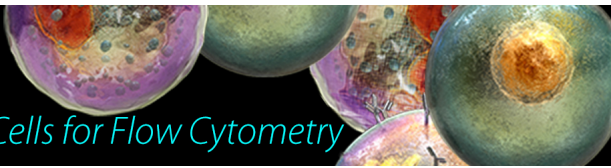


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Immunology Notes and Resources

Update on Gender Equity in Immunology, 2001 to 2016

Virginia Smith Shapiro,^{*} Susan Koyats,[†] Michelle A. Parent,[‡] Sarah L. Gaffen,[§] Catherine C. Hedrick,^{||} Pooja Jain,^{||} Lisa K. Denzin,[#] Malini Raghavan,^{**} and Robin Stephens^{††}

In 2001, The American Association of Immunologists Committee on the Status of Women conducted a survey examining the percentage of women faculty members within immunology departments or women in immunology graduate programs across 27 institutions in the United States, comparing it to the percentage of women receiving a Ph.D. Here, we examine the representation of women across these same 27 immunology departments and programs to examine changes in gender equity over the last 15 years. *The Journal of Immunology*, 2016, 197: 000–000.

In 2001, The American Association of Immunologists (AAI) Committee on the Status of Women conducted a survey examining the percentage of women faculty members within immunology departments or women in immunology graduate programs across 27 institutions in the United States, comparing it to the percentage of women receiving a Ph.D. This information was first published in the August 2001 *AAI Newsletter* (1), and was subsequently reported in a *Commentary in Nature Immunology* (2). Although 48.1% (357/742) of immunology graduate students in 2001 were women, they accounted for just 21.4% of immunology faculty members (178/830). The representation of women varied greatly among institutions, with three institutions having just one woman in their immunology faculty, whereas four other institutions had 30% women or more. At the time, this discrepancy between the number of women receiving their doctorate and the representation of women faculty members in our field was documented to make the community aware of this issue of gender equity, with hopes of initiating productive discussions. