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# Using Social Network Analysis to Understand Growth and Collaboration in the B-cell Mediated HIV Vaccine Field

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# NIAID Mission

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## NIAID Mission

“NIAID conducts and supports basic and applied research to better understand, treat, and ultimately prevent *infectious*, immunologic, and allergic diseases. For more than 60 years, NIAID research has led to new therapies, *vaccines*, diagnostic tests, and other technologies that have improved the health of millions of people in the United States and around the world.”



More information about NIAID can be found [here](#).

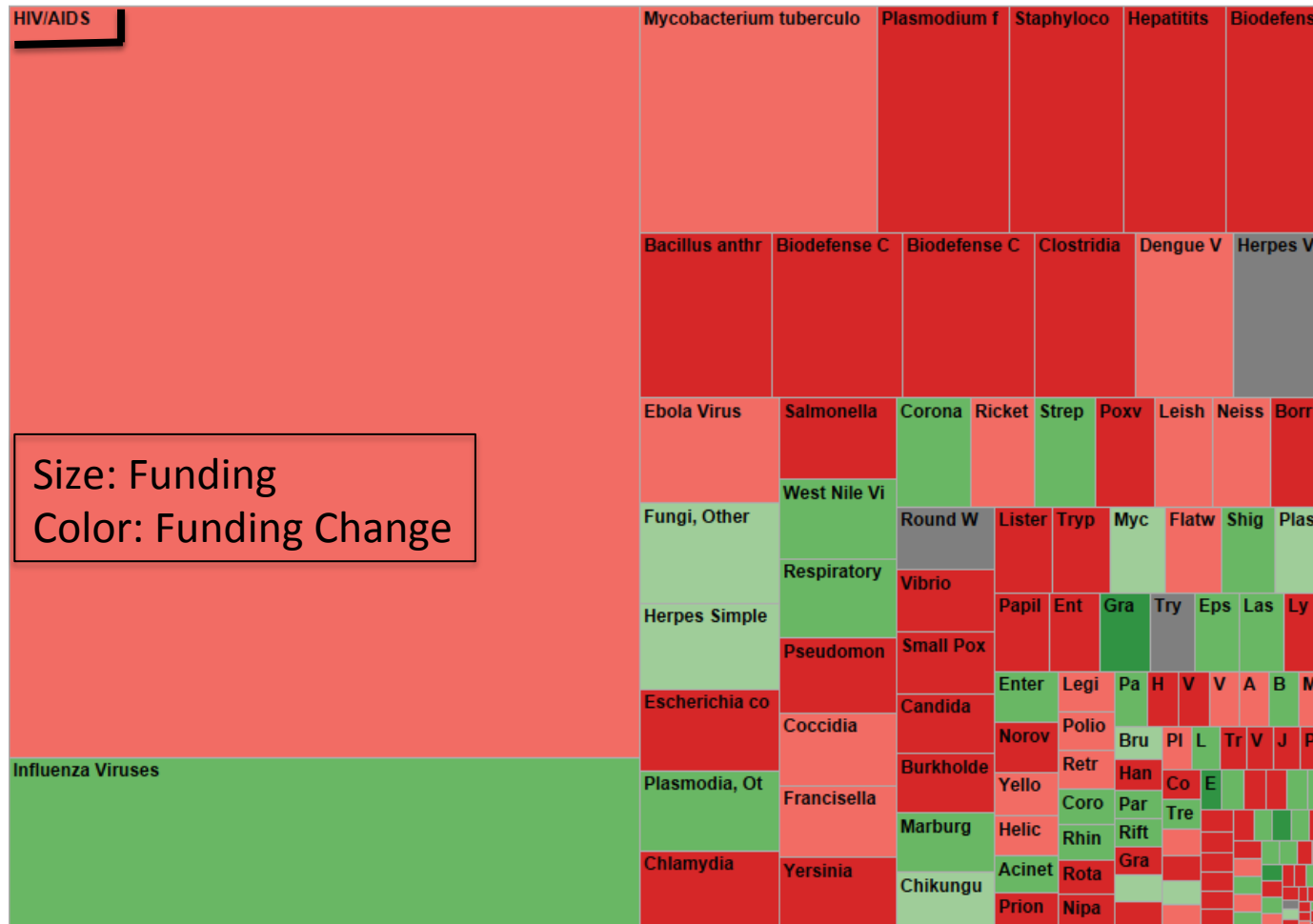


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Infectious Diseases

# Why Did We Initiate This Study?

## B- Cell Mediated HIV Vaccine Research

### A Snapshot of Infectious Organisms/Agents Funded by NIAID



Source: NIAID's Internal Coding Database

