

A vibrant photograph of a group of children and a woman, likely in a community health setting. The children are smiling broadly, some with their arms raised. The woman in the center is also smiling. The background shows a simple outdoor environment with some concrete structures.

Photo: PATH/Doune Porter

RSV Vaccine Development – Status Update

WHO RSV Surveillance Pilot | 18-20 Dec 2017 | Washington DC

Deborah Higgins | PATH



CENTER FOR VACCINE
INNOVATION AND ACCESS

PATH RSV Vaccine Project

Advancing RSV Vaccines

- Monitor RSV prevention landscape
- RSV assay standardization/harmonization
- Provide evidence and support to advance global policies
- Assess country-level needs and challenges



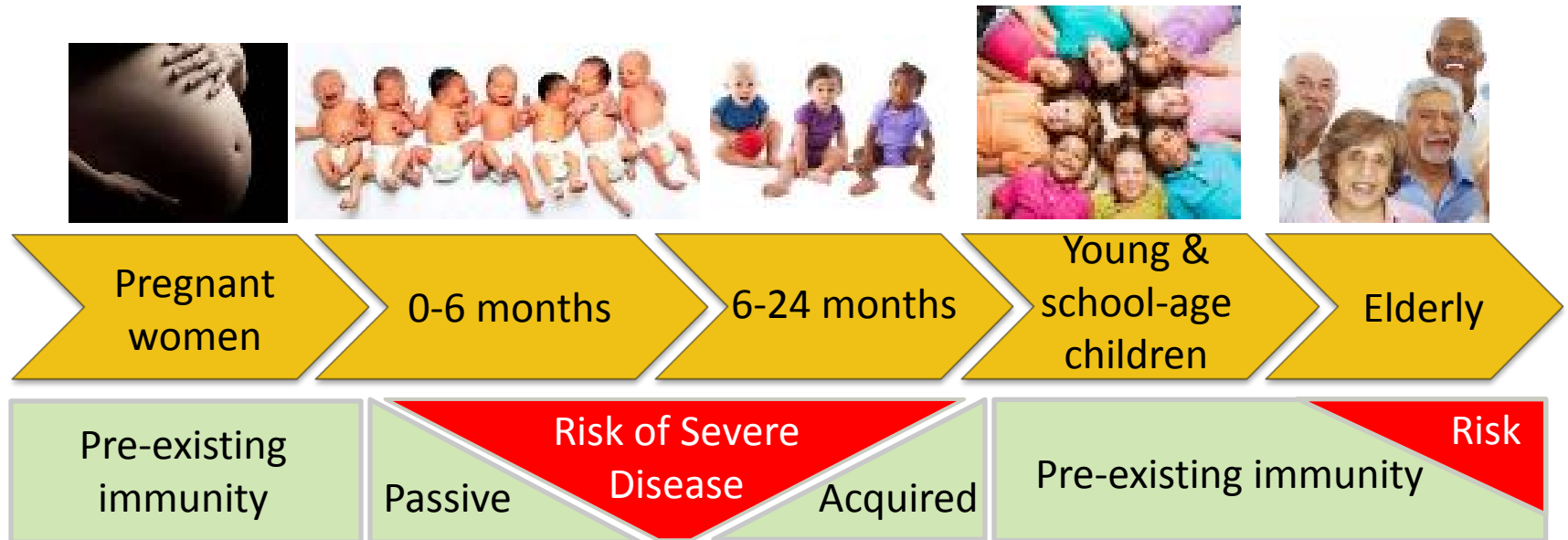
Outline

RSV Prevention Landscape

- Populations that need protection
- Protection goals and options
- RSV vaccine and mAb pipeline
- RSV prevention context

