2009 Survey of Neuroscience Graduate, Postdoctoral, & Undergraduate Programs

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Introduction

Neuroscience departments and programs are relatively new entities, being virtually unknown 40 years ago. By now they are plentiful, diverse in organization and goals, and still evolving. For years the former Association of Neuroscience Departments and Programs (ANDP) attempted to monitor that evolution by characterizing the departments and programs along several important dimensions so they could better understand their members (i.e., bench-marking), and empower the departments to more fully represent themselves to colleagues, deans, students, and to the federal agencies that support pre-doctoral and postdoctoral training programs.

The first ANDP surveys of graduate and postdoctoral training in the U.S and Canada were conducted in 1986 by Michael Zigmond, in 1991 by Linda Spear, and in 1998 by Lesly Huffman, Robert Fellows, and Ronald Schoenfeld.[1, 2] In 2000, ANDP wanted to initiate a series of annual surveys that would focus on the most critical issues and would deliver readily available current information about the academic discipline. Two versions of the survey were developed, one intended for graduate and postdoctoral programs and one intended for undergraduate programs. Programs were asked to complete and submit data electronically to the University Center for Social and Urban Research (UCSUR) at the University of Pittsburgh, which was responsible for compiling the obtained responses. A report based on the obtained data, which focused on academic year 1999-2000 (AY2000), was posted on the ANDP Web page in spring 2001.[3]

In early 2002, another survey was conducted which focused on AY2001. The new data were added to the pool of responses from the previous year, and a report based on the merged file of information spanning two consecutive years was posted on the ANDP web page in spring 2002.[4] The feedback received in response to the AY2001 survey resulted in the decision to conduct surveys every other year rather than annually. Thus, the next surveys were begun in fall 2003 and posted in spring 2004[5], begun in fall 2005 and posted in spring 2006[6], and begun in fall 2007 and posted in spring 2008.[7]

In July 2009, the ANDP and the Society for Neuroscience (SfN) consolidated, recognizing the converging interests and complementary missions of the two organizations. SfN adopted a new higher education and training strategy and created the Committee on Neuroscience Departments and Programs (CNDP), charged with recommending and managing programs, activities, and initiatives that advance education and research training in academic neuroscience. The biennial survey is one such activity now managed by the CNDP. (Prior survey reports can be found on the SfN web site at http://www.sfn.org/index.aspx?pagename=professionalDevelopment_ndpsurvey.) At the same time, SfN created a new class of membership – Institutional Program (IP) members – for former ANDP members.

The current survey was begun in fall 2009. Responses were obtained from 114 of the 134 graduate training programs that were, at the time, SfN IP members[8], which represents a remarkable 85% rate of participation. Similarly, responses were obtained from 27 of the 40 undergraduate programs that were IP members (68%). As with the previous surveys, an important value of these responses is in the numbers they provide in comparison to the results of earlier surveys. In this regard, 98 (86%) of the graduate programs, and 20 (74%) of the undergraduate programs that participated in the 2009 survey[9] had also participated in the 2007 survey.

A complete list of the 114 graduate programs and 27 undergraduate programs that participated in the 2009 IP survey is given below. A broad cross-section of graduate neuroscience departments and programs is represented. That is, responses were obtained from older programs and relatively new

programs, from programs with many students and programs with relatively few students, and from programs located in medical schools and programs located in colleges of arts and sciences (or both, or neither). The 114 graduate programs which responded are located in 38 U.S. states and the District of Columbia. Responses also were obtained from programs in two Canadian provinces. Similarly, the 27 institutions with undergraduate programs in the neural sciences are diverse in age, size, institutional affiliation, and administrative structure, and are located in 19 U.S. states plus one Canadian province. The results reported below represent the full responses from these programs. Responses from the graduate programs in Canadian institutions, to questions regarding U.S. citizenship and U.S. racial and ethnic minority groups, were excluded.

The results have been organized for presentation in nine categories, as in previous years. The first six categories summarize the results regarding graduate and postdoctoral training. Whenever possible, the results of the 2009 IP survey were compared with those obtained from the ANDP surveys in 1986, 1991, 1998, 2000/2001, 2003, 2005, and 2007. The seventh category summarizes the responses regarding undergraduate training. The final two categories provide a summary of the major findings of the 2009 survey and the conclusions drawn. A specific index of these nine categories is as follows:

Results

[1]Zigmond, M.J. and Spear, L.P. Neuroscience training in the USA and Canada: observations and suggestions. *Trends in Neuroscience* 15: 379-383, 1992.

[2]Huffman, L., Fellows, R.E., and Schoenfeld, R.I. The 1998 ANDP survey of neuroscience graduate and postdoctoral programs.

[3]Stricker, E.M. The 2000 ANDP survey of neuroscience graduate, postdoctoral, and undergraduate programs.

[4]Stricker, E.M. The 2000 and 2001 ANDP surveys of neuroscience graduate, postdoctoral, and undergraduate programs.

[5]Stricker, E.M. The 2003 ANDP survey of neuroscience graduate, postdoctoral, and undergraduate programs.

[6]Stricker, E.M. The 2005 ANDP survey of neuroscience graduate, postdoctoral, and undergraduate programs.

[7]Stricker, E.M. The 2007 ANDP survey of neuroscience graduate, postdoctoral, and undergraduate programs.

[8]These numbers do not include the IP member programs that are located outside the U.S. and Canada.

[9]The expert advice and technical assistance of Mr. Robert Keene of the UCSUR is gratefully acknowledged.

Participating Institutions

Graduate and Postdoctoral Programs (n = 114)

Note that some institutions have multiple neuroscience training programs (the number of which is indicated in parentheses) that participated separately in the survey.

