

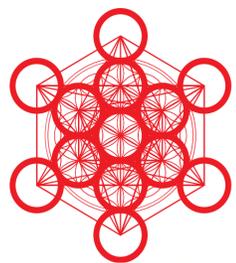
Presidential Commission

for the Study of Bioethical Issues

Private Sector Partners in the BRAIN Initiative-
Ethical Issues in Neuroscience

December 18, 2013

Miyoung Chun, Executive VP of Science Programs



The Kavli Foundation: Science Programs

Goal: Advancing Science

Research Programs

• Kavli Institute

Kavli Frontiers of Science

U.S. Symposium

Indo-American Symposium

Israeli-American Symposium

Korean-American Symposium

Chinese-American

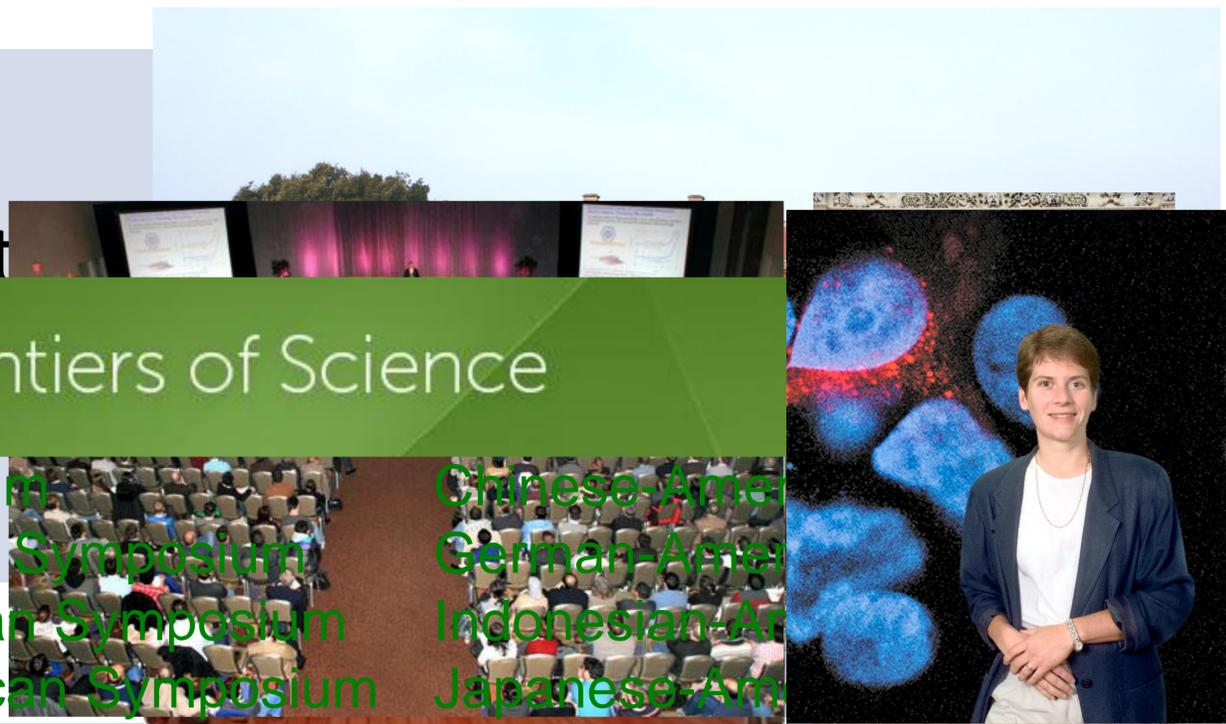
German-American

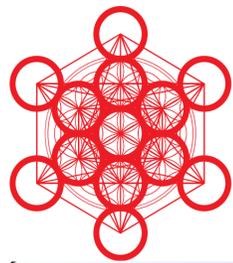
Indonesian-American

Japanese-American

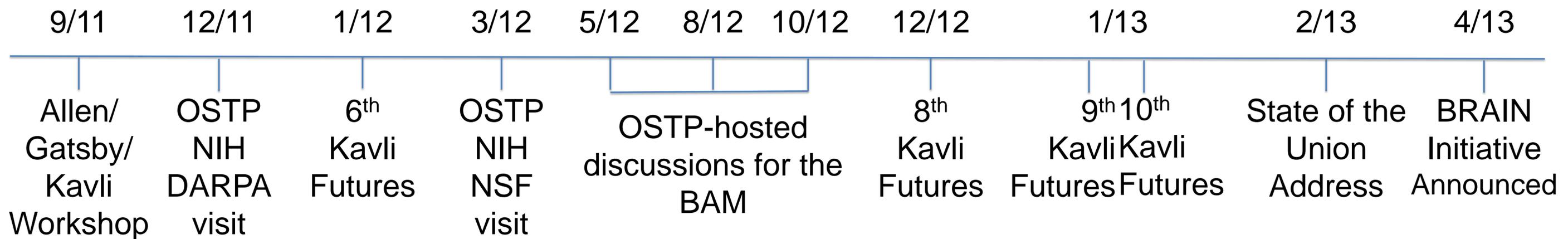
Meetings Program

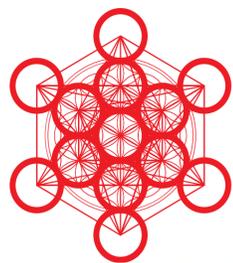
- Academy Collaborations
- Scientific Society Collaborations
- Kavli Futures Symposia
- Kavli Royal Society Centre



