30 Years with AIDS:
Where it Came From and Why It’s Still With Us

Kevin McCarthy
Ben Morris
Jamie Schafer
30 Years with AIDS:
Where it Came From and Why It’s Still With Us

Part I: The Origins of HIV and the AIDS Epidemic

Kevin McCarthy

Part II: HIV: The Retrovirus

Ben Morris

Part III: An HIV Vaccine: What's the hold up?

Jamie Schafer
Part I: The Origins of HIV and the AIDS Epidemic

Brief Timeline

The HIV-1 Outbreak

Where HIV-1 came from
Pneumocystis Pneumonia — Los Angeles

In the period October 1980–May 1981, 5 young men, all active homosexuals, were treated for biopsy-confirmed Pneumocystis carinii pneumonia at 3 different hospitals in Los Angeles, California. Two of the patients died. All 5 patients had laboratory-confirmed previous or current cytomegalovirus (CMV) infection and candidal mucosal infection. Case reports of these patients follow.
Discovery of the HIV-1 Virus

May 20th
1983

Zanetti et al., 2006 doi:10.1371/journal.ppat.0020083.g001
The First anti-HIV Drug

March 20th

1987
NAMES Project AIDS Memorial Quilt

1987
Earvin “Magic” Johnson

November 7th

1991
A New Class of Anti-HIV Drugs

December 6th

1995
Two Major Vaccine Failures

1995-2008
A Third Class of Anti-HIV Drug

September 7th
2007
“Thai Trial”

December 3rd, 2009

Vaccination with ALVAC and AIDSVAX to Prevent HIV-1 Infection in Thailand
Where do We Stand?

33.3 Million People (31.4-35.3 million) Living with HIV in 2009

November 16th

2011

No Data
0.1% - <0.5%
0.5% - <1.0%
1.0% - <5.0%
5.0% - <15.0%
15.0% - 28.0%
The Beginning? June 5th 1981

Pneumocystis Pneumonia — Los Angeles

In the period October 1980–May 1981, 5 young men, all active homosexuals, were treated for biopsy-confirmed *Pneumocystis carinii* pneumonia at 3 different hospitals in Los Angeles, California. Two of the patients died. All 5 patients had laboratory-confirmed previous or current cytomegalovirus (CMV) infection and candidal mucosal infection. Case reports of these patients follow.
Was Los Angeles the Epicenter?
The last Great Pandemic: 1918 Flu
What Changed in the Last 100 Years?
HIV Was Not the Only Virus Spreading

Doctors Sent to Africa for Study of A Disease that Has killed 150
NYT: October 6, 1976

W.H.O. Team to Study Fatal African Disease
NYT: October 16, 1976

African Virus to be Studied in U.S.
NYT: October 29, 1976

Green Monkey Fever
NYT: November 3, 1976

Virus in Zaire Epidemic Named for the Ebola River
NYT: December 1, 1976
<table>
<thead>
<tr>
<th></th>
<th>HIV</th>
<th>Ebola</th>
</tr>
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<tbody>
<tr>
<td><strong>Fear Factor:</strong></td>
<td>Scary</td>
<td>Scary</td>
</tr>
<tr>
<td><strong>Transmission:</strong></td>
<td>Fluid Exchange</td>
<td>Fluids, Aerosol ect.</td>
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<tr>
<td><strong>Untreated Mortality rate</strong></td>
<td>Very High</td>
<td>Very High</td>
</tr>
<tr>
<td><strong>Time to first Symptoms</strong></td>
<td>2-4 weeks</td>
<td>2-21 days</td>
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<tr>
<td><strong>Initial Symptoms:</strong></td>
<td>Non-specific</td>
<td>Flu-like</td>
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<tr>
<td><strong>Final stage Symptoms:</strong></td>
<td>Opportunistic infections</td>
<td>Hemorrhagic Fever</td>
</tr>
<tr>
<td><strong>Disease Progression:</strong></td>
<td>Very slow</td>
<td>Very rapid</td>
</tr>
<tr>
<td><strong>Asymptomatic Phase:</strong></td>
<td>Months-Years</td>
<td>None</td>
</tr>
<tr>
<td><strong>Chronic Disease</strong></td>
<td>AIDS</td>
<td>None</td>
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Where HIV Came From
Reconstructing Past Events
Family Tree (Phylogenetetic Tree)

