

# Analysis of Invention and Patents among NHLBI Extramural Investigators

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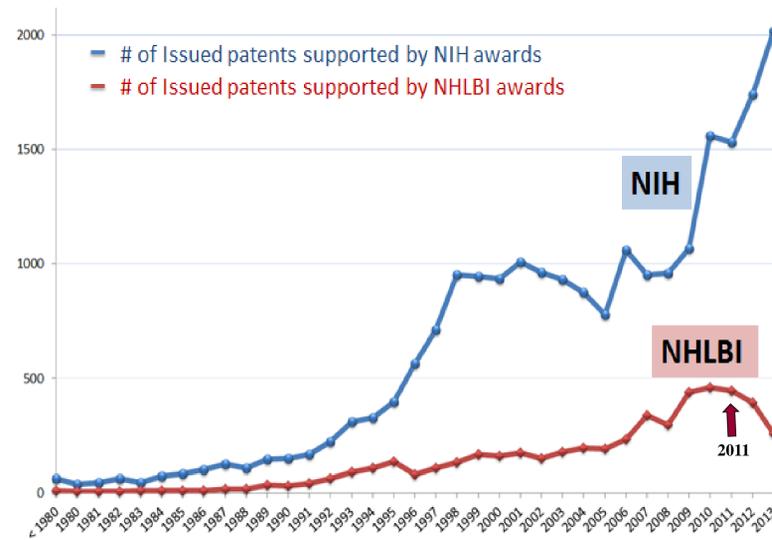
## Introduction

- Patents comprise the blueprints for, and foreshadow the future of, all next-generation biomedical drugs, devices, and diagnostics.
- It has been historically very difficult to accurately link NIH Research Project Grants (RPGs) to the inventions and patents.
- The Office of Portfolio Analysis (OPA) is developing a grant to patent linkage system that will make such linkage more comprehensive, accurate, transparent, and searchable.
- This project, as a case study, uses such linkage data to analyze inventions and patents among NHLBI extramural RPG investigators.
- The above described linkage data is one of many components of OPA's **iTech** tool, which is to link a NIH grant with patent filing and further with technology commercialization (Please visit **Poster #11 in Room C** for cases in commercialization)

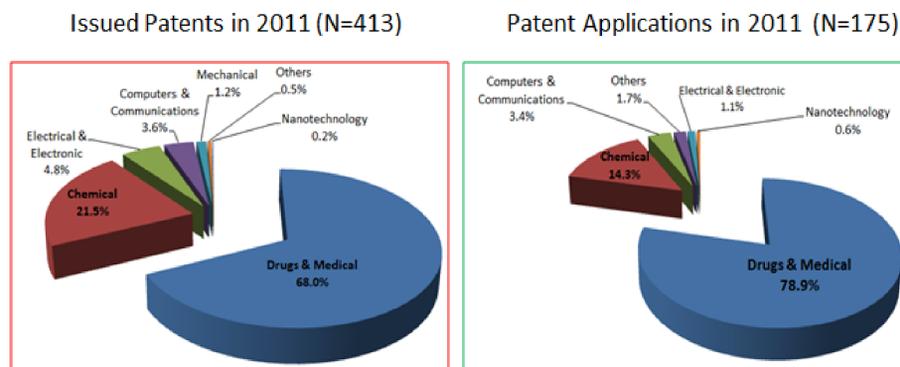
## Data and Methods

- Data Collection: US Patent & Trademark Office (USPTO) database; NIH grants database, IMPAC II; invention report by the Association of University Technology Managers (AUTM)
- Methods:
  - Identify NHLBI awards linked to patents/applications through searching original patent documents
  - Categorize the patents linked to NHLBI awards based on ownership, code classification, dates, location, and AUTM's invention reports
  - Analyze NHLBI awards associated with 2011 US patents/applications by mechanism, program division, and research institution

