Open Innovation Networks: An Imperative for Breakthrough Therapies

Neal H. Cohen, MD, MPH, MS
Vice Dean
Professor, Anesthesia and Medicine
UCSF School of Medicine

August 8, 2008
Creating Breakthrough Technologies

- Why aren’t existing models sufficient?
- What are the barriers that undermine new scientific breakthroughs?
- How can industry and academia collaborate to more effectively address them?
- What are “Open Innovation Networks” and “Precompetitive Collaboration” and are they viable alternatives?
“Advancing Healthcare”

“Industry”

“Management”

“Marketing”

“Basic Scientists”

“Clinician-Scientists”

“Academics”

“Community Providers”

“Clinicians”

“Patients”

“Regulatory Agencies”

- Genetic Profiles
- Environment
- Co-Morbid Conditions
“Advancing Healthcare”

“Industry”

“Management”

“Marketing”

“Basic Scientists”

“Clinician-Scientists”

“Community Providers”

“Patients”

“Clinicians”

“Academics”

“Regulatory Agencies”

- Genetic Profiles
- Environment
- Co-Morbid Conditions

NIH
Models for Biopharmaceutical Innovation

- R&D spending increased 147%
- New drug applications increased 38%
- Drug failures
- Patent expirations

1993-2004

- Collaborative relationships with academic institutions

- Short product life
- Crowded me-too products
- Generic pricing pressure
- Lack of differentiation (threshold of innovation)

- Large clinical trials
- More late stage failures
- Increased regulatory hurdles
Traditional Models No Longer Sufficient

- Current state of knowledge, skills inadequate to address some of the more complex methodologic and clinically important questions
  - Increasing complexity of research methodology
  - Need for diverse expertise
- Mandate for more effective research paradigms
  - Evidence-based therapeutic interventions
  - Comparative effectiveness studies to justify new treatments
  - Personalized approaches to clinical management
- Cost is only one contributing factor
  - On average, 1-in-10 drugs that enter clinical trials will become a marketed product
  - Limitations are not due solely to “commercial” implications
Most Importantly...
**Traditional Models Stifle Innovation**

- Most “collaborations” are the result of independent (siloed) collaborations, based on individual academic-industry relationships
- Each has (appropriate) protections and limits
  - Conflicts of interest, commitment
  - Consulting relationships may preclude other research opportunities
  - For investigators, corporate funding augments Federal grants and contracts – but doesn’t necessarily advance science
- Multi-institutional relationships have been discouraged
- None of these models allow open access or sharing of critical resources and data
...and

Industry Is Recognizing These Realities

- For many companies, it is now more cost effective to bring promising therapies from the outside their own walls

- “The days of a monolithic approach to ... research or commercialization are behind us” (Jeffrey Kindler, CEO, Pfizer)
  - Pfizer reducing R&D spending by $3B by 2012 without sacrificing future drug development
    - Research hasn’t been worth the high levels of investment
    - Partnerships (and Wyeth acquisition) are filling the pipeline
  - AstraZeneca cutting research staff by 3500
  - Sanofi-Aventis cutting R&D spending by 20%
“Open Innovation”

- *Economics of innovation* is a key driver for companies to open their innovation process
- “...newly developing technologies and products benefit from *integrating knowledge and expertise from multiple sources*”

What are the Key Elements of Change?

- Transformative therapeutics will require “creative” approaches, new rules
  - Large databases including diverse populations required to establish meaningful relationships, associations
  - Diverse scientific expertise
    - Cross-disciplinary skills sets
    - Computational biology tools
    - Cores
    - Clinician-basic science collaborations
    - Clinical correlations
- Existing barriers to communication, collaboration, cooperation must be understood and “managed”, if not overcome
- There is no single new model that will address all needs
Where are these “barriers”?  