UNITED STATES

State	Institution
AL	University of Alabama, Birmingham (2)
AZ	University of Arizona
CA	California Institute of Technology
CA	Stanford University
CA	University of California, Berkeley
CA	University of California, Davis
CA	University of California, Los Angeles (2)
CA	University of California, Riverside
CA	University of Southern California
CO	Colorado State University
CO	University of Colorado School of Medicine, Denver
CT	University of Connecticut Health Center
DE	University of Delaware
DC	Georgetown University Medical Center
FL	Florida Atlantic University
FL	Florida State University
FL	University of Florida
FL	University of Miami
FL	University of South Florida
GA	Medical College of Georgia
IL	Loyola University Medical Center
IL	Rosalind Franklin University of Medicine and Science
IL	University of Chicago
IL	University of Illinois, Chicago (2)
IL	University of Illinois, Urbana-Champaign
IN	Indiana University
IA	University of Iowa
LA	Louisiana State University Medical Center (2)
LA	Tulane University
MD	Johns Hopkins University School of Medicine
MD	Uniformed Services University of the Health Sciences School of Medicine
MD	University of Maryland, Baltimore
MD	University of Maryland, College Park
MA	Boston University
MA	Boston University School of Medicine
MA	Brandeis University
MA	Massachusetts Institute of Technology (MIT)
MA	Tufts University School of Medicine and Sackler School of Graduate Biomedical Sciences
MA	University of Massachusetts Medical School
MI	Michigan State University
MI	University of Michigan
MN	Mayo Graduate School
MN	University of Minnesota
MS	University of Mississippi Medical Center
MO	Washington University School of Medicine

NH Dartmouth College
NH Dartmouth College Medical School
NJ Rutgers, The State University of New Jersey
NJ University of Medicine and Dentistry of New Jersey (UMDNJ) of Rutgers University (2)
NM University of New Mexico School of Medicine
NY Albany Medical College
NY Albert Einstein College of Medicine
NY Columbia University (2)
NY Cornell University
NY Mount Sinai School of Medicine of New York University
NY New York University
NY State University of New York, Binghamton
NY State University of New York, Buffalo
NY State University of New York, Stony Brook
NY University of Rochester School of Medicine and Dentistry
NY Weill Medical College of Cornell University
NC Duke University Medical Center
NC University of North Carolina, Chapel Hill (2)
NC Wake Forest University School of Medicine (2)
OH Ohio State University
OH Ohio University
OH University of Cincinnati College of Medicine
OH University of Toledo College of Medicine
OH Wright State University
OK University of Oklahoma
OK University of Oklahoma Health Sciences Center
OR Oregon Health and Science University (2)
OR University of Oregon
PA Drexel University College of Medicine
PA Temple University School of Medicine
PA Thomas Jefferson University
PA University of Pennsylvania
PA University of Pittsburgh
RI Brown University
SC University of South Carolina
TN Meharry Medical College
TN University of Tennessee Health Science Center
TN Vanderbilt University
TX Baylor College of Medicine (2)
TX Baylor University
TX Texas A&M System Health Science Center/College of Medicine
TX University of Texas, Austin
TX University of Texas, San Antonio
TX University of Texas Health Science Center, Houston
TX University of Texas Health Science Center, San Antonio
TX University of Texas Medical Branch, Galveston
UT Brigham Young University
UT University of Utah
VT University of Vermont
VA George Mason University
WA University of Washington
WA Washington State University
WV West Virginia University School of Medicine
WI University of Wisconsin, Madison (2)
WY University of Wyoming

CANADA

Prov.	Institution
ON	Queen's University
ON	University of Toronto
ON	University of Western Ontario
QU	McGill University

Undergraduate Programs (n = 27)

UNITED STATES

State	Institution
CA	University of California, Los Angeles
CO	Colorado College
CO	Regis University
CT	Wesleyan University
LA	Centenary College of Louisiana
LA	Tulane University
MD	Johns Hopkins University
MA	Brandeis University
MN	Macalester College
MN	University of Minnesota
NE	University of Nebraska at Kearney
NH	Dartmouth College
NY	University of Rochester
NC	Davidson College
OH	Baldwin-Wallace College
OH	Muskingum University
OH	Oberlin College
PA	University of Pittsburgh
PA	Westminster College
RI	Brown University
TX	Baylor University
UT	Brigham Young University
VA	Washington and Lee University
WA	Washington State University
WA	Western Washington University
WI	Carthage College

CANADA

Prov.	Institution
ON	University of Windsor

1. Program Characteristics

Based on the information provided by 111 of the 134 graduate programs in the U.S. and Canada that are members of the CNDP, 84% of the programs were founded since 1975. In other words, most graduate neuroscience programs began in the last generation or so, in parallel with the founding of the Society for Neuroscience in 1970. In considering the longitudinal comparisons presented in this report, it is important to note that only ~40% and ~60%, respectively, of the graduate programs in neuroscience had existed in 1986 and 1991 (i.e., at the time of the first two surveys), whereas ~90% were in place when the third survey was conducted in 1998.

Table 1a - School Affiliation

The locus of graduate education in the neural sciences has evolved considerably in the past two decades. In the 1991 survey, graduate programs located in schools of medicine were most numerous, representing almost 40% of all programs. In contrast, less than 20% of the programs involved multiple schools at the university. In the 2000 and 2001 surveys, however, the percentage of such broadly based programs had doubled and become comparable to that of programs located solely in schools of medicine, which had begun to decrease in number. In many cases this change represented a consolidation of multiple programs at the same institution. In the subsequent surveys, that trend continued and the institution-wide programs now represent about half of all programs.

Survey Year	**91**	**98**	**00/01**	**03**	**05**	**07**	**09**
	Percentage of Total						
School of medicine	38	43	33	22	21	24	32
Arts and sciences	30	30	29	28	17	18	21
Multiple schools	17	21	34	40	53	55	47
Other	15	7	4	10	8	3	0

Table 1b - Administrative Structure and Degree Granted

The administrative structure of graduate programs in the neural sciences is quite varied. Only 17% of current programs are found exclusively in departments of neuroscience or neurobiology (or in departments that had those words in their name, such as “behavioral neuroscience” and “anatomy and neurobiology”). In contrast, 67% of the programs link neuroscientists in multiple departments (or in a “center”, “division”, or “institute” of neuroscience) in a unified, degree-granting program, and only 15% are in departments that do not have neuroscience or neurobiology in their names. These numbers are similar to those obtained in the 2000/2001, 2003, 2005, and 2007 surveys.

In about two-thirds of the programs, the degree awarded to graduate students trained in the neural sciences is a PhD. in neuroscience or in neurobiology (or in a discipline that had those words in their name). This situation represents a striking reversal from that which occurred 23 years ago, when the majority of such degrees were awarded in other disciplines. This change occurred during the 1990s and has remained stable ever since. Note that the “other” category in the table represents the few graduate training programs in the neural sciences that do not offer a PhD degree.

Survey Year	86	91	98	00/01	03	05	07	09
	Percentage of Total							
PhD in neuroscience	24	28	66	63	71	74	71	66
PhD in another discipline	74	54	30	33	24	22	25	31
Other	2	18	4	4	5	4	4	3

Perhaps in consequence of the predominantly multi-departmental structure, only 49% of graduate training programs in the neural sciences hire their own faculty. Note that this number has changed little in recent years (44% in the 2003 survey, 47% in 2005, and 52% in 2007).