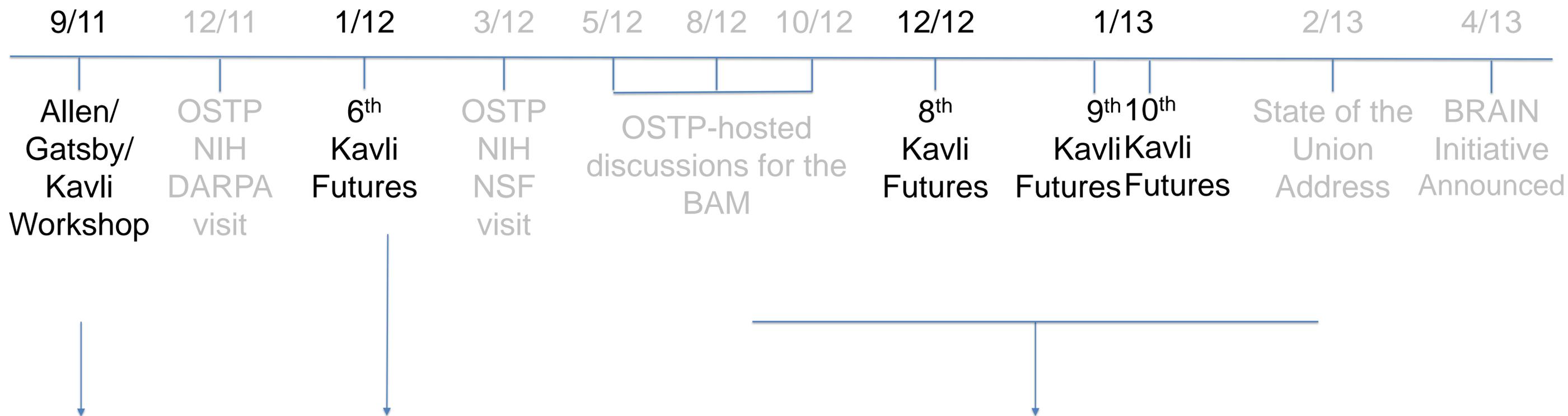


Development of the BRAIN Initiative: 12 Key events





Scientific Workshops



**Birth of BAM*:
White paper to
OSTP**



**Neuron publishes
NeuroView article**

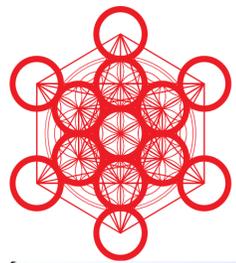


**Science Perspective article:
BAM Definition**

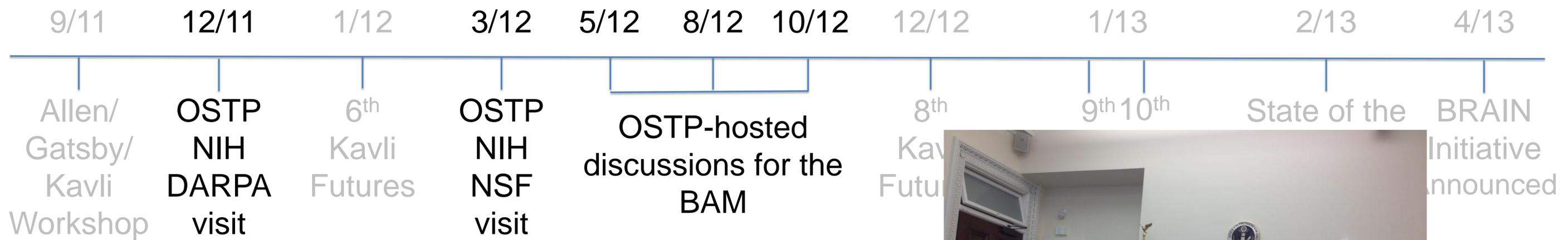


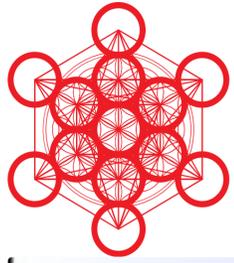
**ACS Nano article:
BAM Tool dev.
road map**

***BAM: Brain Activity Map**



Inter-agency Brainstorming Meetings





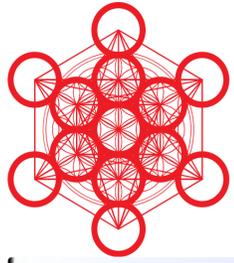
BRAIN Initiative Announcement



**“The next great
American project,
the BRAIN Initiative”**

(Brain Research through
Advancing
Innovative Neurotechnologies)

“...we’re still unable to cure diseases like Alzheimer’s or autism, or fully reverse the effects of a stroke. The BRAIN Initiative will change that **by giving scientists the tools** they need to get a dynamic picture of the brain in action and better understand how we think and how we learn and how we remember. And that knowledge could be -- will be -- transformative.”



Neurological Disorders

➤ more than 600 diseases of the nervous system

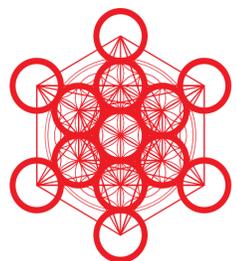
Conditions

- ▶ ALS
- ▶ Arteriovenous Malformation
- ▶ Brain Aneurysm
- ▶ Brain Tumors
- ▶ Dural Arteriovenous Fistulae
- ▶ Epilepsy
- ▶ Headache
- ▶ Memory Disorders
- ▶ Multiple Sclerosis
- ▶ Parkinson's Disease
- ▶ Peripheral Neuropathy
- ▶ Post-Herpetic Neuralgia
- ▶ Spinal Cord Tumor
- ▶ Stroke

