Sustainability of NIAID Early Established Investigators

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INTRODUCTION

Currently there is a huge tension between rising biomedical research demands, increasing research costs, little growth in federal funds, and a swelling number of young investigators that outpace the growth of permanent research jobs.

A most vulnerable period in an early investigator's career is when the first R01 ends and the individual must compete for new funds. The early established investigator (EEI) no longer qualifies for NIH's New PI advantages, nor has the experience and resources of senior PIs. If an EEI fails to obtain an R01 after several tries, s/he may leave the research workforce.

In this analysis, we wanted to know more about the grant submission behaviors of NIAID EEIs, and how they compared with more established PIs.

METHODS

The analysis consisted of a three-stage data extraction from IMPAC II. First, to select our cohort of NIAID EEIs, we extracted all Type 1 R01-equivalent grant submission records between FY03-FY10, where NIAID was the funding IC, the grant status was awarded, and the application was classified as New PI. R01-equivalents included R01, R37, P01, U01, and U19. From this extraction, we saved a QVR person cart containing all the PI IDs associated with the awards. This was our "EEI Cohort".

Second, we extracted all NIAID competing R01-equivalent grant submission records for FY08-FY14. However, we *limited this to only* the EEI Cohort, i.e. the FY03-FY10 person cart.

Third, we ran an identical data extraction for FY08-FY14 but this time *excluded* the person cart of FY03-FY10. We removed all New PI submissions from this data set, leaving only Established PI records for analysis. Thus, we had two FY08-FY14 data sets for comparison, one containing only data the EEI cohort, the other containing only data on other Established PIs.

RESULTS

Table 1. NIAID Early Established Investigator Cohort: New PI R01-Equivalent Awards Made FY03-FY10

R01-Equivalent Activity Code	Number of Awards
R01	1002
U01	103
P01	3
R37	1
U19	1
Total	1110

Tab. 1. Between FY03-FY10, NIAID made 1110 New PI R01-equivalent awards – constituting the *EEI cohort*. 90% of awards were R01s, 9% were U01s, and 1% were P01, R37 and U19.

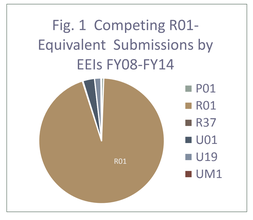

Fig. 1. The EEI cohort submitted 3903 R01-equivalent submissions (or 3213 "applications") between FY08-FY14. 625 awards were made, 94% being R01s.

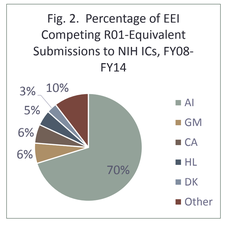

Fig. 2. 30% of the EEI R01-equivalent applications were submitted to ICs other than NIAID.

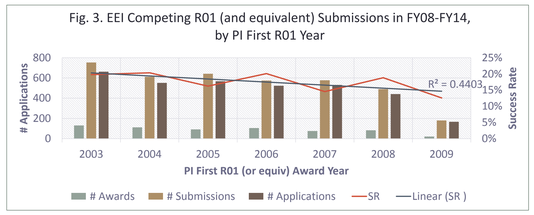

Fig. 3. There was a downward trend in R01-equivalent success rates according to PI First R01 Year (Fig.3).

Table 2. Comparison of New and Renewal R01 Success Rates of Early Established Investigators* and Established PIs**, FY08-FY14

		Number of Submissions		Number of Applications		Number of Awards		Success Rate		Ratio Submissions: Applications	
Type		EEI	Estab PI	EEI	Estab PI	EEI	Estab PI	EEI	Estab PI	EEI	Estab PI
New	*number*	2737	9756	2476	8909	379	1826	15%	20%	1.11	1.10
	% col total	74%	75%	**82%**	**76%**	67%	67%				
Renewal	*number*	969	3301	543	2830	189	908	35%	32%	**1.78**	**1.17**
	% col total	26%	25%	**18%**	**24%**	33%	33%				
Total		3706	13057	3019	11739	568	2734	**19%**	**23%**	**1.23**	**1.11**

Tab. 2. A larger proportion of EEI applications were new (82%) compared to established PI's new (76%). Hence, EEI's had proportionately fewer renewal applications (18%) than established PIs (24%). EEIs had a success rate that was 21% lower than that of established PIs, however they wrote 10% more submissions per application. For renewals, EEIs wrote 50% more submissions per application than established PIs for a comparable success rate.

Table 3. Comparison of New and Renewal R01 Funding Rates of Early Established Investigators* and Established PIs**, FY08-FY14

		Number of PIs Who Applied		Number of PIs Who Received Awards		Funding Rate	
Type		EEI	Estab PI	EEI	Estab PI	EEI	Estab PI
New	*number*	1710	7547	435	2057	25%	27%
	% col total	72%	68%	68%	68%		
Renewal	*number*	631	2796	207	950	33%	34%
	% col total	27%	25%	32%	32%		
Total		2370	11150	642	3007	**27%**	**27%**

Tab. 3. Funding Rates of EEI's and Established PIs were similar, both for new and renewal applications.

CONCLUSIONS

- EEIs are a very vulnerable group of investigators. Repeated, unsuccessful efforts to obtain renewal funding, or new funding, may permanently discourage the young investigator.
- Overall, NIAID EEIs have about a 20% lower R01 success rate than more established PIs.
- NIAID EEIs spend more time writing R01 grant applications than more experienced PIs. This means less time is available to conduct research.
- NIAID EEIs write 50% more renewal submissions per application than more established PIs to achieve the same success rates. This implies that EEI Type 2 applications do not do as well in peer review.
- A larger proportion of NIAID EEI R01 competing applications are new, compared to those of more established PIs, suggesting that EEIs are trying out new ideas and new scientific aims more often.
- *Funding rates* – i.e. the ratio of the number of PIs who got any funding, to the number of PIs who applied – were similar between the two groups. Using funding rates alone would have masked the differences in time spent writing research grants.
- Funding strategies should be tailored to EEIs to address their particular vulnerabilities to prevent them from dropping out of the biomedical workforce.

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