

# THE CHARACTERISTICS OF NETWORK SCIENCE

***Interdisciplinary***

*Empirical*

*Quantitative and Mathematical*

*Computational*

*Interdisciplinary*

***Empirical, data driven***

*Quantitative and Mathematical*

*Computational*

*Interdisciplinary*

*Empirical*

***Quantitative and Mathematical***

*Computational*

*Interdisciplinary*

*Empirical*

*Quantitative and Mathematical*

***Computational***

# THE IMPACT OF NETWORK SCIENCE

# ECONOMIC IMPACT



**Google**  
Market Cap(Jan 1, 2010):  
*\$189 billion*

**Cisco Systems**  
networking gear Market  
cap (Jan 1, 2010):  
*\$112 billion*

**Facebook**  
market cap:  
*\$50 billion*

[www.bizjournals.com/austin/news/2010/11/15/facebooks...](http://www.bizjournals.com/austin/news/2010/11/15/facebooks...) - Cached

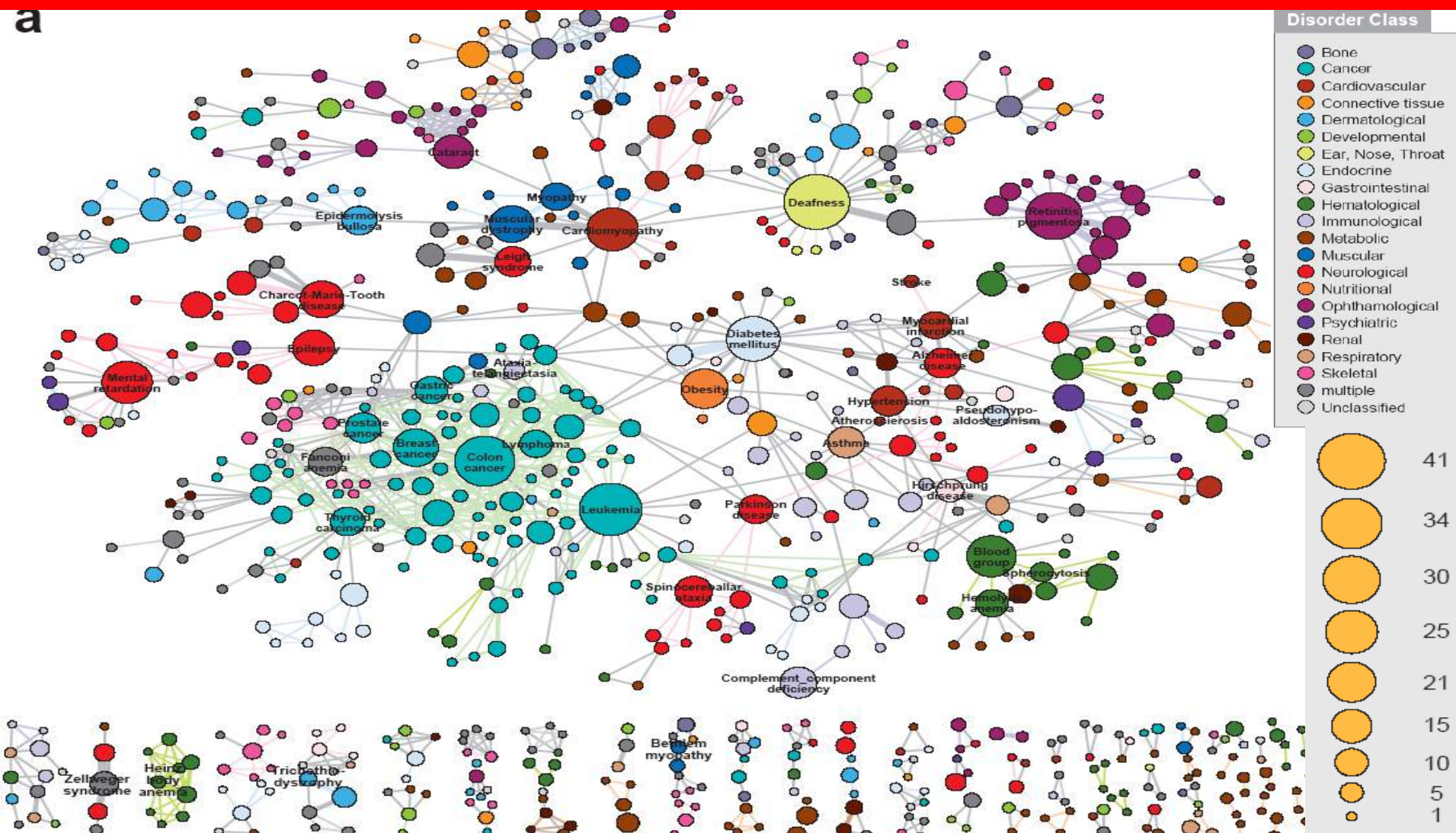
# Network Biology/Network Medicine





# HUMAN DISEASE NETWORK

a



# DRUG DESIGN, METABOLIC ENGINEERING:

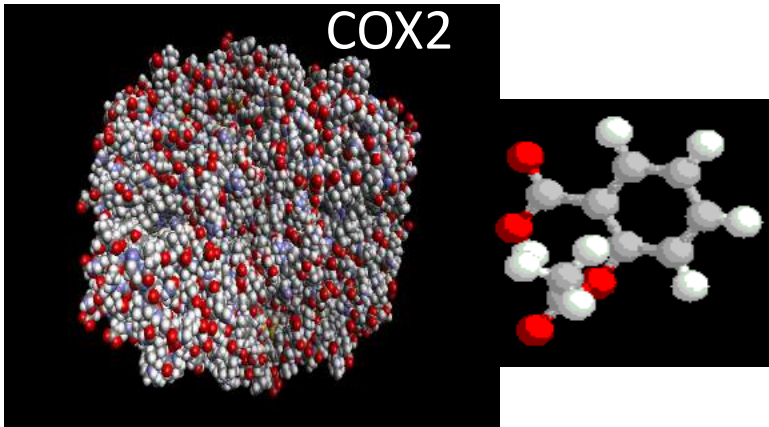
Reduces  
Inflammation  
Fever  
Pain



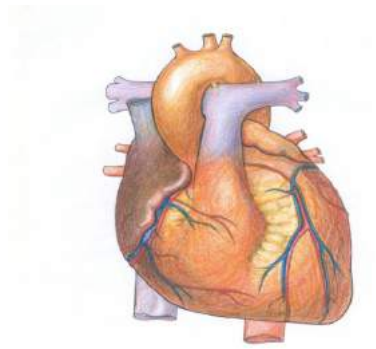
Prevents  
Heart attack  
Stroke



Reduces the risk of  
Alzheimer's Disease