Table 1c - Undergraduate Activities

Graduate programs in the neural sciences now play a substantial role in the education of undergraduate students. Although only 23% of the graduate programs additionally administer an undergraduate program in neuroscience, most graduate programs have faculty members who teach undergraduate courses (67%) and provide opportunities for undergraduate students to be involved in research projects (95%). These important contributions are similar to the findings in the last few surveys but are much greater than those reported 18 years ago, a development which may result from the increasing number of graduate programs whose faculty members are drawn from multiple schools within an institution.

Survey Year	86	91	98	00/01	03	05	07	09
	Percentage of Total							
Formal program	-	23	24	26	15	15	19	23
Teaching	9	48	39	69	65	67	66	67
Research	-	68	62	91	94	94	96	95

2. Faculty

There are 4,833 faculty members in the 97 graduate training programs in the neural sciences that responded to these questions in the 2009 survey, which computes to 50 faculty members per program. This number is comparable to that reported in the 2007 survey; by comparison, mean faculty size was 34 members per program in the 1998 survey and it increased steadily in subsequent years. Forty-five (89%) faculty members per program have tenure-stream positions, whereas 5 (11%) have positions outside the tenure stream. These percentages are similar to those observed in each of the past surveys.

There is considerable stability in the training faculty. In AY2009, only 3% of the tenure-stream faculty left their positions while 6% arrived as new appointments. A similarly low turnover was observed in the three previous surveys. The turnover of non-tenure-stream faculty was a little larger but still small (7%, 15%, respectively), as has been observed in previous years.

Table 2a - Number of Faculty per Program

The number of tenure-stream faculty members per graduate program varies widely, from less than 10 to more than 90 per program. The median number of faculty members is 31.

Number	
0-10	14%
11-20	20%
21-30	17%
31-40	9%
41-50	8%
51-60	6%
61-70	6%
71-80	7%
81-90	2%
>90	11%

Table 2b - Distribution of Faculty by Academic Rank

The distribution of tenure-stream faculty across the three ranks is strikingly similar to that reported in all the previous surveys; approximately half the faculty are full professors and one-fourth each are at the assistant and associate levels.

Survey Year	86	91	98	00/01	03	05	07	09
	Percentage of Total							
Assistant Professor	23	26	24	23	23	24	23	23
Associate Professor	28	28	25	26	25	24	26	27
Full Professor	49	46	51	51	52	52	51	50

Ninety-five percent of faculty members who have tenure-stream positions at U.S. institutions are U.S. citizens, (i.e., U.S. citizens or permanent residents). This number is similar to that seen in the last five surveys (range = 91- 97%). Similarly, 86% of faculty members holding non-tenure stream positions at U.S. institutions are U.S. citizens.

The distribution by academic rank of faculty members who have tenure-stream positions at U.S. institutions but who are not U.S. citizens are 52% assistant professors, 31% associate professors, and 17% full professors. This distribution does not resemble that of U.S. citizens (22%, 27%, 51%, respectively); clearly a much larger percentage of faculty who are not U.S. citizens are assistant professors and a much smaller percentage are full professors. Most of the foreign faculty members are citizens of Asia (41%), Europe (33%), or Canada (10%).

Table 2c - Percentage of Women by Academic Rank

In the 1986 survey, women represented only 15% of all tenure-stream faculty members in graduate programs in the neural sciences. Their number increased steadily to 24% in the 1998 survey but it has increased more slowly subsequently; in the 2009 survey, it is only 29% of the total. Furthermore, the percentage of full professors who are women has increased three-fold in the past 23 years but is still only 26%. On the other hand, the distribution of women faculty members across the three academic ranks (27% assistant professor, 29% associate professor, 44% full professor) now resembles that of men (21%, 26%, 52%, respectively) more closely than at any time previously (e.g., in the 00/01 survey, it was 37%, 29%, 34%, respectively, for women and 23%, 22%, 56%, for men).

Survey Year	86	91	98	00/01	03	05	07	09
	Percentage of Total							
Assistant Professor	23	27	32	30	33	32	36	34
Associate Professor	20	22	27	30	28	27	28	31
Full Professor	9	13	19	17	21	21	21	26

In contrast, women represent almost half (44%) of non-tenure-stream faculty members in AY2009. This number is similar to those seen in the past four surveys.

3. Graduate Education

Table 3a - Recruitment

The number of applications to graduate training programs in the neural sciences is four times the number per program that it was in the 1986 survey. Offers of admission increased less rapidly during the same time period, whereas the number of students matriculating per program rose even less rapidly, in part because students were applying to (and being admitted by) multiple programs.

Women represented 51% of the applicants, 58% of the students admitted, and 56% of those who began graduate training in the neural sciences in AY2009. Each of those numbers is higher than the figures reported in the AY2000-2001 surveys (38%, 44%, and 47%, respectively). Students who are not U.S. citizens represented 39% of the applicants but only 16% of the students admitted and 16% of those who began graduate training. Although students who are members of U.S. racial and ethnic minorities represented only 10% of the applicants, they constituted 13% of the students admitted and 14% of those who began graduate training.

Survey Year	**86**	**91**	**98**	**00/01**	**03**	**05**	**07**	**09**
	Mean per program							
Number of students applied	24	42	61	66	82	65	95	96
Number of students admitted	6	10	12	14	22	16	17	14
Number of students entered	4	5	5	9	10	8	9	8

Table 3b - Academic Credentials of Entering Students

The 2009 survey indicates that the academic credentials of students entering graduate programs in the neural sciences are similar to those of students characterized in previous surveys. Mean GRE scores in the quantitative section of the exam have increased considerably over the years, as have scores on the verbal section during the past decade. The scores in the analytical section are harder to characterize because the new analytical writing component of the GRE led to a new scoring scheme. However, the scores reported on the most recent survey seemed remarkably low; average scores on the quantitative and verbal sections are at approximately the 70th and 80th percentiles, respectively, whereas the average score on the analytical component is at approximately the 50th percentile. Ninety-nine percent of the students had research experience before they began graduate training, as in previous surveys.

The incoming students had a mean GPA in their college courses of 3.51 (i.e., between B+ and A-). Only 22% of these students had an undergraduate major in neuroscience, behavioral neuroscience, or psychobiology. Other common undergraduate majors were biology (23%), psychology (18%), and chemistry or biochemistry (7%), and an additional 12% had dual majors including one or more of these disciplines. These numbers are similar to those seen in the previous surveys.

