

NIH Intramural Research Postdoctoral Fellows Mentoring Survey Report

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**NIH Fellows Committee Mentoring Subcommittee**

Shauna Clark-Chair

Mercy Guech-Ongey

Kara Lukasiewicz

Gila Neta

**Office of Intramural Research**

Joan Schwartz

## **Background**

In 1992, the Office of Intramural Research (OIR), Office of the Director (OD), established the Office of Education, which was reorganized and renamed as the Office of Intramural Training and Education (OITE) in 2004. The mission of the OIR, and its subsidiary office OITE, is to help prepare NIH trainees to become creative and productive leaders of the biomedical research community. To accomplish this mission, the OITE and Dr. Joan Schwartz, former Assistant Director of OIR, work with the NIH Fellows Committee (FelCom) to coordinate programs and provide individual assistance and resources to enhance the scientific, professional, and career development of NIH trainees and to ensure that all trainees receive appropriate mentoring. The OITE leads trans-NIH initiatives aimed at providing a comprehensive training experience for each trainee, from their arrival at NIH to their transition into the scientific workforce. These programs are complimented by the excellent programs offered by the 22 IC Intramural Research Programs through their Fellowship Offices. The expectation is that the NIH will lead the biomedical research community in promoting best mentoring practices and in developing outstanding and innovative training programs for all trainees.

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## Introduction

Whether a postdoctoral fellow perceives his/her mentoring to be of high quality largely depends on the expectations of that fellow and whether those expectations are being met. For postdoctoral fellows today the decrease in the number of academic positions available means that obtaining excellent mentoring and career advice from his/her supervisor(s) is even more essential. In order to determine the quality of mentoring at NIH, the Office of Intramural Research (OIR) in the Office of the Director (OD) and the Fellows Committee (FelCom) Mentoring Subcommittee have been regularly surveying the fellows' community since 1998. Several recommendations for improving mentoring at NIH were made after analysis of the 2001 mentoring survey results. Nearly a decade later, the FelCom Mentoring Subcommittee performed another survey to determine whether the recommendations made in 2001 have improved mentoring at NIH. In particular, the same questions from the 2001 survey were asked in the current survey, along with a few additional inquiries regarding the source and quality of mentoring and key issues like opportunities for networking and career development.



## Methods

We conducted a survey of NIH fellows to determine the level and quality of mentoring across all 22 NIH institutes with intramural research programs. Eligible participants were intramural postdoctoral NIH fellows as of March 31, 2010. Fellows included clinical, IRTA/CRTA, visiting, research and special volunteer fellows. Pre-doctoral and extramural fellows were excluded.

The survey was administered by a contractor (IMS) who ensured anonymity and confidentiality for survey participants. Prior to administering the survey to all NIH fellows, the questionnaire was pilot-tested on FelCom members. Based on responses from FelCom members, it was estimated that the survey took approximately 15 minutes to complete. The survey was a web-based self-administered questionnaire, access to which was sent on May 10, 2010 to all eligible participants using an NIH fellows' email list created by IMS, and which was open until June 7, 2010. During that period, several follow-up email reminders were sent to fellows who had not yet taken the survey. An incentive was provided to encourage participation: Amazon.com gift certificates (\$50) were randomly awarded to 200 respondents.

The survey included 64 questions, 56 of which covered seven major areas: awareness of resources (questions 1-5); defining the mentor relationship (questions 6-9); describing the level and quality of scientific direction and independence (questions 10-20); of mentor feedback and availability (questions 21-27); of recognition in publications and the lab (questions 28-37); of training and career development (questions 38-47); and of the overall quality of mentoring (questions 50-56). In addition, the survey included general questions to which participants could provide open-ended comments, as well as several optional questions on demographic characteristics of the respondent.

Results of the survey were analyzed by degree type, fellowship type, gender, race, age, and length of fellowship. In addition, comparisons were made between results from this survey and the survey administered in 2001. We also evaluated Institute or Center (IC) specific results. Chi-square tests were conducted for categorical data to estimate statistical significance at  $p < 0.05$ , comparing responses to questions by gender, race, type of fellow, type of degree, and time in fellowship. These were global tests to identify whether at least one specific group differed from the others with respect to a given question. In addition, where the global test indicated significant differences, follow-up t-tests were carried out to verify the differences.

## Results

### ***Demographics***

There were 4,208 eligible NIH fellows to whom access to the survey was sent, 43% of whom responded. Table 1 shows the demographic characteristics of survey respondents. Half were female, half were male. Only 15% had an MD or MD/PhD. Of the IRTA/CRTAs, the majority (66%) were Caucasian, followed by 17% Asian/Pacific Islander, 6% African-American, and 5% or less Hispanic, Native American, other, or unknown. Visiting fellows were the largest group of respondents (44%), followed by IRTA/CRTAs (30%), research fellows (19%), clinical fellows (5%), and other (1%). The percentage of respondents by fellowship type was in general agreement with the representation at the NIH, which includes approximately 8% clinical fellows, 25% research fellows, 45% visiting fellows and 23% IRTA/CRTAs. Although parameters of mentoring significantly differed with respect to type of degree, type of fellowship, gender, and race, there were no significant differences among fellows when analyzed by age or length of fellowship. In addition, the number of fellows per PI did not influence how frequently the fellows reported receiving a performance evaluation/progress review each year or whether they felt they received appropriate recognition for their work in publications, formal presentations from their lab, or within their laboratory/branch.

**Table 1 Demographic characteristics of NIH postdoctoral fellows who responded to the 2010 Mentoring Survey**

<b>Characteristic</b>	<b>Number responded</b>	<b>%</b>
<b><i>Gender *</i></b>		
Male	870	50
Female	862	50
<b><i>Ethnicity **</i></b>		
African-American	33	6
Asian/Pacific Islander	90	17
Caucasian	350	66
Hispanic	18	3
Native American	1	< 1
Other	26	5
Unknown	9	2
<b><i>Type of degree *</i></b>		
MD or MD/PhD	269	15
Not MD	1478	85
<b><i>Type of Fellow</i></b>		
Clinical	92	5
Research	327	19
IRTA/CRTA	527	30
Visiting	763	44
Other	23	1
<b><i>Length of Fellowship</i></b>		
<2 years	616	36
2+ years	1085	64
<b><i>Age</i></b>		
<30	237	14
30-35	1001	57
>35	509	29
<b>Total</b>	<b>1747</b>	<b>43</b>

\* Higher proportion of females and non-MDs relative to 2001 (39% female; 71% not MDs)

\*\* Only includes IRTA/CRTA fellows

### **Comparison of 2001 and 2010 Data**

The proportion of female fellows (50%) and non-MD fellows (85%) who responded to the 2010 survey is greater than the proportion who responded to the 2001 survey (39% female and 71% non-MD), suggesting that there may be a higher proportion of female and non-MD fellows now than in 2001. There were no substantial differences between the results of this survey compared with those of the 2001 survey regarding who provides scientific and career guidance mentoring, the level of scientific direction and amount of independence provided by the mentor, the frequency of meetings with the mentor, the amount of encouragement to present at meetings and help with networking with other scientists, the perception of whether training and career goals are being met, and the overall satisfaction with the quality of mentoring. There was some indication of small improvements in the mentors' availability, increasing from 46% to 51% among those who indicated that their mentor is always available, and decreasing from 14% to 8% among those who said that their mentor was only occasionally available (Table 2). There was also an increase in the proportion of fellows who had discussed training goals with their mentors, from 62% in 2001 to 71% in 2010. Moreover, the vast majority of both male (>80%) and female (>70%) fellows indicated that they were evaluated by their mentor at least once per year, in great contrast to the 2001 survey when approximately 40% of male and 60% of female fellows indicated yearly evaluations. There was some indication of decline in mentoring performance with regard to recognizing the fellows' contributions in publications and presentations as well as providing recognition within the lab or branch.

