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**NIGMS Evaluation Support  
Services Task 2: Exploratory  
Assessment of the  
Pharmacology Research  
Associate Program (PRAT)**

**September 29, 2011**

*Prepared for*  
Juliana Blome, PhD MPH  
Office of Planning and Evaluation  
National Institute of General  
Medical Sciences

*Prepared by*  
Luba Katz, PhD  
Abt Associates

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# Executive Summary

## Introduction

The Pharmacology Research Associate (PRAT) program is an intramural postdoctoral training program administered by the National Institute of General Medical Sciences (NIGMS). Established through a Congressional mandate in 1965, the program “is intended for individuals with backgrounds in the basic or clinical sciences who wish to obtain advanced experience in an area of pharmacology, or for those with a pharmacology background to gain experience in new fields.”

To become a PRAT fellow, a researcher must have already been accepted to an intramural laboratory at NIH. The first step in the application process is a nomination by the applicant’s mentor. The fellowship application is then reviewed by a panel of intra- and extramural senior scientists for scientific merit. Concurrently, the PRAT Advisory Committee, composed of intramural researchers, evaluates the match between the mentor and the applicant. Finally, the references are called to verify the applicant’s potential as a future leader in the field of pharmacology. Approximately 20–30 intramural postdoctoral researchers apply for the fellowship per year and 5–7 awards are made. PRAT fellows enter the program as Intramural Research Training Program Award (IRTA) trainees. In their second year, the fellows transition to full-time employment status at NIGMS under Title 42, giving them access to all employee benefits. Program activities include monthly 2-hour meetings (typically scientific presentations), networking events, special symposia, and individualized mentoring by program staff. In addition to salary and benefits, the fellows receive small research and travel stipends.

The PRAT program administrator maintains a database of fellows for application management, tracking, and reporting purposes. The database was established around 2007 and since then it has undergone several rounds of modifications by various IT contractors. The program moved to an electronic application submission process in the 2008 application cycle. PRAT program directors submit annual reports on the status and career progression of the PRAT fellows to the NIGMS Director for inclusion in the Congressional briefing book. These reports are based on the data obtained from the PRAT database. While program directors perform periodic analyses of database content to assess PRAT fellows’ career outcomes, no external evaluation of the program has ever been conducted.

PRAT program directors and staff at the NIGMS Office of Planning and Evaluation (OPAE) are considering the possibility of conducting an outcome evaluation of the PRAT program. To prepare for the evaluation, NIGMS requested our firm to carry out an exploratory study of the program, to identify the best evaluation approaches and to examine available program data. In addition, we were tasked with examining the PRAT database for its deficiencies as a tool for application submission, data management, storage, and reporting and to locate, scan, and archive hard-copy program materials.

## Methods

We conducted 27 semi-structured telephone interviews with two current and one former PRAT directors, 17 PRAT fellows, three mentors, and five members of the PRAT Advisory Committee (the response rate was 93%). During the interviews, we explored program goals, activities, benefits/limitations of participation, satisfaction, and possible approaches to the outcome evaluation.

In addition, we participated in two in-person meetings with PRAT program staff, NIGMS OPAA staff, and IT representatives to discuss the history of the PRAT database, the needs of the program, current system functionality and deficiencies, and the feasibility/schedule for system updates. In addition to the interviews, we obtained and analyzed various program-related documents, including program descriptions, application instructions, internal program reviews, Congressional documents, data on PRAT fellows, and PRAT database manuals.

Finally, we located, scanned, and archived all missing applications, CVs, exit surveys, and other relevant programmatic items. An accompanying document was developed to help future users locate and access these data.

## Results

Most program participants learned about the program by word of mouth. When asked whether PRAT was well known at NIH, the responses among the fellows and the mentors were mixed, with less than half of the interviewees (43%) responding in the affirmative. Further, a senior administrator involved in managing intramural postdoctoral programs at NIH said that the program was not widely known in the training community or integrated with other training activities. We found that depending on the subgroup, respondents had somewhat different opinions on what the program was trying to achieve. According to PRAT directors, the goal of the program was to offer training in the “business of science”—grant writing, presentation of data, development of CVs, and job searching skills. We were also told that the program goals were intentionally flexible, to better address the changing needs of the postdoctoral population, including an increasing interest in non-academic career alternatives. This view was shared by the fellows, who saw the program as very effective in achieving these goals. PRAT mentors and Advisory Committee members, however, identified training in pharmacology as the main objective of the program; they saw PRAT as less effective, as program staff have little involvement with the fellows’ research projects.

PRAT fellows were positive about program activities, emphasizing their utility for networking with other researchers on campus and with potential employers. The fellows also described program directors as accessible, supportive, and very helpful in making vital, and in retrospect appropriate, career choices. All fellows interviewed continued interacting with the program staff after their fellowship ended (note that the fellows to interview were recommended by PRAT staff and thus the sample was biased toward individuals who maintain ties with the program).

To assess program outcomes, we asked respondents to evaluate the quality of the fellows as researchers and to describe the benefits of participation. The fellows were characterized as similar to or better than other NIH postdoctoral researchers in terms of talent, ambition, commitment to science, and potential to succeed as a scientist. Some respondents noted, however, that restricting the program to US citizens and to the area of pharmacology disqualified many excellent candidates. According to the fellows, the advantages of program participation included networking, becoming part of an “elite” community, broadening scientific horizons, developing important skills, higher salary and benefits, and prestige and flexibility associated with independent funding. One-third of the fellows interviewed reported that being in the program helped them obtain their current positions. All the fellows interviewed appeared to be satisfied with the program and attributed its success to the energy and dedication of the program directors.

Our examination of the PRAT program also revealed a few weaknesses. First, respondents across groups reported that the 3-year fellowship duration is insufficient to complete research projects and obtain positions. Therefore, most fellows have to continue their postdoctoral training at NIH after their PRAT fellowship ends. Yet, the fellows cannot regain their IRTA status and have to be hired by their research mentors as contractors, often a demotion in terms of status and benefits. Further, the fellows identified some disadvantages of becoming a full-time NIGMS employee, which occurs in the second fellowship year. The disadvantages mentioned included performance evaluations, inflexible conflict of interest policies related to interactions with industry, and administrative challenges associated with being employed by one institute, but performing research at another. Finally, some respondents expressed dissatisfaction with the focus of the program. We were told that the term “pharmacology” is no longer associated with cutting edge research and that the field is much broader now than it used to be when the program was established, making the definition of pharmacology ambiguous. The PRAT program directors would have liked to have had greater flexibility in determining what scientific areas to target, but were uncertain whether it was procedurally and legally possible to change the focus of the program, without risking its abolishment by Congress.

In addition to the exploratory investigations of the program processes and outcomes, one of our tasks was to examine the PRAT database, to document its strengths and weaknesses, and to identify data gaps. We found several serious problems with the database. These included heavy dependence on manual data entry, unclear organization of information, labor intensive maintenance, and inefficient/possibly erroneous reporting. Thus, we were not surprised to learn that PRAT program managers had concerns about the quality and accuracy of the data and the time commitment required to maintain the database.

To identify data gaps, we reviewed all available program materials, including electronic and hard-copy documents. We found that the database contained 571 records, but that this number was erroneous, as in addition to genuine entries it included duplicates and “dummy records” (records created by a user learning how to use the database). The program staff also provided us with the PRAT fellows’ report, an Excel spreadsheet that contained information on program participants going back to 1965, which was abstracted from the PRAT database and manually cleaned of duplicates. This report included 400 fellows, but we could not determine with certainty whether it

represented a complete or partial set of PRAT fellows. For each fellow, the report included enrollment dates, institute, preceptor, fellow name and contact information, minority status, and a few other variables. Closer examination of the data revealed that most fields were populated with appropriate information. We also found that the PRAT database contained no information on unsuccessful applicants prior to 1998 and limited information prior to 2007, the year the application process became electronic. With the help of PRAT program staff, we were able to locate over 500 paper records, including 72 exit surveys, 60 unfunded applications, and CVs/applications from 380 PRAT fellows. These materials were scanned and archived on the NIGMS server and a tracking sheet was created to help locate these files in the future.

## **Conclusions and recommendations**

Based on the exploratory assessment of the PRAT program, we concluded that it fills an important gap in the postdoctoral training offered at NIH. Through the program, PRAT fellows form ties to other researchers on campus, practice presenting their research, learn how to be effective in looking for a position, and meet potential job contacts from academia, government, and industry. The program directors help the fellows explore various career options and apply for the appropriate positions. This type of mentoring and support is especially useful at NIH, which lacks career offices and other resources available to postdoctoral researchers at universities. Furthermore, the fellowship is viewed as prestigious and competitive at NIH, and is likely a boost to the fellows' self-confidence and reputation in their research laboratories. Finally, the fellows earn higher salaries and have better benefits than IRTAs.

Our only concern with the program is the apparent mismatch between its stated goals and activities. While the official intent of PRAT is to support research training, in practice the program focuses on mentoring and career advancement. While beneficial to the fellows' careers, program activities are peripheral to their research projects, over which the program staff have limited influence or oversight. The simplest solution to this inconsistency between goals and activities might be to rebrand the program as offering primarily mentoring support and career development opportunities.

We concluded that an evaluation of the PRAT program would be appropriate and desirable, as it has never been formally assessed in its 45-year history (this fact was mentioned in a report by the Government Accountability Office). In addition, we determined that it would be feasible to construct samples of funded and unfunded applicants, PRAT mentors, and members of the Advisory Committee—the groups that we recommend for inclusion in the evaluation study. Given the small size of the program, we believe that a combination process/outcome evaluation would be most cost effective. We suggest a mixed-method evaluation approach to include on-line surveys, key informant interviews, and bibliometric analyses. The process study questions should include an examination of appropriate program goals and options for better mechanisms for transitioning from the PRAT fellowship back to IRTA or similar status. The outcome questions should examine career choices made by fellows and unsuccessful applicants, program influence on the fellows' experience

at NIH and on their career choices, the optimal level of mentor involvement in the program, and the program's contribution to the field of pharmacology.

Finally, we recommend several changes to the PRAT database, which we believe will significantly improve its accuracy and reduce maintenance burden on the program staff. These are as follows:

1. Transition to a web-based application portal that will better control and automate the process of data import from applications.
2. Clean existing records and create a system for quality control.
3. Re-evaluate data update needs and processes.
4. Design and implement an automatic or semi-automatic record update process.
5. Revamp the user interface.
6. Enhance the reporting function.
7. Update records in the database.

# Chapter 1: Introduction

## Description of PRAT program

As described in its mission statement, NIGMS “provides leadership in training the next generation of scientists to assure the vitality and continued productivity of the research enterprise.”<sup>1</sup> The Pharmacology Research Associate (PRAT) program, administered by the Institute, contributes to this mission by offering support for postdoctoral research training at the NIH laboratories.

### *Program history*

The PRAT program has a long history. It was established in 1965 after the Committee on Appropriations recommended that NIGMS, the only Institute at the time without an intramural program, establish such a program.<sup>2</sup> Following this recommendation, NIGMS launched a new program in “pharmacology-toxicology,” an area of particular interest to Congress at the time. The 1966 Congressional report noted that 13 awards for a 3-year training period had been made with the 1966 appropriations.<sup>3</sup> A year later, the program had 20 participants and was planning to add another 10, to the total of 30 “fellows-in-training at any given time.”<sup>4</sup>

Over the years, the PRAT program underwent several changes. As documented by the PRAT leadership, in the 1990s the fellowship duration was two years; in 2005 it was extended back to three years following the recommendation of the PRAT Advisory Board.<sup>5</sup> In addition, in the early years of the program only applicants from outside of NIH were eligible for the fellowship. The finalists were invited to NIH to be interviewed by potential mentors pre-approved for the program. However, the process of recruitment and selection of numerous applicants from around the country for a handful of slots was disproportionately burdensome to NIGMS staff. As a result, approximately 10 years ago the application process was changed to admit only applicants who have accepted a position at an NIH laboratory or who have been at an NIH laboratory for less than one year.<sup>6</sup>

As stated on the PRAT website, the program is intended for “individuals with backgrounds in the basic or clinical sciences who wish to obtain advanced experience in an area of pharmacology, or for

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<sup>1</sup> <http://publications.nigms.nih.gov/strategicplan/chapter2.htm> (Accessed 12.02.2010).

<sup>2</sup> Hill. Department of Labor, and Health, Education, and Welfare, and Related Agencies Appropriations Bill. Report No. 537. 89<sup>th</sup> Congress 1<sup>st</sup> Session. August 3, 1965.

<sup>3</sup> Fogarty. Department of Labor, and Health, Education, and Welfare, and Related Agencies Appropriations Bill. Report No. 1464. 89<sup>th</sup> Congress 2<sup>nd</sup> Session. April 28, 1966.

<sup>4</sup> Flood. Department of Labor, and Health, Education, and Welfare, and Related Agencies Appropriations Bill. Report No. 271. 90<sup>th</sup> Congress 1<sup>st</sup> Session. May 22, 1967.

<sup>5</sup> Internal PRAT program evaluation document. Undated.

<sup>6</sup> *Ibid.*

those with a pharmacology background to gain experience in new fields.”<sup>7</sup> Pharmacology is broadly defined by the program to include diverse scientific fields such as biochemistry, drug design, cell biology, and neuroscience.

### ***Application and selection process***

The application components include: (1) PRAT Application (Form 1) and associated supporting materials, such as college transcripts, publications and/or figures; (2) Preceptor Selection Verification; and (3) Request for Evaluation. Item 1 is completed by the applicant and uploaded on the PRAT website, whereas items 2 and 3 are completed by the applicant’s NIH mentor and references and then sent directly to the PRAT program via inter-office mail, postal mail, email, or fax.

The Selection and enrollment process include three stages. Applicants must be nominated by their intramural mentors, called “preceptors.” They are then evaluated by a selection panel composed of intra- and extramural senior scientists. In addition, the PRAT Advisory Committee, a group of approximately 10 senior intramural researchers, evaluates the proposed mentors to ensure an appropriate match between the mentor and the applicant. Finally, references are called to confirm the applicant’s potential as a future leader in the field of pharmacology. Approximately 20–30 intramural postdoctoral researchers apply for the fellowship per year and 5–7 awards are made.

