CHIKUNGUNYA VACCINES

ACIP Meeting
June 23, 2022

Beth Bell, MD, MPH
Chair, ACIP Chikungunya Vaccines Work Group
Background to formation of Chikungunya Vaccines Work Group

- No chikungunya vaccine ever licensed in United States or globally
- Multiple chikungunya vaccines in development
- One manufacturer planning to submit a BLA to FDA during 2022
  - Licensure possible during 2023
- Work Group formed in May 2022
Purpose of Chikungunya Vaccines Work Group

- To review and evaluate data on chikungunya disease, epidemiology, and vaccines

- To develop policy options for ACIP’s consideration for U.S. persons at risk of chikungunya, including
  - Travelers
  - Residents of U.S. territories and states with, or at risk of, transmission
Terms of Reference for Chikungunya Vaccines Work Group

- To review information on chikungunya disease, including outcomes
- To review data on chikungunya epidemiology and burden among U.S. residents, including travelers and persons living in areas at risk for local transmission
- To review data on safety, immunogenicity, and effectiveness of chikungunya vaccines
- To provide evidence-based recommendation options for ACIP
- To identify areas in need of further research for informing potential future vaccine recommendations
- To publish a chikungunya vaccine MMWR Recommendations and Reports document
Chikungunya Vaccines Work Group members

**ACIP**
Sixun Yang, FDA
Beth Bell, Univ Washington (Chair)
Lesley Dupuy, NIH
Wilbur Chen, Univ Maryland

**ACIP Liaisons**
Margaret Ryan, DoD

**CDC Leads**
Elizabeth Barnett, ISTM
Susan Hills, DVBD (Lead)
James Campbell, AAP
Nicole Lindsey, DVBD (Deputy Lead)
Mary Pat Friedlander, AAFP

**Ex Officio**
Robin Levis, FDA

**Invited Consultants**
Carina Blackmore, Florida Dept Health
Alan Lam, DoD
TBD, Puerto Rico
Steven Schofield, CATMAT
David Shlim, Jackson Hole Travel & Trop Med
Nestor Sosa, Uni New Mexico Hospital
Kirsten Vannice, Bill & Melinda Gates Foundation
Mary Wilson, Univ California San Francisco

**Invited Consultants**
Alan Barrett, Univ Texas Galveston
# Chikungunya Vaccines Work Group CDC participants

<table>
<thead>
<tr>
<th>DVBD</th>
<th>DGMQ</th>
<th>ISD</th>
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<tbody>
<tr>
<td>Erin Staples</td>
<td>Sarah Guagliardo</td>
<td>Elisabeth Velazquez</td>
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<td>Ann Powers</td>
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<td>Laura Adams</td>
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<td>Joshua Wong</td>
<td>Michael McNeil</td>
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<th>DHQD</th>
<th>Global Immunization Division</th>
<th>GRADE/ETR consultants</th>
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<tr>
<td></td>
<td>Rebecca Casey</td>
<td>Doug Campos-Outcalt</td>
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<td>Susan Chu</td>
<td>Rebecca Morgan</td>
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<tr>
<th>NCEZID</th>
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<th>ACIP Secretariat</th>
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<tr>
<td>Rita Helfand</td>
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<td>Jessica MacNeil, NCIRD</td>
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Today’s session

- Overview of chikungunya disease and vaccines
  - Susan Hills (CDC/NCEZID)

- Plans and timelines for Chikungunya Vaccines Work Group
  - Susan Hills (CDC/NCEZID)
OVERVIEW OF CHIKUNGUNYA AND CHIKUNGUNYA VACCINES

Susan Hills, MBBS, MTH
CDC Lead, Chikungunya Vaccines Work Group
Arboviral Diseases Branch
Division of Vector-Borne Diseases
Fort Collins, Colorado
Chikungunya virus disease

- Mosquito-borne disease caused by an *alphavirus*
- Clinically characterized by acute onset of fever and often severe polyarthritis
- Has caused large outbreaks with high attack rates
- Outbreaks have occurred in Africa, Asia, Europe, Americas, and islands in the Indian and Pacific Oceans

Chikungunya virus first identified during outbreak of fever and joint pain in Tanzania, 1952–1953

Expansion in area of transmission in Africa, Asia and the Indian Ocean, 1953–2012

Thiberville SD. Antiviral Res 2013

Outbreaks in US territories

Limited local transmission in Florida and Texas

https://www.cdc.gov/chikungunya/geo/index.html
Countries and territories with past or current transmission of chikungunya virus, 2022

https://www.cdc.gov/chikungunya/geo/index.html
Chikungunya cases in US travelers, 2009–2021*

*Based on CDC laboratory and surveillance data
Mosquito vectors

- *Aedes aegypti*
  - Daytime biters with peak activity dawn and dusk
  - Lay eggs in containers that hold water