**Table 2 Comparison of 2001 and 2010 Survey Data**

	<b>2001</b>	<b>2010</b>
<b>Mentor's Availability</b>		
Always Available	46%	51%
Occasionally Available	14%	8%
<b>Discussed training goals with mentors</b>	62%	71%
<b>Evaluated at least once per year</b>		
Males	40%	80%
Females	60%	70%

### **Quality of Mentoring by Degree**

Of the fellows who responded to the survey, approximately 7.6% have an MD, 7.8% have an MD & PhD, 82% have a PhD and 2.6% have other degrees. For a number of the questions, there were no differences in responses relative to type of degree. For example, all felt that their training and career goals were being met; and that they received appropriate recognition in publications, formal presentations by their PIs and laboratory presentations. They were equally likely to have designed all or part of their research projects, to have analyzed the data, and to have written part or all of the manuscript. They had equivalent opportunities to peer-review manuscripts and to mentor a summer student or postbac.

However, there were some significant differences. MD/PhDs were most likely to have discussed the amount of scientific direction they needed (78% vs. 64-69% - Table 3) and most comfortable with what is provided (80% vs. 64% for MDs - Table 4). They were most satisfied with the amount of access to their mentor (always available 62% vs. 48-51% - Table 5).

**Table 3 Have you discussed the extent and nature of scientific direction you receive with your mentor?**

	<b>MD</b>	<b>PhD</b>	<b>MD/PhD</b>
Yes	68.9%	64.2%	78.1%
No	31.1%	35.8%	21.9%

p<0.01

**Table 4 How would you characterize the level of scientific direction provided?**

	<b>MD</b>	<b>PhD</b>	<b>MD/PhD</b>
Too much	6.8%	7.5%	7.3%
Too little	28.8%	19.7%	13.1%
Just right	64.4%	72.8%	79.6%

p<0.006 for MD vs MD/PhD

**Table 5 How would you rate your mentor's availability and is it sufficient?**

<b>Availability of Mentor</b>	<b>MD</b>	<b>PhD</b>	<b>MD/PhD</b>
Always	47.7%	51.3%	62.0%
Mostly	40.2%	40.8%	31.4%
Occasionally	10.6%	7.3%	6.6%
Not available	1.5%	0.6%	0.0%
<b>Sufficient</b>	<b>MD</b>	<b>PhD</b>	<b>MD/PhD</b>
Yes	78.8%	87.6%	88.3%
No	21.2%	12.4%	11.7%

p<0.0001 for availability of mentor; p<0.04 for sufficiency

The MD/PhDs were likely to get evaluations more than once per year (52% vs. 34% for PhDs) and to consider the feedback useful (63.5% vs. 51.9% for PhDs - Table 6). Reflecting all of this, and presumably their mentor's awareness of their research, they were most likely to present at scientific meetings (96% vs. 86-87% - Table 7) and to have their mentor promote scientific networking for them (86% vs. 71-75% - Table 8).

**Table 6 How frequently do you receive a performance evaluation/progress review from your mentor and is the scientific feedback useful?**

<b>Frequency of evaluation/review</b>	<b>MD</b>	<b>PhD</b>	<b>MD/PhD</b>
More than 1 per year	52.3%	34.0%	51.8%
One per year	32.6%	43.5%	35.8%
Less than 1 per year	6.1%	6.8%	3.6%
Never	9.1%	15.7%	8.8%

<b>Value of scientific feedback</b>	<b>MD</b>	<b>PhD</b>	<b>MD/PhD</b>
Very useful	60.6%	51.9%	63.5%
Somewhat useful	27.3%	38.8%	30.7%
Not useful	5.3%	5.3%	1.5%
Never receive feedback	6.8%	4.0%	4.4%

p<0.0001 for frequency; p<0.03 for value of scientific feedback

**Table 7 Have you presented at a scientific meeting; written a review or book chapter; performed most or all of the experiments for a paper?**

<b>Presentation at scientific meeting</b>	<b>MD</b>	<b>PhD</b>	<b>MD/PhD</b>
Yes	87.1%	86.1%	95.6%
No	12.9%	13.9%	4.4%
<b>Review or book chapter</b>			
Yes	41.7%	23.1%	24.1%
No	58.3%	76.9%	75.9%
<b>Experiments for paper</b>			
Yes	42.4%	54.0%	56.9%
No	57.6%	46.0%	43.1%

p<0.02 for presentation; p<0.0001 for review/book chapter; p<0.02 for experiments

**Table 8 Is your mentor helpful in promoting opportunities for networking with scientists outside your lab or branch?**

<b>Helpful</b>	<b>MD</b>	<b>PhD</b>	<b>MD/PhD</b>
Yes	75.0%	71.3%	86.1%
No	25.0%	28.7%	13.9%

p<0.001

Presumably this satisfaction with the mentoring they were receiving led them to rate the quality of mentoring, and its improvement over the course of the fellowship, the highest (excellent quality 57% vs. 38-44% and improved 51% vs. 28-31% - Table 9) and to be least likely to consider career options other than research (42% vs. 55% of PhDs - Table 10).

**Table 9 Rate the quality of the mentoring you receive and indicate whether it has improved over the course of your fellowship.**

Quality	MD	PhD	MD/PhD		Improvement	MD	PhD	MD/PhD
Exc.	43.9%	38.1%	56.9%		Improved	28.0%	30.7%	51.1%
Good	31.1%	34.2%	22.6%		Same	64.4%	62.4%	46.7%
Satisf.	15.2%	16.9%	13.9%		Worse	7.6%	6.9%	2.2%
Poor	9.8%	10.8%	6.6%					

p<0.02

p<0.0001

**Table 10 Have you considered careers other than bench or clinical/population research?**

	MD	PhD	MD/PhD
Yes	50.0%	55.2%	42.3%
No	50.0%	44.8%	57.7%

p<0.02

In contrast to the MD/PhDs, the MDs appeared to feel less prepared (for scientific direction, too little was high and just right the lowest of the respondents – Table 4) and indicated less commitment to a career in research (Table 10). Interestingly, they were both the most likely to have a second mentor (5.3% vs. 1.5-2.0%), and to report that no one mentors them (8% vs. 2-4% - Table 11).

**Table 11 Who provides your scientific and career development mentoring?**

	Scientific				Career		
	MD	PhD	MD/PhD		MD	PhD	MD/PhD
Supervisor	64.4%	80.9%	75.9%		53.0%	53.4%	53.4%



2 <sup>nd</sup> Mentor	5.3%	2.0%	1.5%		9.1%	2.7%	2.7%
Both	20.4%	10.3%	10.3%		18.2%	8.2%	13.1%
No One	7.6%	4.0%	2.2%		14.4%	25.4%	13.9%

p<0.0001

p<0.0001

The MDs were clearly looking for input from their mentors, and thus more likely to discuss both training (79% vs. 69% for PhDs) and career goals (78% vs. 64-67%) with their mentor (Table 12). Despite that, they were most likely to feel they receive too little scientific direction, whether they are clinical fellows or postdoctoral fellows (with an MD) (28% vs. 13-20% - Table 4). Similarly, they reported the least access to their mentor (always available 48% vs. 51-62%) and considered the availability insufficient (21% vs. 12%), again regardless of whether they are a clinical fellow or a postdoctoral fellow with an MD (Table 5).

**Table 12 Have you and your mentor discussed your training goals and your career goals?**

	Training			Career		
	MD	PhD	MD/PhD	MD	PhD	MD/PhD
Yes	78.8%	69.3%	78.8%	78.0%	64.3%	67.4%
No	21.2%	30.7%	21.2%	22.0%	35.7%	33.6%

p<0.02

p<0.02

Although the MDs receive evaluations more than once per year, they are most likely to say they never receive scientific feedback (7% vs. 4%) – part of this may reflect the biannual evaluations that fellows in GME programs receive, that are primarily related to the clinical aspects of their fellowship (Table 6). They were least likely to do experiments (42% vs. 54-57%) but most likely to write a review or book chapter (42% vs. 24%) (Table 7).