### ***Program participation***

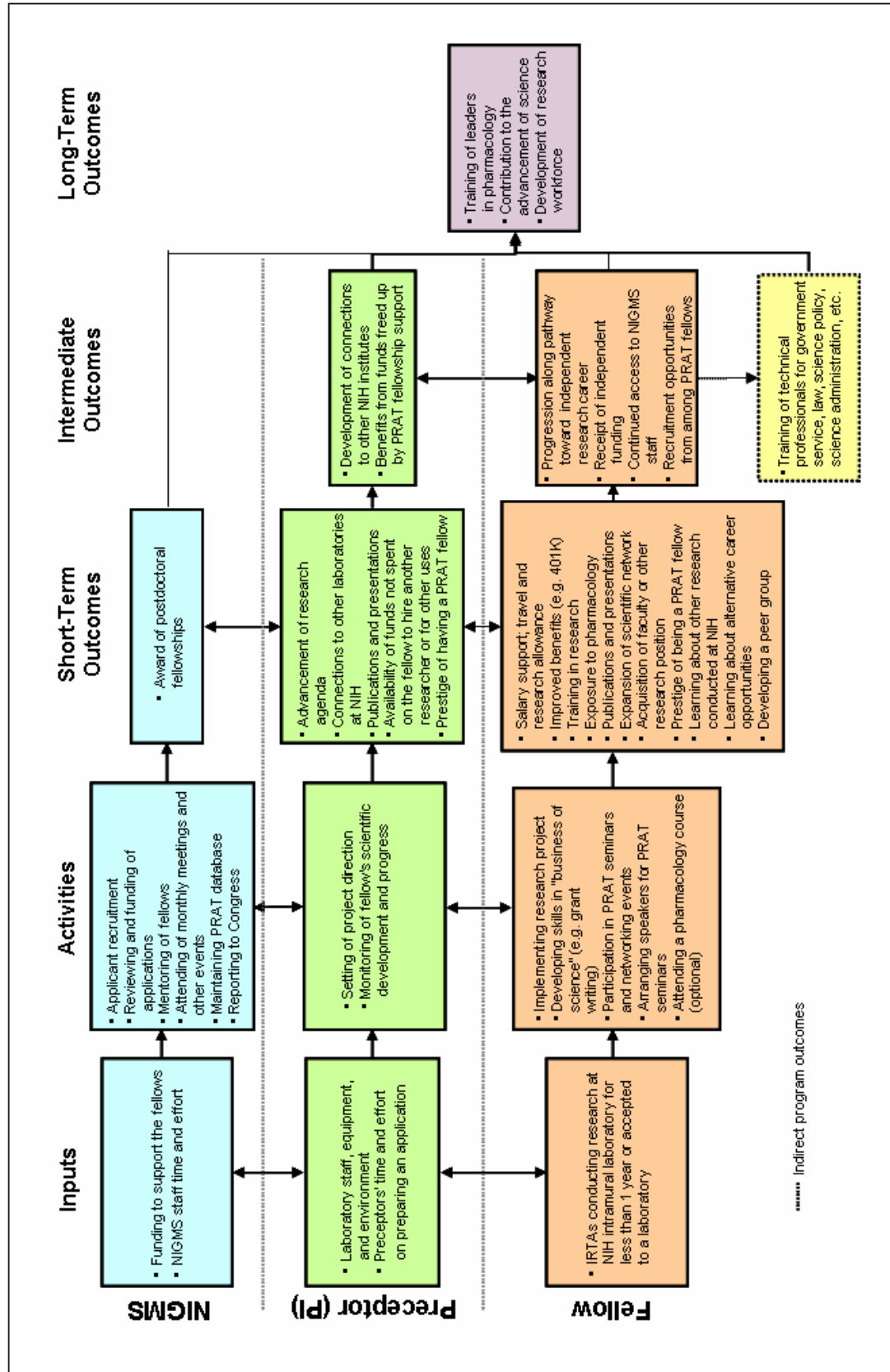
Fellows enter the program as Intramural Research Training Program Award (IRTA) trainees and they are paid using a specialty allowance that recognizes their high caliber for selection to this program. In their second year the fellows transition to full-time employees under Title 42, at NIGMS, giving them access to all employee benefits. (Title 42 provides federal agencies with special hiring authority to employ scientists and consultants without regard for the civil service laws.<sup>8</sup>) Program activities include monthly 2-hour meetings, typically research presentations by fellows and by invited speakers; networking events; special symposia; and individualized mentoring by program staff. In addition to salary and benefits, fellows receive small research and travel stipends. Some of the fellows continue to interact with program staff after they graduate from the program by attending symposia and other events, giving presentations to current fellows, and seeking advice from PRAT directors. The PRAT program Logic Model, depicting program processes and anticipated outcomes, is shown in Exhibit 1.

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<sup>7</sup> <http://www.nigms.nih.gov/Training/PRAT.htm> (Accessed December 2, 2010).

<sup>8</sup> 42 United States Code (U.S.C.) Sections 209(f) – (g) and Code of Federal Regulations (C.F.R.) Part 18.

Exhibit 1: PRAT Logic Model



### ***Program data***

PRAT staff maintains a database (PRAT database or PRAT system) of the fellows who have taken part in the program. The database was established around 2007; since then it has undergone several rounds of modifications by various IT contractors and has been maintained by different NIGMS staff. The program moved to an electronic application submission process in the 2008 application cycle.

### ***Reporting***

Program directors submit annual reports on the status and career progression of the PRAT fellows to the NIGMS Director for inclusion in the Congressional briefing book, and to the program Advisory Board. These reports are based on the data obtained from the PRAT database.

### ***Program assessments***

Program staff has conducted periodic analyses of database content to assess PRAT fellows' career outcomes (data that are reported to Congress). According to program staff, roughly one-third of the fellows obtain positions in academia, one-third in government (including NIGMS, other NIH institutes and other federal agencies), and the remaining one-third in industry and or other science-related careers (e.g., science publishing). No external evaluation of the program has been conducted to date.<sup>9</sup>

## **Study purpose and research questions**

PRAT and NIGMS Office of Planning and Evaluation (OPAE) staff are considering the possibility of conducting an outcome evaluation of the PRAT program. NIGMS requested that Abt Associates carry out an exploratory study of the program to identify best approaches to an outcome evaluation and to examine available program data. More specifically, the study goal was to answer the following questions:

- What are the appropriate research questions for the feasibility study and the outcome evaluation? What are the areas of particular interest to PRAT staff, to Congress? Are there any other stakeholders for the evaluation results? Who are they and what are their interests? How would the evaluation results be used?
- What program data are available for the evaluation? What are the gaps in the data? What is the condition of the PRAT database? What effort would be needed to fill database gaps?
- Beyond database content, what other information would be necessary to obtain in order to conduct an evaluation? How can this information be obtained?
- What are the study populations to be considered? What are appropriate comparison groups? How can data on comparison groups be collected? Would it make sense to link the PRAT evaluation to other planned evaluation activities involving intramural and extramural programs? If yes, who are the individuals who should be brought into the discussion?
- What are the most appropriate methodologies to use in the evaluation? What sampling strategies, if any, should be employed?

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<sup>9</sup> Federal Science, Technology, Engineering, and Mathematics Programs and Related Trends. US Government Accountability Office. Report GAO-05-087. p15.

- What are possible key questions to ask in future evaluations of the program?

To address these research questions, we conducted 27 key informant interviews, examined the contents of the PRAT database and associated manuals, and reviewed other relevant information sources including Congressional reports, internal PRAT assessments, application materials, and the program website. Finally, to better understand data gaps and help prepare NIGMS for a possible evaluation, we electronically archived hard-copy applications to the program for the years prior to the establishment of the PRAT system. In addition, we used web searches to update, as much as possible, the information on the fellows who participated in the program between 1990 and 2005 and are included in PRAT database.

The rest of the report is organized as follows. In Chapter 2 we describe data collection methods used in the study. Then we present our findings from key informant interviews (Chapter 3) and the results of PRAT system analysis (Chapter 4). Chapter 5 is devoted to our conclusions and recommendations to NIGMS staff. As an appendix to this report we include all interview protocols. All database manuals and historical Congressional reports made available to us by NIGMS are organized into a separate volume.

## Chapter 2: Methods

### Key informant interviews

Key informant interviews were conducted: (1) to collect information on the PRAT program processes and outcomes and (2) to understand the development and use of the PRAT system. Details on the interview procedures and respondent groups are presented below.

#### *To collect data on the PRAT program*

A list of individuals to interview, provided by NIGMS, included 2 current and 1 former PRAT directors, 17 PRAT fellows, 3 mentors, and 5 members of the PRAT Advisory Committee<sup>10</sup> (Exhibit 1). In addition, we spoke with one individual not on the initial list who was recommended by an interviewee. To encourage participation, PRAT program directors introduced the study and Abt to all potential respondents. Most respondents quickly agreed to participate; those who did not respond received email and telephone reminders. Of the 29 individuals approached, 27 were interviewed, resulting in a response rate of 93% (Exhibit 1).

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<sup>10</sup> PRAT Advisory Committee is different from PRAT Advisory Board.

<b>Exhibit 1: Individuals participating in the discussions about the PRAT program</b>		
<b>Respondent category</b>	<b>Number approached</b>	<b>Number responded</b>
Former PRAT program director	1	1
Mentors (preceptors)	3	3
NIH staff involved in intramural training	1	1
<b>TOTAL</b>	<b>29</b>	<b>27</b>

<sup>a</sup> Recent graduates on NIH campus (N=6); recent graduates in non-academic positions (N=3); graduates from more than 3 years ago (N=8).

<sup>b</sup> Current members (N=3); past members (N=2).

Telephone interviews were conducted by four Abt researchers in January–March 2010. The interviewers and the note-takers received training by the Abt project director. The training included an overview of the program and its goals, the objectives of the task, the interview protocol, and the characteristics of the respondent population. In the beginning of each interview, the study goals and confidentiality procedures were reviewed with the subjects.<sup>11</sup>

All interviews were semi-structured (protocols included in the Appendix). The interviewer guided the conversation to cover a set of predetermined topics, while encouraging respondents to speak about any aspects of the program they considered relevant. The following topics were discussed:

- Roles and responsibilities related to the program
- Program goals
- Views about the program and the fellows
- Program activities
- Benefits of participation
- Communication and networking
- Satisfaction with the program
- Evaluation design

At each interview, two Abt researchers were present, one to lead the discussion and another to take notes. The notes were reviewed and edited by the interviewer the day of the interview.

Interview notes were coded using QSR NVivo 8, a software tool which is widely used to organize and analyze qualitative data. An NVivo user first designs a set of “codes” used to parse the data by topic. For example, “benefits of participation” or “reasons to apply” were used as codes to organize interview notes. The user then imports the interview text into NVivo and labels the appropriate segments of the text with these codes. In our example, any part of the interview transcript that describes how the fellows benefited from the program would be labeled “benefits of participation.” Once the coding is completed, the user can generate reports by code. The program also allows the analysis of data by coding frequency—the number of times each code was used.

<sup>11</sup> Interview protocols and procedures were approved by the Abt IRB (IRB #0446, November 30, 2009).

For this study, the coding tree that we developed mirrored the topics covered in the interviews. For consistency, the same individual coded all the transcripts. In some cases, fragments of the interview were double- or triple-coded. For example, if the interviewee indicated that giving practice talks to other fellows was valuable training experience, we would double-code this snippet with two codes: “program activities” and “benefits of participation.”

### ***To collect data on the PRAT database***

We participated in two meetings with PRAT program staff, NIGMS OPAE staff, and IT representatives (Exhibit 2). During these meetings we discussed the history of the PRAT system, the needs of the program, current system deficiencies, and the feasibility/schedule for system updates. In addition, we spoke with four IT staff to discuss the functionality of the database in more detail and to receive a demo of the PRAT database. We understand that OPAE, PRAT, and IT staff had internal meetings to discuss our report on the PRAT system.

<b>Exhibit 2: Individuals at NIGMS participating in the discussions about the PRAT database</b>	
<b>Name</b>	<b>Affiliation</b>
Juliana Blome	Office of Program Analysis and Evaluation
Rosalina Bray	Office of Program Analysis and Evaluation
Pamela Marino	PRAT Program Director
Christian Shaw	PRAT Program Analyst
Jose Lopez	Information Resources Management Branch
Alex Naneyshvili	Information Resources Management Branch
Anjun Dahya	Information Resources Management Branch
Lorena Geddes	Information Resources Management Branch

### **Analysis of PRAT documents**

NIGMS provided us with a set of materials listed in Exhibit 3. We reviewed these materials to obtain information on the system features and updates and how they were meant to facilitate the PRAT data collection and management processes. We also reviewed congressional language on the establishment of PRAT program.

<b>Exhibit 3: Documents provided by NIGMS</b>	
<b>Document title/number/date/author</b>	<b>Document content</b>
Business Case for Pharmacology Research Associate Tracking System/PRAT-BCD-06-40/October 17, 2006/IRMB	An assessment of alternatives to bring the PRAT system into compliance with FISMA, HSPD-12, and NIH password policies
Pharmacology Research Associate Tracking System/PRAT-VIS-06-62/January 16, 2007/IRMB	Proposed updating and enhancement of the PRAT system
Pharmacology Research Associate Tracking System Generation 2/PRAT-VIS-07-71/May 23, 2007/IRMB	Proposed updating and enhancement of the PRAT system
PRAT Deployment History and Current Change Status/March 2, 2010/IRMB	A log of the errors in the PRAT system

<b>Exhibit 3: Documents provided by NIGMS</b>	
<b>Document title/number/date/author</b>	<b>Document content</b>
Pharmacology Research Associate Tracking System: Administrator's Guide/PRAT-AGD-07-54/November 30, 2009/IRMB	Administrator's Guide intended for personnel and contractors internal to NIGMS who have access to PRAT system
Pharmacology Research Associate Tracking System: User's Guide/PRAT-UGD-07-53/November 30, 2009/IRMB	PRAT User's Guide is intended for PRAT applicants, to help them download and submit PRAT application forms
Congressional reports from 1965, 1966, 1967	Recommendation to NIGMS to establish an intramural program and description of NIGMS program in pharmacology-toxicology

## Assessment of the PRAT database

Two Abt researchers visited NIGMS once a week over the course of a month to evaluate the PRAT system. They examined the database's content, data entry and update processes, and reporting function. Abt staff prepared detailed notes and took screen shots to document their observations. They also spoke at length with the PRAT program analyst, the main database user, about her experiences and needs.