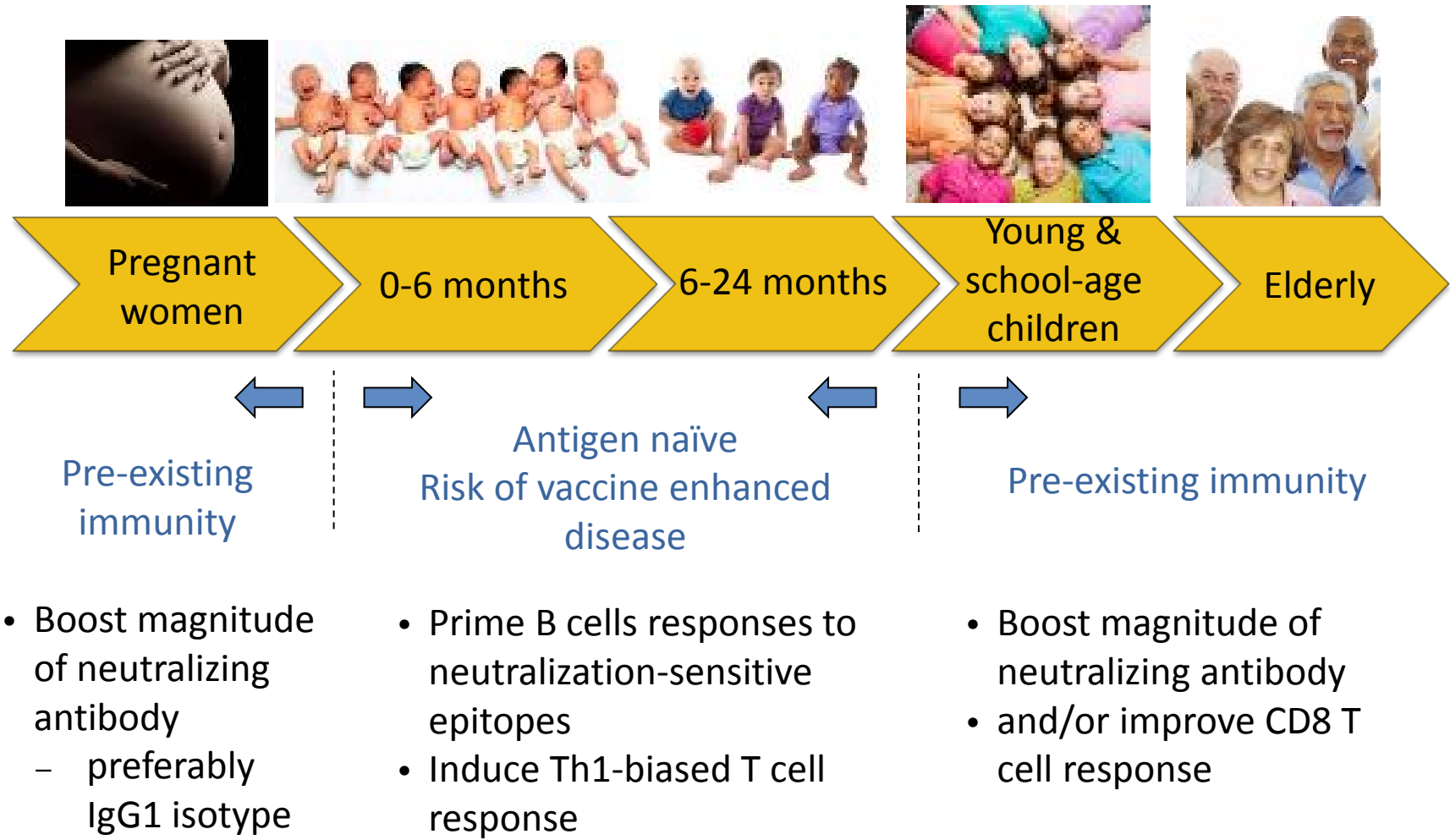
PATH/Aaron Joel Santos

Target Populations for RSV Prevention



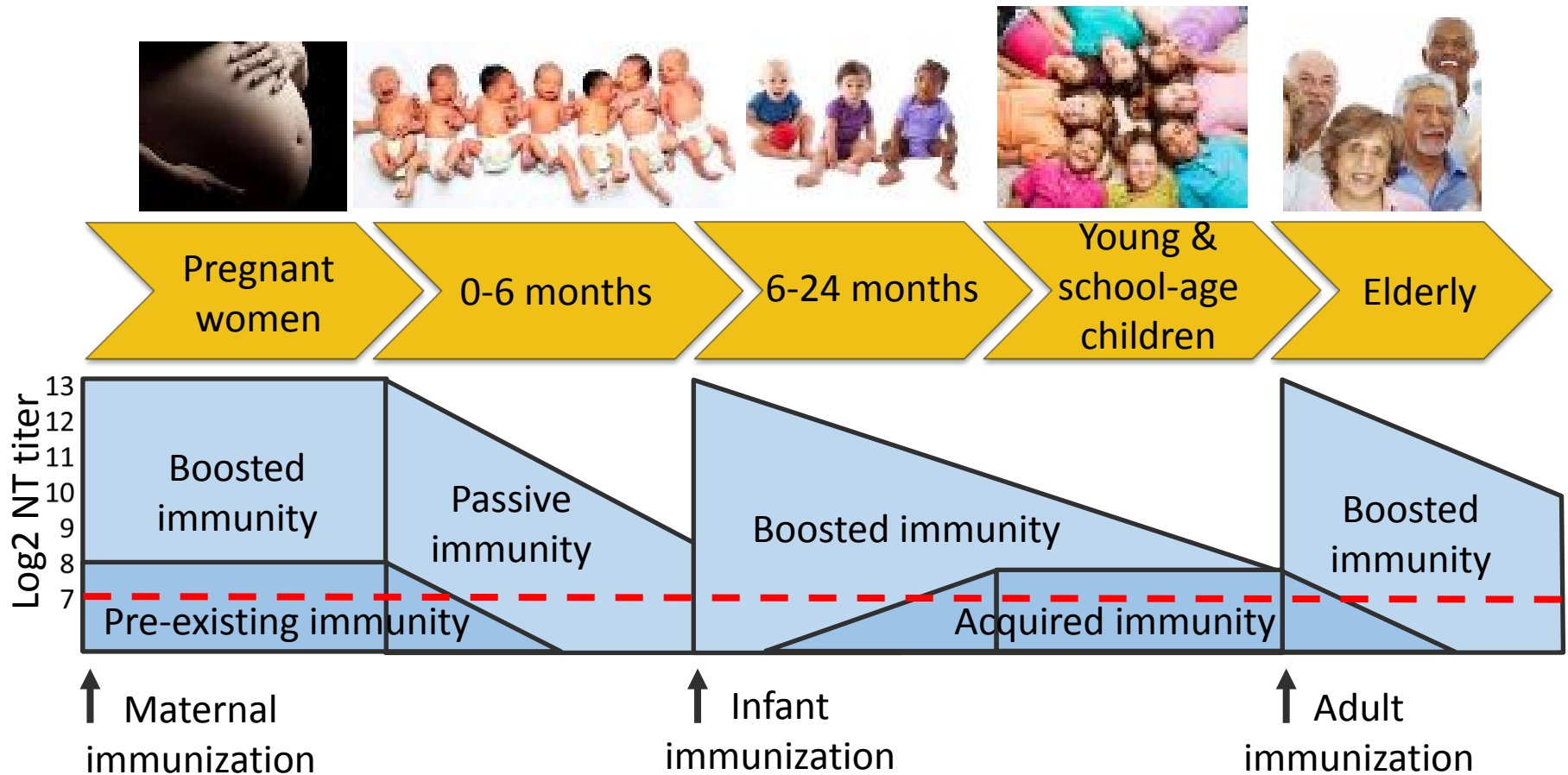
Slide courtesy of Barney Graham/ NIAID

Options for RSV Vaccines



Slide courtesy of Barney Graham/NIAID

Goal of RSV Vaccines



Slide courtesy of Barney Graham/ NIAID

Vaccines to protect RSV naïve neonates, infants, & children

Induce primary immune responses

- Live-attenuated vaccines
 - Do not appear to cause enhanced disease in RSV-naïve infants.
 - In development for decades, but difficult to achieve appropriate balance of immunogenicity and safety.
- Gene-based vector vaccines
 - Replication deficient vectors avoid concerns of live-attenuated vaccines or risk of enhanced disease with subunit approaches.
 - Immune responses less likely to be inhibited by maternal antibodies.