One suggestion of a lower interest in a research career was the finding that half of the MDs consider a discussion of taking a project along not applicable (50% vs. 34-45%) (Table 13).

**Table 13 If you are considering a PI position, have you discussed the option of taking a part of a current project with you?**

	MD	PhD	MD/PhD
Yes	22.0%	34.1%	34.3%
No	28.0%	32.3%	21.2%

Not applicable	50.0%	33.6%	44.5%
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p<0.0001

These findings suggest that if the NIH is serious about increasing the number of MDs involved in research, it needs to identify better ways to mentor them scientifically.

### **Quality of Mentoring by Fellowship Type**

Results from the NIH Fellow’s survey on mentoring show that 45% of all postdoctoral fellows at the NIH who participated in the survey are visiting fellows, followed by IRTA/CRTA (30%), research (19%), clinical (5%) and “other” fellows (1%). This survey provides an opportunity to assess the level of mentorship fellows are receiving based on their fellowship type. Considering the fact that the NIH fellows community is culturally diverse, with the majority of fellows coming from countries all over the world, there are bound to be some differences in how mentoring is perceived and evaluated. Therefore, results should be interpreted with caution. The results showed some significant differences by type of fellowship in the characterization of the level of scientific direction that mentors give. Clinical (30.4%) and IRTA/CRTA (25.2%) fellows reported getting too little scientific direction from their mentors compared to visiting (15.9%) and research fellows (18.7%) (Table 14 – p<0.05 for clinical vs. research fellows; p<0.001 for clinical fellows vs. visiting fellows; p<0.05 for IRTA/CRTAs vs. research fellows; p<0.0001 for IRTA/CRTAs vs. visiting fellows).

**Table 14 How would you characterize the level of scientific direction that your mentor gives you?**

	Type of Fellowship				
	Clinical N=92	Research N=327	IRTA/CRTA N=527	Visiting N=763	Other N=23
Too much	3.2%	4.9%	6.1%	9.7%	4.5%
Just right	66.3%	76.5%	68.7%	74.4%	72.8%
Too little	30.4%	18.7%	25.2%	15.9%	19.9%

p<0.0001 for overall table

p<0.05 for clinical vs. research fellows; p<0.001 for clinical fellows vs. visiting fellows; p<0.05 for IRTA/CRTAs vs. research fellows; p<0.0001 for IRTA/CRTAs vs. visiting fellows

When asked how often they received appropriate recognition for their work, significantly fewer visiting fellows (46.9%) felt that they always received appropriate recognition compared to research fellows (58.1%) (Table 15 – p< 0.03).

**Table 15 In publications and in formal presentations by members of your lab including your mentor, do you receive appropriate recognition for your work?**

	Type of Fellowship				
	Clinical N=92	Research N=327	IRTA/CRTA N=527	Visiting N=763	Other N=23
Always	53.6%	58.1%	60.0%	46.9%	65.2%
Most of the time	31.5%	34.9%	31.7%	41.7%	26.1%
Seldom	7.6%	6.4%	5.9%	8.0%	4.4%
Never	3.3%	0.6%	2.5%	3.4%	4.4%

p<0.001 for overall table; p<0.03 for visiting fellows vs. research fellows

When asked whether training, career and mentor’s goals for their fellowship were being met, significantly fewer visiting fellows compared to the other fellowship types indicated that these different goals were fully met (Tables 17, 18, and 19).

**Table 16 Are your training goals for your fellowship being met?**

Training goals	Type of Fellowship				
	Clinical N=92	Research N=327	IRTA/CRTA N=527	Visiting N=763	Other N=23
Fully met	23.9%	23.2%	24.3%	18.1%	30.4%
Mostly met	52.2%	56.6%	46.5%	51.5%	56.5%
Partially met	20.7%	17.1%	23.5%	27.0%	4.4%
Not met at all	3.3%	3.1%	5.7%	3.4%	8.7%

p<0.001 for overall table

p<0.004 for visiting fellows vs. research fellows; p<0.006 for visiting fellows vs. IRTA/CRTAs

**Table 17 Are your career goals for your fellowship being met?**

Career goals	Type of Fellowship				
	Clinical N=92	Research N=327	IRTA/CRTA N=527	Visiting N=763	Other N=23
Fully met	19.6%	21.1%	21.6%	13.9%	26.1%
Mostly met	46.7%	48.6%	40.2%	44.4%	52.2%
Partially met	32.6%	23.9%	30.7%	33.2%	13.0%
Not met at all	1.1%	6.4%	7.4%	8.5%	8.7%

p<0.001 for overall table

p<0.001 for visiting fellows vs. research fellows; p<0.05 for visiting fellows vs. clinical fellows; p<0.004 for visiting fellows vs. IRTA/CRTAs

**Table 18 Are your mentor's goals for your research project being met?**

Mentor's goals	Type of Fellowship				
	Clinical N=92	Research N=327	IRTA/CRTA N=527	Visiting N=763	Other N=23
Fully met	23.9%	25.8%	24.5%	16.2%	30.4%
Mostly met	50.0%	52.0%	47.8%	49.0%	47.8%
Partially met	18.5%	14.4%	13.5%	20.6%	8.7%
Not met at all	0.0%	0.9%	1.5%	0.9%	0.0%
Don't know	5.4%	4.3%	10.0%	9.2%	13.0%
Never discussed	2.2%	3.4%	2.9%	4.2%	0.0%

p<0.001 for overall table

p<0.0001 for visiting fellows vs. IRTA/CRTAs; p<0.0001 for visiting fellows vs. research fellows

### **Quality of Mentoring by Gender**

Essentially half of all postdoctoral fellows at the NIH are women and this provides an important opportunity to increase the percentage of faculty who are women both at the NIH and at other research institutions. However, for this to occur the women must feel that they are receiving equal treatment and are equally likely to succeed if they become PIs. In many categories, men and women responded comparably: for example, being provided the opportunity to peer-review a manuscript; to write the first draft of their paper; to write a review/book chapter; to present at a scientific meeting; to have mentored a student. They equally felt they received recognition for their contributions in publications or formal presentations, and that they had discussed their training and career goals with their mentor. However, some significant differences were identified in the way the women perceive that they are being mentored. They indicated that the frequency of meetings with their mentors was not sufficient from their perspective (84% vs. 90% for men - Table 19). When asked how often they met with their mentor in person, women indicated a lower frequency than men (69% daily or weekly vs. 76% for men ( $p < 0.005$ )- Table 20).

**Table 19 Is the frequency of these meetings sufficient for your needs?**

<b>Sufficient</b>	<b>Men</b>	<b>Women</b>
Yes	90.1%	83.9%
No	9.9%	16.1%

$p < 0.0001$

**Table 20 How often do you meet in person with your mentor on an individual basis?**

<b>Frequency</b>	<b>Men</b>	<b>Women</b>
Daily	25.4%	18.8%
Weekly	51.3%	50.5%
Monthly	13.1%	15.8%
Less than once per month	9.3%	11.1%
Never	0.9%	1.2%

$p < 0.001$  for overall table;  $p < 0.005$  for daily plus weekly men vs. women

Meetings with one's mentor are important to ensure that the mentor knows the fellow and his/her research well enough that the mentor can promote the fellow when invitations for talks and job

applications are received. In line with the lower access are the data that women receive evaluations less frequently (Table 21).

**Table 21 How frequently do you receive a performance evaluation/progress review from your mentor?**

Frequency	Men	Women
More than one/year	41.3%	33.2%
Once/year	40.1%	43.7%
Less than once/year	5.6%	7.1%
Never	13.0%	16.0%

p<0.004 for overall table

p<0.02 for one or more/year vs. less than once/year or never for men vs. women

Less knowledge about how their female postdocs are doing, as a result of fewer meetings and evaluations, may result in mentors being less likely to promote networking opportunities for them (68% vs. 77% for men - Table 22). These differences were true whether the mentor was male or female. However, it is likely that they reflect the fact that women on average tend to be less assertive about making their needs known.