## Filling data gaps

PRAT program staff provided us with a list of 400 fellows reported by the PRAT system. For individuals participating in the program between 1990 and 2005, we conducted extensive web searches to update to the extent possible the information on the fellow's current institutional affiliation and email address (we found that LinkedIn was particularly useful in locating former fellows). Gap analysis of PRAT system data is presented in Chapter 4.

## Cataloging and archiving program materials

To increase the accuracy and efficiency of data management processes and procedures, NIGMS OPAE staff requested that we provide the following technical assistance to the PRAT program:

1. Assessment of the program's archiving methods and paper filing system
2. Design and development of a new electronic records system (ERS)
3. Analysis of data contained in paper files
4. Summary of processes and findings, and creation of an ERS instruction manual for program staff.

When Abt began developing the ERS, OPAE staff provided us with specific guidance concerning processes for scanning particular items in each file. OPAE staff suggested scanning all curricula vitae (CVs) contained in each file in addition to any important memoranda, requests, or notices, such as program termination letters or affidavits. If a file did not contain a CV, we were to scan the PRAT application. We have followed a standardized procedure for scanning and saving files based on OPAE requests.

As the files were scanned, we logged them into a MS Excel tracking sheet. Abt researchers continued to work closely with OPAE staff to refine the scanning process and to finalize what specific data were to be entered into the tracking spreadsheet. For example, in early November, OPAE requested that we start recording the gender of each fellow, because the program was interested in determining any trends in the gender of fellows admitted to the program over time. The system, our efforts so far, and our plans for completing this assignment are described in the next chapter.

### **NIGMS staff involvement in the study**

Two interim reports were developed for this study: the summary of interview data and the summary of PRAT system analysis. OPAE staff provided comments on the interview report and all suggested revisions were made. The PRAT database report was reviewed, in addition to OPAE staff, by the NIGMS IT group and by PRAT program staff. The readers identified several factual errors and these were corrected. In some cases, the comments on the same statement were inconsistent between the IT group and the program staff. To avoid biasing the report, we included the opinions expressed by both sides. Finally, in a small number of cases we felt that removing or revising the text as suggested by the readers would alter our findings. These revisions were not made.

## **Chapter 3: Key Informant Interviews**

In this section we describe the views of respondents as expressed to us during the interviews. The data are organized by topic across respondent groups; substantive differences in the opinions between groups are noted.

### **Program management**

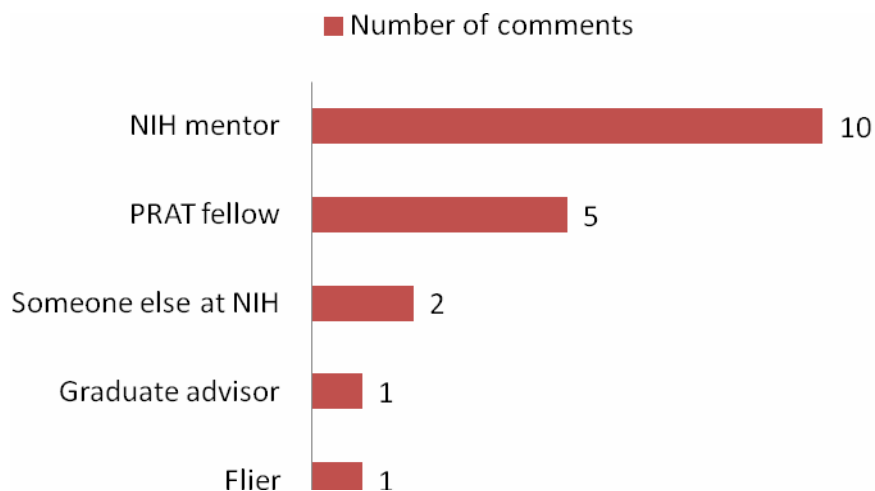
The PRAT program is administered by two co-directors based at NIGMS, who have been in this position since 2003 and 1995, respectively. The co-directors' responsibilities include organizing the peer review process; managing internal NIGMS paperwork; orienting fellows into the program; organizing symposiums, seminar series, and networking events; and guiding and advising the fellows. The co-directors said that they do not oversee fellows' research projects, but rather train them in the "business of science": how to write grants, develop compelling CVs, present to different audiences, and obtain jobs. According to the co-directors, training in these skills is particularly important for the NIH postdoctoral researchers who are based outside of universities and may not have access to this type of expertise.

### **Program visibility**

Most fellows learned about the program by word of mouth: two-thirds from their laboratory supervisors at NIH (when applying for an NIH position or shortly after they begin their training); the rest from other fellows (Exhibit 4). Of the three mentors participating in the interviews, two were former PRAT fellows and had known about PRAT since then (data not shown). Three of the five

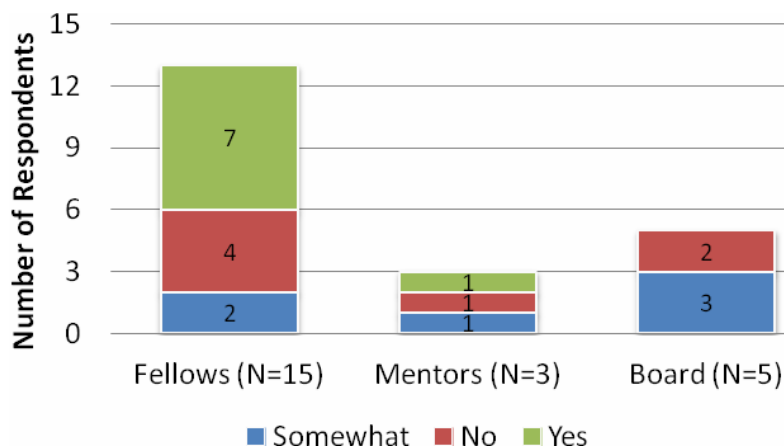
Advisory Committee members learned about PRAT when they were invited to serve on the Committee (data not shown).

**Exhibit 4: How PRAT fellows learned about the program (N=15)**



When asked whether the PRAT program is well known at NIH, 10 of 23 interviewees (43%) responded in the affirmative (Exhibit 5). Many of those who said that the program was known also noted that it was well regarded at NIH (data not shown). Approximately one-third (8 of 23 or 35%) thought that the program was not well known (Exhibit 5). One individual commented that he did not know about the program despite doing his doctoral work at NIH and another pointed out that most fellows come from the same small group of NIH laboratories. On the suggestion of one of the interviewees, we contacted a senior NIH administrator directly involved in the intramural postdoctoral programs at NIH. This respondent said that the program was not widely known in the training community and was not coordinated with other postdoctoral training activities.

**Exhibit 5: Is the program well known at NIH (N=23)?**



## Program goals

The PRAT program “is intended for individuals with backgrounds in the basic or clinical sciences who wish to obtain advanced experience in an area of pharmacology, or for those with a pharmacology background to gain experience in new fields.”<sup>12</sup> In the interviews, we asked respondents to name the program goals and to comment on the program’s effectiveness in meeting these goals. We found that respondent subgroups had somewhat different views on what the program was trying to achieve.

### ***PRAT program directors***

According to program directors, the goals of PRAT program are flexible and tailored to the needs and interests of the fellows. For example, if a fellow is interested in academic careers, as is the case for 90% of those who participate, the program provides guidance on how to write grants, develop compelling CVs, present to different audiences, and obtain jobs (“business of science”). The staff members also help those fellows who are looking for alternatives to academia, such as government service, industry, technical publishing, or intellectual property law. PRAT directors also encourage the fellows who, in the director’s view, do not have competitive records, to consider non-faculty career options.

The directors told us that the realities of academic life have changed over the past 30 years. In contrast to the 1970s, the academic market is more competitive and the duration of doctoral training is longer. In addition, intramural NIH projects tend to be higher-risk and longer-term, and thus more difficult to publish, putting NIH postdoctoral researchers at a disadvantage compared to their university peers.<sup>13</sup> Correspondingly, the program has changed over time to offer the fellows a broader skill set and advice on how to find positions outside of academia.

Finally, the PRAT directors said that the range of research topics that falls under the definition of pharmacology was open to interpretation. Program staff use this term inclusively, as the description of the program on the PRAT web site attests. This view on the scope of the program is not always shared by the members of the Advisory Committee who see the program as more narrowly focused.

### ***Fellows***

Like the program directors, most fellows said PRAT’s goal was to prepare them for the next career step (12 of 15 fellows or 80%, data not shown). Some fellows emphasized preparation for academic careers; others reported that the fellows were being prepared for a broader range of career options, including in government, industry, and other sectors. Many fellows emphasized that program directors expressed support for their choices regardless of whether these choices included a faculty track. It was our impression that few fellows saw the goals of the program exclusively as training in pharmacology.

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<sup>12</sup> <http://www.nigms.nih.gov/Training/PRAT.htm> (accessed September 2, 2010).

<sup>13</sup> The view that NIH intramural research is high-risk high-reward is also expressed in the report prepared by the NIH Office of Intramural Research ([http://sourcebook.od.nih.gov/oir/IRP\\_transition.pdf](http://sourcebook.od.nih.gov/oir/IRP_transition.pdf). Accessed December 4, 2010.)

### ***Mentors***

Of the three mentors interviewed, two said that the goal of the program was to promote interest in pharmacology and to train in pharmacology, broadly defined as a subject. The remaining mentor said that the goals were unclear (data not shown).

### ***Advisory Committee***

Like mentors, most Advisory Committee members saw training in pharmacology as the main goal of the program (four out of five or 80%, data not shown). The fifth member thought that the program aimed to place promising talent into the best possible environment within NIH.

### ***Effectiveness in meeting goals***

Respondents' views on program effectiveness depended on what they perceived to be its goals. Those who saw the program as a tool for mentoring, networking, and career-related advice uniformly reported that it was effective or very effective (data not shown). In contrast, those who thought that PRAT's goal was to support research training said that the program was not always successful, as program staff had little control over fellows' research progress.

## **Application decision**

The most common reasons to apply for the program mentioned by the fellows were its "elite status"<sup>14</sup> at NIH, better salary and benefits compared to these of IRTAs, practice in grant writing, and encouragement by an NIH mentor (data not shown). The fellows thought that participation in the program improved their CV. Several fellows applied for the fellowship to free up laboratory funds to hire another postdoctoral researcher. One fellow decided to apply for PRAT because it was a good fit with his scientific interests in pharmacology.

## **Application process**

PRAT fellows were asked whether they experienced any challenges in the application process. Of the 15 fellows, 12 said that application was straightforward (80%, data not shown). Several fellows added that developing an application was a welcome opportunity to practice grant writing, and one fellow noted that it helped his research program. The remaining three fellows (20%) were not completely satisfied with the process. One said that postdoctoral researchers should not be required to submit undergraduate transcripts. Another suggested using an application portal instead of uploading and emailing PDF forms. Finally, one reported that the directions were not completely clear and that an example application would be helpful in determining what information to include.

We asked the mentors about their level of involvement with applications. Two of the three said that they used to be more involved in developing research plans, but now were mostly "hands-off." The remaining mentor said that generally the applicants wrote the proposal and he completed the form.

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<sup>14</sup> The term "elite" was frequently used by respondents to describe the program and the status of the fellows. The program is seen as elite because of its competitive nature and because the fellows demonstrated that they can obtain independent funding.

None of the mentors interviewed were interested in being more involved in program activities and several fellows commented that they appreciated having a distance from the lab.

Once the application is submitted, it is reviewed in two areas: (1) the fellow's qualifications and the merit of the research plan and (2) the adequacy of the proposed mentor. The review of the research plan is conducted by technical experts in the proposed research area recruited by PRAT directors from the intramural and extramural community. The match between the applicant and the proposed NIH mentor is assessed by the Advisory Committee. Committee members review the materials that are provided to them on the mentor (some also do their own research); each application is then discussed at a Committee meeting. Several criteria are used to judge the adequacy of the mentor:

- The mentor's publication record
- Publication history of former PRAT fellows
- Career trajectories of former fellows
- The size of the mentor's group (the committee looked for a balance between group size and accessibility of the mentor)
- The mentor's seniority
- Any other information relevant to mentoring potential.

Generally, but not always, the Committee reaches a consensus on whether the applicant and a proposed mentor are a good match for productive research training. Members of the Committee appeared to be satisfied with the process of mentor/trainee assessment.

Members of the Committee receive updates from the program on the progress of the fellows, but they are not involved in subsequent program activities.

## **Program activities**

Program participation includes monthly 2-hour meetings, networking events, and ad hoc mentoring by PRAT program staff. Monthly meetings offer fellows an opportunity to practice presentation skills and to learn about academic and non-academic research careers from invited speakers (starting in their second year, the fellows are responsible for identifying and recruiting the speakers). Interview respondents recalled lectures by science editors and by researchers from the federal government, universities, and industry. These speakers described how they got these positions and their job responsibilities. The program also arranges seminars about the grant review process at NIH.

The fellows are encouraged by the program to take a course in pharmacology at NIH and some do, but this is not a formal requirement. Finally, the fellows submit annual reports describing their research progress over the reporting year.

PRAT fellows were positive about the program activities, noting their utility for networking, both with other researchers on campus and with potential employers. The fellows described program directors as accessible and supportive; several examples were given when the directors helped the fellows make important, and in retrospect appropriate, career choices.

