The NIH Small Business Program and Data and Information Transparency Support

Turning Discoveries into Health

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National Institutes of Health

Federal Demonstration Partnership
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Washington, DC
Disclosures: None
To seek fundamental knowledge about the nature and behavior of living systems and the application of that knowledge to enhance health, lengthen life, and reduce illness and disability.
What We Care About – Ultimate Research Outcome

Medical Research Funding
- Sources of funding
  - Government, industry, foundations, charities, and universities
- Historical trends
- International comparisons

Science and Technology Workforce
- Workforce size
- Historical trends
- International comparisons

Medical Research Output
- Patents
  - International comparison of patenting activity
- Publications
  - International comparison of publication activity
- New drugs and devices
  - New drug and device approvals by FDA and EMA
- Market performance
  - Health care sector performance compared with market average

Moses H et al. JAMA 2015;313:174-189
Who pays for inventions?

Inventions logged by the University of California system 1990 - 2005

1. **WHO FUNDS INVENTIONS?**
   - No sponsor: Information 3,949
   - Federal: 5,572
   - Other sponsors: 1,527
   - Federal and corporate: 581
   - Corporate: 887

   Total inventions logged: 12,516

   Less than one-fifth of inventions have any corporate funding.

2. **HOW DO INVENTIONS FAIRE?**

   Most licences taken by third parties.

Wright, B Nature 2014;297
SBIR and STTR: America’s Seed Fund

- Congressionally mandated set aside
- Stimulate technological innovation
- Meet federal R&D needs
- Foster participation of minorities and disadvantaged persons in tech innovation
- Increase private-sector commercialization of innovations resulting from federal R&D
- Foster collaborative research between small businesses and research institutions
- Foster technology transfer out of academia
### SBIR/STTR Budgets by Agency FY16

#### Agencies with SBIR and STTR Programs

<table>
<thead>
<tr>
<th>Agency</th>
<th>Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department of Defense (DOD)</td>
<td>$1.288B</td>
</tr>
<tr>
<td>Dept of Health and Human Services (HHS), inc National Institutes of Health (NIH)*</td>
<td>$891.0M</td>
</tr>
<tr>
<td>Department of Energy (DOE), including Advanced Research Projects Agency – Energy (ARPA-E)</td>
<td>$228.6M</td>
</tr>
<tr>
<td>National Science Foundation (NSF)</td>
<td>$187.7M</td>
</tr>
<tr>
<td>National Aeronautics and Space Administration (NASA)</td>
<td>$183.4M</td>
</tr>
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#### Agencies with SBIR Programs

<table>
<thead>
<tr>
<th>Agency</th>
<th>Budget</th>
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<tbody>
<tr>
<td>U.S. Department of Agriculture (USDA)</td>
<td>$28.8M</td>
</tr>
<tr>
<td>Department of Homeland Security (DHS)</td>
<td>$17.0M</td>
</tr>
<tr>
<td>Department of Commerce: National Oceanic and Atmospheric Administration (NOAA) and National Institute of Standards and Technology (NIST)*</td>
<td>$12.5M</td>
</tr>
<tr>
<td>Department of Transportation (DOT)</td>
<td>$11.6M</td>
</tr>
<tr>
<td>Department of Education (ED)</td>
<td>$7.5M</td>
</tr>
<tr>
<td>Environmental Protection Agency (EPA)</td>
<td>$4.9M</td>
</tr>
</tbody>
</table>

**$2.85 Billion**

- **SBIR**: $2.5 Billion
- **STTR**: $361 Million

*Provides grants and contracts*
NIH Small Business Program (sbir.nih.gov)

$ Project funding for small businesses

Supports feasibility, proof-of-concept, and research and development

Often awarded to: start-up or university spin-out companies (based on an academic lab’s technology)

FY18 > $1 Billion
NIH SBIR/STTR 3-Phase Program

**Discovery Phase I**
- Feasibility

**Development Phase II**
- Full R/D
- **Fast-Track**
- **Direct to Phase II**
- Congressional authority expired

**Competing Renewal Award Phase IIB**
- $3M for up to 3 years

**Commercialization Phase III**
- Commercialization Readiness Pilot (CRP)
- Congressional authority expired
- $3M for up to 3 years

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SBIR.NIH.GOV

NIH National Institutes of Health
Office of Extramural Research
NHLBI SBIR Phase 2B: Strategic Partners

Outcomes include:
- Equity investments
- Co-development partnerships
- Licensing
- Regulatory filings
- Clinical trials

21 Projects

$54M (non-dilutive NHLBI)

>$100M (private match)