**Table 22 Is your mentor helpful in promoting opportunities for networking with scientists outside your lab or branch?**

Helpful	Men	Women
Yes	77.2%	67.9%
No	22.8%	32.1%

p<0.0001

The net result of the lack of availability, evaluation, and promotion of networking opportunities may be that women were less likely to feel that their training and career goals are being fully or mostly met (70% for training goals vs. 75% for men; 58% for career goals vs. 66% for men - Table 23), even though they had indicated equivalent discussion of training and career goals with their mentors. The differences were significant regardless of whether the categories were collapsed to fully + mostly vs. partially + not met, or analyzed as separate responses.

**Table 23 Are your training and career goals for your fellowship being met?**

	Training Goals			Career Goals	
	Men	Women		Men	Women
Fully	22.9%	19.7%		19.5%	16.4%
Mostly	52.5%	49.8%		46.2%	42.5%
Partially	20.3%	26.6%		27.2%	33.3%
Not met	4.2%	3.9%		7.0%	7.9%
	p<0.02			p<0.02	

That impacts on the women’s perception of the quality of the mentoring received and whether it improved over the course of the fellowship (quality excellent for 34% of women vs. 46% of men; improvement seen by 29% of women vs. 35% of men - Table 24). These results are also significant regardless of how categories are collapsed.

We cannot know for sure but all these factors may contribute to women being less interested in PI positions (43% vs. 30% of men felt that this was not applicable,  $p < 0.001$  - Table 25) and more likely to consider other career options (58% vs. 50% for men - Table 26). The types of other career options being considered by men and women are shown in Figure 1.

**Table 24 Rate the quality of mentoring you receive and indicate whether it has improved over the course of your fellowship.**

Quality of Mentoring	Men	Women	Improvement	Men	Women
Excellent	46.1%	33.8%	Improved	34.9%	28.8%
Good	29.2%	36.8%	Same	59.5%	63.5%
Satisfactory	15.3%	18.1%	Worse	5.5%	7.8%
Poor	9.4%	11.4%			
	p<0.0001			p<0.008	

**Table 25 If you are considering a PI position, have you discussed the option of taking a part of a current project with you?**

	<b>Men</b>	<b>Women</b>
Yes	37.5%	27.5%
No	32.5%	29.8%
Not applicable	30.0%	42.7%

p<0.0001

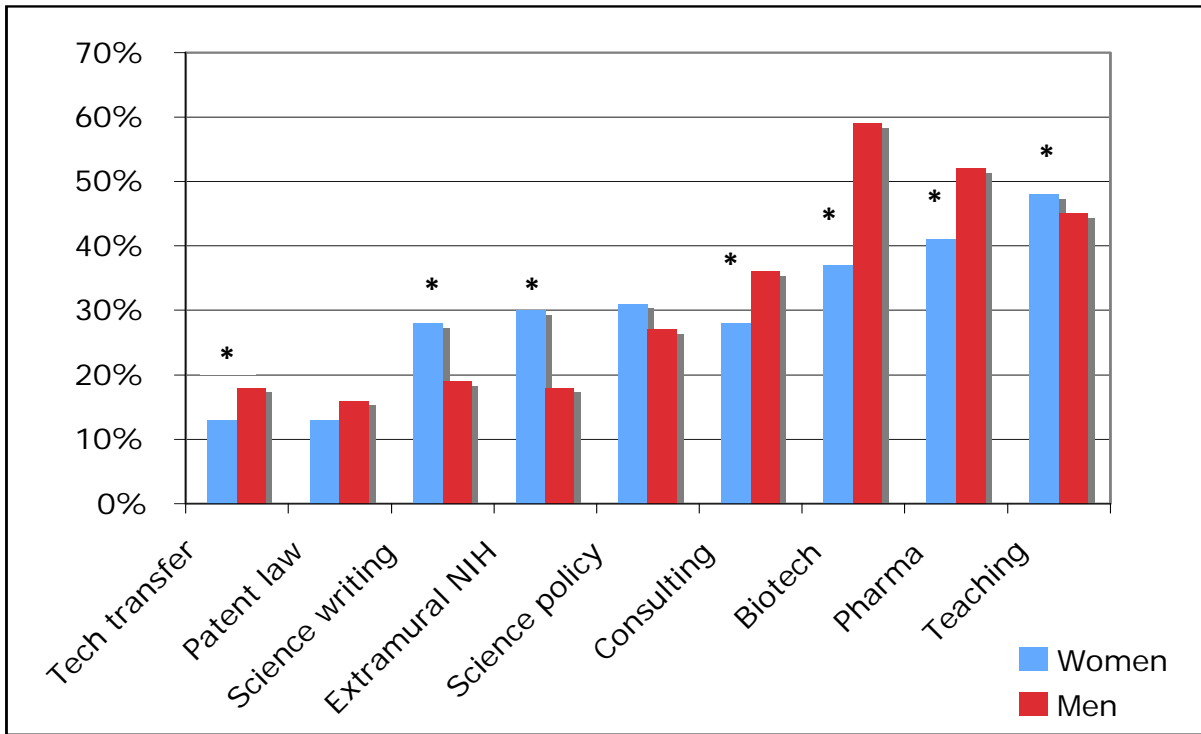
**Table 26 Have you considered careers other than bench or clinical/population research?**

	<b>Men</b>	<b>Women</b>
Yes	49.5%	58.2%
No	50.5%	41.8%

p<0.001



Figure 1 "Non-academia" careers under consideration.



\* p<0.05

## Quality of Mentoring by Race

The US Office of Management and Budget defines race as a self-identified, self-reported social and cultural concept. Here, we report race/ethnicity-based differences in mentoring of postdoctoral fellows at NIH who are US citizens or permanent residents (i.e., IRTAs or CRTAs). Of the 1,747 NIH fellows that participated in the survey, 527 were included in this section of the analysis. The participants included 17% Asian, 6% Black, 3% Hispanic (of any race), 66% White, 5% who checked more than one race, and less than 2% Native American and unknown. For the most part all fellows were equally satisfied, regardless of race/ethnicity. However, there were some significant differences among fellows from different races/ethnicities with regard to their mentor/mentee relationships and the usefulness of these interactions. When asked, “who mainly provides your scientific mentoring”, Hispanics were more likely to indicate that no one was mentoring them (22% Hispanics vs. 4-8% all other groups; Table 27 –  $p < 0.0001$  vs. whites).

**Table 27 Who mainly provides your scientific mentoring?**

Race	Supervisor	Alternate mentor	Both	Other	No one
Asian	69.0 %	1.1 %	17.0 %	5.6 %	7.8 %
Black	67.0 %	6.1 %	18.0 %	3.0 %	6.1 %
Hispanic	67.0 %	0.0 %	5.6 %	5.6 %	22.0 % <sup>*</sup>
White	78.0 %	3.4 %	11.0 %	4.3 %	4.0 %

\*  $p < 0.001$  vs. whites (other groups too small for statistical comparisons)

Interestingly, when asked about the usefulness of mentor evaluations, Hispanic fellows were more likely to find the evaluations not useful (22.2% vs. 3-7.7% -  $p < 0.035$  vs. whites) and Black fellows were less likely to report ever having been evaluated (15.2% vs. 0-7.8% -  $p < 0.001$  vs. whites) compared to fellows in all other groups (Table 28). There were no significant differences among the groups regarding the frequency of meetings with supervisors (data not shown), which may indicate that informal meetings are insufficient to provide adequate evaluation and feedback for some fellows. These results underscore the need for a standard formal evaluation process that occurs on a regular basis (perhaps biannually) for all fellows.