Survey Year	86	91	98	00/01	03	05	07	09
	Average GRE Scores							
Quantitative	624	630	658	689	698	689	694	697
Analytical	624	635	650	670	670	4.9	4.6	4.4
Verbal	590	600	577	567	563	563	576	580

Table 3c - Total Pre-doctoral Students, and PhD Degrees Awarded, per Program

The number of graduate students per program varies widely, from fewer than 10 to more than 100 per program. The mean number of graduate students per program has increased steadily in the past 23 years; from 12 in 1986 to 38 in 2009 (the median number is 30). This increase undoubtedly reflects the combined effects of many developments: the consolidation of smaller programs at the same institution into a single large program, the increase in admission of new students, and the increase in time required to obtain a PhD degree.

The number of faculty in a program, shown earlier in **Table 2a**, is shown again for purposes of comparison. Note that the first row in this table indicates that 14% of the programs have 1-10 faculty members while 14% of the programs have 1-10 students. The number of graduate students in a program is closely correlated with the number of tenure-stream faculty members in that program ($r = 0.64$, $P < 0.001$).

Number	Faculty	Students
1-10	14%	14%
11-20	20%	21%
21-30	17%	16%
31-40	9%	10%
41-50	8%	14%
51-60	6%	11%
61-70	6%	6%
71-80	7%	0%
81-90	2%	2%
>90	11%	6%

Women represent 54% of these graduate students in U.S. institutions in AY2009, while students who are not U.S. citizens represent 18% of pre-doctoral trainees. Among the population of students who are not U.S. citizens, the largest numbers are from Asia (62%) and Europe (13%). These numbers are comparable to those observed in previous surveys.

The increase in graduate students per program was accompanied by a proportionate increase in PhD degrees awarded each year. These annual awards rose from 2.6 per program in the 1986 survey to 5.5 per program in the 2009 survey. Among the graduates, 56% were women, 21% were non-U.S. citizens, and 25% were members of under-represented U.S. racial and ethnic minorities, which resemble their proportions of the total population of pre-doctoral trainees.

Survey Year	86	91	98	00/01	03	05	07	09
	Average per Program							
Total pre-doctoral trainees	12	16	20	25	33	33	40	38
Non-U.S. citizens (%)	---	20	19	20	21	20	22	18
PhD degree awarded	2.6	2.8	3.2	3.6	3.6	3.9	5.5	5.0
PhD degree not awarded	---	---	---	1.3	1.1	1.1	1.7	0.7

Table 3d - Years in Program

The number of years in graduate training that are required to obtain a PhD degree increased substantially between the 1986 and 1991 surveys, but has changed little since. For students graduating in AY2009, it took 5.6 years on average to complete training, with 78% of the students doing so between 5 and 7 years and only 6% taking longer than 7 years. These numbers are virtually identical for U.S. citizens and non-U.S. citizens, for U.S. racial and ethnic minorities, and for male and female students. The one exceptional subgroup consists of the MD/PhD students, who took only 4.6 years to graduate (49% in less than 5 years).

Only 2% of pre-doctoral trainees (~0.7 per program) left their graduate programs in AY2009 without obtaining a PhD. degree. Among the trainees who left early, the numbers of women were much higher (70%), non-U.S. citizens were much lower (3%), and U.S. racial and ethnic minorities were similar (22%) to their representation in the total population of pre-doctoral trainees. Students who left without a PhD degree did so after 2.4 years of training on average (85% within 3 years, 91% within 4 years). Almost half the students were awarded a MS degree. These numbers are all comparable to those observed in the 2000/2001, 2003, 2005, and 2007 surveys. A surprisingly large number (16%) of the students who left were in an MD/PhD. program, and they returned to medical school or began their medical internship or residency earlier than anticipated.

Survey Year	86	91	98	00/01	03	05	07	09
	Average Years							
PhD awarded	4.3	5.2	5.5	5.5	5.6	5.7	5.7	5.6
PhD not awarded	---	---	2.2	2.5	2.4	1.9	2.2	2.4

Table 3e - Placement of New Graduates with a PhD Degree

Upon receiving their PhD degree, most graduates pursued further research training and accepted postdoctoral positions (70%), as was observed in the previous surveys. This was especially true of non-U.S. citizens (90% vs. 68% of U.S. citizens). Many graduates went to medical school or began a medical internship or residency (13%); note that this was only true of U.S. citizens (14% vs. 0% of non-U.S. citizens). Relatively few took faculty positions (3%) or jobs in industry (6%) soon after graduation. As in previous years, very few graduates were employed outside of neuroscience (0%) or were not yet employed (1%). The percentage of graduates who were women (56%), U.S. citizens (79%), members of

U.S. minorities (25% of U.S. total), or Asian-Americans (49% of U.S. minorities) were comparable to their numbers among graduate students.

Survey Year	91	98	00/01	03	05	07	09
	Percentage of Total						
Postdoctoral position	60	70	62	71	69	69	70
Medical school	13	15	11	16	14	15	13
Faculty position	6	5	7	3	5	4	3
Industry	12	1	8	3	4	6	6
Other	6	5	8	7	6	5	7
Employed outside the field	2	3	2	0	1	1	0
Currently unemployed	1	1	2	0	0	1	1

4. Postdoctoral Training

Table 4a - Profile of Postdoctoral Trainees

According to the 2009 survey, most of the postdoctoral trainees (89%) have only a PhD degree and an additional 6% have both PhD and MD degrees. In contrast, 4% have only a medical degree, the lowest percentage yet reported. Each of these values is generally similar to those of the four previous surveys. As with the pre-doctoral students, the number of postdoctoral trainees in a program is significantly correlated with the number of tenure-stream faculty members in that program (r = 0.69, P <0.001).

Survey Year	**86**	**91**	**98**	**00/01**	**03**	**05**	**07**	**09**
	Percentage of Total							
PhD	78	63	88	83	87	87	85	89
MD	18	25	5	9	7	8	9	4
MD/PhD	4	12	6	6	5	4	5	6
Other	0	0	1	2	1	1	1	1

Only about one-third of the programs provided information about postdoctoral trainees other than the degree(s) they obtained, which is certainly much less information than was provided about pre-doctoral trainees and faculty members. Perhaps such information is difficult to obtain by the administrative offices of graduate programs in neuroscience, especially in the interdisciplinary programs. Inspection of the data from the past four surveys indicates a similar shortage of responses, and the same may be true of previous surveys as well. That caveat should be kept in mind when considering the results obtained over the years.