## Post-fellowship involvement

All fellows interviewed continued interacting with the program after their fellowship ended. It was clear that the program directors and the fellows took steps to sustain these relationships. The program invited former fellows to give lectures at the monthly meetings, to review applications submitted to the program, and to attend holiday parties and other networking events. Program directors also tapped into the alumni network for contacts to help current fellows seeking employment. Alumni who volunteered for these activities expressed satisfaction that they were offered an opportunity to “give something back.” We found that some PRAT alumni continued to consult with the directors on various issues related to their careers.<sup>15</sup>

## Program outcomes

When asked to compare the fellows to other NIH postdoctoral researchers in terms of talent, ambition, commitment to science, and potential to succeed as a scientist, most comparisons were favorable. Advisory Committee members characterized the fellows as the best at NIH or elsewhere. Not all respondents were equally enthusiastic in their assessment of the fellows, however. Several individuals pointed out that the program was restricted to US citizens, and therefore a large segment of the talented postdoctoral population at NIH was ineligible to participate. We were also told that the program focus on pharmacology excluded many good postdoctoral candidates interested in other scientific areas.

In the interviews, all respondents were asked to identify benefits and disadvantages of being a PRAT fellow. The advantages of participation included networking, becoming part of an “elite” community (or “fellowship” in the words of respondents), broadening scientific horizons, developing important skills, improved salary and benefits, and prestige and flexibility associated with independent funding. One fellow mentioned that having the fellowship freed up funds in the laboratory to purchase expensive equipment that was instrumental to the research project. Finally, one-third of the fellows interviewed reported that being in the program helped them obtain their current positions.

## Participant satisfaction

All fellows were satisfied with the program and said that they would recommend it to other postdoctoral researchers at NIH. Mentors and Advisory Committee members were just as positive. Committee members noted that all NIH intramural postdoctoral training should adopt the PRAT model.

Many respondents attributed the PRAT program’s success to the energy and dedication of the program directors. The fellows that we spoke with continue to be involved with the program—they both consult with the directors about their own career-related issues and return to the NIH campus

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<sup>15</sup> Note that the interview sample was biased towards the individuals who maintain ties to the program directors.

to offer their own experience to the next generation of fellows. In fact, some respondents expressed concerns about the program if a leadership change were to occur.

## Program weaknesses

Respondents across groups reported that one of the problems of participating in PRAT was transitioning when the fellowship ends. Both program directors and fellows said that 3 years, the current duration of the program, was insufficient to complete projects and obtain positions.<sup>16</sup> Yet, the fellows cannot regain IRTA status and have to be hired by their research mentors as contractors, often a demotion in terms of status and benefits.

According to respondents, becoming a full-time NIGMS employee had benefits and limitations. The advantages included better salary and benefits, tuition assistance, and credit of fellowship years towards government service. Being subject to NIGMS performance evaluations was seen by some respondents as a disadvantage. The fellows also viewed NIGMS conflicts of interest policies as too inflexible for their situation, because under these rules the fellows had to justify scientific collaborations and could not give presentations to industry. In addition, the fellows experienced some administrative challenges associated with being technically employed by NIGMS but physically located elsewhere, such as IT access. Some PRAT fellows reported problems at their own institutes. For example, one respondent had to struggle to obtain access to the core facilities shared between the home institute and another institute at NIH. The use of the facility required that the fellow be employed by the home institute and not by NIGMS (the issue was eventually resolved).

Respondents also mentioned challenges in defining the scope of the program. In the view of the directors and many others interviewed, in modern biomedical science “pharmacology” is much more widely defined than it was in the 1960s when the program was established. In addition, the term pharmacology is no longer associated with cutting-edge research. PRAT directors believed that fields such as structural biology and signal transduction can be legitimately included in the modern definition of the discipline. PRAT directors would have liked to expand the scope of the program, but appeared inhibited by the constraints of the Congressional mandate<sup>17</sup> and the resistance from some members of the Advisory Committee.

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<sup>16</sup> The average length of a postdoctoral fellowship is 4-5 years, according to the Executive Director of the National Postdoctoral Association ([http://sciencecareers.sciencemag.org/career\\_magazine/previous\\_issues/articles/2006\\_02\\_10/science.o.pms.r0600001](http://sciencecareers.sciencemag.org/career_magazine/previous_issues/articles/2006_02_10/science.o.pms.r0600001)). Accessed December 5, 2010.)

<sup>17</sup> At the time of writing this report, OPAE staff was unable to locate any Congressional documents that strictly defined the scope of the program. Congressional appropriation reports from the 1960s mentioned in the Introduction refer to the program as training in pharmacology-toxicology, but do not include any language about what specific research topics must be covered by the program.

## Evaluation design

We assumed that most respondents would not be familiar with program evaluation. In the interviews, we explained that this was an exploratory study for a possible program assessment and asked them what were the most important questions to ask about the program, what groups should be interviewed or surveyed, what aspects of the program performance should be measured, and what programs at NIH or elsewhere were most comparable to PRAT. All of the suggestions that we received are summarized in Exhibit 6.

<b>Exhibit 6. Areas of interest for the possible PRAT evaluation suggested by respondents</b>	
<b>Study questions</b>	<ul style="list-style-type: none"><li>• What are the goals of the program? Do these goals include alternative careers?</li><li>• How should pharmacology be defined? What direction should the program take?</li><li>• Has the program changed the way fellows look at science? Has the program made them better scientists?</li><li>• Has the program influenced their experience at NIH?</li><li>• Has the program influenced their career paths? Has it helped them get a position? Has it broadened their horizons?</li><li>• What benefits have the fellows derived from the program? Has the networking through the program helped them? Have the seminars been useful?</li><li>• How satisfied are the fellows with their positions?</li><li>• Would PRAT mentors like to be more involved? Do they feel unwelcome?</li><li>• Do fellows consider themselves pharmacologists? Did the program introduce them to the field?</li><li>• How has the program contributed to the field of pharmacology? Have any alumni been involved in a seminal way in a production of a new drug, become a leader in the field, or been important in a drug company?</li></ul>
<b>Performance indicators</b>	<ul style="list-style-type: none"><li>• Ability to expose fellows to diverse career paths</li><li>• Ability of fellows to find jobs and how the program has helped them</li><li>• Success of fellows while they are in the program (meetings attended, papers published, awards received, presentations given)</li><li>• Satisfaction with mentoring by program staff</li><li>• Length of postdoctoral training</li><li>• Length of job search period</li><li>• Job placement (type of organization, position)</li><li>• Job satisfaction</li><li>• Percentage of fellows in academic positions</li><li>• Tenure status</li><li>• Number of fellows in key pharmacology-related positions, in academia (chairs of pharmacology department) and in industry (chief scientific officers at drug companies)</li><li>• Funding success, time to first grant</li><li>• Publication record</li><li>• Relationship with NIH mentor</li><li>• Mentoring by former fellows</li></ul>
<b>Populations</b>	<ul style="list-style-type: none"><li>• PRAT fellows</li><li>• Mentors (preceptors)</li></ul>

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**Exhibit 6. Areas of interest for the possible PRAT evaluation suggested by respondents**

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	<ul style="list-style-type: none"><li>• Advisory Committee members</li><li>• Program directors</li><li>• Leaders in pharmacology</li><li>• Staff at NIH institutes in charge of training</li></ul>
Comparison groups	<ul style="list-style-type: none"><li>• Unfunded PRAT applicants</li><li>• F32 fellows</li><li>• K99 fellows; other K fellows</li><li>• US citizen intramural postdoctoral trainees</li><li>• US citizen intramural postdoctoral trainees from the same labs as PRAT fellows</li><li>• Interagency Oncology Task Force Joint Fellowship Program (NCI)</li><li>• HHMI fellows conducting research on NIH campus</li><li>• Jane Coffin Fund fellows</li><li>• Cancer Research Institute fellows</li><li>• Postdoctoral characteristics from Science and Engineering Indicators</li></ul>

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## Chapter 4: Extant PRAT Data

This chapter is divided into two parts. First, we describe the PRAT system and its evolution, organization, purposes, and content. Following, we summarize our efforts at organizing and archiving PRAT data. Note that our review of the system took place six months ago, in June-July of 2010. We understand that some flaws in the system identified in this chapter may have been corrected.<sup>18</sup>

The PRAT database is currently used to store and manage applications and other associated materials and to report data on program participation that is subsequently included in the Congressional brief. According to key informant interviews and IT manuals, the system has been modified several times by various contractors. Program staff believes that this has resulted in missing data; the database was described to us as “being in various stages of disrepair.”

### PRAT system history

According to a former PRAT program assistant, originally PRAT data were stored in two systems: Access and Data Ease. In early 2007, the database was transitioned from Access to ColdFusion with an Oracle backend to bring it into compliance with FISMA, HSPD-12, and NIH password policies, while preserving the data and enhancing the functionality of the existing system.<sup>19</sup> The IT group has run tests to confirm that there were no losses in data when the system was transitioned and they contend that any missing data have most likely not been properly entered by the user. According to the program staff, some data may have been lost during this first transition, from Access/Data Ease to ColdFusion.

The key enhancement in the ColdFusion/Oracle Release 1.0 relative to Access was the ability to automatically populate the PRAT database with information from the application form.<sup>20-21</sup> As requested by the PRAT program staff, some of the information contained in the application form is not automatically transferred into the PRAT database. Details about this process are provided below. In May 2007, the IT group released a modified version of the database, ColdFusion/Oracle Release 2.0, which had a reporting capability.<sup>22-23</sup> Since then, there have been four major and one

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<sup>18</sup> NIGMS staff, personal communication.

<sup>19</sup> Business Case for Pharmacology Research Associate Tracking System. PRAT-BCD-06-40. October 17, 2006. IRMB.

<sup>20</sup> Pharmacology Research Associate Tracking System. PRAT-VIS-06-62. January 16, 2007. IRMB.

<sup>21</sup> NIGMS IT group, personal communication.

<sup>22</sup> Pharmacology Research Associate Tracking System Generation 2. PRAT-VIS-07-71. May 23, 2007. IRMB.

<sup>23</sup> NIGMS IT group, personal communication.

minor enhancement to the PRAT database. ColdFusion/Oracle Release 2.4.1 was the system in use at the time of investigation. The PRAT program began accepting electronic applications in 2007.

PRAT program staff report technical problems with the database to the NIGMS IT group throughout the year. We found that “high priority” requests, such as problems with application submission, are fulfilled immediately. There seemed to be a disagreement between the IT group and the program staff about who determines whether a given request is high priority. Other requests are back-logged until the next release or enhancement is scheduled.<sup>24</sup> Between June 2007 and March 2010, the IT database request log for PRAT included 88 items, such as “PRAT 2.0 – received error when trying to generate a report” (7/30/2007), “PRAT public site – reword upload instructions” (9/28/2009), or “education/training needs date validation” (11/12/2009).<sup>25</sup> The IT group has attended to these requests and has made additional enhancements to the system, 155 in total since 2007. Eight new requests for changes had been submitted in 2010 at the time of data collection, which were scheduled to be addressed in the fall.

## **PRAT system organization and purpose**

The PRAT system has three purposes: data receipt and storage, data tracking, and data reporting. It has a public access portal for application submissions and an internal portal for data management and reporting. The internal portal has a “front end,” the user interface accessible to the PRAT program staff, and a “back end,” components of the system where the data are stored and processed, that is accessible to the IT group. PRAT program staff can update the information in the database, delete some items, and generate reports. The IT group maintains the ability to change the way the data are organized and displayed by the system as this requires more technical programming skills.

The main user of the PRAT database is the PRAT program assistant, whose responsibilities include: (1) manually entering data to supplement the information automatically transferred from the application; (2) obtaining and updating fellow information; (3) abstracting the data from the system; and (4) conducting maintenance and cleaning of the database (e.g., deleting duplications and test records). Program staff expressed a view that the IT group shares the responsibility of database cleaning.

## **PRAT system as an application tool**

PRAT applicants enter their information into a PDF application form, which is available on the PRAT website. The form includes 15 questions, ranging from the applicant’s name to his/her research and career objectives. As requested by the PRAT program staff, only a subset of information entered by the applicant is automatically imported to the PRAT system; information not imported is either entered manually by program staff, is linked to the participant profiles in the PRAT system as a PDF

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<sup>24</sup> IT group, personal communication.

<sup>25</sup> PRAT Deployment History and Current Change Status. March 2, 2010. IRMB.

document, or is archived outside of the PRAT system. Exhibit 7 lists data elements which are automatically or manually entered into the system.<sup>26</sup>

<b>Exhibit 7: Transfer of the application form data provided by the applicant</b>	
<b>Data element</b>	<b>Mode of data entry</b>
<b>Name and contact information</b>	
First name, middle name, last name	Automatic import
Year of assignment	Automatic import
Home address (street, city, state, zip code, country)	Automatic import
Telephone (primary, work, cell)	Automatic import/Not stored in database <sup>a</sup>
<b>Education/Training</b>	
School name	Automatic import
City/State	Automatic import
Major1, Major2	1=Automatic; 2=Manual
Dates attended	Automatic import
Conferred date of completion/year of completion	Automatic import/Manual
Other postdoctoral fellowships/training	Not stored in the database
Professional positions held or expected prior to NIH duty	Not stored in the database
Membership in honorary societies	Not stored in the database
Previous research or lab experience	Not stored in the database
<b>References</b>	
Name	Automatic import
Street, city, state, zip code	Automatic import
<b>Requested preceptor</b>	
Name	Automatic import
Lab/Institute	Manual entry
<b>Other information</b>	
Citizenship	Automatic import
Awareness of program	Not stored in the database
Publications	Not stored in the database
Special training or experience seeking at NIH	Not stored in the database
Research plan	Not stored in the database
<sup>a</sup> As requested by the PRAT program staff, cell phone number is not stored in the database	

In addition to the application form, the application package includes Preceptor Selection Verification and Request for Evaluation forms. Unlike the application form, which is uploaded on the web site, these materials are completed by the requested preceptor and evaluator and delivered to the program via inter-office mail, postal mail, email, or fax. As requested by the PRAT program staff, these materials are not integrated with the PRAT database.

<sup>26</sup> These data were provided by the NIGMS IT group.