UCSF Medical Center

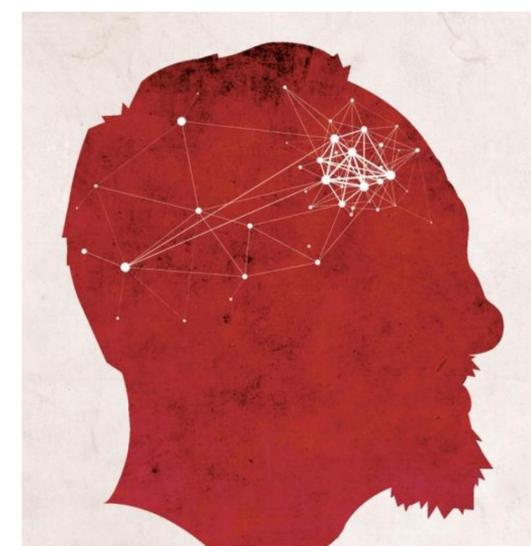
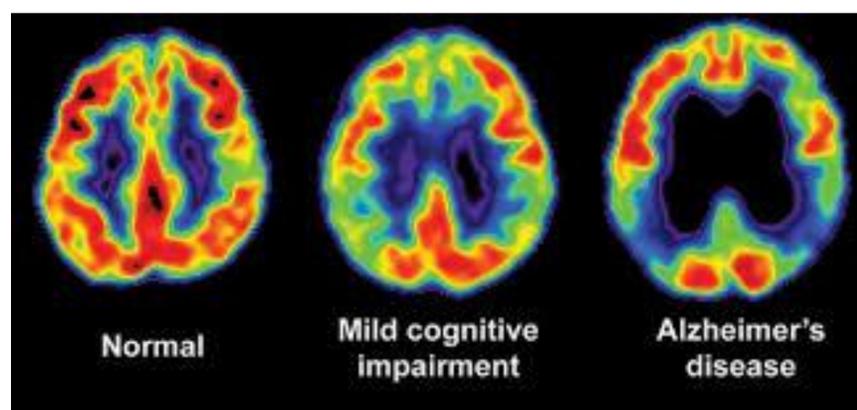
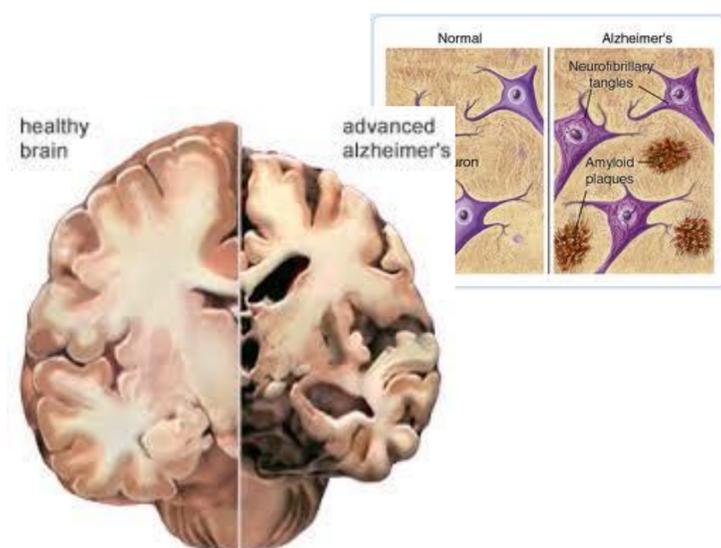
Question from Tom Insel, Director of National Institute for Mental Health:

“Thanks to better early detection, there are 63% fewer deaths from heart disease than there were just a few decades ago. Could we do the same for [brain disorders]?”



BRAIN Initiative & Alzheimer's Disease

- 20 years of intense research and more than \$1 billion worth of clinical trials:
No effective drug treatment for Alzheimer's disease
- Current thinking: early intervention
- Major stumbling block: absence of tools to reveal the first expression of the disease. All the current approaches that are used to diagnose Alzheimer's are crude and unreliable.

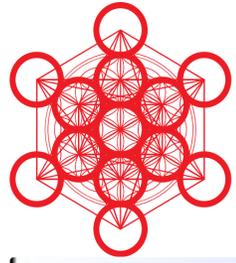


Macroscopic changes
Molecular changes

Imaging

Mesosopic
brain circuitry change

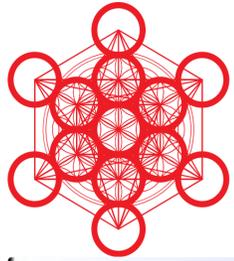
(Study neuron networks to tackle Alzheimer's, Kosik, Nature 2



Alzheimer's Disease with Genetic Cause: Clear Diagnosis

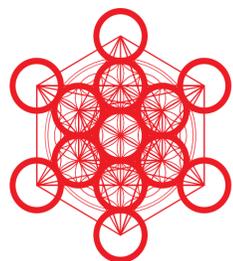


Mrs. Cuartas (82) takes care of her son Dario (55) and daughter Maria (61)



The Case of Colombian Family

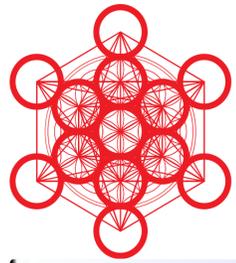
- World's largest family to experience early-onset Alzheimer's: extended clan of 5,000 people who live in Medellin, Colombia
- Specific genetic mutation begin showing cognitive impairment around age 45, and full dementia around age 51, debilitated in their prime working years as their memory fades and the disease quickly assaults their ability to move, eat, speak, and communicate
- No treatment today
- **Ethical Issue: To diagnose or Not to diagnose**