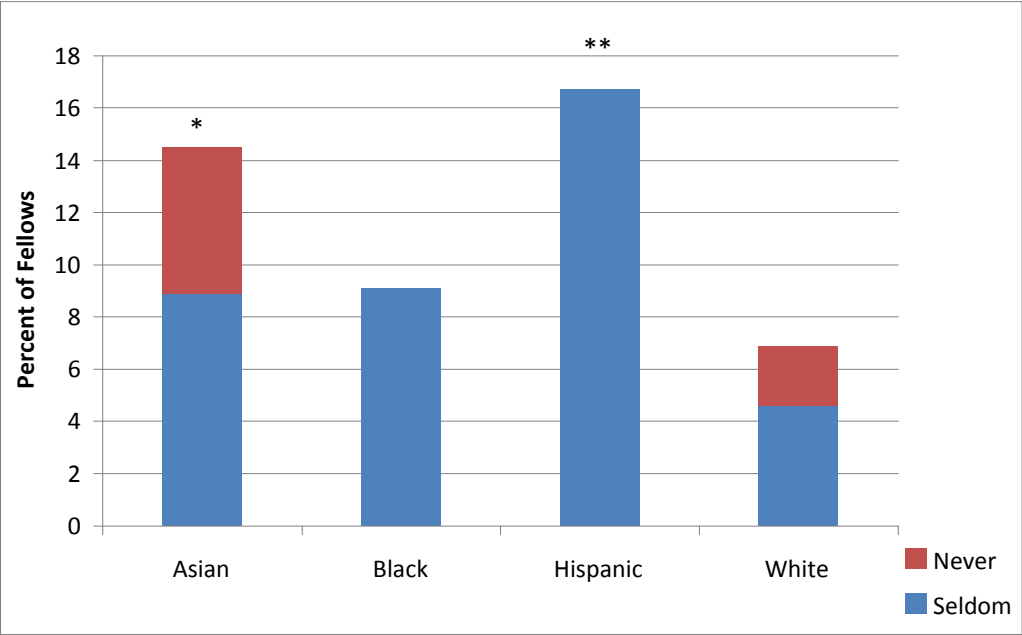
**Table 28 When your mentor evaluates your work, how useful is that?**

<b>Race</b>	<b>Very useful</b>	<b>Somewhat</b>	<b>Not Useful</b>	<b>Never Evaluated</b>
Asian	45.6 %	42.2 %	4.4 %	7.8 %
Black	60.6 %	21.2 %	3.0 %	15.2 % <sup>**</sup>
Hispanic	55.6 %	22.2 %	22.2 % <sup>*</sup>	0.0 %
White	49.1 %	40.0 %	7.7 %	3.1 %

\* p<0.035 vs. whites; \*\* p<0.001 vs. whites

Although most fellows in all groups report receiving appropriate recognition for their work, only Asian and White fellows indicated “never” receiving recognition (5.6% and 2.3% respectively), and Hispanic fellows were most likely to report “seldom” receiving recognition for their work (Figure 2). Both Asians (p<0.007) and Hispanics (p<0.015) were significantly more likely than Whites to report that they seldom/never received appropriate recognition. The real or perceived lack of recognition may cause disenchantment among fellows, possibly leading to poor mentor/mentee relationships and decreasing the overall quality of the training experience.

Figure 2 Do you receive appropriate recognition for your work?



\* p<0.007 vs. whites    \*\* p<0.015 vs. whites

## Conclusions and Recommendations

These survey results are an invaluable tool to guide our understanding of the merits and shortcomings of mentoring at the NIH. An appreciation of the origin(s) of the differences found in this survey among various groups of fellows is imperative to determine what steps should be taken to address each finding. One fundamental question in all cases where significant differences were noted is whether the affected groups are treated differently than their peers or are they responding differently to their surroundings and situations. Both possibilities need to be addressed in order to ensure quality training experiences for all fellows. Below we describe a set of recommendations, based on the findings from the survey, for OIR and the Scientific Directors to consider.

- (1) Our first recommendation is that the Trans-NIH Mentoring Committee develop a workshop to train PIs in mentoring. We suggest that all PIs who take on trainees should be required to complete the workshop. In addition to this one-time workshop, continued refresher courses on mentoring (perhaps an abbreviated online version of the workshop) should be taken every one to two years.
- (2) The second recommendation is to ensure that annual evaluations of trainees are being done appropriately. In the 2001 Mentoring Report we recommended that mentors provide mentees with an annual assessment of the trainee's progress, strengths, and areas requiring improvements. These evaluations should include an in-person discussion between the trainee and mentor. Interestingly, in the current survey approximately 14% of fellows report never receiving a performance evaluation or progress review and an additional 6% report receiving an evaluation less than once per year. Therefore, we suggest that Scientific Directors ensure that all evaluations involve a meeting between mentor and trainee, and that this meeting and written documentation be required for renewal of the fellowship.
- (3) A review of the data by type of degree suggests that fellows with an MD (whether clinical or postdoctoral fellows) appeared to feel the least prepared and indicated the least commitment to a career in research relative to their PhD or MD/PhD peers. More information is required to properly address this issue; therefore we recommend that Clinical FelCom, the FelCom Mentoring Subcommittee, and representatives from the CC Office of Clinical Research Training and Medical Education have a roundtable discussion of the origin of these findings, to address the seemingly unique needs of this population of fellows.
- (4) Visiting Fellows are the largest group of fellows at NIH and make up 45% of the survey respondents. Only 18% of this group responded that their training goals were being fully met. It would be interesting to determine if these results reflect cultural differences in expectations between mentors and trainees. We recommend that a follow-up survey aimed specifically at Visiting Fellows be carried out to ascertain and address specific issues in this population. In addition, we recommend that all PIs take the OITE course on cultural diversity, or alternatively that a section on cultural diversity be included in the mentor-training workshop mentioned in recommendation one.

(5) In our assessment of fellows by gender, we found that female fellows were more likely than males to report a lack of mentor availability, evaluation, and promotion of networking opportunities and were less likely to respond that their training and career goals are being fully or mostly met. One possible reason for these results is that female fellows may be less assertive than their male counterparts and therefore do not seek out their mentors or request their time as frequently. In order to address this concern we recommend that a training workshop designed to specifically address how to make one's needs known should be implemented and available to fellows at least once per year. [We have since learned that OITE offers such a workshop, called Speaking Up]. We also recommend that PIs regularly assess if their availability and scientific direction are sufficient for the trainees in their labs. In addition, sessions for fellows (particularly females) that address how to navigate career and family are recommended and may help retain some of the fellows who had been considering careers outside of bench or population-based research.

(6) Our recommendations for improving mentoring with regards to race and ethnicity begin with trying to understand why 22% of Hispanic fellows report that no one mentors them. We propose a discussion with appropriate senior Hispanic PIs at NIH about creating a "support" group for Hispanic scientists similar to the Black Scientist Association (BSA) headed by Roland Owens. This group would also give Hispanic fellows a chance to network with one another and discuss other important issues affecting this population. [OITE has just established a chapter of SACNAS (Society for the Advancement of Chicano and Native American Scientists) at the NIH, which could begin to address these issues]. The Mentoring Subcommittee would like to work with both groups (BSA and SACNAS chapter) to enhance the services they provide for postdoctoral fellows. Interestingly, Hispanics were more likely to report that when they are evaluated this process is not useful, while approximately 15% of black fellows report never being evaluated. Again, we recommend annual formal evaluations as well as less formal (and more frequent) progress assessments, which should benefit all fellows but may be especially useful to those that report never being evaluated.

## **Acknowledgements**

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We also appreciated useful input and recommendations from the Scientific Directors, Training Directors and members of FelCom, and Drs. Patricia Hartge and Joni Rutter, members of our advisory board.

We particularly appreciated the Set-aside Evaluation funding provided by DPCPSI/OD, without which it would not have been possible to carry out the survey.

## **Appendix 1- Open Comments**

The NIH FelCom 2010 survey contained several questions (questions 3, 7, 17, 19, 37, 48, 55, and 56) that allowed fellows to write in comments. As part of our analysis, the FelCom mentoring committee has further dissected the comment questions and presented those analyses as pie charts in Figures 3-8. Here we present some additional information about those analyses.