The number of postdoctoral trainees per program in the 2009 survey (~17) is a little higher than the numbers seen in the 2005 and 2007 surveys (~15), which were greater than those seen in earlier surveys (7-12). Fifty-six percent of these trainees are not U.S. citizens, about three times the percentage of foreign pre-doctoral trainees but not a further expansion above the rapidly increasing numbers that were observed beginning 18 years ago (40%, 49%, 60%, 64%, 57%, and 60%, respectively, in the 1991, 1998, 2000/2001, 2003, 2005, and 2007 surveys). Among that population, the largest portions are from Asia (55%) and Europe (24%). Women constitute 34% of the foreign postdoctoral trainees, 41% of the domestic trainees, and 37% of the overall population.

Table 4b - Placement from Postdoctoral Position

When postdoctoral trainees leave, they typically pursue additional training in another postdoctoral position (39%) or take a faculty position (36%; note, however, that in this case no distinction was made between positions at research universities or undergraduate colleges, or between positions inside or outside the tenure stream). This general outcome also was seen in the previous surveys, although it is now clear that a progressive increase has occurred in the numbers who take another postdoctoral position and a decrease in the number who take a faculty position. It would be of interest to know whether, over the years, there also has been a progressive increase in time between earning a PhD. degree and securing a faculty position, and in the number of postdoctoral positions held before a permanent job was taken. Unfortunately, this information has not been available from neuroscience program administrators and therefore it has not been tracked by these surveys. Note that such a trend has been documented in other biomedical sciences.[10, 11]

As in previous years, very few postdoctoral trainees leave to take employment outside of neuroscience or are not employed. This pattern of placements was similar for U.S. citizens and non- U.S. citizens except that fewer U.S. citizens left for another postdoctoral position 29% vs. 50%, respectively) and more took a faculty position (44% vs. 28%, respectively). Forty-one percent of the trainees who left a postdoctoral position were women and 49% were not U.S. citizens, which is close to their representation among fellows.

Survey Year	**91**	**98**	**00/01**	**03**	**05**	**07**	**09**
	Percentage of Total						
Another postdoctoral position	21	30	34	37	38	44	39
Medical school	3	1	6	4	3	1	3
Faculty position	45	28	41	38	29	32	36
Industry	14	4	5	7	11	7	7
Other	14	29	9	14	15	15	13
Employed outside the field	2	1	3	0	3	0	0
Currently unemployed	1	6	1	0	1	1	1

[10]Marincola, E., and Solomon, F. The career structure in biomedical research: Implications for training and trainees. The American Society for Cell Biology survey on the state of the profession. *Molecular Biology of the Cell* 9: 3003-3006, 1998.

[11]Garrison, H.H., Gerbi, S.A., and Kincade, P.W. In an era of scientific opportunity, are there opportunities for biomedical scientists? *FASEB Journal* 17: 2169-2173, 2003.

5. Diversity

Table 5a - Minority Representation

The representation of U.S. racial and ethnic minorities as a percentage of all pre-doctoral trainees and tenure-stream faculty has doubled since the 1991 survey, but a smaller increase in their representation among postdoctoral trainees occurred. However, it should be noted that the figures on the left side of Table 5a are confounded by the substantial increase in the number of postdoctoral trainees at U.S. institutions who are not U.S. citizens. When the figures are expressed as a percentage of only the postdoctoral trainees who are U.S. citizens (right side of the table), it becomes clear that the training of members of U.S. racial and ethnic minorities has increased more substantially at the post-doctoral level. On the other hand, among these three subgroups, minority representation in tenure-stream faculty positions remains relatively low. The distribution of racial and ethnic minorities across the three academic ranks (34% assistant professor, 30% associate professor, 36% full professor) demonstrate that they are noticeably under-represented at the full professor level in comparison to Caucasian tenure-stream faculty members (20%, 27%, 53%, respectively). Minority representation in non-tenure stream positions has also increased slowly (to 14% of all such positions in the 2009 survey, up from 6% in the 2000/2001 surveys).

Survey Year	91	98	03	07	09	91	98	03	07	09
	Percentage of Total					Percentage of Total U.S.				
Pre-doctoral	9	18	16	18	19	11	22	20	25	23
Postdoctoral	6	11	8	11	8	10	21	20	27	18
Tenure-stream faculty	6	7	8	10	11	6	7	9	11	13

Table 5b - Minority Distribution

Among the U.S. racial and ethnic minority population, Asian-Americans represent the largest group of pre-doctoral and postdoctoral trainees, and of tenure-stream faculty, in the neural sciences. Hispanic-Americans are much less numerous in all three categories, while African-Americans are even fewer in number and Native Americans are still fewer.

Survey Year	91	98	03	07	09	91	98	03	07	09	91	98	03	07	09
	Pre-doctoral					Postdoctoral					Faculty				
Asian American	38	42	41	44	38	53	50	50	51	45	64	61	66	63	64
Hispanic American	32	25	30	27	32	25	10	25	18	18	22	20	17	20	22
African American	22	20	18	18	21	12	32	21	14	16	11	7	8	8	7
Native American	-	8	1	4	2	-	4	0	6	3	-	5	0	2	1
Other	8	5	10	7	7	10	4	4	11	18	3	7	9	7	6

When funding trainees, the U.S. federal government places special emphasis on African-Americans, Hispanic Americans, Native Americans, and Pacific Islanders among members of U.S. racial and ethnic minorities because they are under-represented in academia. Thus, it should be noted that when just these groups are considered (i.e., Asian-Americans are excluded), their representation in the 2009 survey is reduced to only 14% of pre-doctoral trainees who are U.S. citizens (12% of all pre-doctoral trainees), to only 10% of postdoctoral trainees who are U.S. citizens (4% of all postdoctoral trainees), and to only 5% of tenure-stream faculty members who are U.S. citizens (4% of all tenure-stream faculty members).

6. Financial Support

Table 6a - Stipend Sources - First Year Graduate Students

Almost all pre-doctoral trainees in the neural sciences receive stipend support. During the past 23 years, first-year graduate students have received between 56% and 70% of this support from university funds (61% in AY2009), much less often in the form of teaching assistantships than previously. Training grant funds have increased during this time; whereas the relatively small amount of support from research grants and from individual fellowships have changed little throughout the years.