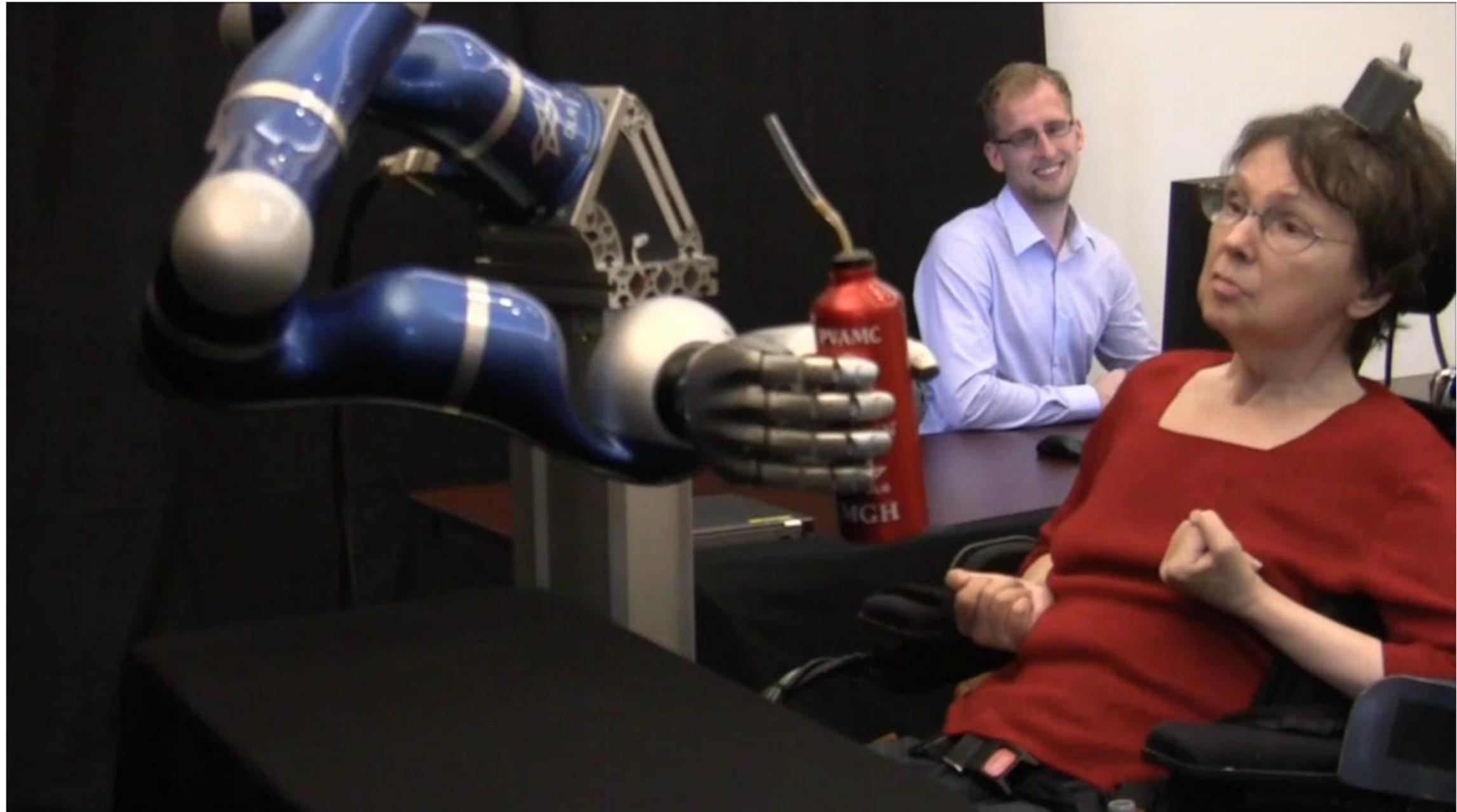
Alzheimer's Disease: Preventive Treatment

Trial name	Aim	Length	Size	Cost
Alzheimer's Prevention Initiative	To test crenezumab in people who have mutations in the presenilin 1 gene and other genes that cause Alzheimer's in middle age.	5 years	~ 300 people	\$100 million
Dominantly Inherited Alzheimer Network	To test three drugs on asymptomatic people with Alzheimer's-linked mutations in genes for presenilins 1 and 2, and amyloid precursor protein.	5 years	160 people	\$60 million for 2 years
Anti-amyloid treatment in asymptomatic Alzheimer's disease	To test a drug in asymptomatic people who have high levels of amyloid- β , and some who have a gene variant that increases their risk of Alzheimer's.	3 years	1,000 people	\$110 million