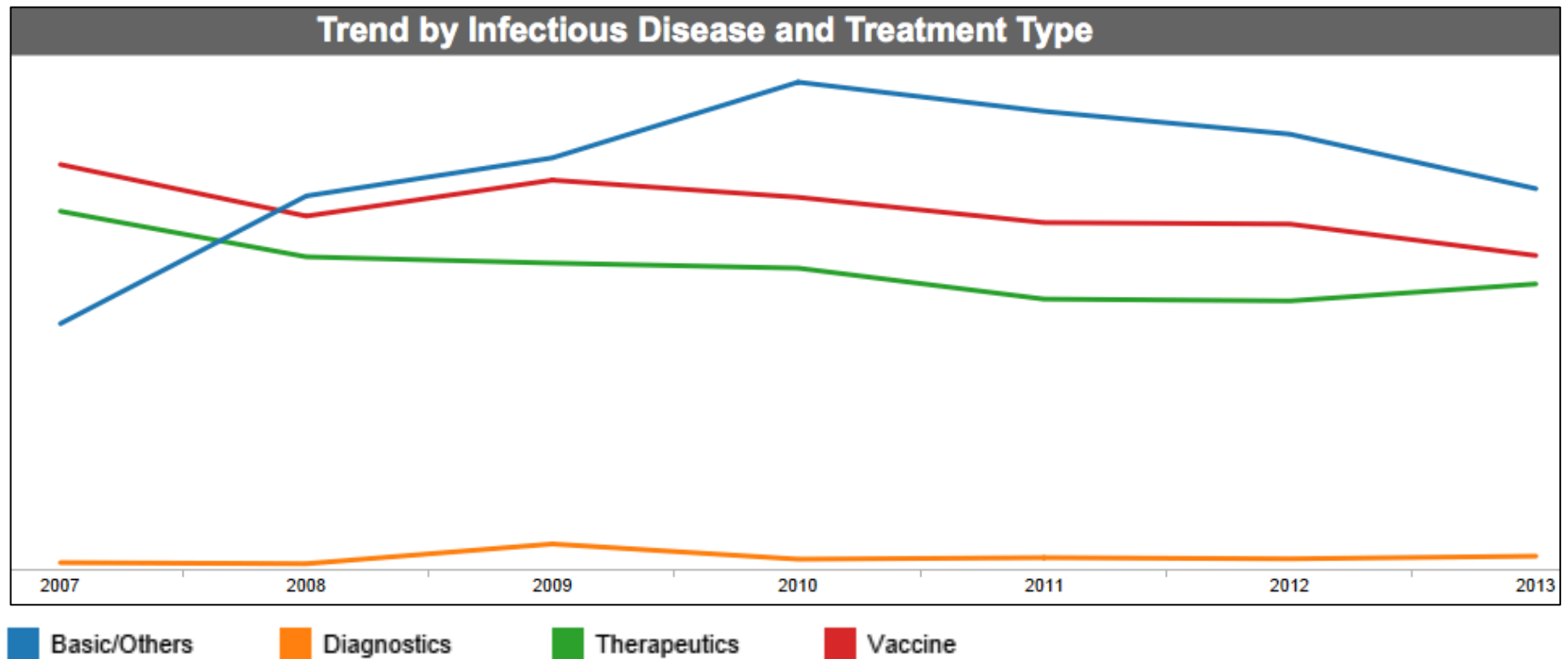


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# Why Did We Initiate This Study?

## B- Cell Mediated HIV Vaccine Research

### NIAID-Supported HIV/AIDS Funding By Areas of Research 2007-2013



Source: NIAID's Internal Coding Database



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# Key Questions

## B- Cell Mediated HIV Vaccine Research

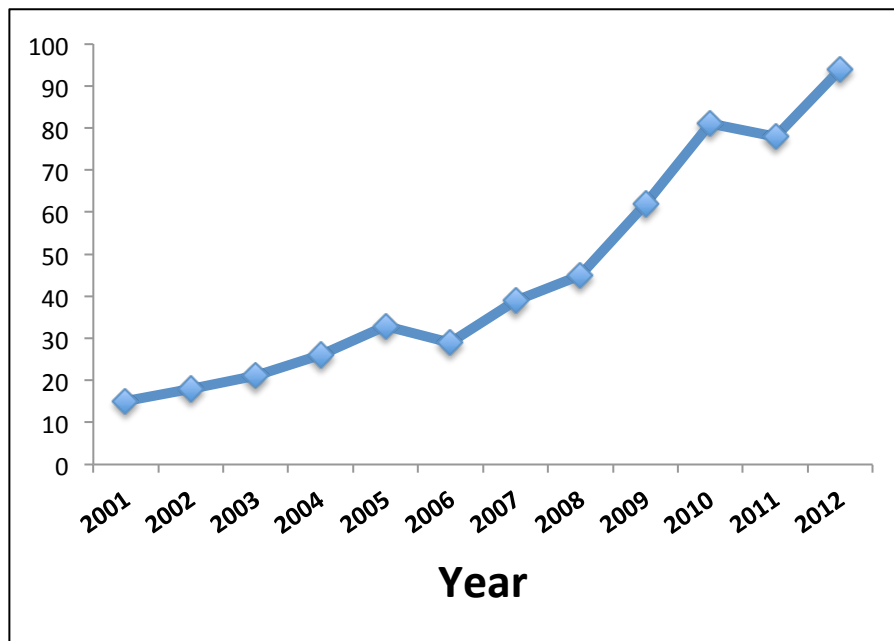
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- **Is research robust in this field?**
- Who are the key investigators in the field?
- What are the key funding agencies?

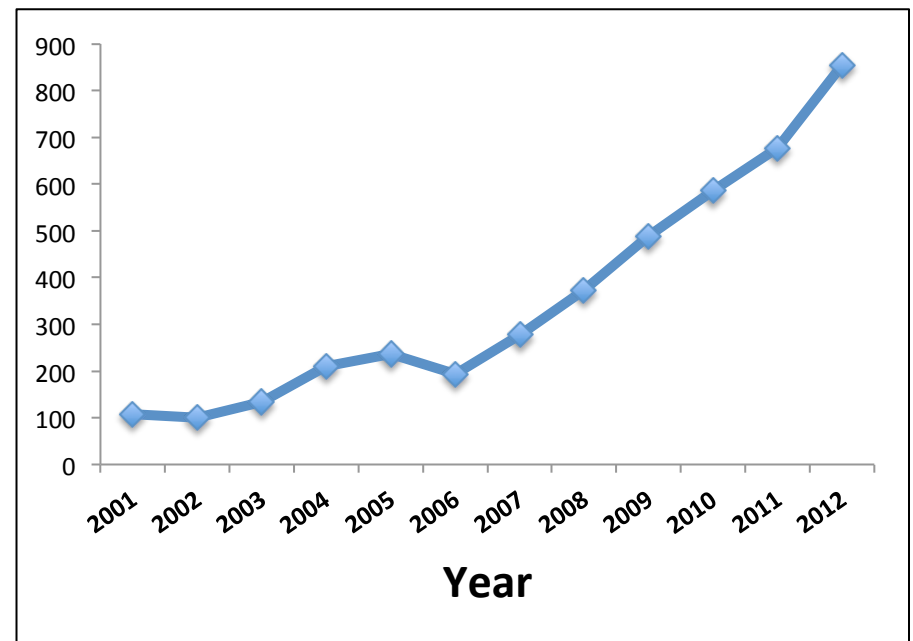
# Robust Growth in Publication and Author Count

## B- Cell Mediated HIV Vaccine Research

### Number of Publications 2001-2012



### Number of Authors 2001-2012



### Method:

Searched ISI-WOS database with the keywords **Broadly Neutralizing Antibodies** and **HIV** from **2001-2012** for **original research articles**.