Vaccines to protect RSV experienced infants, children, and adults

Boost pre-existing immunity

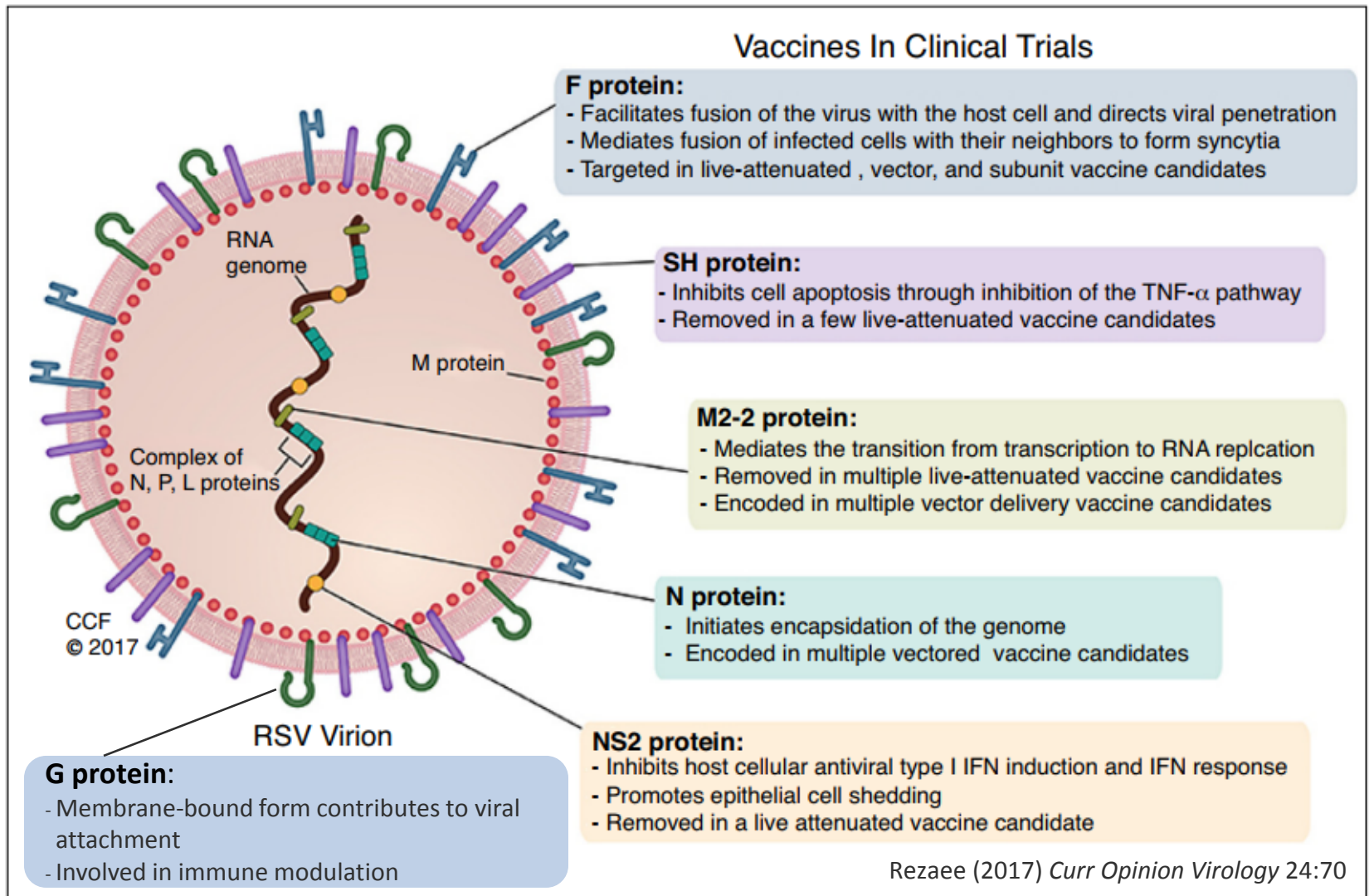
- Protein-based vaccines
 - Whole-inactivated virus vaccines, subunit vaccines, particle-based vaccines
- Nucleic acid vaccines
 - Use either plasmid DNA or messenger RNA encoding RSV antigens.
 - Intended to avoid issues with vector immunity and safety.
 - New approaches encode directly for antibody production.
- Gene-based vector vaccines
 - May be able to increase cell-mediated immunity