Survey Year	86	91	98	00/01	03	05	07	09
	Percentage of Total							
Teaching assistantship	34	29	29	27	23	14	17	18
Other university funds	30	38	41	39	34	42	41	43
Training grants	9	10	10	15	18	26	21	18
Research grants	16	14	9	14	14	12	11	10
Fellowships	10	8	11	5	11	6	10	11

Table 6b - Stipend Sources - Advanced Graduate Students

Pre-doctoral trainees beyond their first year received only 30% of their support from the university. This amount has been decreasing from the 52% support indicated in the 1986 survey. To compensate for this change, research grants have provided increasing support of these advanced graduate students; indeed, in the past three surveys research grants provided about half of the total funds for stipends, up from the 24% support indicated in the 1986 survey. In other words, research grants and university funds have traded places as the principal support of advanced graduate students. Other sources of support are provided by training grants and fellowships, in smaller amounts that have changed little throughout the years.

Survey Year	86	91	98	00/01	03	05	07	09
	Percentage of Total							
Teaching assistantship	31	27	29	22	18	15	14	17
Other university funds	21	21	12	12	17	14	10	13
Training grants	12	9	6	12	11	11	11	10
Research grants	24	33	37	43	40	47	52	48
Fellowships	13	10	6	11	14	13	13	12

Table 6c - Stipend Sources - Postdoctoral Trainees

Research grants also are the major source of the stipends for postdoctoral trainees. The first three ANDP surveys considered the support of all postdoctoral trainees collectively, whereas the subsequent surveys considered U.S. and non-U.S. citizens separately. The latter results indicate the strong dependence on research grants for support of postdoctoral trainees; such grants now provide two-thirds of the stipends for U.S. citizens and more than 80% of the stipends for non-U.S. citizens, whereas 23 years ago the grants contributed less than 40% of the stipends.

Survey Year	86	91	98	00/01 (U.S.)	00/01 (Non-U.S.)	05 (U.S.)	05 (Non-U.S.)	09 (U.S.)	09 (Non-U.S.)
University funds	8	12	9	4	4	8	1	4	8
Training grants	22	16	12	11	1	9	1	17	1
Research grants	38	50	65	74	90	69	89	69	85
Fellowships	30	22	12	10	5	11	3	9	5
Other	2	0	2	1	0	3	6	1	1

7. Undergraduate Programs

The existence of undergraduate programs in neuroscience is a relatively recent phenomenon. Based on information available from 25 of the 27 undergraduate program members in the CNDP that participated in the survey, 6 (24%) programs were founded before 1990, 13 (52%) were founded between 1990 and 1999, and 6 (24%) were founded after 1999. Thus, a representative mix of older and newer programs participated in the present survey, as in the previous two surveys.

i. Institutional Affiliation. Fifteen (56%) of the 27 programs are located in undergraduate colleges that do not have a PhD. program in neuroscience.

ii. Administrative Structure. Twenty (74%) of the 27 programs are interdisciplinary in nature and offer a BS or BA degree in neuroscience. Two programs offer a BS or BA degree in psychology with a specialization in neuroscience. Only five programs are located in departments of neuroscience or behavioral neuroscience.

iii. Faculty Hiring. Nineteen (73%) of the 26 programs responding to this question hire faculty members for their program, which is greater than the percentage of graduate training programs that do so (49%).

iv. Faculty Appointments. The average number of faculty members with tenure-stream positions in AY2010 is ~8 per program (median = 8 per program). There was an 8% turnover of positions (i.e., faculty members leaving or arriving as a percent of the total number of faculty affiliated with a program). An additional ~1 faculty position per program is outside the tenure-stream, and the turnover of faculty with such positions was 17%.

v. Faculty. In AY2010, the distribution of faculty members with tenure-stream positions is 25% assistant professors, 24% associate professors, and 51% full professors. Women occupy 41%, 24%, and 24% of these positions, respectively, for a total of 29% of all tenure-stream positions. They also hold 43% of the non-tenure-stream faculty positions. These numbers are generally similar to those of faculty members in graduate programs in the neural sciences.

Among faculty with tenure-stream positions in U.S. institutions, 94% are U.S. citizens and 7% are members of U.S. racial and ethnic minorities. Among faculty with non-tenure-stream positions, 89% are U.S. citizens and 15% are members of U.S. racial and ethnic minorities.

vi. Undergraduate Students. The number of undergraduate students with neuroscience majors per program continues to vary widely (range = 1 to 400), with roughly equal numbers of males and females. The median program has 110 majors and five programs have more than 200. It is worth noting that the median number of neuroscience majors in undergraduate programs was only 22 in the 2001 ANDP survey, with intermediate numbers in the years in between. Evidently the size of these programs has grown considerably during the past decade, although the number of faculty per program has not.

These results must be considered with caution because of the relatively small size of the obtained sample. Nonetheless, it should be noted that, with the exception of the large increase in the number of undergraduate student majors in neuroscience, every other response was similar to that provided in the 2000/2001, 2003, 2005, and 2007 surveys.

8. Summary

Graduate training programs in the neural sciences used to be located predominantly in schools of medicine or in schools of arts and sciences. However, during the past decade these graduate programs have evolved towards larger university-wide programs that link neuroscientists in multiple schools on campus.

Although the administrative structure of graduate programs in the neural sciences is quite varied, most training now is conducted in interdisciplinary programs rather than in departments offering degrees in neuroscience or in other disciplines. Graduate students trained in the neural sciences are much more likely to be awarded a PhD degree in neuroscience or neurobiology than in another discipline.

Graduate faculty members in the neural sciences play a substantial role in undergraduate education, both by teaching undergraduate courses and by providing opportunities for undergraduate students to become involved in their research projects.

There are 50 faculty members per program, on average, in the graduate programs surveyed. Forty-five (89%) have tenure-stream positions. The annual turnover in these positions is small (3% leaving, 6% arriving). Approximately half of the tenure-stream faculty members are full professors while one-fourth each are assistant professors or associate professors.

The annual number of applications for graduate training in the neural sciences has quadrupled during the past 23 years and is now 96 per program, while the number of new matriculants has doubled and is now 8 students per program. The academic quality of incoming graduate students has remained high, as suggested by their undergraduate GPA (average = 3.51), their scores on the GRE (70th percentile in quantitative section, 82nd in verbal), and their research experience.

Only 22% of the incoming graduate students had an undergraduate major in neuroscience or behavioral neuroscience. Other common majors were biology (23%), psychology (18%), and chemistry (7%), and an additional 12% had dual majors including one or more of these disciplines.