Independent author count extracted using Sci2 and graphed for each year.

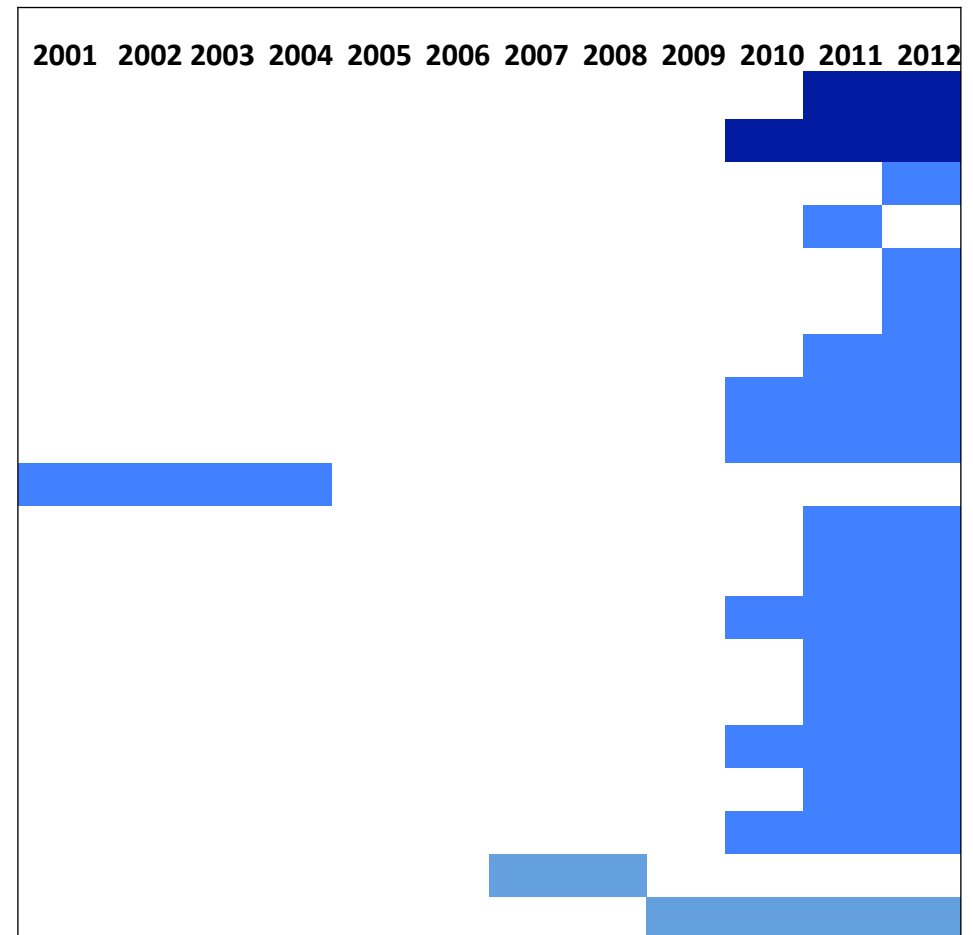
# Interest in Literature Remains High

## B- Cell Mediated HIV Vaccine Research

### Citation Burst Over Time

#### Publications

Wu XL, 2010, SCIENCE, V329, P856, DOI 10.1126/science.1187659  
Walker LM, 2009, SCIENCE, V326, P285, DOI 10.1126/science.1178746  
Walker LM, 2011, NATURE, V477, P466, DOI 10.1038/nature10373  
Zhou TQ, 2010, SCIENCE, V329, P811, DOI 10.1126/science.1192819  
Wu XL, 2011, SCIENCE, V333, P1593, DOI 10.1126/science.1207532  
Scheid JF, 2011, SCIENCE, V333, P1633, DOI 10.1126/science.1207227  
Corti D, 2010, PLOS ONE, V5, DOI 10.1371/journal.pone.0008805  
Scheid JF, 2009, NATURE, V458, P636, DOI 10.1038/nature07930  
Stamatatos L, 2009, NAT MED, V15, P866, DOI 10.1038/nm.1949  
DSouza MP, 1997, J INFECT DIS, V175, P1056  
Walker LM, 2010, PLOS PATHOG, V6, DOI 10.1371/journal.ppat.1001028  
Mascola JR, 2010, ANN REV, V28, P413, DOI 10.1146/annrev--030409-101256  
Alam SM, 2009, PNAS, V106, P20234, DOI 10.1073/pnas.0908713106  
Hessell AJ, 2009, NAT MED, V15, P951, DOI 10.1038/nm.1974  
Gray ES, 2009, J VIROL, V83, P8925, DOI 10.1128/JVI.00758-09  
Hessell AJ, 2009, PLOS PATHOG, V5, DOI 10.1371/journal.ppat.1000433  
Simek MD, 2009, J VIROL, V83, P7337, DOI 10.1128/JVI.00110-09  
Rerks-Ngarm S, 2009, NJEM, V361, P2209, DOI 10.1056/NEJMoa0908492  
Binley JA, 2004, JVI, V78, P13232, DOI 10.1128/JVI.78.23.13232-13252.2004  
Sather DN, 2009, J VIROL, V83, P757, DOI 10.1128/JVI.02036-08



**Method:** Identified “hottest” publications from 2001-2012 using Sci2’s Citation Burst Algorithm.

Graphed articles with top 20 Citation Burst Weights.