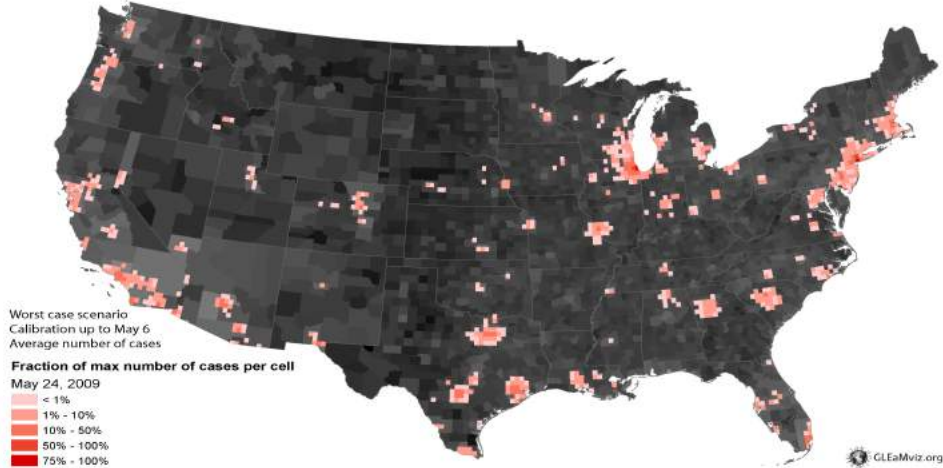
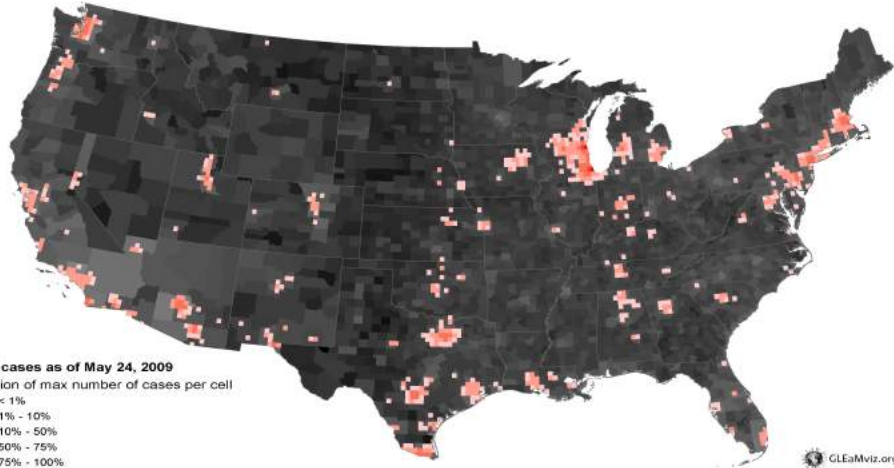
Reduces the risk of  
breast cancer  
ovarian cancers  
colorectal cancer



Causes  
Bleeding  
Ulcer

## Real

## Projected

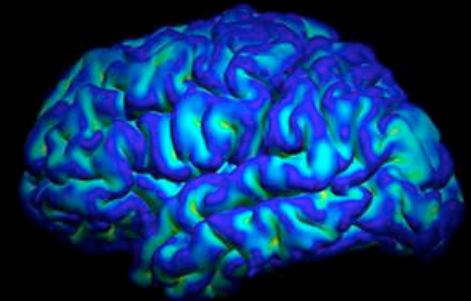
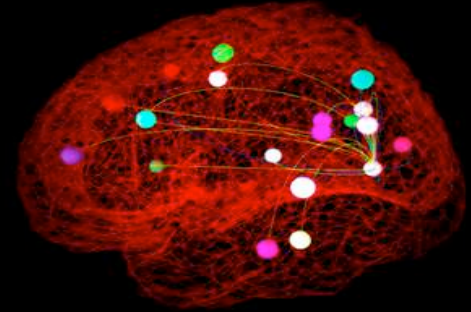


# BRAIN RESEARCH

In September 2010 the National Institutes of Health awarded \$40 million to researchers at Harvard, Washington University in St. Louis, the University of Minnesota and UCLA, to develop the technologies that could systematically map out brain circuits.