- Industry  
- Academia  
- The Public  
- Government/Regulatory Agencies
Industry-Imposed Constraints

- "Industry" is diverse
- Discovery valued based on benefit it brings to real world problem(s) – [commercial value]
- Scientific "autonomy"
- Economic realities
- Regulatory constraints
Academia-Imposed Realities

- Discovery valued for “advancing knowledge”
- “Academic freedom”
- Intellectual autonomy

- Lack of inventory of research focus, strengths, opportunities
- “Compartmentalization” of basic scientists and clinicians

- Merit, promotion, tenure processes

- University policies and procedures
  - Contract negotiations
  - Technology transfer (royalty stream)
  - Economic autonomy
Other “Hurdles”

- Potential conflicts between public good and shareholder value
  - Conflict of interest
  - Conflict of commitment

- Historical “errors in judgment”
  - Scientific misconduct
    - 90% of clinicians believe that ignoring certain entry criteria for a trial is acceptable if a patient *might* benefit from the trial
  - Lack of critical evaluation
  - Poor research design and execution
The Challenges Provide an Opportunity to Create New Relationships ...

- Categorize existing research relationships and assess its value
  - Identify opportunities to expand relationship
- Define the new (broader) strategic vision for collaboration
  - Scientific synergies, internal needs
  - Opportunity to establish relationship in other areas
- Consider alternatives
  - Precompetitive Collaboration
  - Open Innovation Networks
  - Other “Translational” Opportunities
- Evaluate strategy and outcomes
Some Critical Elements

- Recognize the *Value Proposition* of each collaboration
- Manage the industry-academic collaboration as an *Investment Portfolio*
- Adopt new approaches to *Information Sharing*
- Then define the most appropriate *Innovative Models* that will foster collaboration and overcome barriers
Value Proposition

- All participants bring something of value to the collaboration
  - Valuation of assets of collaborators must be “equitable” and “flexible”

- Goals are more aligned than not and are compatible
  - Academia values discovery that increases knowledge
  - Corporation values discovery that solves a real world problem
Manage Collaboration as an “Enterprise-Wide” Investment Portfolio

- Manage projects as a portfolio to capitalize on synergies and eliminate redundancies
- Identify partner(s) that provide the synergies
  - Clarify the roles and responsibilities of each partner
  - Be sure each partner values the relationship
- Negotiate master agreements that define goals and scope of collaborations
  - Predefine terms and conditions
  - Optimize “contractual” negotiations, minimize delays
Acknowledge the AHS as a critical link to fostering innovation

Identify potential collaborators throughout the academic community
• Basic and clinician scientist relationships longstanding
• Clinicians also provide keys to breakthrough technologies
  – Understand mechanisms of disease
  – Monitor individual response to and compliance with therapies
  – Source for patient cohorts, biological specimen banks
• AHCs train future generations of health care professionals

Clinical and translational science initiatives (CTSA) are facilitating translation of bench science to the “bedside”
Share Information

- Develop “open” standards to allow validation, comparative analysis
- Create “Open Innovation” Research Networks to foster collaboration and innovation through shared resources (compound libraries, screening facilities, personnel sharing)
- Create non-exclusive consortia, alliances, networks, particularly in precompetitive areas of research
  - Examples
    - RNAi Consortium
    - Biomarkers Consortium
    - Diabetes Genetic Initiative
- Identify Collaborators within the Academic Community
## Search Results (261)