**Hottest Publications:** Publications suddenly heavily cited.

# Key Questions

## B- Cell Mediated HIV Vaccine Research

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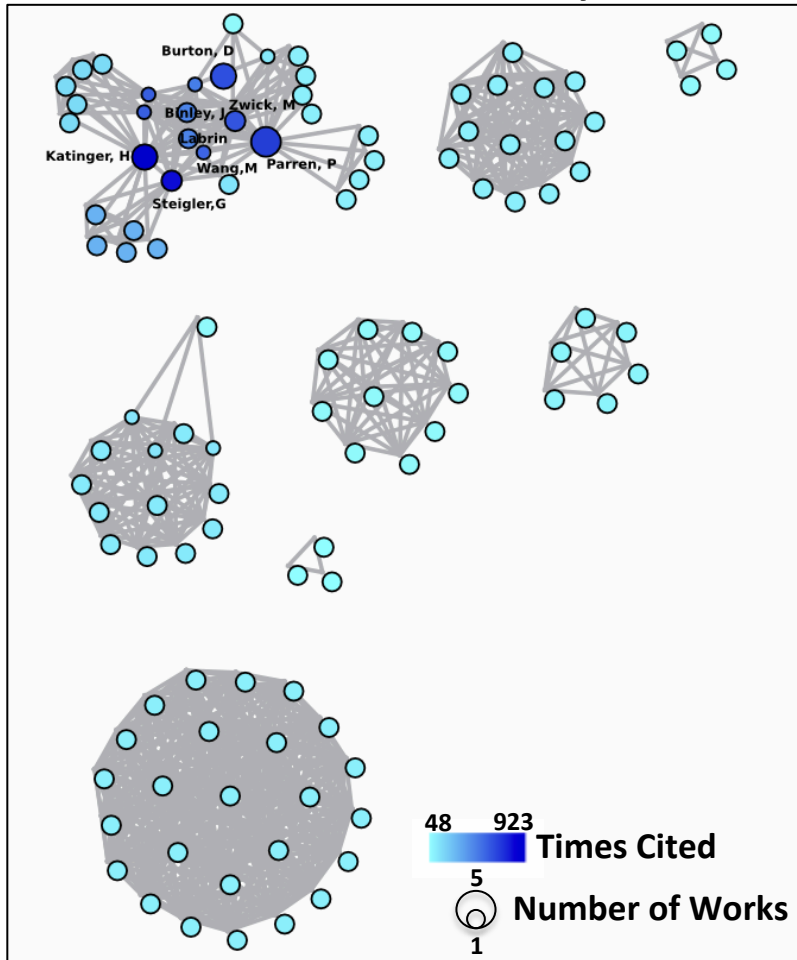
- Is research robust in this field?
- **Who are the key investigators in the field?**
- What are the key funding agencies?



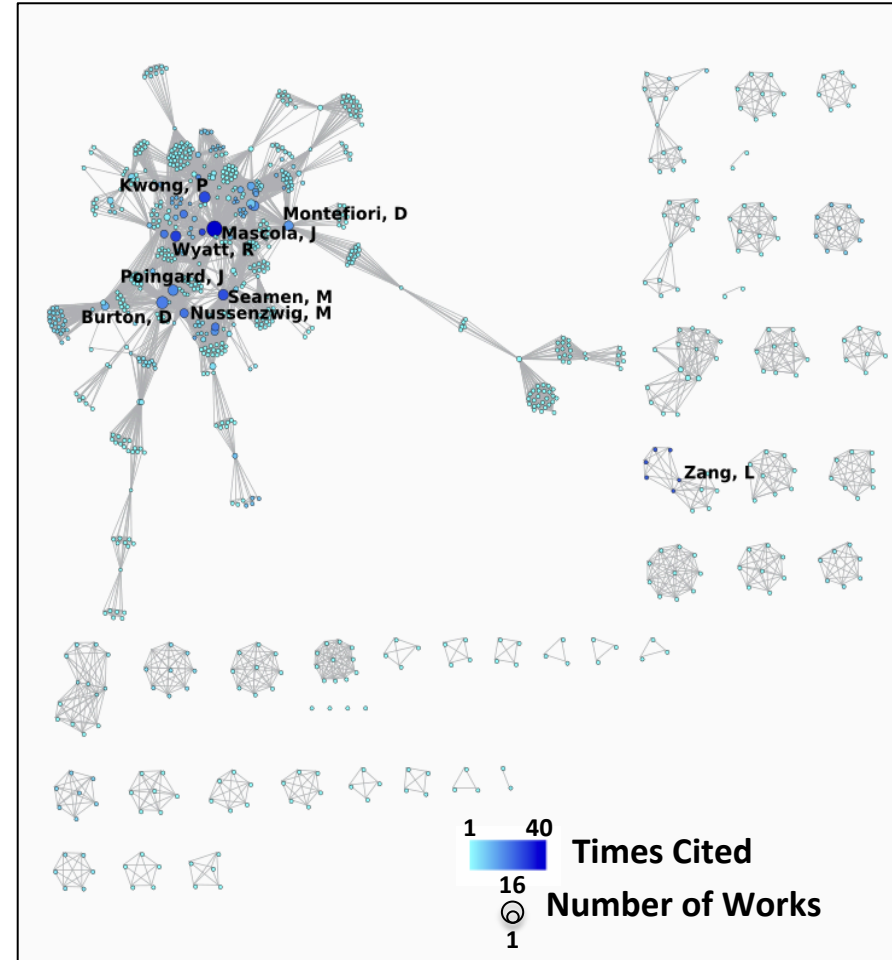
# Network of Authors has Grown Over Time