- *Aedes albopictus*
Other rare chikungunya virus transmission modes

- Intrauterine
- Intrapartum
- Needlestick injury
- Laboratory exposure
Clinical features of chikungunya

- Incubation period: 3–7 days
- Febrile illness with often severe arthralgia
- Multiple joints involved, typically bilaterally and symmetrically
- Arthralgia most common in hands and feet, can involve more proximal joints
- No specific antiviral treatment
Rare complications

- Myocarditis
- Ocular disease
- Hepatitis
- Acute renal disease
- Severe bullous lesions
- Neurologic disease
Risk factors for severe disease

- Age >65 years
- Underlying medical conditions (e.g., hypertension, diabetes, heart disease)
- Intrapartum transmission
  - Neonatal complications can include neurologic, myocardial, hemorrhagic symptoms
Outcomes

- For many, symptoms resolve in 7–10 days
- Some have ongoing joint pain and prolonged fatigue for months or years
- > 50 studies with variability in results based on
  - Study methodology
  - Duration of follow up
  - Symptom ascertainment
  - Type of cohort
  - Demographics
Risk factors for prolonged symptoms

- Older age
- Severity of acute illness
- Pre-existing joint disease
Prevention of chikungunya

- Protective measures against mosquito bites
- If licensed, chikungunya vaccine
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<thead>
<tr>
<th>Manufacturer</th>
<th>Type</th>
<th>Schedule and administration</th>
<th>Status</th>
<th>Notes</th>
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<tbody>
<tr>
<td>Valneva Live</td>
<td>attenuated Live</td>
<td>1 dose IM</td>
<td>- Phase III in adults ≥18 years completed</td>
<td>CEPI co-funding</td>
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<td>- Phase III in adolescents (12–17 years) commenced January 2022</td>
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<td>- Lot-to-lot consistency completed</td>
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<td>- Expected BLA submission to FDA during second half of 2022</td>
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<tr>
<td>Emergent BioSolutions</td>
<td>Virus-like particle</td>
<td>1 dose IM</td>
<td>- Phase III in 12–65 years commenced October 2021</td>
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Abbreviations: IM-Intramuscular; BLA-Biologics License Application; FDA-Food & Drug Administration; CEPI-Coalition for Epidemic Preparedness Innovations
Other chikungunya vaccines with support from CEPI

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<tr>
<td>Merck</td>
<td>Live attenuated measles-vectored</td>
<td>1 dose + booster</td>
<td>Phase II completed</td>
<td>CEPI co-funding</td>
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<tr>
<td>International Vaccine Institute/</td>
<td>Inactivated whole virus</td>
<td>2-dose</td>
<td>Phase II/III commenced</td>
<td>CEPI co-funding</td>
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<tr>
<td>Bharat Biotech</td>
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<td>August 2021</td>
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Abbreviations: CEPI - Coalition for Epidemic Preparedness Innovations
Valneva’s chikungunya vaccine

- FDA has given the vaccine Breakthrough Therapy designation which allows request for priority review
  - Accelerated approval pathway is 8 months from time BLA submission is received
  - Licensure expected during 2023

- Anticipated initial indication for adults ≥18 years
  - Adolescent trial in progress
  - Pediatric trial expected in future
Summary of chikungunya and chikungunya vaccine

- Mosquito-borne disease that can cause large outbreaks
  - In United States, previous outbreaks in territories and limited local transmission in states (i.e., Florida, Texas)
  - For travelers, greatest risk during outbreak periods

- Clinical presentation with fever and severe polyarthralgia with risk for long-term joint symptoms

- One vaccine, manufactured by Valneva, soon to be submitted for licensure

- No chikungunya vaccine previously licensed and no existing ACIP chikungunya vaccine recommendations
NEXT STEPS FOR CHIKUNGUNYA VACCINES
WORK GROUP

Susan Hills, MBBS, MTH
CDC Lead, Chikungunya Vaccines Work Group
Arboviral Diseases Branch
Division of Vector-Borne Diseases
Fort Collins, Colorado
Work Group timeline (tentative)

2022: BLA submission

- (Today) Review of chikungunya and vaccines
- Present to ACIP: Vaccine immunogenicity and safety data [Valneva] and epidemiology among travelers

2023: Possible licensure

- Present to ACIP other data relevant to recommendations
- Present to ACIP other data relevant to recommendations
- Present to ACIP EtR/GRADE

2024

- ACIP vote on vaccine recommendations
Future topics

- Epidemiology
  - Travelers
  - Residents of areas of United States with past transmission of chikungunya virus

- Disease burden from acute disease and sequelae

- Additional vaccine data in younger age groups and/or additional chikungunya vaccines
Acknowledgements

- Chikungunya Vaccines Work Group members
- Nicole Lindsey
- Erin Staples