>$500M (follow-on funding)
Enabling Commercialization: NIH Entrepreneurial Education Programs

Niche Assessment Program Foresight S&T
(Phase I awardees)
https://sbir.nih.gov/nap

Commercialization Accelerator Program Larta, Inc.
(Phase II awardees)
https://sbir.nih.gov/cap

I-Corps™ at NIH

Coulter College Commercializing Innovation (C3i)
- Focused on medical device development
- Provides mentoring and expert consulting services
More Enabling: Entrepreneurs in Residence

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More Enabling

Regulatory
- Navigating the FDA Website
- "First Contact" with FDA
- Finding the Right Regulatory Consultant
- Medical Device Regulation Overview

Commercialization
- Writing your Phase II Commercialization Plan
- Identifying and Connecting With Your Customer
- How Pharma Evaluates New Therapeutic Opportunities

Intellectual Property
- Intellectual Property Basics for the New Innovator
- Making Your Mark: The Use and Care of Trademarks
- Patent Litigation: Basics, Defense, and Offense – Parts 1 & 2
SBIR/STTR Reauthorization update

• Congress passed a 5 year SBIR/STTR Reauthorization as part of S.2943, the 2017 National Defense Authorization Act (NDAA)
• SBIR/STTR programs reauthorized for 5 year FY18 through FY22
• Simple, one line reauthorization
• No pilot programs extended, all expire 9/30/17
  – SBIR Direct Phase II
  – Commercialization Readiness Pilot Program (SB1)
  – 3% Agency SBIR Admin funds
  – NIH Phase 0 Proof of Concept Partnership Pilot
• Bills circulating in Congress as we speak on these and other areas. – Stay tuned.
SBIR and STTR reauthorization as part of the National Defense Authorization Act for Fiscal Year 2012 (HR1540)

SEC. 5127. PHASE 0 PROOF OF CONCEPT PARTNERSHIP PILOT PROGRAM (Pages 1094 - 1096)

“(jj) PHASE 0 PROOF OF CONCEPT PARTNERSHIP PILOT PROGRAM.—

“(1) IN GENERAL -- The Director of the National Institutes of Health may use $5,000,000 of the funds allocated under subsection (n)(1) for a Proof of Concept Partnership pilot program to accelerate the creation of small businesses and the commercialization of research innovations from qualifying institutions.
“(3) PROOF OF CONCEPT PARTNERSHIPS.—

“(A) IN GENERAL.—A Proof of Concept Partnership shall be set up by a qualifying institution to award grants to individual researchers. These grants should provide researchers with the initial investment and the resources to support the proof of concept work and commercialization mentoring needed to translate promising research projects and technologies into a viable company. This work may include technical validations, market research, clarifying intellectual property rights position and strategy, and investigating commercial or business opportunities.

“(B) AWARD GUIDELINES


NIH Centers for Accelerated Innovations
Research Evaluation and Commercialization Hubs

Translate basic science discoveries into commercially viable products that improve health. REACH is fully and NCAI is partially funded through the Phase 0 Proof-of-Concept Centers provision of the 2011 STTR Reauthorization (Sec. 5127).

Turning discoveries into health
Proof-of-Concept Centers Support Milestone-Driven Development for Academic Innovators

NIH Centers for Accelerated Innovations (NCAI)

Research Evaluation and Commercialization Hubs (REACH)

National Institutes of Health (NIH)

Cleveland Clinic

http://ncai-reach.nhlbi.nih.gov
How do the NCAI and REACH Work?

NCAI and REACH

Developing a scalable model and best practices for accelerating academic discoveries toward therapies and cures to address unmet medical needs.

The Centers Provide Comprehensive Product Development Support

- Up to $400K in project funding
- Project management and coaching by industry-experienced mentors
- Personalized feedback
- FDA, CMS, USPTO
- Kaiser Permanente
- Life science industry experts
- Training and Resources
  - Business development
  - Regulatory planning
  - Financing and partnerships

NIH National Institutes of Health
Office of Extramural Research
• NIH and NSF supported the three NCAI centers to develop best practices for tailoring the I-Corps curriculum for biomedical technologies.

• The centers leveraged this funding and continue to expand. For example, the Ohio center has extended its program to five partner institutions.

• The REACH hubs are all at institutions with NSF I-Corps Site awards and use the curriculum to strengthen the business elements of their technology development project proposals.