### **Question 3 (Figure 3): How did you learn about Felcom?**

Although there were not many respondents to this question, two interesting pieces of information were learned. First, 17% of fellows had no idea what Felcom was. Second, IC Training Offices were the source of information for only 7%, suggesting that these offices could do a more significant job of informing new fellows. In contrast, at NIEHS the NTA and their training office informed another 7%.

### **Question 5 (Figure 4): Who else mentors you?**

Respondents were asked to indicate others who provide mentoring.

### **Question 37 (Figure 5): Has your mentor encouraged you to present your work at scientific meetings? If you answered "No", please specify why not?**

Half of the respondents to this question stated that lack of progress or data in the project was the reason that he/she was not encouraged to present at scientific meetings. The next highest percentage response was grouped under “mentor” at 23%. Comments that fit into this group included that mentors had someone other than the respondent present the work, that mentors deemed the respondent’s data inadequate, that mentors considered presenting at scientific meetings to be unimportant and that the mentor felt that presenting at scientific meetings was a waste of time. Fear of being scooped after presenting unpublished data was cited as the reason in 9% of responses, while funding was cited in 4% of responses. Comments grouped under “other” cited language barrier, a conflict with another NIH lab, lack of a suitable forum, or that the postdoctoral fellow, not the mentor, initiated the discussion about presenting at a scientific meeting.



**Question 47 (Figure 6): Have you considered careers other than bench or clinical/population-based research? If you answered Q46 "Yes", what type(s) of careers have you considered? (Mark all that apply). If you answered Q47 "Other", please specify:**

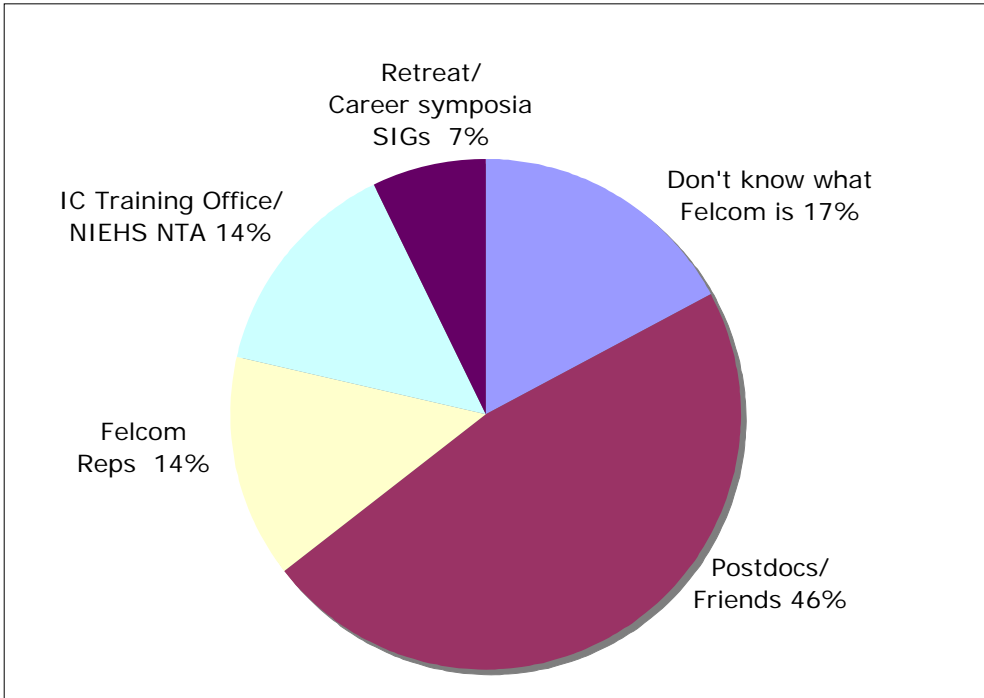
The largest group, accounting for 33% of the responses, chose clinical practice. A striking 4% of the responses cited that they were considering careers completely outside of science. The remaining 21% were so varied that they were grouped as “other”. This group contained responses as diverse as forensics, politics, sales, computational biology, and consulting.

**Question 55 (Figure 7): What are the most positive aspects of the mentoring you have received at NIH? You may respond "Not applicable".**

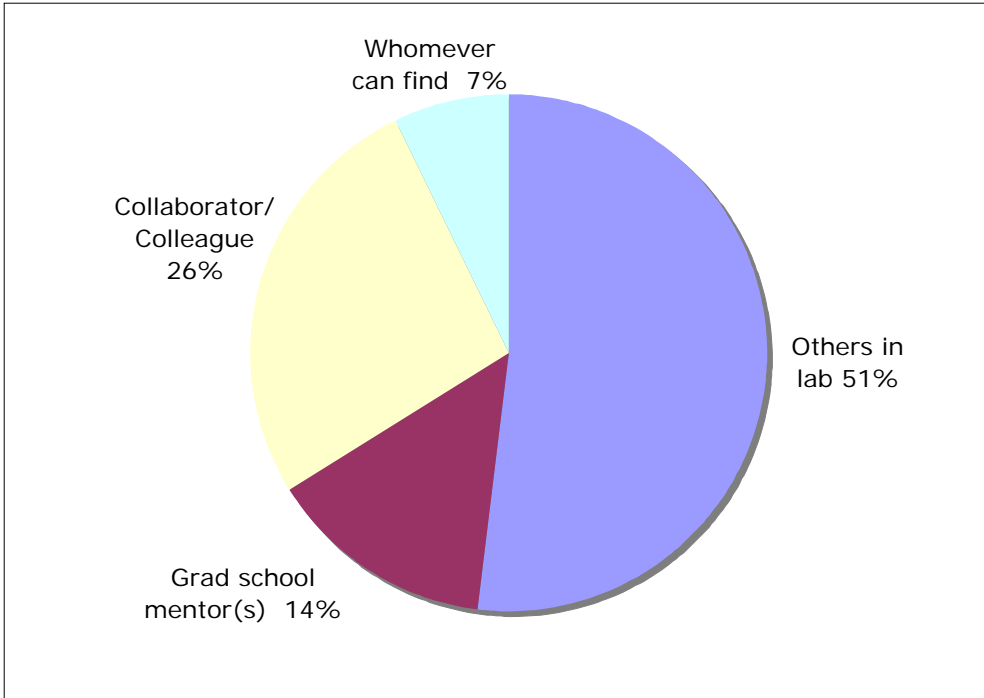
Scientific training was the most common response followed by mentor, environment, career development, and networking and collaboration. Of note, OITE was specifically mentioned in 3% of all the responses.

**Question 56 (Figure 8): What aspects of the mentoring you have received at NIH need improvement? You may respond "Not applicable".**

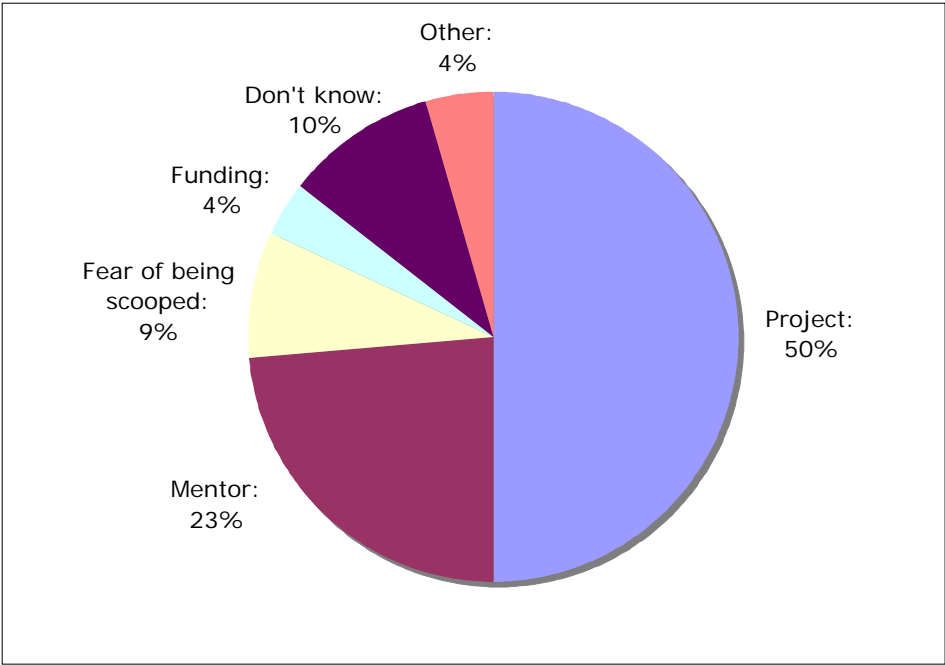
The groups of responses listed from most common to least common were career development, scientific training, mentor, networking and collaborations, environment, “all”, and evaluations. Comments were grouped into the “all” category when the respondents indicated that all aspects of NIH needed improvement.