Additional options to protect RSV naïve neonates and infants

Passive Immunization

- Immunization during pregnancy
 - Using vaccines to boost maternal pre-existing immunity
 - Also increases transfer of RSV-specific antibody to protect infants during the first several months of life.
- Immunoprophylaxis using monoclonal antibodies
 - Targets protecting protect infants during their first RSV season(s)
 - mAb approaches include antibodies specific for RSV F and N.
 - RSV G-specific mAbs in development as therapeutics.
 - Genetic modifications that increase potency and half-life may provide protection for an entire RSV season with just a single dose.

RSV protein targets



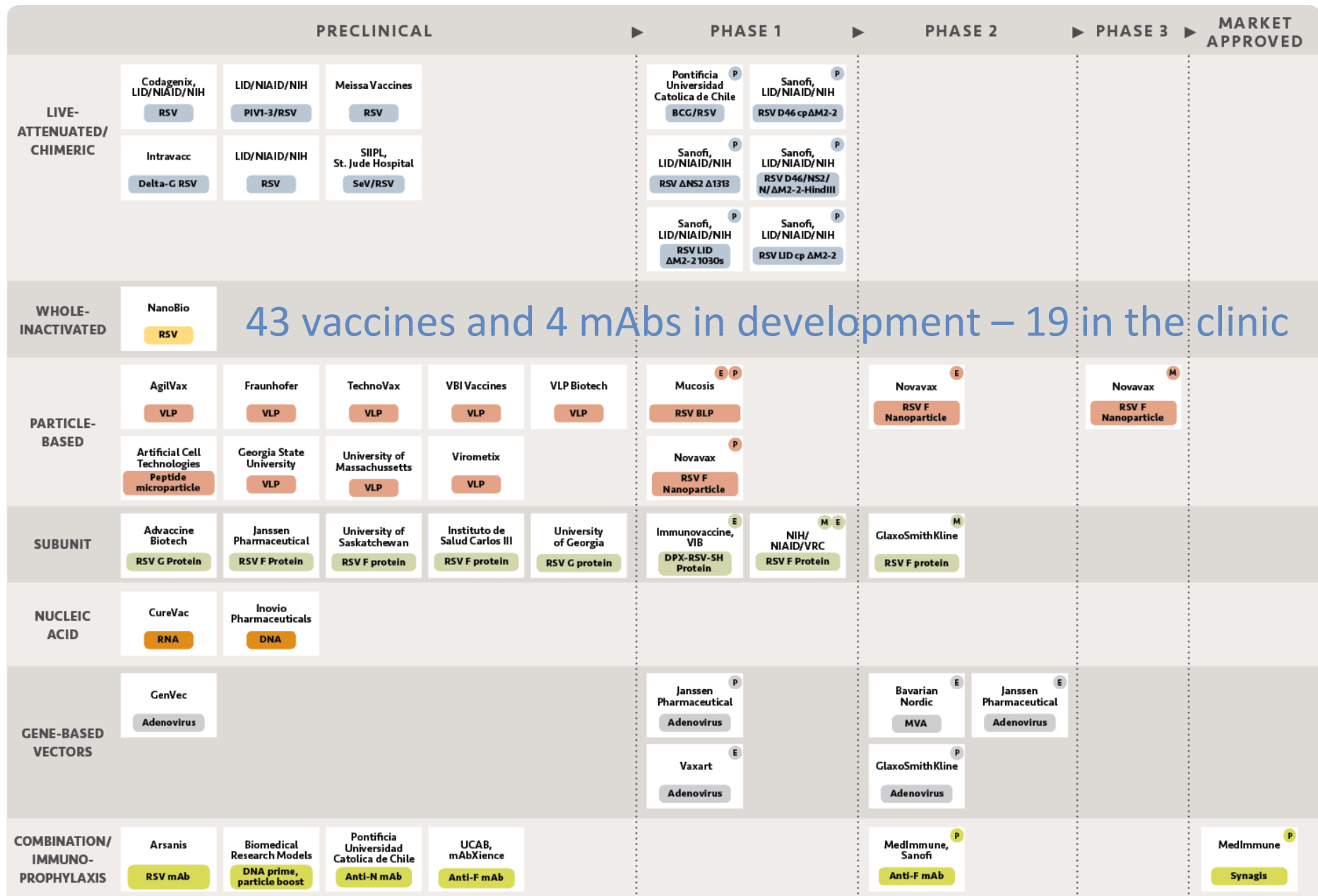
Rezaee (2017) *Curr Opin Virology* 24:70

