



NIEHS

National Institute of
Environmental Health Sciences

Perspectives on the Brain and International Relations

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Embassy of France, Washington, D.C.

June 24, 2008



Elements of Neuroscience

Anatomy, physiology, molecular biology.... of central and peripheral nervous system

Developmental neurobiology

Disease onset, progression, treatment

Understanding behavior

Social issues

Training and retaining global neuroscientists



Global Burden of Disease

Non communicable diseases are responsible for nearly half of total global deaths.

They cause up to 80% of all deaths in industrialized countries and 40% of all deaths in the developing world.

By the year 2020, non communicable diseases are expected to account for 70% of deaths in the developing region.

The Burden of Disease, 2001

	<u>Low- and Middle- Income</u>		<u>High-Income</u>		<u>World</u>	
	DALYs	DALYs (Stillbirths included)	DALYs	DALYs (Stillbirths included)	DALYs	DALYs (Stillbirths included)
Total DALYs (thousands)	1,387,426	1,260,643	149,161	148,316	1,536,587	1,412,600
Causes of Death (percent)						
Communicable diseases, pregnancy outcomes, nutritional deficiencies	39.8	33.6	5.7	5.4	36.5	30.5
Non- communicable conditions	48.9	52.4	86.7	87.2	52.6	56.4
Injuries	11.2	12.1	7.5	7.5	10.9	11.6

Source: *Disease Control Priorities in Developing Countries*, second edition, 2006, Table 1.A2

Disease Burden of Selected Major Psychiatric Disorders, By Region, 2001

Region	DALYs Lost Annually per One Million Population			
	Schizophrenia	Bipolar Disorder	Depression	Panic Disorder
Sub-Saharan Africa	1,716	1,803	4,905	777
Latin America and the Caribbean	2,049	1,678	9,919	777
Middle East and North Africa	2,247	1,830	6,544	852
Europe and Central Asia	1,630	1,400	8,944	713
South Asia	2,087	1,612	10,507	779
East Asia and the Pacific	2,126	1,685	7,594	757
High-income countries	1,201	1,137	9,054	577
World	1,894	1,583	8,431	740

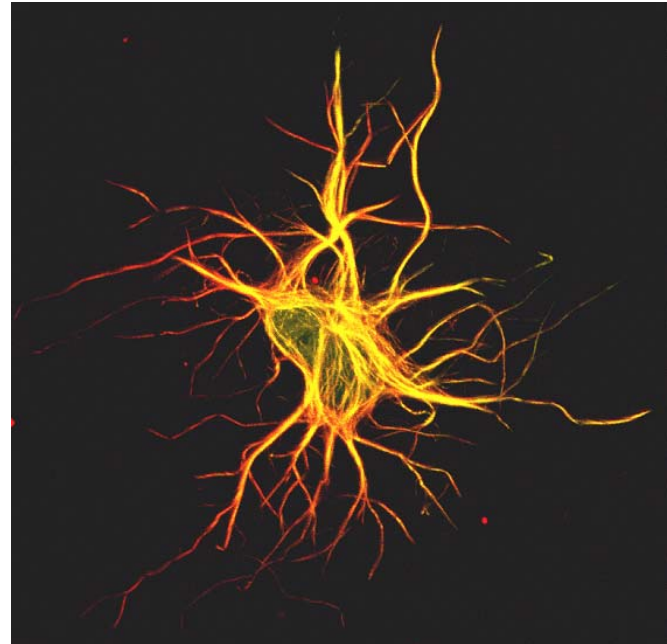
Source: *Disease Control Priorities in Developing Countries*, second edition, 2006, Table 31.1

Today's Talk

Recent advances in neuroscience

Neuroscience on diplomatic agenda

Issues on the horizon



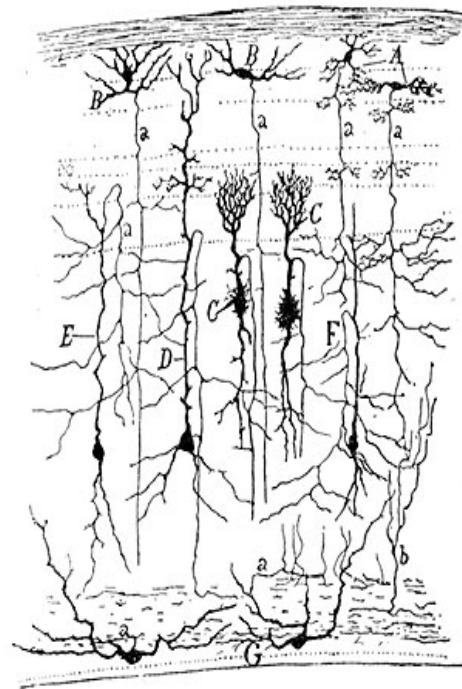
The brain exists merely to cool the blood and is not involved in the process of thinking. This is true only of certain persons.