Grandmother
Grandfather
Grandma
Grandpa

Mom

Dad

Me
Sister
The First Confirmed HIV Case

An African HIV-1 sequence from 1959 and implications for the origin of the epidemic

Tuofu Zhu*,†, Bette T. Korber‡§, Andre J. Nahmias‖, Edward Hooper¶, Paul M. Sharp# & David D. Ho*

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¶ PO Box 4087, Worthing BN14 7LQ, UK
# Department of Genetics, University of Nottingham, Queens Medical Centre, Nottingham NG7 2UH, UK

Sharp and Hahn, Nature 2008
HIV Was Spreading in 1960!

Direct evidence of extensive diversity of HIV-1 in Kinshasa by 1960

Michael Worobey¹, Marlea Gemmel¹, Dirk E. Teuwen²,³, Tamara Haselkorn¹, Kevin Kunstman⁴, Michael Bunce⁵, Jean-Jacques Muyembe⁶,⁷, Jean-Marie M. Kabongo⁶, Raphaël M. Kalengayi⁶, Eric Van Marck⁸, M. Thomas P. Gilbert¹ † & Steven M. Wolinsky⁴
Where did HIV Come From?
We Are Not Alone

Red-Capped Mangabey de Brazza’s Monkey Gabon Talapoin
Olive Baboon Greater Spot-Nosed Monkey
Green Monkey Sooty Mangabey
Mustached Guenon Crested Mona
Patas monkey
Diana Monkey Angolan Talapoin Mandrill Allen’s Swampmonkey
Tantalus Monkey Yellow Baboon Olive Colobus
Mona Monkey Blue Monkey Sun-Tailed Monkey Agile Mangabey Drill Mantled Guereza
Wolf’s Mona Chimpanzee Red-Tailed Monkey
Mandrill
Gray-Cheeked Managabey
Central Sun-Tailed Monkey
Owl-Faced Monkey Western Red Colobus
Vervet Monkey Grivet L’Hoest Monkey
Chacma Baboon Syke’s Monkey
Humans

SITN - Science in the News
A Common Ancestor
A History of Cross Species Jumps

Sharp and Hahn, Nature 2008
Simian Immunodeficiency Virus Family Tree

- SIV Western red Colobus Monkey
- SIV Syke's Monkey
- SIV Olive Colobus Monkey
- SIV l'Hoest Monkey
- SIV Sun-Tailed Monkey
- SIV Mantled Guereza
- SIV Talapoin
- SIV Mona Monkey
- SIV Greater-Spot Nosed Monkey
- SIV Mandrill
- SIV de Brazza's Monkey
- SIV Red-Capped Mangabey
- SIV Chimpanzee
- SIV HIV-1
- SIV HIV-2
- SIV drill
- SIV Mandrill
- SIV Sabaeus
- SIV Grivet
- SIV Vervet
- SIV Tantalus
- SIV drill
- SIV Mandrill
- SIV Sooty Mangabey
A Common Ancestor

Flickr: Eric Kilby, mararie
HIV-2 From Sooty Mangabeys

- SIV Sooty Mangabey1
- HIV-2 Group "D"
- SIV Sooty Mangabey2
- HIV-2 Group "E"
- HIV-2 Group "F"
- HIV-2 Group "C"
- HIV-2 Group "A"
- HIV-2 Group "B"

Flickr: Eric Kilby
The Global Pandemic Was Not the Only Time

HIV-1 Group M → Pandemic → HIV-1 Group N → HIV-1 Group O


Flickr: Afrika Expeditionary Force, Eric Kilby
Is this the End?

BRIEF COMMUNICATIONS

A new human immunodeficiency virus derived from gorillas

Jean-Christophe Plantier¹, Marie Leoz¹, Jonathan E Dickerson², Fabienne De Oliveira¹, François Cordonnier³, Véronique Lemée¹, Florence Damond⁴, David L Robertson² & François Simon⁵