<table>
<thead>
<tr>
<th>Name</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laura J Esserman, MD</td>
<td>Surgery</td>
</tr>
<tr>
<td>Karla M Kerlikowske, MD</td>
<td>Medicine</td>
</tr>
<tr>
<td>Nola N Hylton, PhD</td>
<td>Radiology</td>
</tr>
<tr>
<td>Margaret R Wrensch, PhD</td>
<td>Neurological Surgery</td>
</tr>
<tr>
<td>Hope S Rugo, MD</td>
<td>Medicine</td>
</tr>
<tr>
<td>Robert C Brasch, MD</td>
<td>Radiology</td>
</tr>
<tr>
<td>Christine A Miaskowski, RN PhD FAAN</td>
<td>Physiological Nursing</td>
</tr>
<tr>
<td>Donna G Albertson</td>
<td>HDF Comprehensive Cancer Center</td>
</tr>
<tr>
<td>Thea D. Tisty, PhD</td>
<td>Pathology</td>
</tr>
<tr>
<td>Robert A Hiatt, MD PhD</td>
<td>Epidemiology &amp; Biostatistics</td>
</tr>
<tr>
<td>John K Chan, MD</td>
<td>Ob/Gyn &amp; Reproductive Sciences</td>
</tr>
<tr>
<td>Allan Balmain</td>
<td>HDF Comprehensive Cancer Center</td>
</tr>
<tr>
<td>Zena Werb</td>
<td>Anatomy</td>
</tr>
<tr>
<td>Rajvir Dahlia</td>
<td>Urology</td>
</tr>
<tr>
<td>Joseph T. Rabban, MD</td>
<td>Pathology</td>
</tr>
</tbody>
</table>

Record 1 - 15 of 261  Page 1 of 18  Per Page 15  Previous  Next
Potential Models for Collaboration

- One company/one academic institution
- One company/several academic sites
- Consortium of industry and academic “members”
- Open access platforms
Define Scope of Relationship(s)

β “Consultancy Phase”
  • Define potential targets, drug candidates
  • Provide “due diligence”

β Pre-Clinical Collaboration
  • Pre-competitive

β Clinical Trials
Current Collaboration Management
Allocation by functional area with each responsible for managing its own collaborations

Future Collaboration Management
Enterprise-wide portfolio management, utilizing diverse partnership models

Partnering Business Models

- Incubator
- Orchestrator
- Outsourcer
- Complementor
- Collaborator
- Aggregator

Partnership Strength

- High
- Low

Partnership Complexity

- Simple (One-to-One)
- Complex (One-to-Many)
What Do “Open Innovation Networks” Provide?

- Create **coherent datasets** that capture the inherent complexity of human physiology
- Develop **robust representations of biology and disease** to more completely reflect the underlying complexity of physiologic systems
- **Harness the creativity** of the community of scientists
- Enable **more rapid progress** in refining the representations of biology and disease
Open Innovation Models

- **InnoCentive (e.Lilly Division)**
  - Designed to foster innovation and efficiencies in research and development

- **Open Access Drug Companies**
  - Sector of corporate R&D designated for collaborative partnerships to focus on rare diseases

- **Sage Bionetworks**
  - Open access platform for sharing and disseminating complex data
Open Innovation Models

- Each of these approaches has a different structure, different goals, different financial expectations

- Multiple approaches
  - Information Sharing
  - “Matchmaking”
  - Venture Capital
  - Incubators
  - Identify Potential Multi-institutional Collaboration Opportunities
How Can We Optimize Chances for Success for These Collaborations?

- Define a oversight structure that promotes exchange of knowledge and collaborative development of milestones
- Prospectively acknowledge potential sources of conflict
  - Organizational Issues
  - Culture
  - Funding challenges
- Address key sources of controversy
  - Confidentiality
  - Ownership and commercialization of jointly developed biologics
  - Publication “delays” (patent filing)
  - Intellectual property rights
  - Budgeting to support the research collaboration
- Appoint “advisory board” to address COI issues
Model for Industry-Academic Collaboration

**Strategic Planning Board**
- Defines strategic goals
- Identifies potential collaborative partnerships, opportunities

**Coordinating Committee**
- Coordinate collaborative activities
- Identifies and leverages campus, investigator expertise
- Manage database(s)

**Advisory Board**
- External review body to evaluate strategies and provide oversight
- Manage COI issues
Outstanding Questions

What will be the measures of success for these models?

Is “precompetitive” collaboration sufficient to generate breakthrough technologies?

Are “open innovation networks” and consortia the best models?

Finally, are there other ways to create “out of the box” alternatives?
"Leap...
and the net will appear"

Zen Proverb