The seat of the soul and the control of voluntary movement - in fact, of nervous functions in general, - are to be sought in the heart. The brain is an organ of minor importance.

And of course, the brain is not responsible for any of the sensations at all. The correct view is that the seat and source of sensation is the region of the heart.

Icons in Neuroscience

Santiago Ramon y Cajal



Rita Levi Montalcini



Sir John Eccles



Global Neuroscience: Milestones in Understanding

- Stem cells in the brain
- Ron McKay, NINDS/NIH (Scottish, Lebanese) identifies neurofilament specific to young neurons
- Sets in motion years of work that today shed light on stem cells in the brain and other parts of the body
- Working to understand factors to differentiate stem cells into diverse cell types.

Fast Forward to 2008

“A Visionary Approach Using Stem Cells to Repair Eye Damage. New eye research center in India aims to fix visual impairment with the help of stem cells.”

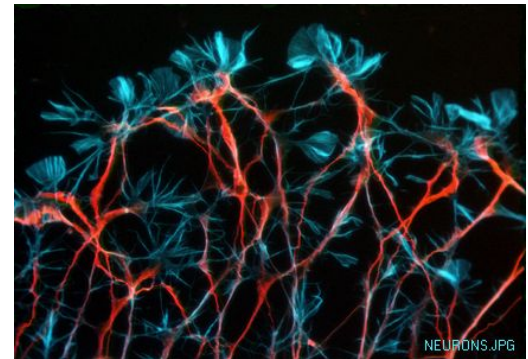
- Scientific American, January 2008

“Stem cell therapy for eye disease. UK scientists are attempting to restore vision in people with a leading cause of blindness using stems cells.”

- BBC News

“Pfizer Eyes New Use for Stem Cells.”

- Health Care



Other Landmark Neuroscience Advances

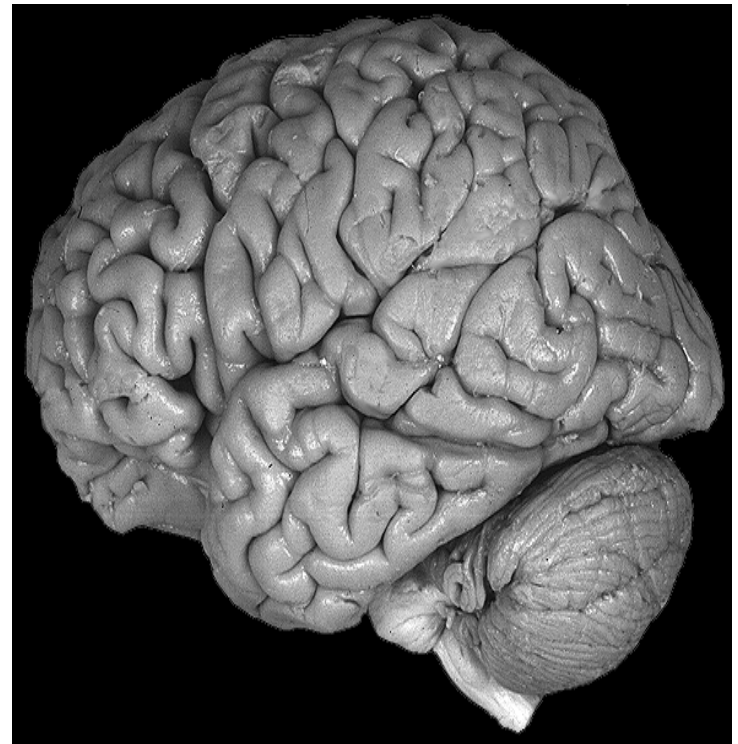
- Functional MRI -- understanding the awake, functioning brain. Insights on behavior, addiction, gender differences....
- Identification of genes specific to schizophrenia, other mental illnesses

Rita Levi Montalcini

Two gene variants implicated in schizophrenia interact to degrade the brain's ability to process information.

The interaction impaired working memory — retaining information from moment to moment.

