Advisory Committee to the Director

Ebola: Then vs. Now

Anthony S. Fauci, M.D.
Director
National Institute of Allergy and Infectious Diseases
National Institutes of Health
June 14, 2018

Ebola Virus

Source: CDC
**Ebola Virology**

- Family *Filoviridae*, genus *Ebolavirus*
- Species and average fatality in the genus *Ebolavirus*
  - *Bundibugyo ebolavirus* – ~30%
  - *Zaire ebolavirus* – ~40%
  - *Reston ebolavirus* – animal disease
  - *Sudan ebolavirus* – ~50%
  - *Taï Forest ebolavirus* – 1 non-fatal human case

**Typical Ebola Virus Disease Clinical Course**

<table>
<thead>
<tr>
<th>Exposure</th>
<th>Incubation period</th>
<th>Symptoms begin</th>
<th>Recovery or death</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average 8-10 days, range 2-21</td>
<td>Days 1-3 Weakness, fever, influenza-like illness</td>
<td>Days 4-7 Vomiting, diarrhea, hypotension</td>
<td>Days 7-10 Confusion, possible bleeding (typically minor), shock</td>
</tr>
</tbody>
</table>

Source: Adapted from N Bhadella as shown in the Huffington Post 8/7/14.
Selected Ebola Outbreaks 1976 to Present Day

*Democratic Republic of the Congo

- Number of cases
- Number of deaths

Source: Nature Vol 514, June 2018 WHO

State of the Outbreak: March 2014

Source: E Ervin, CDC, WHO
Viral Hemorrhagic Fever Viruses

- High degree of lethality and high infectivity
- Therapy: Mainly supportive
- Vaccine: Not available at present

Ebola — Underscoring the Global Disparities in Health Care Resources

Anthony S. Fauci, M.D.

“It is unlikely that any miracle cure will end the current epidemic. Rather, sound public health practices, engagement with affected communities, and considerable international assistance and global solidarity will be needed to defeat Ebola in West Africa.”
Public Health Response to Ebola in Affected Countries

- Education
- Hygiene practices
- Case identification
- Contact tracing
- Personal Protective Equipment for caregivers
- Prompt isolation
- Aggressive supportive care
- Safe burials

International Response to Ebola Outbreak: U.S. Response

- 3,000+ troops
- Construction of Ebola Treatment Units (ETUs)
- 25-bed facility for healthcare workers
- Ongoing CDC and USAID support

“Faced with this outbreak, the world is looking to us, the United States, and it’s a responsibility that we embrace... We are going to keep leading in this effort.”

–President Barack Obama, Sept. 16, 2014
Medevacs from West Africa

Number of evacuations by country
- 1
- 5
- 10

Evacuated to
- Liberia
- Sierra Leone
- Mali

NIH Special Clinical Studies Unit: Designated Ebola Treatment Facility

*As of Oct. 2014, three Designated Ebola Treatment Facilities existed in the U.S.*
The Washington Post

October 25, 2014

Nina Pham, Nurse Who Contracted Ebola, is Now Free of Virus and Leaves NIH

Photo: The Washington Post

Photo: Nina Pham

CNN

March 12, 2015

U.S. Ebola Patient Headed to NIH
Patient Admitted With Ebola Virus Disease Discharged From NIH Clinical Center
A Recombinant Vesicular Stomatitis Virus Ebola Vaccine — Preliminary Report

JA Regules, JH Beigel, RT Davey Jr, SJ Thomas et al. for the rVSVΔG-ZEBOV-GP Study Group

Feb. 1: Lane Speaks at Opening Ceremony for PREVAIL Ebola Vaccine Study in Monrovia, Liberia
Partnership for Research on Ebola Virus in Liberia (PREVAIL)

Liberia MOH-NIAID Collaboration

- PREVAIL 1: Phase 2, two candidate vaccines vs placebos
- PREVAIL 2: ZMapp vs standard-of-care treatment
- PREVAIL 3: Study of Ebola survivors
- PREVAIL 4: GS-5734 vs placebo for persistent Ebola RNA in semen
- PREVAIL 5 (PREVAC): Phase 2, three vaccine strategies vs placebos
- PREVAIL 6: Genome-wide association study, genetic factors affecting Ebola
- PREVAIL 7: Cataract surgery in Ebola survivors and close contacts

A Randomized, Controlled Trial of ZMapp for Ebola Virus Infection

The PREVAIL II Writing Group, for the Multi-National PREVAIL II Study Team. RT Davey, Jr., D Malvy et al.

- Multinational RCT of ZMapp + standard of care vs. standard of care alone
- Results showed promise but did not reach statistical significance (in setting of declining in incidence)
Phase 2 Placebo-Controlled Trial of Two Vaccines to Prevent Ebola in Liberia
SB Kennedy, HC Lane et al. for the PREVAIL I Study Group

Efficacy and Effectiveness of an rVSV-Vectored Vaccine in Preventing Ebola Virus Disease: Final Results from the Guinea Ring Vaccination, Open-Label, Cluster-Randomised Trial (Ebola Ça Suffit!)
AM Henao-Restrepo, M-P Kieny et al.

- Core principles of science and ethics in conducting clinical research should not change during an epidemic
- RCTs ethical and appropriate: most efficient, reliable way to determine safety and efficacy
- Clinical research studies must have
  - Scientific and social value
  - Respect for/engagement with affected communities
  - Post-trial access to candidate products proved safe/effective

World Health Organization

New Ebola Outbreak Declared in Democratic Republic of the Congo

May 8, 2018

- 55 cases (38 confirmed), 28 deaths, 634 contacts being followed (as of June 11, 2018)

Cases reported in three towns in Equateur Province, DR Congo
Ebola Then vs. Now: Key Changes

- Better coordination at the international level
- Significant experience in country
- Strong pre-existing research partnerships
- Countermeasures with evidence from robust clinical trials

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April 20, 2018: Dr. Tedros Visit to NIH and Signing of WHO-NIAID MOU

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Patient with Ebola Hemorrhagic Fever, Bumba Zone, Equateur Province, DR Congo (Zaire), October 1976

Pierre Sureau (France) and patient, 1976

Ebola Outbreaks 1976 to Present Day

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○ Number of cases
● Number of deaths

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THE WALL STREET JOURNAL
May 23, 2018

Experimental Ebola Treatment May Be Deployed to Congo

Distribution of the therapeutic, developed by the National Institute of Allergy and Infectious Diseases, will be coordinated with WHO

By Betsy McKay

- mAb114 isolated from blood of a survivor of 1995 Ebola outbreak in DR Congo.
**Ebola Then vs. Now: Key Changes**

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- Strong pre-existing research partnerships

**Countermeasures with evidence from robust clinical trials**

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*Speedy Ebola Tests Help Contain Africa’s Latest Outbreak*
STAT

Experimental Vaccine to be Used against Ebola Outbreak in the DRC

By Helen Branswell

“The plan is to employ a ring vaccination approach, vaccinating anyone who has been in contact with a case.”

REUTERS

WHO Chief Says Ebola Outbreak in Congo Is Stabilizing

![Graph showing number of cases by date of illness onset (2018)]

- Confirmed
- Probable

Date of illness onset (2018)