The Realities of Rewarding and Recognizing Inter-disciplinary Activities

Patricia Hurn
Translational Neuroscientist
Team scientist and collaborator
PI NIH

DISCLOSURE INFORMATION for Hurn PD
The following relationships exist related to this presentation:
NIH Grants NR03521
If you want to go *fast*, go alone.
If you want to go *far*, go together.
For today’s forum

The rewards: Singing to the choir about IDR
The risks: how IDR can fail and what we can do about it
The foundation: collaboration and why having a great culture is not the whole story
The future: examples for U.T. System
What is a Scientific Research Team?

.....think of it as a continuum.....

**Level of Interaction and Integration**

**Investigator-initiated research**

Investigator works on a scientific problem – largely on his or her own.

**Research Collaboration**

- Group works on a scientific problem, each bringing some expertise to the problem.
- Each member works on a separate part, which are integrated at the end.
- The interaction of the lead investigators varies from limited to frequent with regard to data sharing or brainstorming.

**Integrated Research Team**

- Team works on a research problem with each member bringing specific expertise to the table.
- There are regular meetings and discussions of the team’s overall goals, objectives of the individuals on the team, data sharing, and next steps.
- One person takes the lead while other members have key leadership roles in achieving the goal.

Bennett J Invest Med 60:768 2012
Powerful when applied correctly but not a magic bullet

- Large, high impact scientific problems
- Research areas with conceptual or technical limitations
- Avoid incremental progress in a research question
- Develop innovative methods or analytical techniques
- Not time-limited
Big Data in Cancer: MD Anderson’s APOLLO warehouses data with IBM Watson powered analytics

Clinical Information and Data

Patient Consent, Biospecimen Collection, Banking, Biomolecule Processing

Genomics (Research) Data

Big Data Warehouse

Big Data Analytics

Insight discovery
Clinical decision support
Business Analytics

Objectives of Big Data Analytics
• Enhance Clinical Effectiveness
• Advance Future Care

TCGA/ICGC
Pubmed
Patent database
Social media

Courtesy Lynda Chin M.D.
University of Texas MD Anderson Cancer Center
Rewards of IDR: a personal story
Cerebrovascular disease is “sexually dimorphic”

Northern Manhattan Stroke Study

Annual Incidence Rate per 100,000

Men

Women

Age Groups in Years

20-24 25-34 35-44 45-54 55-64 65-74 75-84 85+

8 4 13 7 42 46 175 76 392 184 650 468 688 629 857 931
Other clues involve outcome, not risk ...

• Number 1 cause of disability in women worldwide
• 60% of stroke deaths in US are female
• Mortality is only decreasing in men

Sex differences in stroke at clinical, animal, cell and molecular levels
Primary Neuronal Culture from Mouse Brain

E16-18 Cortex: DIV 10

After ODG Live/Dead
Sex Determination in Culture by PCR

F    M    M    M    F    F    M    M

Myog →

Sry ←

Sex establishes sensitivity to injury in brain cells

Liu et al., 2007
In male cells, reversing the masculinization of brain reduces sensitivity to injury.
Hormone Conundrum

Increased Risks Prompt Researchers to Halt Study; A Big Dilemma for Women

By Thomas M. Burton

In a dramatic move certain to enflame the long-running debate over hormone-replacement therapy, researchers halted a government-run study of a hormone pill taken by millions of older women. Long-term use of the pill increases the risk of coronary heart disease, invasive breast cancer, strokes and blood clots in the lungs, the researchers said.

The action, which involved Prempo, a popular combined estrogen/progesterone pill produced by Wyeth, is likely to change how menopausal women and their doctors approach medical decisions related to aging. The findings come less than two weeks after published research showed that estrogen alone—often sold under Wyeth's brand name Premarin—didn't help protect older women heart patients from further heart disease.

Women have used such drugs for half a century, assured that the medicines provided protection against heart disease and osteoporosis in addition to treating the symptoms of menopause. "I think this is the end of the standard practice of prescribing hormones for long-term disease prevention," says Jennifer Hays, director of the Baylor College of Medicine's center for women's health in Houston, who participated in the study. The study did find that Prempro reduced the incidence of osteoporosis and colorectal cancer, but the dangers were found to outweigh these benefits.

The findings pose a dilemma for the many women who have depended on the pills to treat sometimes-severe menopausal symptoms such as hot flashes, night sweats and vaginal dryness. Should they still take these...
Rewards of IDR: $28M NIH funding, 3 generations of investigators, and still going strong

- Allows you to define your research by big picture thinking
- Pushes you to create novel techniques that let you ask a completely new question
- Harnesses controversy to advance your goals
The Risks: How IDR can fail and what we can do about it
Studies of Pitfalls and Processes: IDR and Team Science

• The brilliant scientist myth
• Central core of quality science
• The lure of a shared discipline
  • same training, same language, ease of understanding
• Lack of trust
• Shared recognition and credit
• Insufficient interpersonal and communication skills
  – Self awareness and other-awareness
  – Creating a shared vision
  – Open communication
  – Defining roles and responsibilities
  – Promoting disagreement while handling conflict
  – Enjoying the work
Research Agreements for IDR