The mean number of graduate students per program has increased steadily in the past 23 years, from 12 in 1986 to 38 in 2009 (median = 30). The mean number of PhD degrees in neuroscience awarded annually per program was 5.0, while the mean time to degree was 5.6 years. Only 2% of pre-doctoral trainees (0.7 per program) leave the program annually without obtaining a PhD degree. Most new graduates pursue further research training in postdoctoral positions (70%) while many others go to medical school (13%).

Ninety-five percent of postdoctoral trainees in the neural sciences have a PhD degree. Postdoctoral trainees usually leave their position either to accept a faculty position or to pursue further training; very few are employed outside the field or are not employed at all.

Pre-doctoral students who are women, U.S. racial and ethnic minorities, or non-U.S. citizens are equally likely to obtain their PhD degree, and in the same time frame, as one another and as the American Caucasian male majority.

Women represent 50% of undergraduate neuroscience majors, 54% of pre-doctoral trainees, 37% of postdoctoral trainees, and 44% of non-tenure-stream faculty members. In contrast, women represent only 29% of tenure-stream faculty members and 26% of full professors.

Among U.S. citizens in U.S. institutions, members of U.S. racial and ethnic minorities represent 23% of pre-doctoral trainees and 18% of postdoctoral trainees but only 13% of tenure-stream faculty members and 14% of non-tenure-stream faculty members. Most of these trainees and faculty members are Asian-American. When Asian-Americans are excluded and only under-represented U.S. racial and ethnic minorities are considered, the numbers shrink to 14%, 10%, 5%, and 5%, respectively, of U.S. citizens.

Pre-doctoral trainees who are not U.S. citizens come predominantly from Asia and Europe. They now represent 18% of pre-doctoral trainees, a number that has changed little during the past 18 years.

The number of postdoctoral trainees who are not U.S. citizens increased progressively, from 40% in 1991 to 60% in the 2000/2001 survey, and it has remained at approximately that level subsequently. Nonetheless, less than 10% of all tenure-stream graduate faculty positions in the neural sciences at U.S. research universities are not U.S. citizens.

Almost all pre-doctoral students receive stipend support, primarily from university funds (first-year students) and from research grants (more advanced students). Research grants are the major source of support for postdoctoral trainees, especially those who are not U.S. citizens.

Although much less information was available from undergraduate programs in the neural sciences, most programs appear to be interdepartmental in administrative structure. Most tenure-stream faculty members in U.S. institutions are Caucasian male Americans (92%, 71%, and 96%, respectively). The median number of tenure-stream faculty positions is 8 per program, and the median number of undergraduate students with majors in neuroscience is 110 per program.

9. Conclusions

Neuroscience is a very attractive discipline. It is unusually multidisciplinary in nature, and it has drawn significantly from fields as diverse as molecular biology, cognitive psychology, computer science, and clinical medicine. Increased recognition and appreciation of neuroscience has been promoted during the past 25 years by such developments as the "decade of the brain", the award of Nobel prizes to neuroscientists, and conspicuous progress in the diagnosis and treatment of Parkinson's disease, Alzheimer's disease, and spinal injury. These and other developments have attracted a steady increase in the number of graduate students being trained in the neural sciences. Increased recognition and appreciation of the discipline also is reflected in the likelihood that graduate students trained in the neural sciences will receive their degrees in neuroscience or neurobiology rather than in some other discipline, as was true 25 years ago.

The finding that graduate training in the neural sciences is not confined to departments of neuroscience is in keeping with a similar trend in other biomedical sciences (e.g., cell biology, pharmacology), but it is in striking contrast to graduate training in the physical sciences (e.g., chemistry, physics). In explanation, not all schools with neuroscientists as faculty members have departments of neuroscience. Even in schools with such departments, neuroscientists may be found in many other departments, both clinical (e.g., neurology, psychiatry) and preclinical (e.g., biology, pharmacology). Neuroscientists in these other departments understandably want to interact with their colleagues elsewhere on campus, both in research centers and in graduate training programs. The resultant integration of neuroscientists across departments and across schools undoubtedly enhances the quality of those programs while making the community more collegial, more visible and attractive to students and faculty, and more influential on campus. In addition, it makes it more likely that faculty appointed in graduate and professional programs will participate in undergraduate education on the same campus.

When the NIH budget doubled around 10 years ago, substantial increases occurred in the number and size of federally funded research grants devoted to issues in neuroscience. Such research usually depends heavily on the involvement of pre-doctoral trainees, and so a secondary increase in the number of such trainees occurred as well. It is important to emphasize that there was little evidence that the quality of the entering graduate students had been reduced in order to expand the size of the programs, or that the goals of increasing diversity among pre-doctoral trainees had been compromised, or that disproportionately large numbers of foreign students were matriculating. Instead, graduate programs in neuroscience have simply grown larger and continued to flourish.

Despite these clear indications that neuroscience is a thriving discipline, its research and training programs face several significant challenges. Some are not unique to neuroscience but are common within the biomedical sciences generally.[12] For example, the recent economic recession and decrease in federal funds for research and training (relative to the increased number of applicants) should ultimately affect three interrelated, dependent variables: the size of graduate programs, the number of tenure-stream faculty positions, and the influx of foreign postdoctoral fellows. Although conspicuous decreases in these variables have not yet occurred, increases have not continued; instead, their numbers have stabilized. Furthermore, despite modest increases during the past 23 years, women still are very much under-represented as tenure-stream faculty members, especially at the full professor level, in comparison to their full representation among pre-doctoral trainees. At the most recent rate of increase (i.e., only 5% in the past 11 years), it will take four decades before women comprise 50% of the tenure-stream faculty members in neuroscience unless graduate programs become even more committed than they now are to a policy of gender equality in their faculty. A similar statement can be made regarding members of under-represented U.S. racial and ethnic minorities among faculty in graduate neuroscience programs, but their relatively slow progress to date has been further impeded by their continued under-representation among pre-doctoral and postdoctoral trainees in neuroscience.

Other issues may be more specific to training in the neural sciences at the undergraduate, pre-doctoral, and/or postdoctoral levels. Here are some that were addressed in this survey.

Undergraduate - The finding that most tenure-stream faculty positions in undergraduate neuroscience programs are at the associate or full professor levels suggests that neuroscience is not being taught

primarily by faculty who received graduate and postdoctoral training in recent years. This situation likely provides a challenge for faculty to provide contemporary research experiences to their students, especially in undergraduate programs located at institutions that do not have graduate programs in neuroscience.