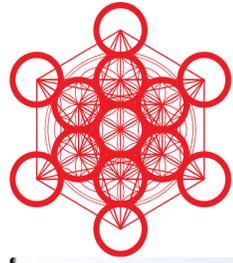
- Ethical Issue – To treat or Not to treat



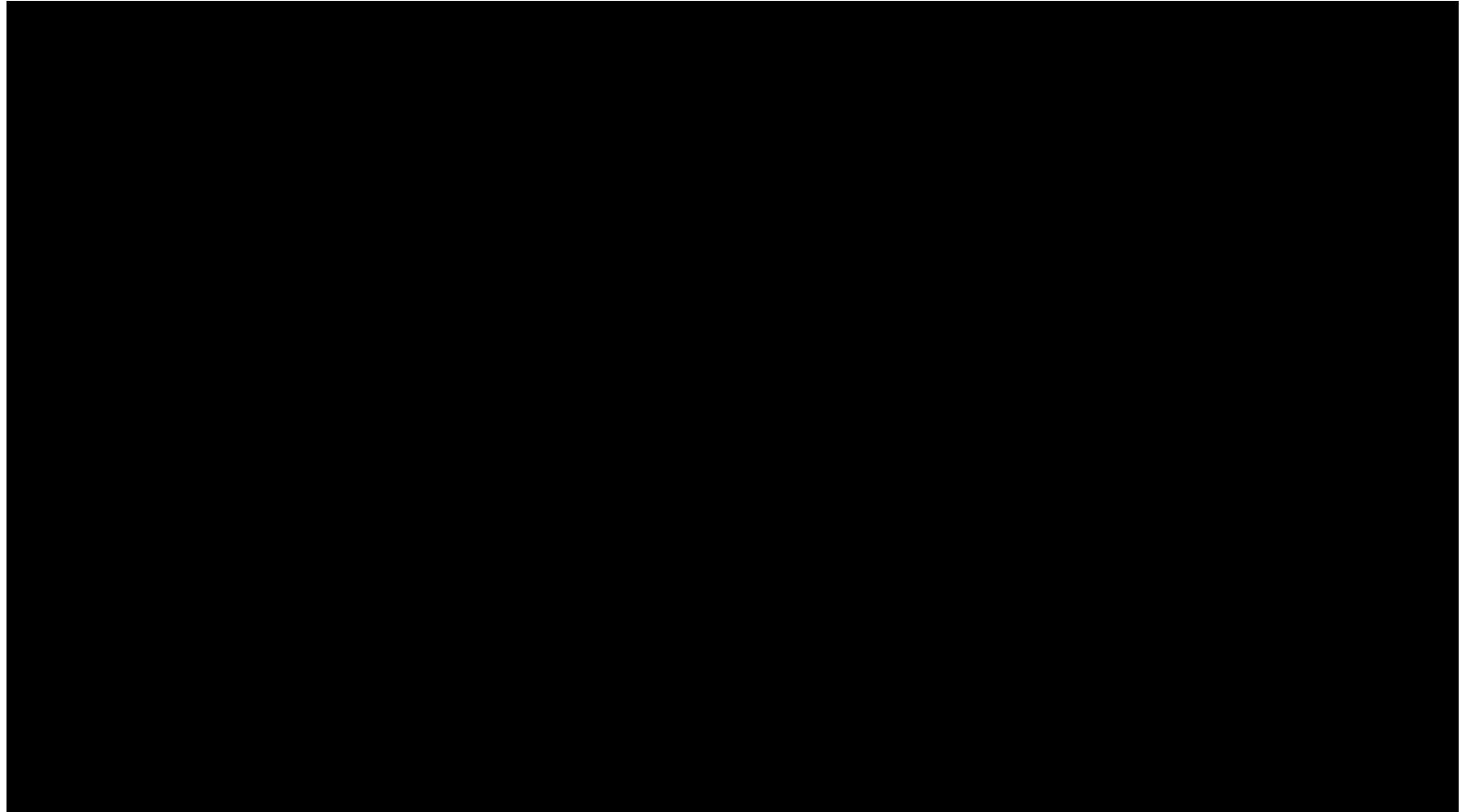
BRAIN Initiative & Deep Brain Stimulation



Courtesy of John Donoghue and Arto Nurmikko



Neurotechnology Development Ethical Issues



http://www.youtube.com/watch?v=FqrTEQ_1h68