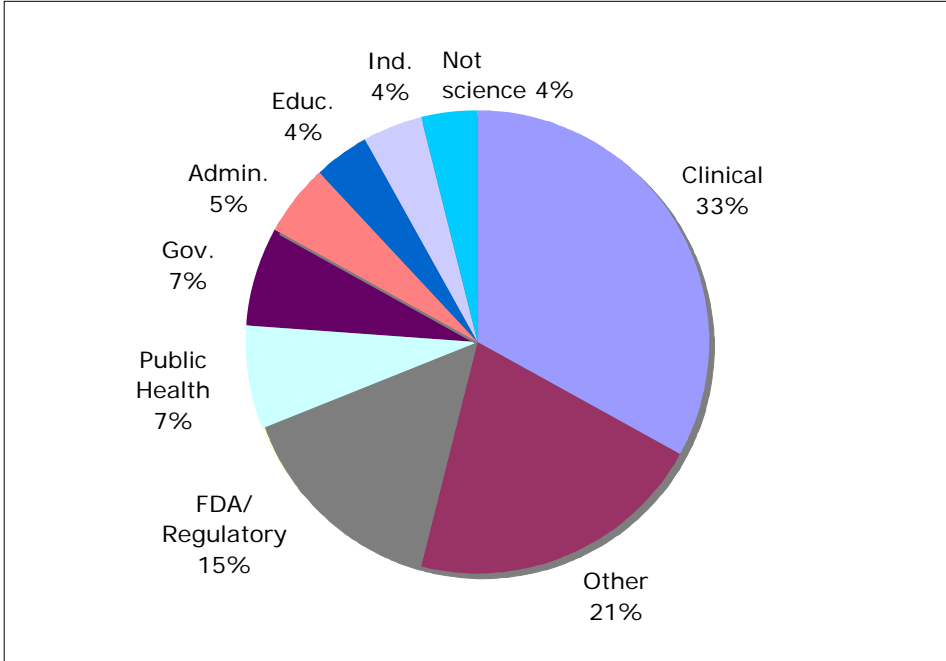
**Figure 3** How did you hear about FelCom?



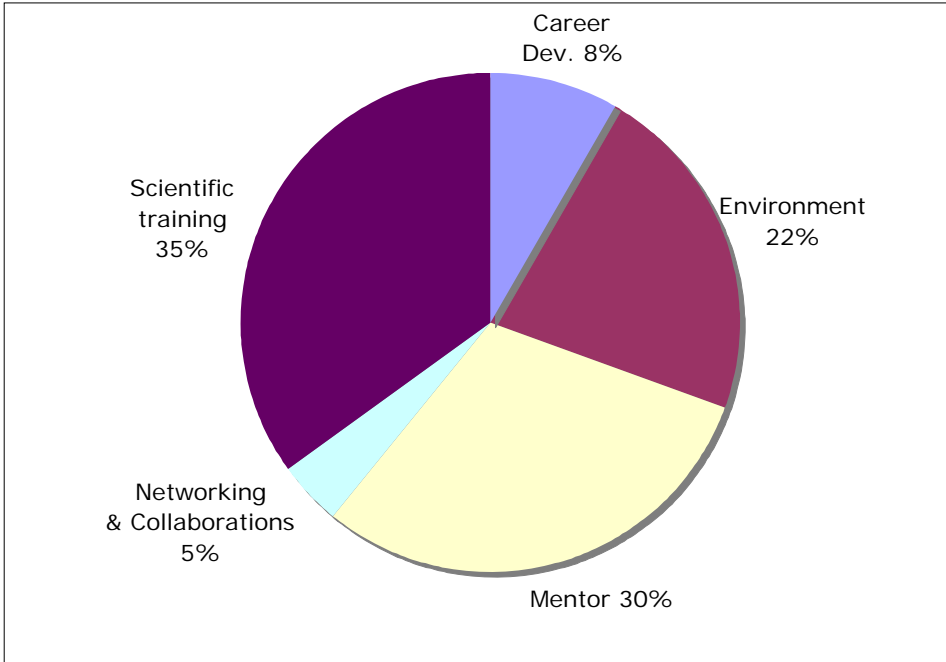
**Figure 4 Who is your second mentor?**



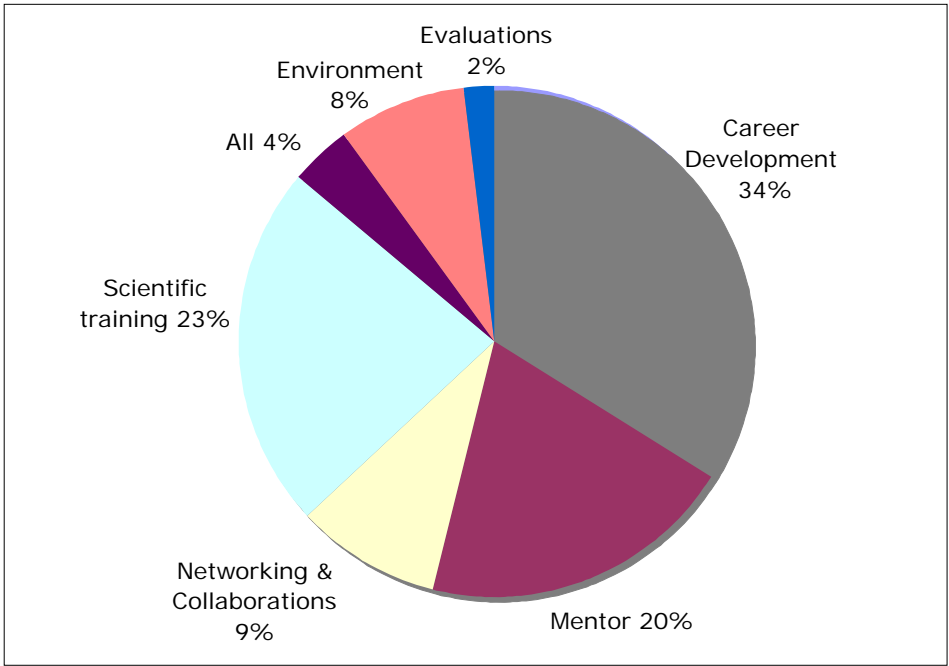
**Figure 5 Reasons for not presenting at scientific meetings**



**Figure 6 Careers considered besides bench, clinical, or population research**



**Figure 7 Positive aspects of mentoring at NIH**



**Figure 8 Aspects of mentoring at NIH that need improvement**

## Appendix 2 - 2010 Mentoring Survey

### Fellows Training (Resources) Materials

1. Did you receive the NIH guidelines for:

*\*Training and Mentoring?*

- a. Yes
- b. No
- c. Don't know

*\*Conduct of Research?*

- a. Yes
- b. No
- c. Don't know

2. Are you aware of the Office of Intramural Training and Education and its resources, such as the new postdoctoral fellow orientation or handbook?

- a. Yes
- b. No

3. How do you learn about FelCom events and activities? Please select all that apply from the drop-down menu.

4. Are you aware of your Institute or Center (IC) Training/Education Office's resources, such as grant writing, teaching curriculum, or writing courses/workshops?