**Figure 1. Issued Patents Supported by NIH and NHLBI Awards from 1976 to 2013**



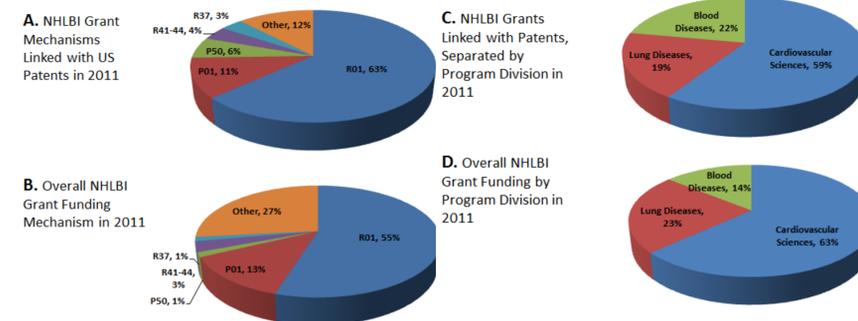
**Figure 3. Patent Category of 2011 NHLBI Invention**



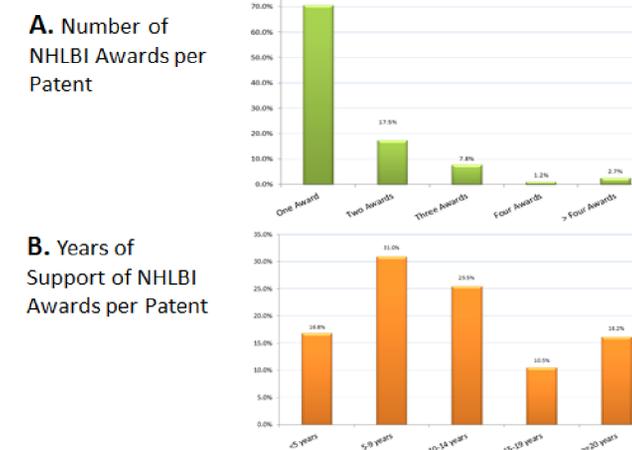
**Figure 5. Map of 2011 NHLBI Innovation Activities. Top 3 Innovative States were CA, MA, and NY (>85 inventions).**



**Figure 2. Distribution of NHLBI Grants (889) Associated with US Patents in 2011**



**Figure 4. Number of NHLBI Awards (A) and Years of Support (B) Associated with 2011 Issued US Patents and Applications**



**Figure 6. Top 12 Research Institutions having most NHLBI-supported patents in 2011. Institutions whose HL's contribution is >10% of overall invention portfolio were highlighted. For example, 47% of inventions (\*) coming from Boston University was supported by NHLBI.**

Patent Assignee	# of HL Funded Issued Patents in 2011	# of Total Issued Patents in 2011	% of Total Issued Patents Funded by HL	2011 National Ranking by Issued Patents (AUTM)
1 UNIVERSITY OF CALIFORNIA	17	343	5.0%	#1
2 UNIVERSITY OF PENNSYLVANIA	10	68	14.7%	#18
3 STANFORD UNIVERSITY	10		N/A	N/A
4 COLUMBIA UNIVERSITY	8	88	9.1%	#9
5 YALE UNIVERSITY	8		N/A	N/A
6 UNIVERSITY OF TEXAS SYSTEM	7	156	4.5%	#3
7 JOHNS HOPKINS UNIVERSITY	7	58	12.1%	#24
8 UNIVERSITY OF WISCONSIN	7	156	4.5%	#4
9 BOSTON UNIVERSITY	7	15	*46.7%	#84
10 MASSACHUSETTS GENERAL HOSPITAL	6	89	6.7%	#8
11 UNIVERSITY OF VIRGINIA	6	37	16.2%	#34
12 UNIVERSITY OF MINNESOTA	6	41	14.6%	#31

## Results

### Summary of NHLBI Invention (1982-2014)

- ~5,000 NHLBI awards were cited as providing direct support to the development of the inventions in ~3,000 issued US Patents.
- On average, it took ~4 years for a patent to be issued after its initial filing

### Summary of 2011 NHLBI Patent Portfolio

- 71% of the patents had funding support through one NHLBI award
- R01 is the major grant mechanism producing the patents (63%)
- Most patents (84%) had 1-4 inventors
- Drug & Medical Category is the major NHLBI Invention

## Conclusions

- Patents are an under-utilized metric for assessing the impact of NIH and NHLBI funded extramural research.
- The grant/patent search tools being developed by OPA can make the linkage between NIH grant awards and US patents.
- This new tool is useful to track inventions and potential translational prospects from any NIH Institutes

### Acknowledgement:

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