Significant RSV pipeline changes

- Failures to meet efficacy endpoint:
 - Novavax Phase 3 in elderly with unadjuvanted RSV F nanoparticle vaccine.
 - MedImmune Phase 2b in elderly with GLA/SE adjuvanted RSV F vaccine (MEDI7510).
 - Regeneron Phase 3 in infants with RSV F mAb (RGN2222).
- Development partnering
 - Sanofi Pasteur and LID/NIAID/NIH on live-attenuated RSV.
 - Sanofi Pasteur and MedImmune on RSV F mAb (MEDI8897).
 - Serum Institute of India and St. Jude Hospital on SeV/RSV.
 - UCAB and mAbXience on RSV F mAb (palivizumab copy).

RSV Vaccine and mAb Snapshot

TARGET INDICATION: P = PEDIATRIC M = MATERNAL E = ELDERLY



UPDATED: NOVEMBER 30, 2017

<http://www.path.org/vaccineresources/details.php?i=1562>



WHO RSV Vaccine and mAb Pipeline Tracker

- Track the status of clinical trials and reporting of results.
http://www.who.int/immunization/research/vaccine_pipeline_tracker_spreadsheet/en/
- Informs the WHO Global Observatory on Health R&D.
http://www.who.int/research-observatory/monitoring/processes/health_products/en/

Vaccine Candidate

Candidate Vaccine	Candidate Vaccine Status	Platform	Immunogen Type	Immunogen	Adjuvant Type	Adjuvant
-------------------	--------------------------	----------	----------------	-----------	---------------	----------