## B- Cell Mediated HIV Vaccine Research

### Co-author network, 2001



### Co-author network, 2012



**Method:** Co-authorship networks for 2001 and 2012 generated using Sci2.

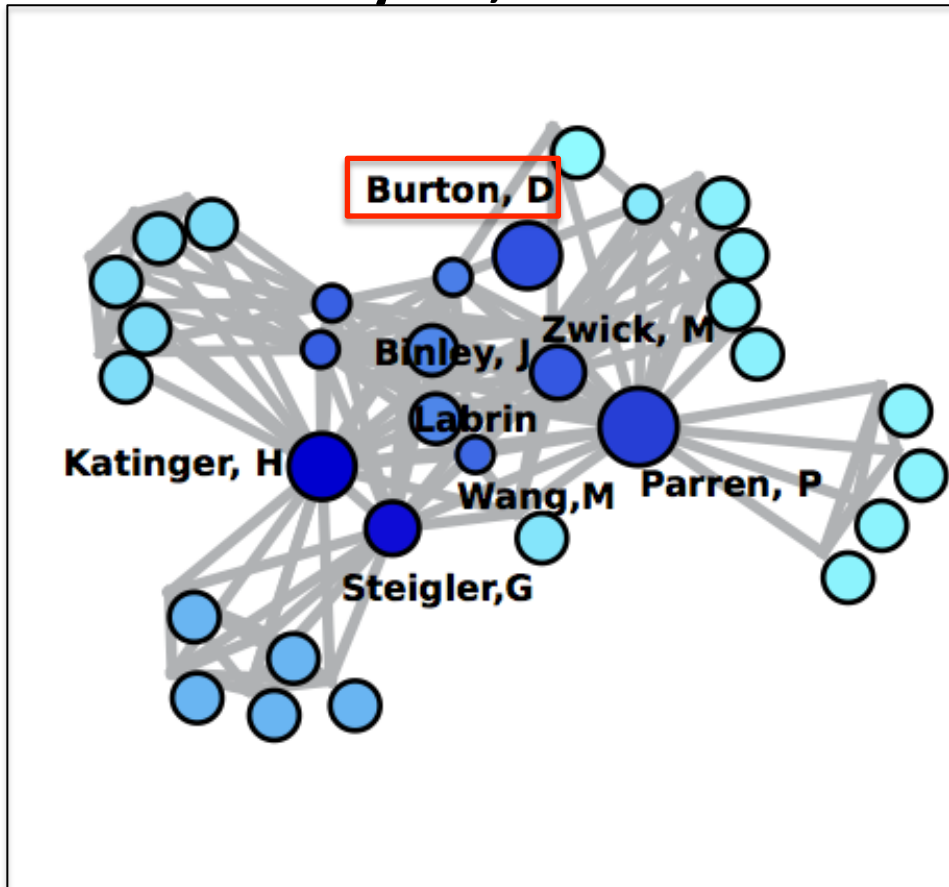


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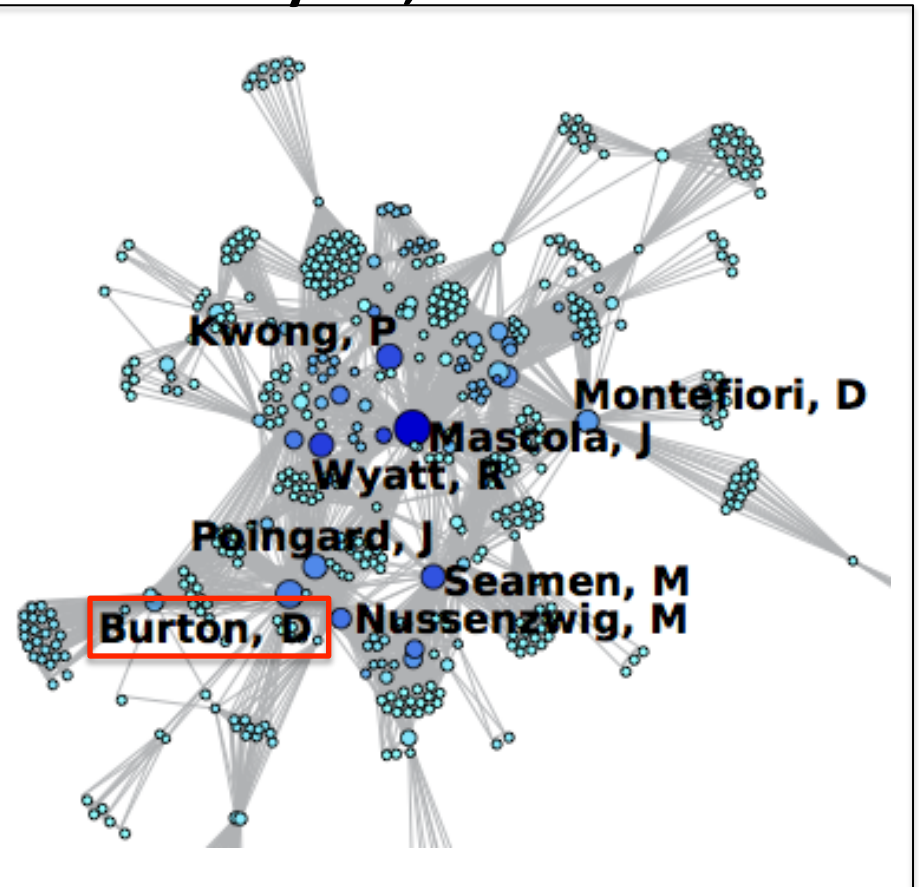
# Key Authors Have Changed Over Time