- a. Yes
- b. No

### Identification of primary source of mentoring

5. Who mainly provides your scientific mentoring?

- a. My supervisor
- b. Someone else designated as my mentor
- c. Both
- d. Other \_\_\_\_\_ (please specify)
- e. No one

6. Who mainly provides your career guidance mentoring?
- a. My supervisor
  - b. Someone else designated as my mentor
  - c. Both
  - d. Other
  - e. No one

For the remaining questions, assume your direct supervisor is your mentor:

7. My mentor is:
- |                       |                       |
|-----------------------|-----------------------|
| Male                  | Female                |
| <input type="radio"/> | <input type="radio"/> |

Quality of scientific direction provided by mentor

8. How would you characterize the level of scientific direction that your mentor gives you?
- a. Too much
  - b. Too little
  - c. Just right
9. How would you have answered this question 2 years ago?
- a. Too much
  - b. Too little
  - c. Just right
  - d. Not applicable
10. Have you discussed with your mentor the extent and nature of scientific direction you want him/her to give you for your project within the present year?
- a. Yes
  - b. No
11. How would you characterize the amount of independence you have in your research?
- a. Too much
  - b. Too little
  - c. Just right

12. Has the extent and nature of scientific direction that you have received ever been a source of tension between you and your mentor?
- a. Never
  - b. Occasionally
  - c. Often
  - d. Very often

If you answered "often" or "very often", did you seek conflict resolution assistance?

- a. Yes
- b. No

If you said "yes", which resource(s) did you seek out for help?

- a. Lab or Branch Chief
- b. Institute/Center (IC) Training Director
- c. OITE
- d. Ombudsman's Office
- e. Other (please specify): \_\_\_\_\_

Was the conflict resolved?

- a. Yes
- b. No
- c. Additional comments (optional) \_\_\_\_\_

13. If you are considering a PI position, have you discussed the option of taking some part of your current postdoctoral project with you as a starting point for your own research lab?
- a. Yes
  - b. No
  - c. Not applicable

Extent and type of scientific direction provided by mentor

14. In general, when your mentor critically evaluates your work, how useful is that criticism?
- a. Very useful
  - b. Somewhat useful
  - c. Not useful
  - d. Never critically evaluates my work
15. When your work is going well, how useful is your mentor's feedback?
- a. Very useful
  - b. Somewhat useful



- c. Not useful
  - d. Never gives feedback
  - e. My work has never gone well
16. How frequently do you receive a performance evaluation/progress review from your mentor?
- a. More than once per year
  - b. Once per year
  - c. Less than once per year
  - d. Never

Extent of mentor availability

17. How would you rate your mentor's availability to you? By availability, we are referring to "face-to-face" time and response to email correspondence and telephone calls.
- a. Always available
  - b. Mostly available
  - c. Occasionally available
  - d. Not available
18. How often do you meet in person with your mentor on an individual basis?
- a. Daily
  - b. Weekly
  - c. Monthly
  - d. Less than once per month
  - e. Never
19. Is the frequency of these meetings sufficient for your needs?
- a. Yes
  - b. No
20. How many other postdoctoral fellows work directly for your mentor?
- a. 0
  - b. 1
  - c. 2
  - d. 3
  - e. 4 or more
  - f. Don't know

Opportunities for building communication skills

21. Has your mentor provided opportunities for you to peer-review manuscripts?
- a. Yes
  - b. No
22. Has your mentor let you write the first draft of your own manuscripts?
- a. Yes
  - b. No
  - c. Not applicable
23. How many publications do you have from your current postdoctoral position at NIH? \_\_\_\_\_

On how many of your publications are you first or co-first author? \_\_\_\_\_

24. What were your contributions to the manuscript(s)? (**check all that apply**)
- a. Wrote the first draft
  - b. Performed all or most of the experiments
  - c. Wrote part of the paper
  - d. Wrote part of or the entire discussion
  - e. Contributed to the discussion
25. Have you written a review or book chapter during your current postdoc?
- a. Yes
  - b. No
26. In publications and in formal presentations by members of your laboratory including your mentor, do you receive appropriate recognition for your work?
- a. Always
  - b. Most of the time
  - c. Seldom
  - d. Never

27. Within your lab or branch, do you receive appropriate recognition for your work?

- a. Yes
- b. Most of the time
- c. Seldom
- d. Never

28. Has your mentor encouraged you to present your work at scientific meetings?

- a. Yes
- b. No
- c. If no, why? \_\_\_\_\_

Networking opportunities provided by mentor

29. Is your mentor helpful in promoting opportunities for networking with scientists outside your lab or branch?

- a. Yes
- b. No

30. Has your mentor helped to set-up collaborations with others outside your laboratory?

- a. Yes
- b. No

If so, are your collaborations with:

- a. A PI
- b. A staff scientist
- c. A fellow

If so, are your collaborations outside of:

- a. Your Laboratory/Branch/Program
- b. Your Institute or Center (IC)
- c. NIH

31. Approximately how many seminars do you attend per month (seminars within Institutes or Centers (IC) throughout NIH?)

- a. 0
- b. 1 to 5
- c. 6 to 10
- d. More than 10

#### Career development

32. Have you and your mentor discussed the possibility of you taking courses at FAES, other NIH courses, and/or courses outside NIH?

- a. Yes
- b. No

33. Have you mentored a student (summer, post-bac, etc)?

- a. Yes
- b. No

34. Have you and your mentor sat down to discuss your:

Training goals?

- a. Yes
- b. No

Career goals?

- a. Yes
- b. No

35. Have you considered careers other than bench or clinical/population-based research?

- a. Yes
- b. No

If yes, what type(s) of careers have you considered? (choose all that apply)

- a. Science policy
- b. Science writing
- c. Technology transfer
- d. Patent law
- e. Biotechnology
- f. Pharmaceutical
- g. Teaching
- h. Consulting
- i. Extramural NIH Program Development/Grant Review
- j. Other \_\_\_\_\_

36. Is your mentor supportive of you pursuing such careers?

- a. Yes
- b. No
- c. Haven't discussed it
- d. Don't know
- e.

#### Summary Questions

37. Are **your** training goals for your fellowship being met?

- a. Fully met
- b. Mostly met
- f. Partially met
- g. Not met at all

38. Are **your** career goals for your fellowship being met?

- a. Fully met
- b. Mostly met
- c. Partially met
- d. Not met at all

39. Are **your mentor's** goals for your research project being met?

- a. Fully met
- b. Mostly met
- c. Partially met
- d. Not met at all
- e. Don't know
- f. Never discussed

40. Overall, how would you rate the quality of mentoring you now receive?

- a. Excellent
- b. Good
- c. Satisfactory
- d. Poor

41. Over the course of your fellowship, has the quality of the mentoring you receive changed?

- a. Improved
- b. Stayed the same
- c. Worsened

What are the most positive aspects of the mentoring you have received at NIH? \_\_\_\_\_

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What aspects of the mentoring you have received at NIH need improvement? \_\_\_\_\_

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### Demographic Information

These data will be used for statistical purposes only; please answer as many questions as possible.

I am:

Male                  Female

I was born in the year:

I am a:

- Clinical Fellow
- Research Fellow
- IRTA/CRTA
- Visiting Fellow
- Other

I have a (**check all that apply**):

- MD       PhD       DDS/DMD  
 DVM  DO       Other

How many **previous** post-doctoral positions have you held?

- 0     1     2  
 3     More than 3

In what year did you begin your **current** fellowship?

Institute or Center:

- FDA/CBER     NHGRI       NICHD       NINDS  
 CC               NHLBI       NIDA       NINR  
 NCCAM           NIA           NIDCD  
 NCBI/NLM     NIAAA       NIDCR  
 NCI-CCR       NIAID       NIDDK  
 NCI-DCEG     NIAMS       NIEHS  
 NEI               NIBIB       NIMH



Ethnicity/Race (**check all that apply**):

Asian/Pacific Islander

Black

Hispanic

Native-American

White

Other