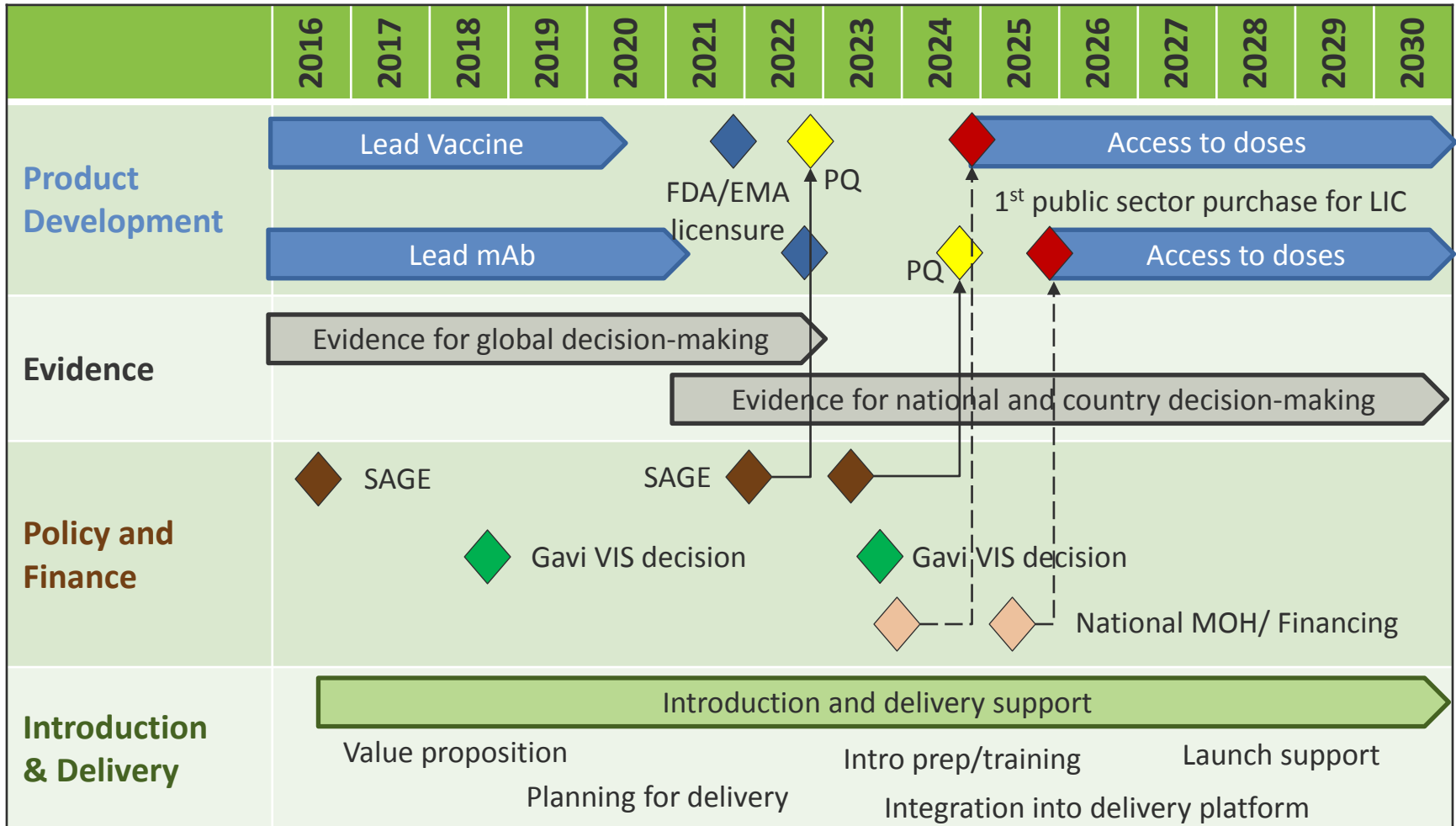
Clinical Trial Information

Registry ID	Trial Status	Sponsor	Phase	Study Start Date	Completion Date	Age	Sample Size, Enrollment	Location
-------------	--------------	---------	-------	------------------	-----------------	-----	-------------------------	----------

Results Reporting Information

Results Reporting Status	Interim Publication Type, Date, Link	Full Publication Type, Date, Link	Clinical Trials Registry Date
--------------------------	--------------------------------------	-----------------------------------	-------------------------------

RSV Prevention Context



Sources: Product development timeline is illustrative; Estimated lag times from licensure to selected policy, finance, and implementation milestones; and SAGE and Gavi historical decision making calendars. Not exhaustive. Lag times are highly variable from product to product. Gavi VIS assumptions for modelling purposes for PQ and first Gavi country introduction based on consultations.



Acknowledgements

PATH RSV Snapshot and WHO RSV Vaccine Pipeline Tracker

- Catie Plourde (PATH)

Funding

Bill & Melinda Gates Foundation

ami Advancing Maternal Immunization

Vision—To improve infant health and survival

- AMI is a WHO/PATH collaboration, convening global, cross-sector experts to establish a framework for informing, coordinating, tracking, and contributing to global efforts to advance RSV maternal immunization.
- Key activities:
 - **Identify evidence needs** to enable efficient, well-informed global and country decisions and requirements for rapid launch and uptake of RSV maternal vaccines in LMICs
 - **Assess evidence gaps** and priorities, and **articulate the way forward** in a **RSV maternal immunization roadmap**
 - **Develop a plan** for meeting the full spectrum of decision-making, rapid launch, and uptake needs