## PRAT system as data collection, storage, and management tool

### Viewing information in the system
























A user logging into the PRAT system will be directed to a web page called “PRAT Participation List,” which is a roster of all applicants and fellows (Exhibit 8). The letter (F) or (A) accompanying each name on the list indicates an applicant’s status as a funded fellow or an unfunded applicant (once the funded fellows have been selected for a given year, “applicant” refers only to unfunded applicants). The names on the web page are hyperlinks, which if followed will open individual profiles. The applicant names have two icons next to them – a pencil and an x. Clicking on the pencil button will allow a user to modify the record and clicking on the x button will delete this record. Fellows’ records can be modified, but not deleted; hence they display only the pencil icon.

### Exhibit 8: List of applicants and fellows as it appears in the PRAT system

571 Applicant/Fellows have been retrieved.

Select:  Status:  Program Year:

To view/update a record, click on the appropriate Applicant/Fellow name. Only Applicant profiles can be deleted (✕).

	Applicant/Fellow Name	Institute	Class Year	Preceptor
 	<a href="#">NIGMS Test3_3 Supporting Apps k (A)</a>		2010	test test *
 	<a href="#">NIGMS TEST2_5Supporting apps M (A)</a>		2010	test 2` Test 211 *
	Names redacted	National Institute of Allergy and Infectious Diseases (NIAID)	2010	<a href="#">Ronald Germain</a>
		National Institute of Neurological Disorders and Stroke (NINDS)	2010	<a href="#">Susan Wray</a>
 			2010	Gisela Storz *
		National Institute of Neurological Disorders and Stroke (NINDS)	2010	<a href="#">David R. Sibley</a>
		National Human Genome Research Institute (NHGRI)	2010	<a href="#">Julia Segre</a>
 			2010	Juan Bonifacio *
 			2010	Eric Freed *
 			2010	Lawrence Samelson *
		National Cancer Institute (NCI)	2010	<a href="#">Gordon Hager</a>
 			2009	Herbert Geller *
 			2009	Herbert Geller *
 			2009	Keji Zhao *

Information on each applicant appears as a separate web page in the PRAT system (see Exhibit 7 for information on how these tabs are populated with data). Exhibit 9 is a snapshot of an applicant profile. Each applicant profile has five tabs: Applicant Information, Education/Training, References, Requested Preceptor, and Check List.

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## Exhibit 9: Applicant profile in the PRAT system

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Applicant: Name redacted

Applicant Information	Education/Training	References	Requested Preceptor	Check List
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Applicant Information

First Name  MI  
Name redacted

Telephone Number (999-999-9999) \*

Last Name  Suffix  
Name redacted


Alternate Telephone Number (999-999-9999)

Contact E-Mail Address (email@example.com) \*

---

Present Home Address 1 \*

Present Home Address 2


City \*  State \* Alabama  Zip \*  Country

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How did you learn about the PRAT program?

Poster ☐ Preceptor ☐ Fact Sheet ☐ NIGMS Training Website ☐

Other ☐ Specify Other Source Here:

 Required Information

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When an applicant is accepted, program staff clicks a button “accept applicant” and this action changes the record in the database from an applicant to a fellow. There are two differences between applicant and fellow records. First, fellow records can be modified, but cannot be removed from the system. In addition, fellow profiles have different tabs: PRAT Enrollment, Post Fellowship, Education/Training, Awards/Research, and Record History (Exhibit 10). Notice that the fellow profile in Exhibit 10 contains PDFs of various materials submitted with the application. These have been automatically imported from the external PRAT application web page.<sup>27</sup>

The NIGMS director reports to Congress only on the status and whereabouts of the fellows, thus no information is collected on unfunded applicants past the point of their application. An unfunded applicant reapplying for the program is treated as a separate entity by the system, which creates a new profile.

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<sup>27</sup> <https://prat.nigms.nih.gov/> (Accessed July 14, 2010.)




## Exhibit 10: Fellow profile in the PRAT system

### Participant Profile

Fellow: Name redacted (Class Year: 2010)

PRAT Enrollment	Post Fellowship	Education/Training	Awards/Research	Record History
-----------------	-----------------	--------------------	-----------------	----------------

#### Original Application Documents

 Name redacted (894.45KB)  Name redacted  Name redacted (759.23KB)

#### Personal Information

**First Name** ✓  
Name redacted

**Last Name** ✓  
Name redacted

**MI**  **Suffix**

**NIH Telephone Number**  
(999-999-9999) \*

**Alternate Telephone Number**  
(999-999-9999)

**NIH E-Mail Address**  
(email@nih.gov) ✓

Email address redacted

**NIH Address** ✓

**Bldg./Room #**

**NIH City** ✓  **State** ✓

**Zip** ✓  **Country**

### Updating information in the system

Program staff updates information on former PRAT fellows by modifying the Post Fellowship, Education/Training, and Awards/Research tabs (Exhibit 11). When updating a fellow record, the user has an option of selecting “save as history event” option. Choosing this option will automatically create an entry in the Record History tab (Exhibit 12). Each entry in this tab is a hyperlink to a web page, which displays the information entered.

## Exhibit 11: An example of a modified Post Fellowship tab

Fellow: Name redacted (Class Year: 1966)

PRAT Enrollment	Post Fellowship	Education/Training	Awards/Research	Record History
-----------------	-----------------	--------------------	-----------------	----------------

#### Alumni Information

**First Name** ✓  
Name redacted

**Last Name** ✓  
Name redacted

**MI**  **Suffix**

**Home Telephone Number**  
(999-999-9999) ✓  
Phone number redacted

**Alternate Telephone Number**  
(999-999-9999)

**Contact E-Mail Address**  
(email@nih.gov) ✓  
Email address redacted

**Present Home Address 1** ✓  
Address redacted

**Present Home Address 2**

**City** ✓  **State** ✓

**Zip Code** ✓  **Country**

**Class Year**  ✓ **Clinical-Pharmacology**

**Employment**  **Title**

**Institution/Company**  **Department**

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**Exhibit 12: An example of information in the Record History tab**

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◇ Participant Profile

Fellow Name Redacted (Class Year: 1966)

PRAT Enrollment	Post Fellowship	Education/Training	Awards/Research	Record History
-----------------	-----------------	--------------------	-----------------	----------------

History Events

Date Amended	History Begin Date	History End Date
<a href="#">August 22, 2008</a>		
<a href="#">August 22, 2008</a>		
<a href="#">August 22, 2008</a>		
<a href="#">August 22, 2008</a>		
<a href="#">August 22, 2008</a>		

Add Event

According to the program staff, annual requests for CVs are made to former fellows and data are manually entered into the system as received. As mentioned above, the system creates a record for each updating event. Based on the PRAT fellow report,<sup>28</sup> 93 updating events are documented in the system (data not shown). If the number of updating events is accurate, it indicates that most of the records in the system have not been updated. It is likely that this number is actually higher than 93, as the updating activities are not always documented by the program staff users.

Also, while the system documents changing events, there is no mechanism for a user to make comments about the updating process. For example, program staff may have unsuccessfully attempted to find information on a former fellow on the Internet, but it is not possible to make a note about this action. Similarly, there is no way to document in the database that a request for a CV has been made, but not met. The ability to enter this type of information is important for being able to track individuals over time.

Finally, we noticed that some of the fields in the Post Fellowship tab contained information for fellows who were still in the program (Exhibit 13). The IT group confirmed that information in certain fields—name, telephone, email address, home address, and class year—was automatically imported from the Applicant Info/PRAT Enrollment tab at the time the fellow receives the award. We believe that this approach is problematic as it can lead to confusion about what information about former fellows has and has not been updated.

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<sup>28</sup> For details on how this report was generated, see PRAT System as the Program Reporting Tool section.

## Exhibit 13: Fellow profile in the PRAT system

Fellow: Name redacted (Class Year: 2010)

PRAT Enrollment Post Fellowship Education/Training Awards/Research Record History

Alumni Information

First Name Last Name MI Suffix

Name redacted C

Home Telephone Number Alternate Telephone Number Contact E-Mail Address

(999-999-9999) (999-999-9999) (email@nih.gov)

Contact information redacted

Present Home Address 1 Present Home Address 2

Address redacted

City State Zip Code Country

Rockville Maryland 20852 USA

Class Year 2010 Clinical-Pharmacology

Employment Title

Academic

Institution/Company Department

## PRAT system as the program reporting tool

The PRAT database user can generate several reports from the system: Applicant Report, Fellow Report, and Preceptor Report. The system can also provide a report of incomplete records. The user can specify the type of information sought and the output layout, such as column order. The system can generate reports in MS Word, Excel, or Adobe PDF formats (Exhibit 14). Note that the system provides a count of the number of rows (285) that are returned, which is circled in blue.

When examining the reporting tabs in the database, we found that the system returned multiple entries for the same individual, as indicated by the green oval in Figure 14. Based on conversations with the IT group, we learned that these duplicates appear simply because the data are incorrectly formatted by the system. For example, if the applicant John Doe states in his application that he got a BA from Berkeley and a PhD from Stanford, the system will produce a report that has two rows of identical information for him, with the exception of the education cells, which will contain “Berkeley” in one row and “Stanford” in another. When generating reports, the user can choose what fields to output (for example, names or education). According to the IT group, the way to generate a unique list of applicants is to limit the reporting to those fields for which only one entry is allowed in the application. For example, reporting by name will produce only one entry for Doe.

In our view, this data management process is seriously flawed, as the program relies on this reporting system to provide accurate counts of the number of fellows to Congress. Since the reporting system only provides a count of the number of rows that are generated in the report, and not an actual count of the fellows, the program staff has been manually removing any duplicate rows in order to get a more accurate count of fellows. This manual data processing is not only labor

intensive, it is also error-prone. For example, if the report were to contain information about which institutions the fellows attended, any of the institutions listed in the rows that were removed would not be included in the report. When analyzing the list of 400 fellows that was manually cleaned by the program and provided to us (dated June 30, 2010), we noticed that it contained a duplicate entry and was missing at least one fellow. This individual appears on the screen in the “front-end” of the database, but is absent from the reporting list, which had been manually processed by program staff.

## Exhibit 14: Reporting function in the PRAT system

PRAT Applicant Report Results

Generate Export File  
[MS Word](#) [MS Excel](#) [Adobe PDF](#)

The following results match your search criteria. 285 rows returned. [Adjust Column & Sorting Order](#) / [Search Again](#)

First Name	MI	Last Name	Suffix	Address	City	State
3 Supporting Apps	k	NIGMS Test3		3862198 South Street	Rockville	ME
5 Supporting apps	M	NIGMS TEST2		863298 MAIN sTREET	Bethesda	AK
Names redacted				460 Locust Hill Rd	Max Meadows	VA
				460 Locust Hill Rd	Max Meadows	VA
				460 Locust Hill Rd	Max Meadows	VA
				460 Locust Hill Rd	Max Meadows	VA
				460 Locust Hill Rd	Max Meadows	VA
				3406 Queensboro Drive	Olney	MD
				3406 Queensboro Drive	Olney	MD
				8802 Grant Street	Bethesda	MD
				8802 Grant Street	Bethesda	MD

## Completeness and accuracy of information in the system

The PRAT system reports containing records on 571 applicants and fellows (see blue oval in Exhibit 8), but this number is erroneous. There are several sources for incorrect reporting. First, each time a test “dummy” entry is created for purposes of learning how to use the database<sup>29</sup> these entries are retained by the system until manually deleted.<sup>30</sup> For example, the two top participants on the list captured in Exhibits 8 and 14 are dummy entries; these are counted by the system as applicants. Duplications also result from multiple resubmissions of application materials by the same applicant during the same application cycle.<sup>31</sup> If the program staff does not remove these extra entries, they

<sup>29</sup> According to the IT staff, there is an option of exploring and testing the PRAT system outside of the database.

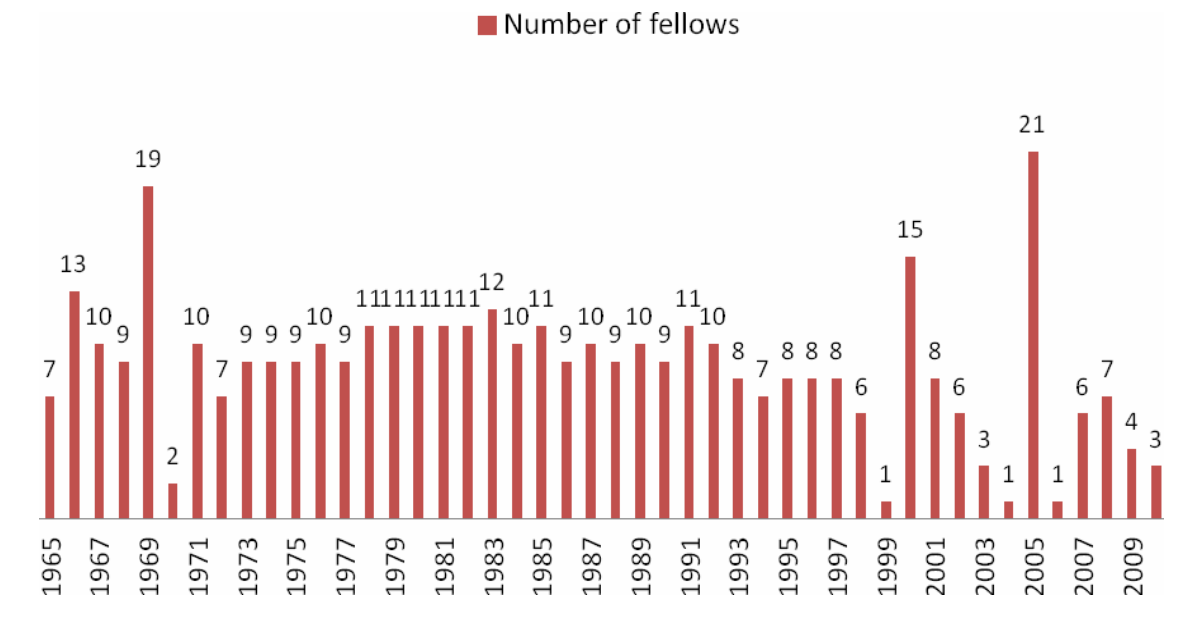
<sup>30</sup> We found that IT staff and program staff disagree about the origin of the dummies and about who should remove them.