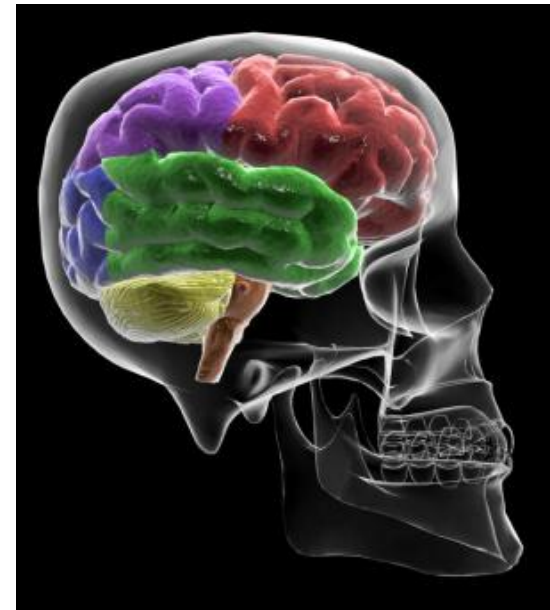
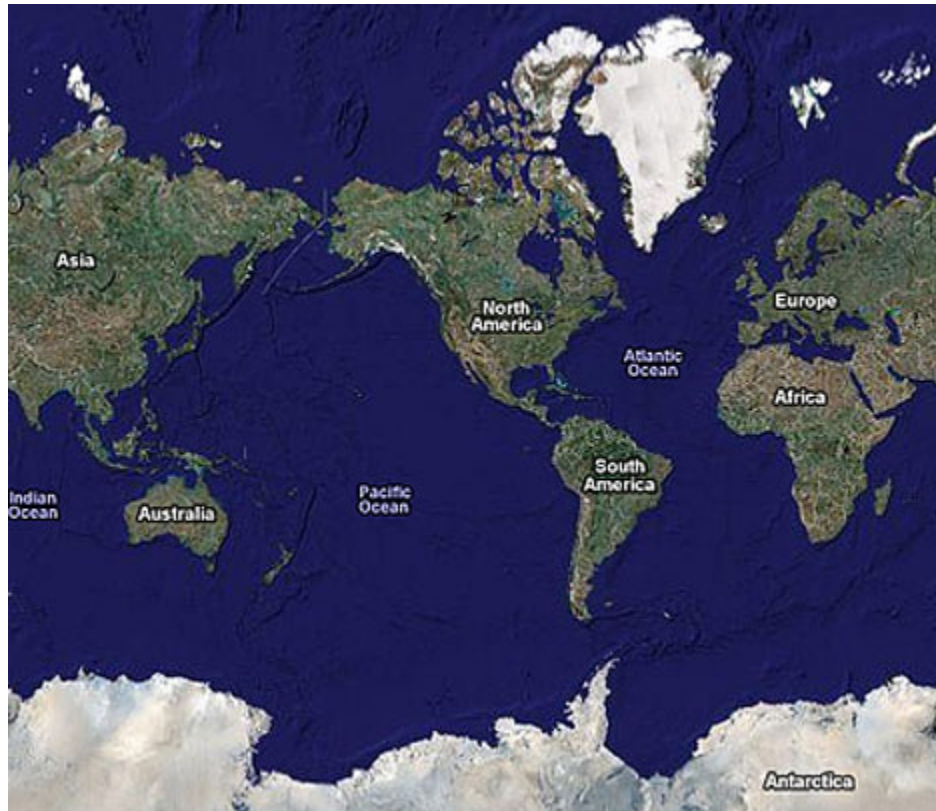
Such thinking problems are a hallmark of this severe mental illness that affects about one percent of the population.



Summary thus far...

- Technology moving rapidly to help understand brain function and dysfunction
- Team science is the norm, and teams are increasingly international in scope.

Neuroscience and the Diplomatic Agenda



International Neuroscience – formal

- Heads of State -- The G8 Agenda
- What are some factors considered when placing health/science on the annual agenda?