Another pressing problem stems from the remarkable growth in the number of neuroscience majors per program while concurrently little change has occurred in the number of tenure-stream faculty members. This may mean that class size has increased considerably, and it also may mean that the availability of research laboratories for training have become overcrowded and hard to come by (unless a graduate neuroscience program also is present on campus, in which case the research labs of its faculty members usually are available to undergraduate students).

Pre-doctoral - The remarkable heterogeneity in background of students entering graduate programs in the neural sciences suggests that extensive expertise in neuroscience generally is not a decisive variable in the admission process. This heterogeneity in background presents a considerable challenge for programs to design a suitable curriculum of graduate courses. Relevant undergraduate courses in neuroscience sometimes are available on the same campus and represent a special opportunity for graduate students to improve their background in the subject, although the faculty may be reluctant to encourage that option and the students may be reluctant to take advantage of it. To further complicate matters, only half the graduate programs in the neural sciences can hire their own faculty, and therefore the programs that cannot do so likely have difficulty in maintaining a stable curriculum of graduate courses and research specialties. This situation no doubt occurs in many undergraduate programs, as well.

Postdoctoral - The percentage of non-U.S. citizens among pre-doctoral trainees in neuroscience at U.S. institutions has been relatively constant during the past 23 years. In contrast, the number of non-U.S. citizens among postdoctoral trainees in neuroscience has increased substantially and, according to the surveys in 2000/2001 and subsequently, non-U.S. citizens constitute more than half of the total population of postdoctoral trainees. During this same time period, the financial support of postdoctoral trainees (and of advanced graduate students) has become increasingly dependent on faculty research grants, especially trainees who are not U.S. citizens and therefore are not eligible for federal fellowships or support on federal training grants. Whether the NIH will continue to allow research grants to support so many trainees is a controversial matter still under discussion.[13, 14] If the NIH decides to limit the use of research funds to support trainees, then alternative funds for this purpose will have to increase or else the size of training and research programs in the neural sciences will diminish drastically. The problem is, of course, exacerbated by the relatively slow increase in federal funds that are available to support faculty research. An attractive proposal to reduce the number of postdoctoral trainees without compromising the faculty research programs in which they are engaged is to develop new academic job titles and professional scientist positions for advanced postdoctoral fellows who in most respects are no longer in training. [14-16] These new positions would need to be funded by sources other than research grants in order to provide some financial relief. For example, they might be funded by the universities and associated with traditional academic teaching, research, and committee responsibilities. Similarly, the universities might contribute more to the support of advanced graduate students, as they once did.

Finally, a problem that cuts across all levels of training stems from the finding that faculty positions in the neural sciences are increasing more slowly than the number of postdoctoral fellows in neuroscience who seek such positions. According to statistics compiled by the National Science Foundation, the total number of PhD degrees in neuroscience awarded per year in U.S. institutions rose gradually from 404 in 1996 to 472 in 2003, but then increased to 689 in 2005[17] and 880 in 2008.[18] If the number continued to increase at the same rate last year, we estimate that there were ~940 degrees awarded in 2009, which would represent a doubling in the past 6 years after increasing by only 17% during the previous 7 years. The present survey data are consistent with that estimate. If the 129 graduate programs in the U.S. that are SfN IP members represent 70% of all such programs, then there are 184 of them at present; if ~5 graduate students per program receive their doctoral degree each year, then that computes to ~920 degrees awarded each year.

Although this survey does not provide precise numbers of postdoctoral fellows or job openings the way a census would, it is possible to use the survey data to estimate those numbers. If 920-940 students graduate with doctoral training in neuroscience, and 70% of them become postdoctoral fellows, and 80% of them are U.S. citizens, then there are 515-525 new domestic fellows each year. If there are 45 tenure-stream faculty per graduate program, then a total of ~8,300 such positions exist among all programs. If new faculty hires amount to 6% annually, then there are only ~500 new jobs each year in graduate programs (even fewer, actually, since some positions are filled by faculty members transferring from one institution to another). Thus, it may be estimated that domestic graduate students with doctoral training in neuroscience at U.S. institutions have been produced at a rate comparable to that which can be absorbed into academia. Allowing that some domestic graduates ultimately will not take tenure-stream faculty positions at U.S. institutions, and some foreign-trained graduates will do so, the demand to fill these positions appears to have been met.

A similar analysis suggests that there are ~3,125 postdoctoral fellows in neuroscience in the U.S. (based on ~17 fellows per program). This estimate clearly indicates that there is a great excess in the number of postdoctoral fellows in comparison to new faculty positions at research universities. That excess, of course, results from the large influx of recently graduated scientists from abroad who seek additional training and, in many cases, employment opportunities in the U.S. Those postdoctoral fellows greatly enhance the research productivity and the training of pre-doctoral students in the laboratories they join, and generally strengthen the scientific workforce, so their large numbers must raise concerns about the dependence of the academic research establishment on such a temporary and mobile population.[19] It has always been difficult for them to gain employment in academia at U.S. institutions; more than 90% of faculty members in graduate neuroscience programs in the U.S. are U.S. citizens, and the same is true at the much lower number of undergraduate neuroscience programs. On the other hand, not all of those postdoctoral fellows in neuroscience wish to have tenure-stream faculty positions, and many pursue other academic positions, jobs in industry and at research institutes, and other opportunities that are not in scientific laboratories but make good use of scientific training. And not all foreign fellows wish to remain in the U.S. Consequently very, very few scientists with doctoral or postdoctoral training in neuroscience have been unable to find employment.

It is an acknowledged challenge to prepare graduate students and postdoctoral fellows located in academic training programs for professional careers in nonacademic positions. It has been an even bigger challenge to develop a sound national policy regarding how many pre-doctoral and postdoctoral trainees there should be. One suggestion is to limit graduate training and thereby reduce the number of postdoctoral trainees seeking employment in academia.[13,20] The ANDP leadership had opposed that view, pointing out that it never has been possible to accurately predict future job markets, that numerous opportunities for employment besides faculty positions always have been available, and that postdoctoral trainees almost invariably find employment in science ultimately.[21] In addition, as mentioned, most postdoctoral fellows in neuroscience at U.S. institutions did not receive their doctoral training domestically. More generally, it seems inappropriate to prevent students from obtaining the training they seek in order to compete successfully for the jobs they want, it seems unwise to reduce graduate education in science at a time when major problems of life have become increasingly more complex and science-based, and it seems unfair to place limits on opportunities when some groups have not yet had a chance to take advantage of them. On the other hand, it does seem appropriate for graduate programs to educate trainees broadly while preparing them for diverse careers and for the uncertainty they may experience while they clarify their professional goals and evaluate relevant opportunities.

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