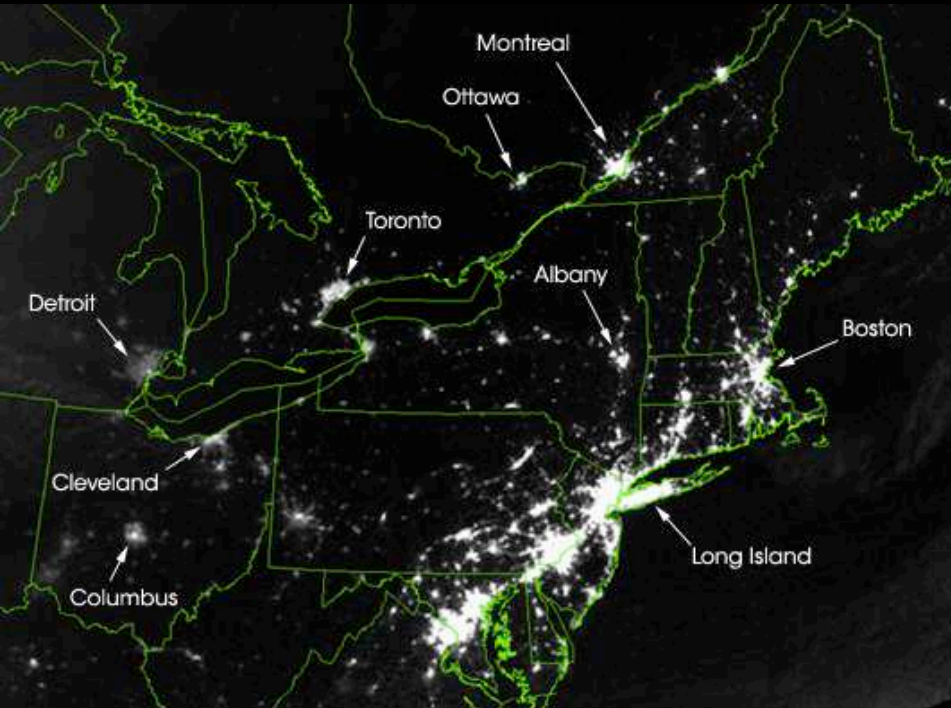
**The Human Connectome Project (HCP)** with the ambitious goal to construct a map of the complete structural and functional neural connections in vivo within and across individuals.

<http://www.humanconnectomeproject.org/overview/>

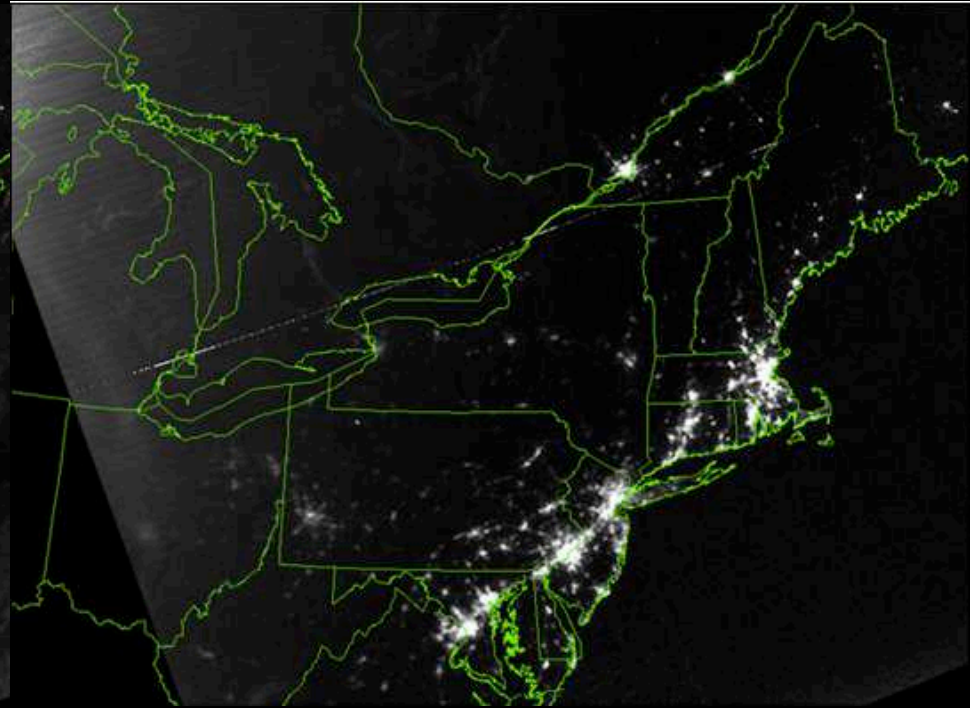


# VULNERABILITY DUE TO INTERCONNECTIVITY

# A SIMPLE STORY (2): August 15, 2003 blackout.



August 14, 2003: 9:29pm EDT  
20 hours before



August 15, 2003: 9:14pm EDT  
7 hours after