<sup>31</sup> The PRAT program staff allows the applicants to resubmit their materials up to five times so that they can correct and expand the information being submitted.

are retained in the database and included in the overall applicant count. The IT staff members were reasonably certain that in the majority of other cases duplications were not due to system malfunction, but rather were issues of maintenance, which do not fall under the responsibilities of the IT group. Program staff believed that duplications may have occurred as a result of transition from Access to ColdFusion.

The program provided us with the PRAT fellow report (dated June 30, 2010), which contained 400 individuals.<sup>32</sup> Exhibit 15 shows the number of entries by cohort.

**Exhibit 15: Number of fellows by cohort (N=400)**



The analysis of 400 entries indicated that with the exception of degree and fax number, the data were nearly complete (Exhibit 16). However, we observed that some information has been inconsistently entered. For example, in 10 cases the title or institution variable contained an entry “deceased” and in additional 15 cases an entry “retired.” Finally, in two cases a date has been entered instead of a phone number and in one case a phone number appeared truncated. One of the fellows had a duplicative record.

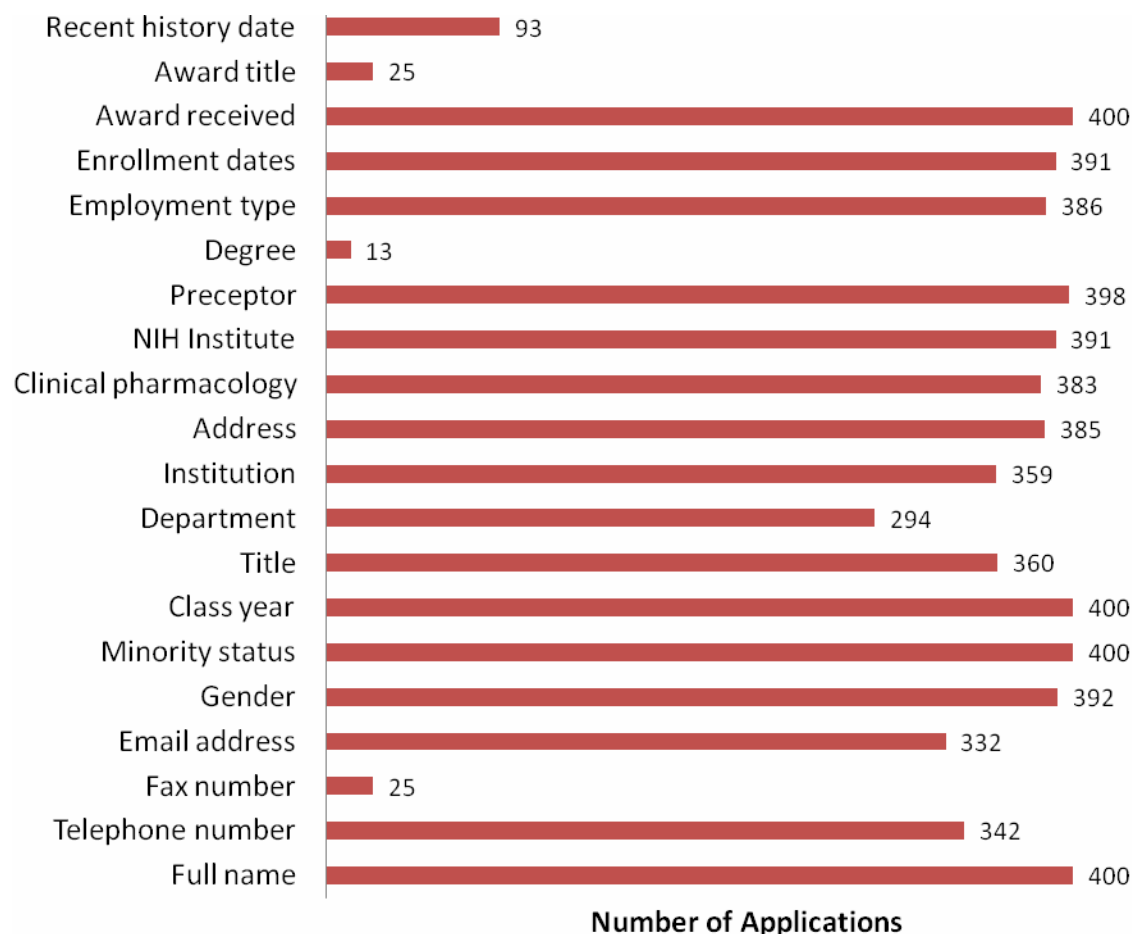
We found that the system contains no information on unsuccessful applicants prior to 1998 and the information is sparse prior to 2007, the year the application process became electronic. Based on the conversations with PRAT staff, we understand that there are approximately 30 unfunded applicants per year. Thus, we estimate that the PRAT database should contain about 120 unfunded applications for the years of 2007 to 2010. No data are collected on unfunded applicants post-application.

<sup>32</sup> For details on how this report was generated, see PRAT System as the Program Reporting Tool section.

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**Exhibit 16: Completeness of data in the PRAT system**

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**Exit surveys**

In the early 1990s,<sup>33</sup> program staff began surveying the fellows completing the program (exit surveys). We obtained and reviewed a sample survey. It includes 7 open-ended questions about participants' plans, experience in the laboratory, and views on the seminar series, interactions with the directors, and the program overall. The survey instructions say to complete the survey and return it via email to the PRAT program assistant.

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<sup>33</sup> We could not establish the start year with greater accuracy. Drs. Marino, Long, and Cole, who were consulted, were unsure. The consensus opinion was that the survey began sometime in early 1990s, which is consistent with the earliest dates for which hard copy surveys could be located (1992).

## Abt efforts at updating, organizing, and archiving PRAT data

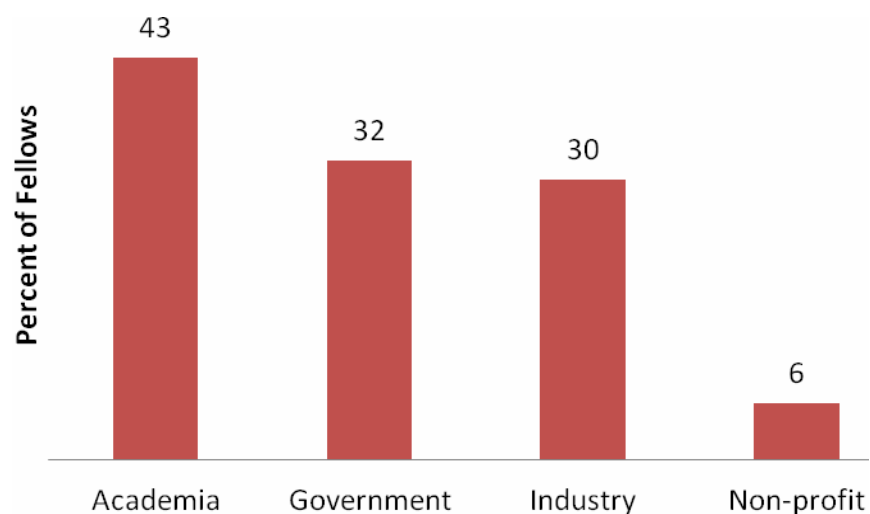
To assist the PRAT staff in preparing for the possible outcome evaluation, we updated fellow affiliation and contact information in the PRAT database for 1990–2005 (program staff have complete data for the past 5 years) and organized/archived hard copy CVs, applications, and exit surveys.

With the data in the PRAT database as a starting point, we conducted Internet searches to verify and update the information on the fellows who entered the program between 1990 and 2005. Of 129 fellows in this group, we were able to find current email addresses for 82 (64%) and current affiliation for 110 (85%). For the 110 for whom affiliation could be identified, 39% held a position in academia (Exhibit 17).

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**Exhibit 17: Current affiliation for 110 PRAT fellows, classes of 1990–2005**

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In early October 2010, Abt and OPAE staff met with the PRAT program assistant to review the program’s archiving process and to transport and prepare the program’s paper files so they could be scanned and saved to the shared drive at NIGMS. Exhibit 18 provides a list of documents contained in the files for PRAT fellows.

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**Exhibit 18: Contents of hard-copy files for PRAT fellows maintained by the program**

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Document	Description
Curriculum vitae	Most files contained at least one CV, and many contained more than one CV spanning a number of years.
PRAT application	Most files did not contain an application. The PRAT application included appendices including a biographical sketch, CV, recommendation letters, and school transcripts.
Exit survey	Only a few files contained an exit survey, which is a follow-up evaluation given to fellows after they complete their fellowship.
Memoranda, requests, and notifications	Some files contained printed documentation such as memoranda, requests, or notifications.
E-mails and letters	Many files contained correspondence between the program staff and the fellow, often requesting a copy of a current CV or information needed to update records.
Other resources	Some files contained printed copies of online resources, such as the fellow's biography and current address listing.

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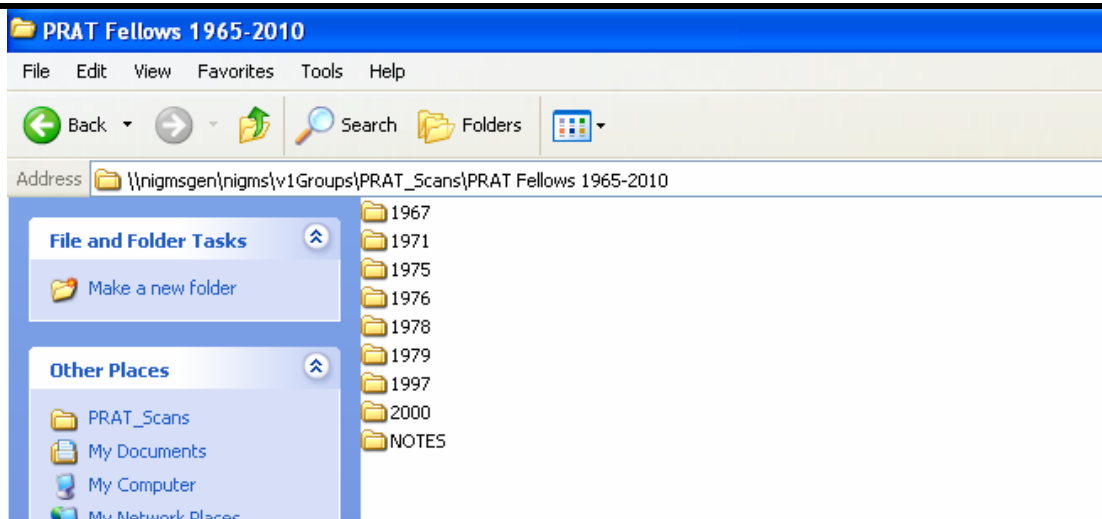
Between October 2010 and January 2011, two Abt researchers worked onsite at NIGMS to sort through the paper files, to scan their contents, and then to save the scanned items to a folder on the shared drive. The researchers also established and updated a tracking spreadsheet in MS Excel to record each scanned item and to make notes about the data being archived.

NIGMS IRMB created a base folder on the shared drive at NIGMS to store all scanned files. We modified the base folder and added a series of subfolders based on a filing mechanism organized by year or fellowship cohort, and subsequently, log number, which is used to identify each participant in the program. A screen shot of the contents of the subfolder, “PRAT Fellows 1965–2010,” which houses additional subfolders by year/fellowship cohort, is shown in Exhibit 19.

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**Exhibit 19: A screenshot of folders containing scanned hard-copy data**

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As files were scanned and saved, they were assigned unique log numbers used to track and identify participants in the program. Each log number has six digits. The first four digits represent the fellowship cohort by program start year, and the last two digits represent numerical, and in many cases, alphabetical, order. The documents contained in a particular file are all assigned the same log number, and are then saved in a designated folder, also assigned a corresponding log number. Assigning log numbers to files and using a numerical method to organize and store files in folders streamlines the data archiving and administration process, which increases the quality assurance of the data and makes it easier to quickly find information used for programmatic oversight or reporting purposes. All scanned files were also entered using the six-digit number into the tracking spreadsheet. We termed this system “ERS” – electronic record system.

At the time of writing this report, all paper files that could be located have been scanned and archived using the system describe above. We will train program staff on how to use the ERS system and will develop a brief instruction manual describing the contents of the system and detailing the process for retrieving and archiving files.

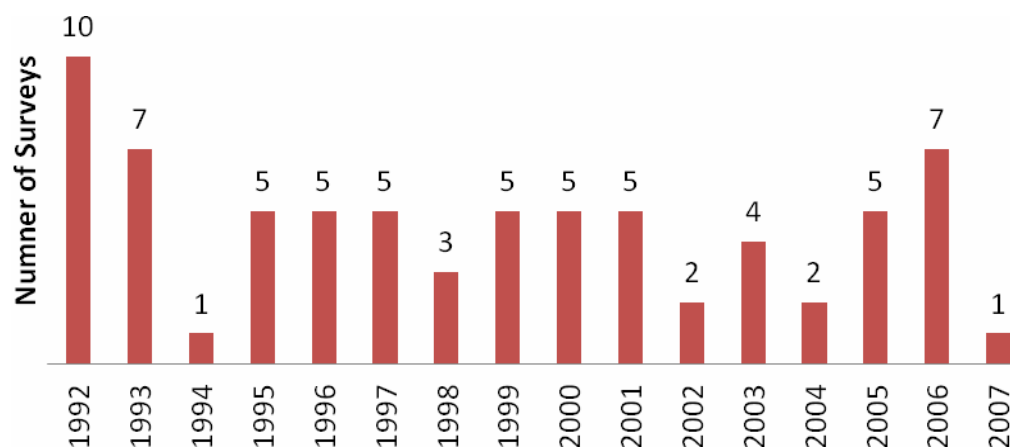
### Analysis of hard copy data

Based on conversations with three current/previous program managers and two program assistants, it appears that the program first began administering exit surveys in the early 1990s. We were able to locate and archive a total of 72 exit surveys for fellows who entered the program between 1992 and 2007 (Exhibit 20).