Promising Output Indicators

- Letters of intent and pre-applications: 1047
- Full applications: 553
- Funded projects: 220
- Guidance from program partners:
  - New companies: 8
  - Technology licenses and options: 31
  - Follow-on Funding: $485M

Program Partners:
- NCAI
- REACH
- SBIR/STTR Award

https://ncai.nhlbi.nih.gov/ncai/
NIH Centers for Accelerated Innovations Program: principles, practices, successes and challenges

Commercializing innovations in academic environments is notoriously challenging. Here, we describe the progress of the NIH Centers for Accelerated Innovations program — initiated in 2013 to address these challenges — which we believe could help set a new standard for the early-stage commercialization of biomedical innovations in academic environments.

“We propose that data mining and network analysis utilizing public databases can identify and quantify relationships between scientific discoveries and major advances in medicine (cures). Such approaches could enhance decision making...”
Underreporting Research Is Scientific Misconduct

Iain Chalmers, FRCOG

“Substantial numbers of clinical trials are never reported … Failure to publish is a form of scientific misconduct that can lead to inappropriate treatment decisions. Investigators, ethics committees, funding bodies, and scientific editors all have responsibilities to reduce underreporting of clinical trials.”

JAMA 1990;263:1405-8
Title VIII--Clinical Trial Databases, Sec 801

“(C) DATA SUBMISSION. — The responsible party for an applicable clinical trial, including an applicable drug clinical trial for a serious or life-threatening disease or condition, that is initiated after, or is ongoing on the date that is 90 days after, the date of the enactment of the Food and Drug Administration Amendments Act of 2007, shall submit to the Director of NIH for inclusion in the registry data bank the clinical trial information described in of subparagraph (A)(ii) not later than the later of—
“Despite the **ethical mandate** and expressed values of academic institutions, there is poor performance and noticeable variation in the dissemination of clinical trial results across leading academic medical centers.”

BMJ 2016;352:i637
“Sharing Results Should Not Be Optional”

Academic Medical Centers Get An F In Sharing Research Results

February 23, 2016 - 1:59 PM ET

HARLAN KRMHOLZ

“Not reporting results violates the basic principle of the scientific method. It hurts patients, society and science. It dishonors the people who gave their consent and bore the risk of participating...

The holding back of the results impedes progress toward scientific breakthroughs, corrupts the medical literature and wastes research funding.”

http://www.npr.org/sections/health-shots/2016/02/23/467712481/academic-medical-centers-get-an-f-in-sharing-research-results
Why it’s important

- 70% phase II and 50% phase III trials fail
- Inadequate basic science
- Data integrity issues
- Failure negatively affects patients
- What is needed?
  - “a culture where the facts and data are confronted with brutal honesty”
  - Optimize Phase III trial design -- “Harness the vast amount of data available in public sources (e.g. Clinicaltrials.gov) to determine what worked....”

Grignolo and Pretorius, Applied Clinical Trials; Aug/Sep 2016
Now the Policy Exists… the Final Rule

42 CFR Part 11
[Docket Number NIH-2011-0003]
RIN: 0925-AA55

Clinical Trials Registration and Results Information Submission

Effective Date
This policy is effective January 18, 2017.

Date: September 12, 2016

Francis S. Collins, M.D., Ph.D.
Director
National Institutes of Health

NIH Policy on the Dissemination of NIH-Funded Clinical Trial Information

Notice Number: NOT-OD-16-149

“A fundamental premise of all NIH-funded research is that the results must be disseminated …

In research involving human beings, scientists have an ethical obligation to ensure that the burden and risk that volunteers assume comes to something, at the very least by ensuring that others are aware of the study and that its findings contribute…”

Is Your Study a Clinical Trial?

The 4 Questions

• Does the study involve human participants?
• Are the participants prospectively assigned to an intervention?
• Is the study designed to evaluate the effect of the intervention on the participants?
• Is the effect that will be evaluated a health-related biomedical or behavioral outcome?

If “Yes” to ALL of these questions, your study is considered a clinical trial

Clinical Trial Interactive Decision Tree: https://grants.nih.gov/ct-decision/index.htm
New Human Subjects and Clinical Trials Information Form

Must apply to specific trials’ announcements NOT-OD-16-147
Take a video tour of the new form.

Review High Level Summary of Form Changes: FORMS-E to learn about other form changes.

Starting with application due dates on or after Jan. 25, 2018
“To realize the benefits of a clinical trial, the data must be broadly shared quickly. The DHHS has released a regulation for registration and summary results reporting. The NIH will **withhold clinical trial funding** if the agency is unable to verify adequate registration and results reporting…”

JAMA 2016 (online September 16, 2016)
What We Care About

Evolucumab

Trials

Foundational publications

NIH grants

NIH-supported organizations

Cited References

Thanks to Brian Haugen, Cindy Danielson, George Chacko and Samet Keserci
Thank you