J.VACCINE.2017.09.048. https://www.sciencedirect.com/science/article/pii/S0264410X17312963?via%3Dihub e. PATH RSV vaccine pipeline https://www.path.org/publications/files/CVIA_RSV_snapshot_fs.pdf