## B- Cell Mediated HIV Vaccine Research

Key PIs, 2001



Key PIs, 2012



**Method:** Highly cited authors identified in networks and compared from 2001 and 2012.



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# Key Questions

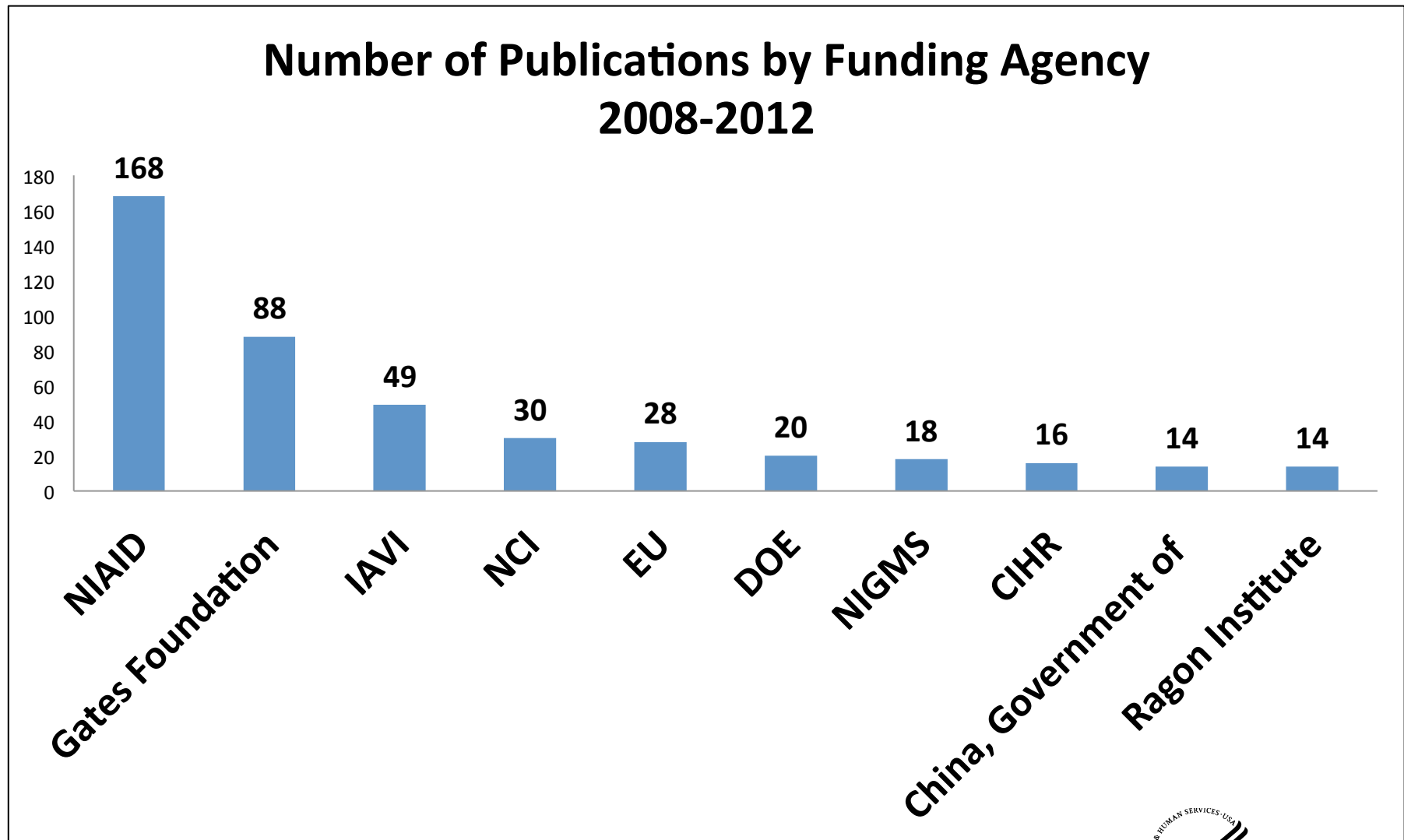
## B- Cell Mediated HIV Vaccine Research

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- Is research robust in this field?
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# Most Frequently Cited Sources of Support

## B- Cell Mediated HIV Vaccine Research



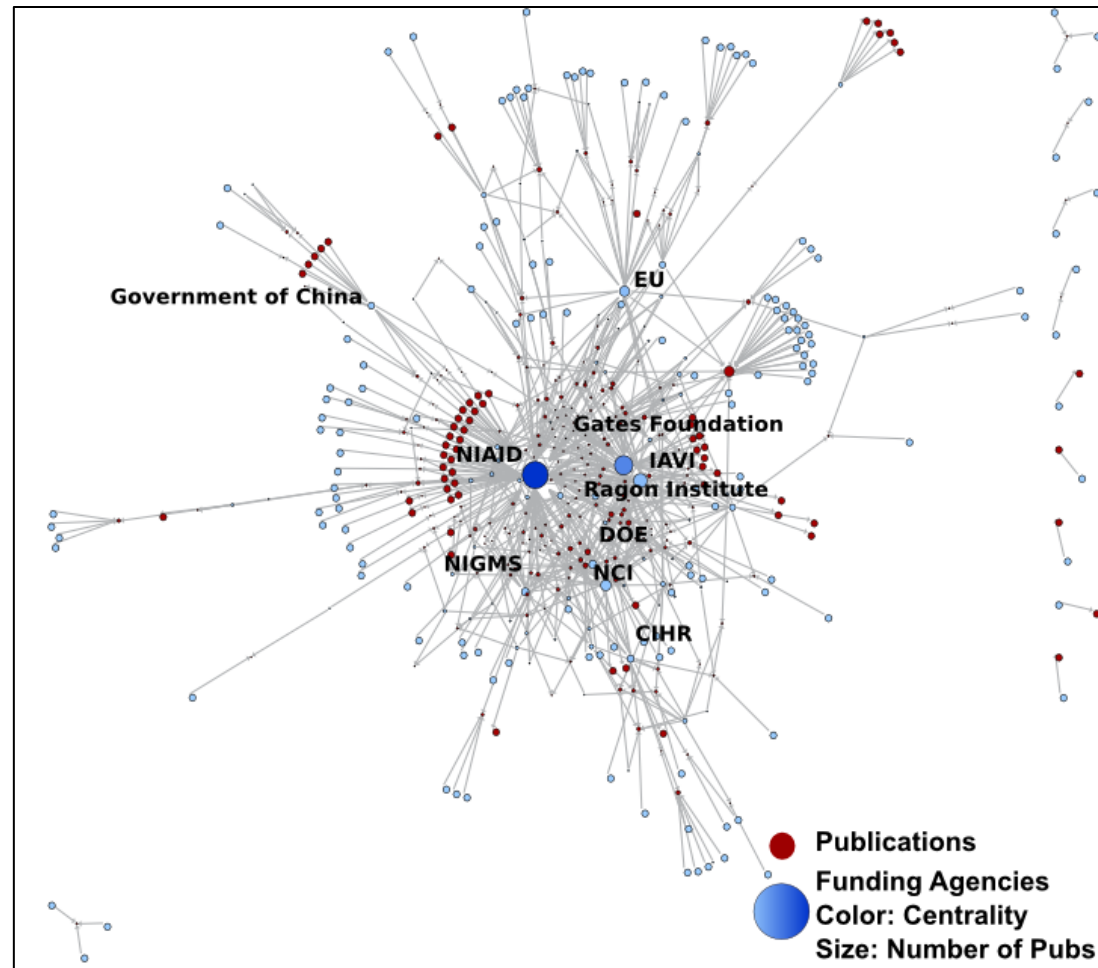
**Methods:** Funding agency information downloaded from ISI-WOS and graphed.