G8 and Health Agenda: A Look at AIDS

- AIDS on the 2005 Gleneagles G8 agenda
- Recognition that economic and social impact would be staggering, particularly in poor nations
- Called for universal coverage – AIDS by 2010

International Neuroscience – formal

- G8 agenda?
- Human Frontier Science Programme – based on Strasbourg, France. Multilateral program for research and training. Neuroscience one of initial areas of priority.
- Healthy Aging
- Health and Equity/Capacity in Africa

International Neuroscience – formal

- Bilateral agreements in Science and Health – opportunities to share expertise, leverage resources
- US-China Joint Commission
 - NIH included neuroscience on agenda, China agrees
 - Dr. Ting-Kai Li, Director NIAAA, presents at formal bilateral discussion
 - Spurs site visits, further agreements on alcohol-related research with counterparts in Shanghai

International Neuroscience –formal

- Letters of Intent
- WHO, International Brain Research Organization, SfN, many other agencies
- Visiting Program at NIH – 3000 of 6000 working scientists at NIH are from abroad, many in the neurosciences

Summary thus far...

- Neuroscience, mental health included as part of broad global health, capacity building agendas considered by G8.
- With increasing awareness of mental health impacts on society, may see increasing attention to neuroscience and mental health in intergovernmental exchanges.
- Agencies will continue to look for partnerships that will extend scientific knowledge.
- Scientist-to-scientist international cooperation thriving; NGOs dedicated to this field increasing

Issues on the Horizon - 1

- Low- and mid-income countries have needs to build expertise in neuroscience and in mental health care/delivery.

Health Expenditures, 2001 By Country Income Level

Country Group	Health Expenditure Per Capita (2001 US\$)	Health Expenditure (Percent of GDP)	Public Sector Expenditures (Percent of Total Health Expenditures)
Low income	23	4.4	26.3
Middle income	118	6.0	51.1
High income	2,841	10.8	62.1
Countries in the European Union	1,856	9.3	73.5
World	500	9.8	59.2

Source: *Disease Control Priorities in Developing Countries*, second edition, 2006, Table 1.2

Cost-effectiveness of Interventions for Mental Disorders in Low- and Middle-Income Countries

Condition	Intervention	Cost-effectiveness (\$ per DALY averted)
Schizophrenia	Antipsychotic drugs with optional psychosocial treatment (hospital-based)	4,105-19,736
Schizophrenia	Antipsychotic drugs with optional psychosocial treatment (community-based)	2,472-17,197
Bipolar Disorder	Mood-stabilizing drugs with optional psychosocial treatment (hospital-based)	3,590-5,244
Bipolar Disorder	Mood-stabilizing drugs with optional psychosocial treatment (community-based)	2,498-3,728
Depression	Drugs with optional psychosocial treatment	657-2,741
Panic Disorder	Drugs with optional psychosocial treatment	384-1,084

Select Health Research and Development Best Buys

Category	Key R&D Investments
Maternal and child health	<ul style="list-style-type: none">- Increase efficiency in vaccine development and delivery- Develop new contraceptive methods (male and female)
Microbial threats	<ul style="list-style-type: none">- Develop an effective prophylaxis for tuberculosis- Develop a malaria vaccine and an HIV/AIDS vaccine
Noncommunicable diseases and injuries	<ul style="list-style-type: none">- Establish research and training programs on noncommunicable diseases, healthy aging, and injuries
Health policy	<ul style="list-style-type: none">- Establish a research and training program on health systems and policy

Fogarty International Center and NIH partners -- Brain Disorders in the Developing World

- Effects of Malnutrition on Cognitive Development
 - University of Virginia – Brazil
- Traumatic Brain Injury in Latin America: Lifespan Analysis
 - Univ. of Washington – Bolivia
 - Planning Grant -- Preventing FAS in Russian Children -- Univ. of OK - Russia

Building Capacity in Neuroscience in Low- and Mid-Income Countries

- International Brain Research Organization
 - Schools for Neuroscience
- Human Frontier Science Program – re-entry grants
- Pew Fellowships/Latin America
- Fogarty “GRIP” – re-entry

Women in World Neuroscience -- International Brain Research Organization

- Increasing awareness of women's issues in the field.
- Advancing interests of women in neuroscience.
- Fostering networking and mentoring opportunities for young women pursuing neuroscience.
- Developing country focus.