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**Exhibit 20: Number of exit surveys prior to 2008 that could be located by fiscal year (N=72)**

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The program started receiving electronic applications in 2008, so we assume that unfunded applications for 2008, 2009, and 2010 are stored in the PRAT database. For years prior to 2008, we located and scanned 60 applications (Exhibit 21). The program assistant did not know how her predecessor managed the paper files and why unfunded applications for only six cohorts prior to 2008 were preserved.

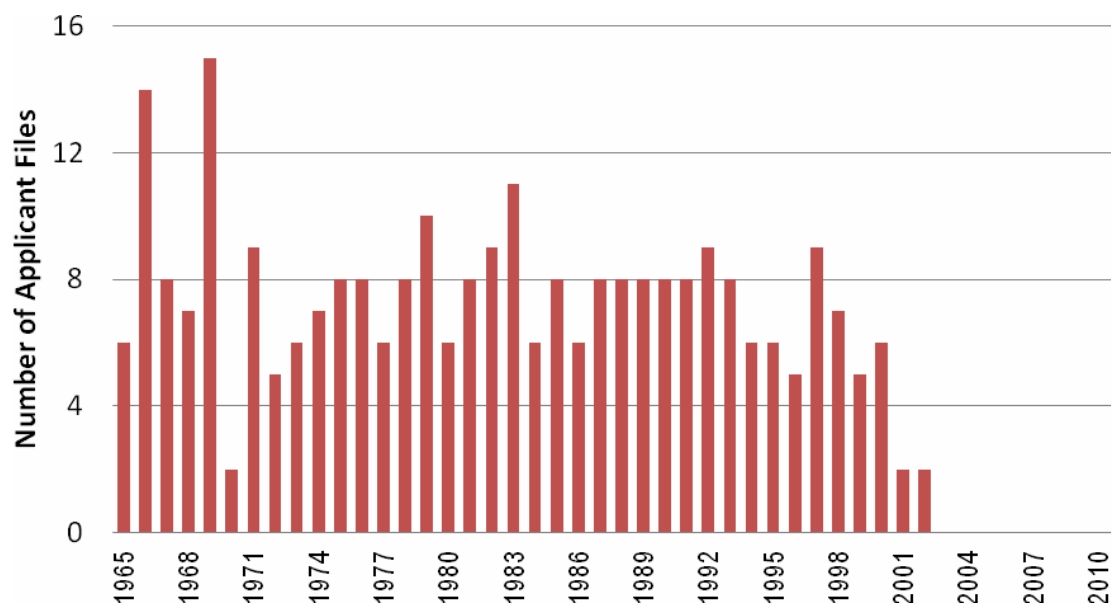
**Exhibit 21: Number unfunded applications that could be located prior to 2008 by fiscal year (N=60)**



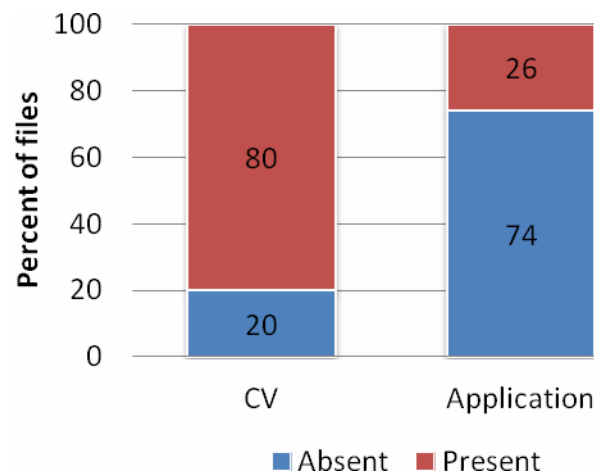
We located and archived application files on 380 PRAT fellows. Exhibit 22 shows the number of application files per year and the numbers of CVs and applications within these files. We do not know why the program generally preserved fellow CVs and discarded the applications.

**Exhibit 22: Completeness of hard copy fellow data available at NIGMS (N=380)**

A. Total number of fellow files per year



## B. Completeness of fellow data in the paper files



This concludes our presentation of the data gathered on the PRAT program. In the next chapter, we offer our interpretation of the data and recommendations to NIGMS on possible directions for the program, outcome evaluation design, and improvements to the PRAT data system.

## Chapter 5: Conclusions and Recommendations

At the request of NIGMS OPAAE, we analyzed PRAT program data and interviewed a convenience sample of 27 individuals including PRAT directors, current and former fellows, mentors, and members of the Advisory Committee. Based on this small data collection effort we offer several observations. It was clear from the interviews that the program fills an important gap in the postdoctoral training offered at NIH. By participating in the program, the fellows form peer groups with other postdoctoral researchers on campus, practice presenting their research, learn how to be effective in looking for a position, and meet potential job contacts from academia, government, and industry. The program directors help the fellows explore the best career options for them and support their decisions.

There are other benefits to being a PRAT fellow. The fellowship is viewed as prestigious and competitive and is probably a boost to the fellows' self-confidence and reputation in the laboratory. While the fellows have already joined a laboratory by the time of application, having their own funding opens doors to most laboratories at NIH if they decide to make a change. And finally, the fellows earn higher salaries and have better benefits than IRTAs. As far as we could tell from the interviews, there are no disadvantages—and many advantages—to being a PRAT fellow.

Our only concern with the program is the apparent mismatch between its stated goals and activities. While the official intent of the program is to support research training, in practice the program offers mentoring and preparation for the transition from a postdoctoral position to the next career step, be that in academia or elsewhere. Arguably, this type of support is also very important for a young scientist, in particular at NIH, which lacks some of the services and resources available at

research universities. However, while beneficial to the fellows, program activities are peripheral to the fellows' research projects, over which the program has limited influence or oversight.

We are unsure what NIGMS staff can do to better align program activities with its goals. Ideally, training in the "business of science" should be available to all postdoctoral researchers at NIH, regardless of their scientific interests or citizenship status, but this is clearly not a viable alternative given limited program funds and staff. The simplest solution might be to rebrand the program as offering mentoring and career development opportunities to individuals conducting research in the scientific areas broadly defined as pharmacology (or in some other area which NIGMS leadership feels is important to promote).

## **Recommendations on the outcome evaluation design**

Based on the results of this assessment, ***we recommend conducting an outcome evaluation of the PRAT program.*** Our reasons for this recommendation are as follows. First, the program was singled out for a special mention by the Government Accountability Office as not having been formally evaluated in its entire 45-year history.

Second, our review of program materials suggested that it will be possible to locate sufficient numbers of fellows and unfunded applicants to carry out meaningful program assessment. For the years of 1990–2005 we were able to establish a current employer for 80% of the fellows and obtain email addresses for 64% of the fellows with simple Internet searches. Telephone calls to the employers or emails through LinkedIn would likely yield additional email contacts. The data are largely complete for post-2005 fellow cohorts. Our study revealed that the program has complete data on unfunded applicants only for the years of 2007–2010. We expect that limited additional data will be available in the PRAT system, although even with this extra information the data on unfunded applicants are unlikely to be sufficient for rigorous comparison. In the section below, we propose a strategy to enhance the comparison group.

Finally, we believe that an outcome evaluation will offer the program staff and the leadership of NIGMS an opportunity to re-examine the program goals and to obtain a more complete and systematic picture of the effects of PRAT program participation on the fellows' careers.

### ***Study questions***

Given the small size of the program, we suggest a single process/outcome evaluation. The study should answer the following questions:

#### **Program processes**

- What are the most appropriate goals for the program? Should the program retain its focus on mentoring and professional development? If the program's aim is mentoring and professional development, should full salary/benefits support be provided to the fellows or should the level of support per fellow be reduced to increase the number of participants? Can NIGMS handle larger number of participants? Will the program attract talented applicants if the level of support is reduced?

- Should the program maintain its emphasis on pharmacology? How should pharmacology be defined?
- What information is required for Congressional reporting? What are the legislative boundaries within which the program must operate?
- What are the options for easing the transition of the fellows from PRAT, if they need to continue with postdoctoral research?

#### Program outcomes

- What are the fellows' career paths following PRAT program participation? How do these compare with those of the IRTAs who applied for funding, but were not selected?
- In what way has the program influenced fellows' career paths? Has it helped them get a position they sought? What benefits have the fellows derived from the program?
- In what way has the program influenced fellows' experience at NIH?
- How satisfied are the fellows with their positions? To what extent has the program prepared them for their jobs?
- How satisfied are the fellows with the program? What changes (if any) would they recommend?
- Would PRAT mentors like to be more involved in the program? Can mentor involvement provide a link between program activities and a fellow's research training?
- Do fellows consider themselves pharmacologists? Did the program introduce them to the field?
- How has the program contributed to the field of pharmacology?

#### ***Study populations***

We suggest including the following groups in the evaluation study:

1. PRAT and NIGMS leadership, to explore the process questions posed above
2. PRAT alumni for the past 20 years, to examine career progression (including evidence of leadership in pharmacology) and the contribution of PRAT program to career outcomes
  - a. To avoid recall biases, we suggest limiting the questions for the PRAT alumni for 1990–2000 to career outcomes and how PRAT participation has affected these outcomes
3. Unfunded PRAT applicants for 2000–2010, to examine career progression as a comparison to PRAT fellows
4. PRAT mentors for classes 2000–2010, to examine desired level of involvement with PRAT and the views on the program
5. All Advisory Committee members for the past 5 years, to examine their views on the program and its future direction.

#### ***Comparison groups***

An ideal comparison group would include individuals who are exactly the same as the PRAT fellows on all of their characteristics other than participation in the program. Since this ideal group will be impossible to construct, the unfunded applicants are the next best choice. While these individuals cannot be assumed to be identical to the fellows, they demonstrated the same intent to participate in the program, and can thus be argued to be reasonably similar in their career goals and interests.

However, it emerged from the analysis of program records that the data on this population may not be sufficiently robust for a comparison. As a possible solution to this problem, we suggest supplementing the limited group of unfunded applicants with those postdoctoral researchers who were the contemporaries of the fellows in the same laboratory for the years of interest, 2000 to 2006. We assume that the fellows' mentors will be able to identify an appropriate comparison candidate. Some of these candidates may even be unsuccessful applicants, since we learned in the interviews that the fellows tend to come from a limited number of labs at NIH. While we cannot assume that this group is similar to the fellows in their intent to participate in the PRAT program, it can be argued that it is similar in other important characteristics, namely in their choice to join the same laboratory at NIH. To make the two groups as similar as possible, we recommend including only US citizens as comparisons. We are reluctant to suggest this approach for pre-2000 cohorts, as the mentors may have difficulty recalling who was at their laboratory more than 10 years ago.

### ***Evaluation methods***

We suggest a mixed-method evaluation approach to include on-line surveys, key informant interviews, and bibliometric analyses (Exhibit 21).

<b>Exhibit 21: Suggested data collection strategies for PRAT outcome evaluation</b>	
<b>Population</b>	<b>Data collection method</b>
NIGMS leadership	Key informant interviews
PRAT alumni	On-line survey; bibliometric analysis
Unfunded PRAT applicants and lab contemporaries	On-line survey; bibliometric analysis
PRAT fellow mentors (preceptors)	Key informant interviews
Advisory Committee members	Key informant interviews

On-line surveys are the best method to collect data from PRAT fellows and unfunded applicants. First, these are relatively large groups (our rough estimate is 100 fellows and 200 unfunded applicants), making on-line surveys more cost-effective than interviews. In addition, the survey will reduce noise in the data that is unavoidable in key informant interviews because the target and the comparison groups will be asked the same questions, with the same answer options, and in the same order. Finally, the surveys have an advantage of allowing respondents to consider the answers more carefully and on their own time, which will be particularly important for individuals who have to recall the events of several years ago.

We recommend key informant interviews for the remaining study groups. These groups are smaller in size and could be interviewed at relatively modest cost. Perhaps more importantly, semi-structured questions will give respondents an opportunity to share ideas in a free-flowing manner guided by the prompts from the interviewer. For example, a question about possible directions and formats for the program is much better addressed in a conversational format than in a survey.

Finally, we suggest conducting bibliometric analyses on the scientific products generated by the fellows and the applicants in the past five years. These analyses should include publications counts (indicator of productivity), citation counts (indicator of influence), and journal impact factors (indicator of quality and reputation). We also recommend collecting data on patents, licenses, and

technology transfer agreements because these outputs are indicative of innovation and of translation potential, which are relevant to a research program focused on pharmacology.

## **Recommendations on improving PRAT database**

The goal of the analysis of PRAT database was to document current practices for data collection, management, and reporting and to make recommendations to enhance the utility of the system to the PRAT program and as a resource for a possible outcome evaluation. Based on the interviews and meetings with NIGMS staff including database users and the IT group, analysis of documents associated with database development and use, and hands-on experience with the database, we identified several weaknesses of the system, as follows:

1. Since 2007, applications to the program are uploaded directly to the PRAT database, but several data elements that are collected at the time of application, but not included on the primary application form, have to be manually entered. This process is time-consuming and error-prone.
2. Organization of information in the database is not intuitive. Information submitted in the application is partitioned into several tabs, Education/Training, Applicant Information, Post-Fellowship, References, and Requested Preceptor. It could be unclear to a new user whether the Education/Training and Post-Fellowship tabs for fellows contain only the data submitted with application or also include post-fellowship updates.
3. Once the applicant is selected, his/her profile in the database is changed to “fellow,” essentially removing this individual from the applicant pool. Once the status is changed, fellow and unsuccessful applicant profiles display different tabs and have different user permissions. Finally, by “applicants” the system means only unfunded applicants. These features may challenge a new user.
4. The system user can create dummy records in the system, which should be subsequently removed (we found that at least some of these remain). These dummy records contaminate the database.
5. Fellow information in the database may be incomplete; program staff also expressed concerns about data accuracy. We found inconsistencies in some fields; for example, an individual was marked as “retired” in the institution name field. There is no information on unsuccessful applicants prior to 1998 and little information prior to 2007.
6. The process for updating records once a fellow is no longer active is not systematic and there is no mechanism to enter comments about the status of the requests for updates or the results of Internet searches. The system does not generate automatic notifications about what records to update and does not have an automatic process for sending information requests and for entering updates provided by the fellows.
7. The reporting system is currently inefficient as it outputs multiple rows for the same applicant. Program staff manually de-duplicates the reports.
8. The current setup is excessively and unnecessarily dependent on maintenance by the program. Duplicate records and dummy records have to be manually removed to keep the database “clean.”