# NIAID is Central to the Funding Network

## B- Cell Mediated HIV Vaccine Research

### Network of Publications and Sources of Funding (2008-2012)



**Method:** Data for funding agencies and publications downloaded from ISI-WOS.  
Networks generated using Sci2.



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# NIAID Funds Many of the “Hottest” Publications

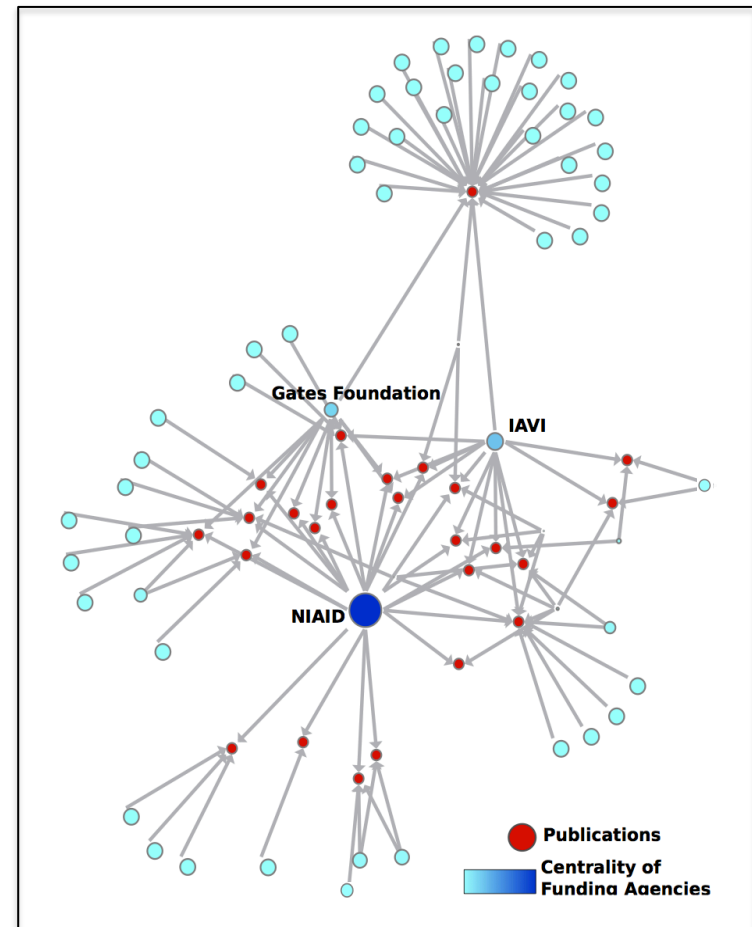
## B- Cell Mediated HIV Vaccine Research

### Network of “Hottest” Publications and Sources of Funding

Downloaded publications from 2001-2012.

Identified “hottest” publications using citation burst analysis.

Conducted network analysis on top 25 “hottest” publications, according to citation burst weight that had funding agency data.



**Hottest Publications:** Publications suddenly heavily cited.



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# The “Hottest Publications Cite NIAID and Gates Foundation as Funding Sources at A Similar Rate

## B- Cell Mediated HIV Vaccine Research

Funding Agency	Total Publications	“Hottest” Publications	% of “Hottest” Publications
NIAID	168	21	12.5%
Gates	88	11	12.5%

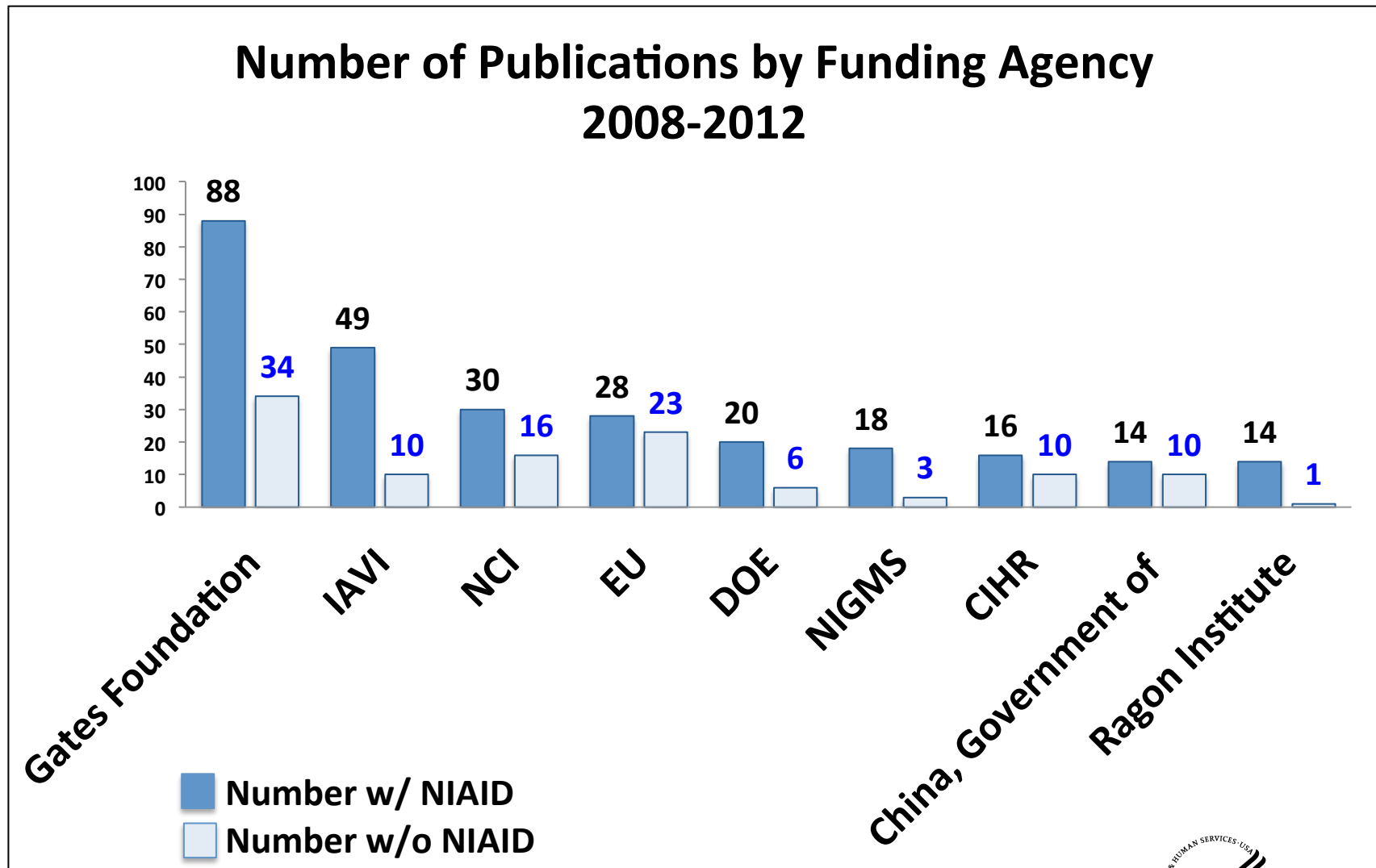
**Hottest Publications:** Publications suddenly heavily cited.