Women in World Neuroscience, IBRO

- Judy Iles (Chair, Canada)
- Rita Balice-Gordon; Connie Atwell, Sharon Hrynkow; Jean King; Joanne Berger-Sweeney (USA)
- KaneezFatima (Pakistan)
- Nouria Lakhdar-Ghazal (Morocco)
- Viji Ravindrinath (India)
- Eva Sykova (Czech Republic)
- Eliane Volchan; Leny Cavalcante (Brazil)
- Orly Weinreb (Israel)
- Parisa Gazerani (Denmark)
- Lisette Blanco (Cuba)

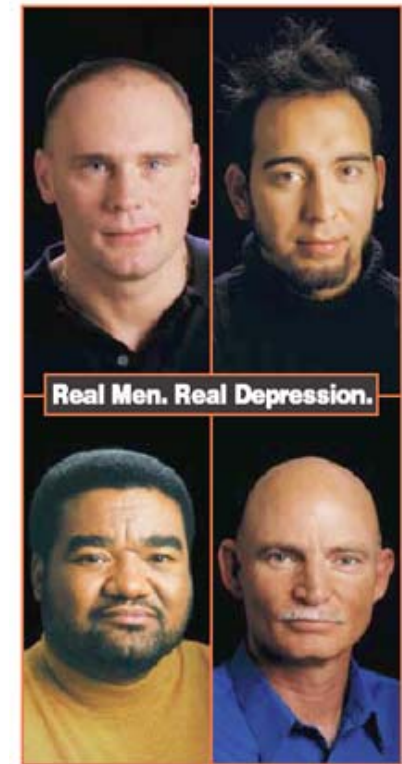
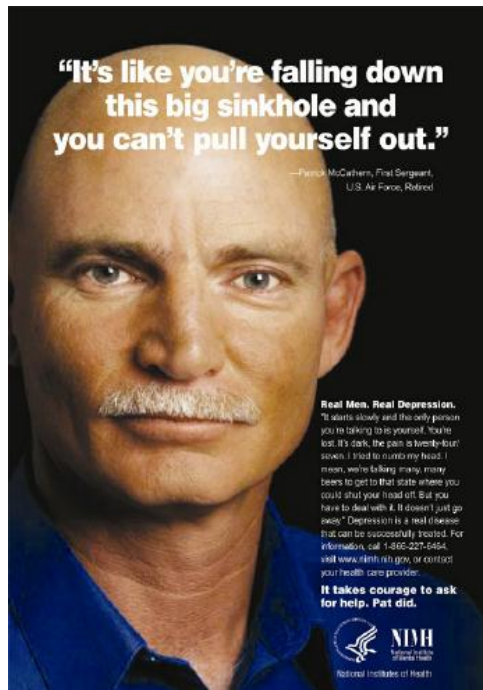


Issues on the Horizon - 2

- Stigma of mental health disorders – worldwide challenge
 - Stymies health seek behavior, contributes to under-reporting, under-recognition of magnitude of the problem
- Developed and developing countries

Real Men, Real Depression

- First national campaign to raise awareness that depression affects an estimated 6 million men annually.
- Educating the public about depression in men –
- Helping men to help themselves.



**It takes courage to ask for help.
These men did.**

Issues on the Horizon - 3

- Neuroscientists targeted by animal rights groups
- Challenges in the UK and other countries

Issues on the Horizon - 3

- NIH speaks out
 - Deputy Director for Extramural Research issues statements following two incidents involving NIH-supported researchers
- <http://grants.nih.gov/grants/oer.htm>

Issues on the Horizon - 4

- Social, ethical implications of emerging technologies and treatments
 - College students
 - Military applications
 - 40- and 50-year olds keeping up with GenX
 - Privacy issues
- New field emerging – “neuroethics”

Conclusions

Stunning advances in neuroscience hold promise for treatments and understanding of mental health disorders

Given the burden of illness worldwide and demographic trends, neuroscience and mental illness may increasingly appear as themes for cooperation on the diplomatic agenda.

Challenges remain, particularly in developing countries and those in which stigma contributes to under-recognition of the problem and discourages health-seeking behavior

With advances in technology, societies will grapple increasingly with social and ethical dimensions of neuroscience.

Opportunities for international cooperation?

Opportunities to advance neuroscience and mental health issues on array of intergovernmental forums, including policy discussions?

Selected References

- **Disease Control Priorities Project**
 - <http://www.dcp2.org/main/Home.html/>
- **World Health Organization - Global burden of disease**
 - http://www.who.int/topics/global_burden_of_disease/en/
- **National Institute of Environmental Health Sciences**
 - <http://www.niehs.nih.gov/index.cfm>
- **NIH Blueprint for Neuroscience Research**
 - <http://neuroscienceblueprint.nih.gov/>
- **Brain Disorders in the Developing World: Research Across the Lifespan**
 - http://www.fic.nih.gov/programs/research_grants/brain_disorder/

Thank you!

Climate Change and Mental Health

Katrina & Rita: Greatest Impact was Mental Health

Louisiana State Poll:

In what ways did the hurricanes impact your own health or the health of people in your community?