- Goals of Research
- Timeframe
- Expectations, roles, responsibilities, accountability
- Authorship: criteria, attribution, public statements, IP, media
- Contingencies
- Conflicts of interest
Incentivize and Bring down the Barriers

• The Faculty Engine
  – P&T processes that recognize and reward collaboration
  – Compensation that rewards joint ventures in science

• Trans-disciplinary Education
  – Curriculum Task force for shared learning, resources across schools
  – Collaboration and Team science skills

• Research
  – Set intramural incentives for collaborative research
    • Internal pilot funding mechanisms either first dollar in or last dollar added
  – Evaluate and reward centers and institutes with collaborative mission
  – Ombudsman programs to shepherd IDR
The Foundation: collaboration...why having a great “culture” is not the whole story
Think “we”, not “me”

Emerging investigators

- Access to technical and creative resources that you do not have alone
- Opportunities for multiple sources of salary support during lean years
- Build non-competitive relationships that allow resource sharing
Advantages for Established Investigators

- Established investigators
  - Avenues for a “diverse funding portfolio”
  - Cross-discipline activity will keep you at the leading edge
  - Provides opportunities for program building to rapidly advance your field
  - Longevity is training your future collaborators
The long view: collaborate to compete
Form a “Synergome”
Biology of Collaboration

• Our brains are wired for social threat
  • New person, not of your group, triggers distinct neural pathways much like those evoked in physical discomfort
  • So social aspects of collaboration must be managed

• Cooperation stimulates oldest parts of the brain by fMRI
  – Amygdala, caudate-striatum, pre-frontal cortex

• Trust and fairness are highest requirements in collaboration
  – Gaming studies (Prisoner’s Dilemma: cooperate or defect)
  – Neuropeptide Oxytocin rises and falls with trust signals
  – Intranasal Oxytocin ↑ cooperative behavior in men
Rilling et al., 2011

(a) Graph showing the relationship between left caudate CC beta values and plasma OT concentration (pg/mL).

(b) MRI image highlighting the brain region of interest with a color scale indicating correlation values.

"p(Bonf) < 1.0000
p < 0.048198"
Mega Collaboration: Crowdsourcing and Crowdfunding
http://www.youtube.com/watch?v=hyueRRCb
PTE
The Future: Examples for U.T. System
Political Interest

- Patrick Kennedy (November, 2010) SfN: A Neuroscience 'Moonshot': Rallying a New Global Race for Brain Research. ‘inner space program’; call for new interdisciplinary approaches to brain research


- Congressman Chaka Fattah (PA) (2011) Ranking member of Commerce, Justice and Science Subcommittee; Strong Advocate for Increasing NS Research

- The BRAIN Initiative (President Obama, April 2013)
Priorities of the National Brain Initiative

1) Generate a census of cell types
2) Create structural maps of the brain
3) Develop new large-scale network recording capabilities
4) Develop a suite of tools for circuit manipulation
5) Link neuronal activity to behavior
6) Integrate theory, modeling, statistics, and computation with experimentation
7) Delineate mechanisms underlying human imaging technologies
NIH Neuroscience Research Opportunities: Next 10-Years

• **BRAIN Initiative**
  – *National Research Priority-White House/Congress*
  – *NIH, NSF, DARPA, Industry, Private Partnerships*

• **CNS Translational Research**
  – *NeuroNEXT; Cooperative Translational Award; CTSA*
  – *NCATS; NS Blueprint, 13 NIH ICs –Neurotherapeutics Network*

• **Stroke Research**
  – *National Stroke Research Plan (NINDS, NIA, NHLBI, NICHD)*
  – *Stroke Trials Network (StrokeNet)*

• **Alzheimer’s Disease**
  – *HHS-AD Task Force; NIA & NINDS Priority;*
  – *NIA received $100M New Funds in FY14*

• **TBI/PTSD**
  – *DOD, VA, NIH Initiative*
  – *White House Executive Order*
DARPA-Neuroscience Initiatives 2014

• Neuro Function, Activity, Structure & Technology (NEURO-FAST)
  – Solicitation in 2014

• Hand Proprioception and Touch Interfaces (HAPTIX)
  – Solicitation: DARPA SN-14-27
  – Proposer’s Day in April 2014
NSF-Neuroscience Initiatives 2014

• Research Coordination Networks (RCN)

• Collaborative Research in Computational Neuroscience (CRCNS) NSF 14-504

• Science & Technology Centers: Integrative Partnerships
The National Research Agenda: Convergence

“merging expertise that goes beyond interdisciplinary intersection of fields to the emergence of new disciplines”

“convergence of fields is the next revolution...multi-disciplinary thinking and analysis will permit new scientific principles ..and equal partnerships between engineers, physical scientists, biologists, clinicians

Phillip Sharp and Robert Langer: Science July 2011
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