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# Loss of NIAID Funding Affects the Entire Field

## B- Cell Mediated HIV Vaccine Research



**Method:** Potential outcome of funding loss calculated from co-funding information of publications.

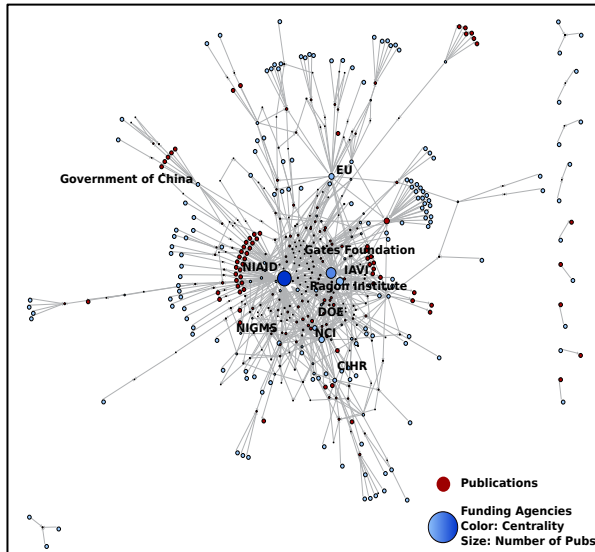




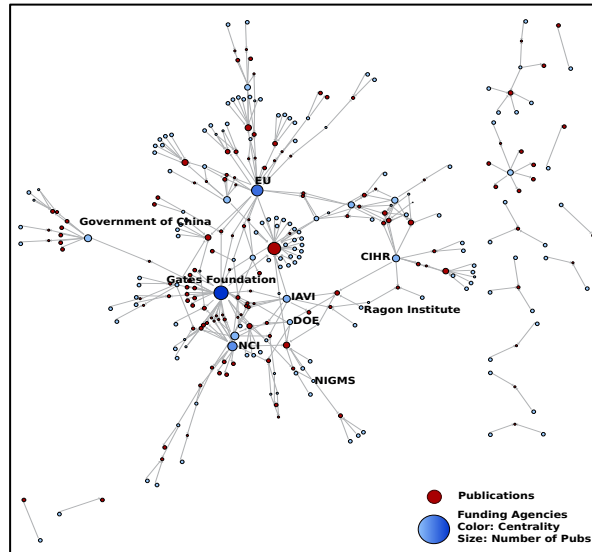
# Loss of Key Funding Agencies Affects the Entire Field

## B- Cell Mediated HIV Vaccine Research

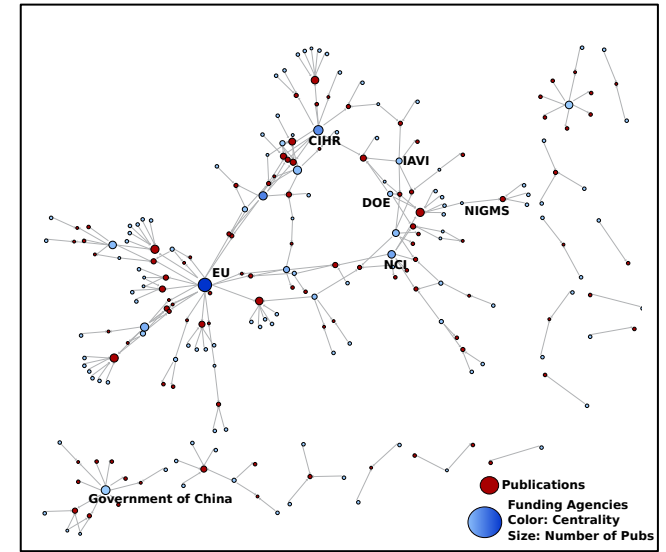
**With NIAID  
2008-2012**



**No NIAID  
2008-2012**



**No NIAID and Gates  
2008-2012**



### Method:

Potential outcome of funding loss visualized through a network of funding agencies and publication.

Networks of publications and funding agencies with or without NIAID/ NIAID and Gates Foundation generated using Sci2.

# Summary

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## Is research robust in this field?

- Growth in the number of publications
- Growth in the number of researchers
- High interest in recent publications

## Who are the key investigators in the field?

- Network of investigators has grown over time
- Key investigators have changed over time

## Who are the key funding agencies?

- Most publications have cited NIAID as a funding source.
- The “hottest” publications cite NIAID and Gates Foundation at a similar rate

# Thanks!

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Kevin Callahan

Marie Parker

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