Based on these findings, we make several recommendations.

**Recommendation 1: Transition to a web-based application portal that will better control and automate the process of data import from applications.**

- Set up a web-based application portal that will allow applicants to create a user profile where they can enter and exit the system to submit application materials. The system should include a number of controls that flag any information that needs to be completed or modified before the application can be accepted into the system. This will help avoid record duplication and improve data quality as the system would “recognize” these errors and require the applicant to correct them.
- Automatically import all application materials into the system, including Preceptor Selection Verification and Request for Evaluation forms, which are currently emailed separately to the program.
- On the application form, include a field to indicate whether this is a repeat application.
- Create and display a unique number for each new applicant; if an applicant submits additional information during the same application cycle, store this information under the same record number to avoid creating duplicates.

**Recommendation 2: Clean existing records and create a system for quality control.**

- Remove all dummy records from the system and restrict any demo or learning activities to the PRAT database demo site, which exists on a separate server.
- Remove all duplicate records from the system or organize the system to prevent duplicate reporting.
- Remove erroneous entries, such as “retired” in the Institution field and partial telephone numbers.
- Create a system that identifies and reports errors and duplicate entries. Better still, create a system that prevents duplication of records and storage of erroneous and test entries.
- Annually check all the information added to the database that year.

**Recommendation 3: Re-evaluate data update needs and processes.**

- Determine what information must be used to brief the Institute’s Director and consistently collect this information.
- Determine how far back to update the records and with what frequency
  - We suggest annual tracking of all fellow records going back 10 years (unless reporting to Congress specifically requires longer-term tracking).
- Determine whether to update information on unsuccessful applicants
  - We suggest two updates for each cohort of unsuccessful applicants, 5 years and 10 years post-application.<sup>34</sup> This will be invaluable for an outcome evaluation and will provide context for Congressional reporting.

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<sup>34</sup> We suggest infrequent requests to unsuccessful applicants because they may be unwilling to collaborate with a program that has not funded them, especially if they have to provide data on an annual basis.

- Keep all updates for each person under the same tab, called Post-Fellowship. It is best not to over-write information, but to keep a running log.

**Recommendation 4: Design and implement an automatic or semi-automatic record update system.**

- Create a system to notify the user which records are due for an update at any given year.
- Create a system for collecting post-fellowship information via a short survey. Ideally, this feature should be integral to the database, but if that is not possible, “SurveyMonkey” software or a similar commercial tool could be used.
  - Create a mechanism for the survey data to automatically populate the Post-Fellowship tab in the database
  - To minimize burden on respondents, only collect the information reported to Congress and have an “unchanged” button for every data item
  - Follow up with non-respondents to request CVs or specific data items or look them up on the Internet. These data will probably need to be manually entered.

**Recommendation 5: Revamp the user interface.**

- We suggest organizing the information in the database using temporal logic to coincide with the following four tabs:

Tab 1: Application Information

- For all applicants, include all of the information submitted during the application process under a single application tab, including research proposal, personal data, preceptor information, references, checklist, etc.
- Instead of clicking the “accepted” button to modify the records for those selected as fellows, there should be an award status field that is updated for all applicants which indicates their final status with the program (i.e., unfunded applicant, fellow, withdrew from the program, etc.) without changing the applicant profile.

Tab 2: Fellowship Information (Fellows only)

- This tab should be created once an applicant is selected as a fellow. Any information relating to the fellowship experience should appear under this tab. Some of the information that currently resides in the existing PRAT Enrollment tab should be moved to this tab as it directly relates to the fellowship experience and does not come from the application (i.e., Status and Preceptor).
- Revise or clarify the status options for fellows, which currently include active, inactive, and deceased. These options are confusing and have not been used consistently from one database user to the next (e.g., inactive and deceased appear to be used interchangeably). There appears to be no clear consensus among program staff and the IT group about what these options mean, suggesting that these options need to be modified so that they can be applied consistently from one database user to the next. Alternative options could be current participant, post-fellowship-employed, post-fellowship-unemployed, retired, and deceased.

Tab 3: Exit Survey (Fellows only)

- This tab should be created to capture information collected from the exit survey. The survey could be made into a web survey or electronic PDF file that gets uploaded, so that the responses are automatically imported into the database.

Tab 4: Post-Fellowship (Fellows only):

- This tab should be restricted so that information can only be entered when fellows have completed their fellowship term. Since 2007, this tab has been pre-populated with data from the application form, and is not being used properly to capture information about the fellow once they graduate from the program.
- This tab should include all the information required for the annual report prepared for Congress. To ease burden on the PRAT program staff and to streamline the collection and manual processing of this information, a survey should be used as the primary method of data collection. The existing method of longitudinal data collection which involves personally contacting each individual and requesting an updated CV, and then manually entering the information from the CV into the database is inefficient and time-consuming.
- All post-fellowship data should be contained under this tab (like a running log), rather than being moved to and stored in the Record History tab, as in the present setup. We suggest adding an “update fields” button, which would create additional fields for entering new information while maintaining the data that already exist.
- We also recommend including a comment field in which a user can briefly describe and date each data collection effort (e.g., information updated, individual did not respond, could not find any information on the Internet, etc.). This can also be presented as a pull-down menu. There should be a tag for individuals who do not wish to be contacted.
- Finally, creating a link to PubMed would ensure that all publications can be easily accessed through the system.

**Recommendation 6: Enhance the reporting function.**

- All data for a given individual should be displayed in a single row, rather than in multiple rows as it is currently.
- The reporting system should be revised so that it can generate unique outputs filtered by name, program status (fellow/unsuccessful applicant), enrollment year, employing organization.
- The system should report out the most recent updated information available, indicating the date when this information was collected.
- Include a feature that allows the user to create and save common reporting templates (e.g., information reported to Congress).

**Recommendation 7: Update records in the database.**

- Once the decision is made on what information to store in the database, update the records for funded and unsuccessful applicants going back 10 years (or more if necessary). This can be done via Internet searches first and then by requesting CVs if necessary (a survey would be best, but would require OMB clearance).

- We suggest keeping these updated data separately until the database has been fixed.
- Upload all application materials, including the Application Form, Preceptor Selection Verification, Request for Evaluation, and exit survey for individuals who do not have this information in the database. The database user can upload these materials just as the applicants do using the PRAT application submission webpage: <https://prat.nigms.nih.gov/>.

## Appendix: Interview Protocols

### Pre-interview script

My name is \_\_\_\_\_, and I am a researcher at Abt Associates, a policy research firm. Under the contract with NIGMS, we are collecting preliminary data to explore the best approaches to the PRAT Outcome Evaluation. We are conducting telephone interviews with approximately 10-15 individuals, including PRAT program managers, preceptors, fellows, and Advisory Council members. The interview will cover topics such as your role in the program, your perception of program success, and any suggestions on the outcome evaluation approaches.

Your participation in the interview is entirely voluntary; there will be no consequences for non-participation, including on the part of the NIH, at the time of the study or in the future. Please feel free to decline to answer any questions that are posed to you or to stop the interview at any time, for any reason. Your answers will be kept confidential and will be reported in aggregate with other participants; you will not be quoted by name in our final report.

## Module 1A: Former NIGMS Program Staff

### *Roles and responsibilities*

- What years were you the PRAT program director?
- What were your roles and responsibilities related to the program?

### *Views on the program*

- What were the goals of the program at the time? If you know, have the goals changed? Has the program changed?
- What do you think were the limitations of the program at the time? Have these issues been resolved? If you know, what are the limitations of the program as it is currently?
- What are the advantages to being a PRAT fellow compared to other postdocs at NIH?
- Are there any disadvantages to being a PRAT fellow?

### *Views on the fellow population*

- How would you compare the fellows to their peers in terms of talent, ambition, commitment to science, potential to succeed as a scientist?

### *Communication with the fellow population*

- How was the progress of fellows assessed or evaluated?
- What opportunities were there for participants to engage with PRAT staff?
- How did you track or engage the alumni?
- How did you assess participants' satisfaction or dissatisfaction with the program?

### *Evaluation design*

- What program processes and outcomes are important to capture?
- What populations should be considered?
- Do you have any suggestions for the appropriate comparison groups?

## Module 1: NIGMS Program Staff

### Implementation procedures:

1. *{Once the protocol is approved}* Abt contacts PRAT program staff (N=2)<sup>35</sup> requesting a 30 minute phone interview
2. Abt conducts phone interviews
  - a. Respondents are given assurances of confidentiality
  - b. Notes are entered into the questionnaire template on the day of the interview

### Questions:

#### *Roles and responsibilities*

- How long have you been the PRAT program manager?
- What are your roles and responsibilities related to the program?

#### *Views on the program*

- What are the goals of the program?
- Is the program effective in meeting these goals?
- Would you change anything about the program?
- What issues or problems do you perceive regarding the program?
- What are the advantages to being a PRAT fellow compared to other postdocs at NIH?
- Are there any disadvantages to being a PRAT fellow?

#### *Views on the fellow population*

- How would you compare the fellows to their peers in terms of talent, ambition, commitment to science, potential to succeed as a scientist?

#### *Communication with the fellow population*

- How is the progress of fellows assessed or evaluated?
- What opportunities are there for participants to engage with PRAT staff?
- How do you track or engage the alumni?
- How do you assess participants' satisfaction or dissatisfaction regarding the program?

#### *Evaluation design*

- Have there been any changes to the program since its inception? If yes, what were these changes?
- What program processes and outcomes are of particular interest to you? To Congress?
- Are there any other stakeholders for the evaluation results? Who are they and what might be their interests?
- How would the evaluation results be used?
- What program data are available for the evaluation? How can these data be made available to Abt?

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<sup>35</sup> Richard Okita and Pamela Marino

- What populations should be considered? Do you have any suggestions for the appropriate comparison groups?
- Do you have in mind any outcome evaluation studies that you consider exemplary?

*Development of PRAT materials*<sup>36</sup>

- What information would you like to see included in each of these documents?
- Do you have any suggestions or preferences on the format, such as length and layout?
- Do you have any example materials that you like, which we could use?

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<sup>36</sup> Internal program policies and procedures document and external recruitment brochure

## Module 2: PRAT Mentors (“preceptors”)

### Application process

- How did you learn about the program? Is the program well known at NIH?
- Approximately, how many PRAT fellows have you nominated?
- How do you make a decision whether to nominate a fellow? Are there any characteristics of your postdocs that you see as appropriate for the PRAT fellowship?
- What has been your role in the application process?

### Program goals

- What, in your view, are program goals? Would you change these goals?

### Program role

- Have you participated in any program activities? If yes, please describe.
- Are you satisfied with your role in the program? Would you like to be more involved? Less involved?

### Views on the fellow population

- How would you compare the postdocs who received the fellowship with other postdocs in your research group in terms of talent, ambition, commitment to science, potential to succeed as a scientist?

### Satisfaction with the program

- Would you change anything about the program?
- What are the advantages to being a PRAT fellow compared to other postdocs at NIH?
- Are there any disadvantages to being a PRAT fellow?
- In what way, if at all, do you think the program helped the fellow’s career?

#### Probes

Research project, job search, preparation for the next career step

- Has the program had any effect on other members of your group? Your own career?

### Evaluation design

- What program processes and outcomes are of particular interest to you? What questions should be asked?
- What populations should be considered?
- Do you have any suggestions for the appropriate comparison groups?

### Module 3: PRAT Fellow

#### Decision to apply

- How did you learn about the program? Is the program well known at NIH?
- Why did you decide to apply for the fellowship?

#### Views on the program and on its career impacts

- What are the goals of the program? Is the program effective in meeting these goals?
- What activities were you involved in as a fellow?
- Were you satisfied with the application process? Do you have any recommendations how to change the process?
- Were you satisfied with your fellowship experience? What issues or problems do you perceive about the program? What would you change about the program?
- What benefits did you derive from being a PRAT fellow? What was the effect of the fellowship to your research work, career, and professional development?
- Are there any disadvantages to being a fellow?
- Have you continued to interact with the fellows or the program directors after the fellowship ended? Have you participated in any program activities after your fellowship ended?
- Do you have any knowledge of the fellows' satisfaction or dissatisfaction with the program?

#### *Views on the fellow population*

- How would you compare the fellows to your peers in terms of talent, ambition, commitment to science, potential to succeed as a scientist?

#### *Evaluation design*

- What program processes and outcomes are of particular interest to you? What questions should be asked?
- What populations should be considered?
- Do you have any suggestions for the appropriate comparison groups?

## Module 4: PRAT Advisory Committee

### Roles and responsibilities

- How did you learn about the program? Is the program well known at NIH?
- How long have you been on the Advisory Committee? Why did you decide to serve in this capacity?
- What are your roles and responsibilities the Advisory Committee member?
- Do you stay informed on the nature of the experience of the PRAT fellows? Do you interact with the fellows or the preceptors after the fellowship is awarded?
- Are you satisfied with your program role?
- Are you satisfied with the composition of the Advisory Council?

### Views on the fellow population

- How would you compare the fellows to their peers in terms of talent, ambition, commitment to science, potential to succeed as a scientist?
- Are you aware of the career progression of the former fellows? Their level of satisfaction with the program?

### Views on the program

- What are the goals of the program? Is the program effective in meeting these goals?
- Would you change anything about the program?
- What issues or problems do you perceive about the program?
- What are the advantages to being a PRAT fellow compared to other postdocs at NIH?
- Are there any disadvantages to being a PRAT fellow?

### Evaluation design

- What program processes and outcomes are of particular interest to you? What questions should be asked?
- What populations should be considered?
- Do you have any suggestions for the appropriate comparison groups?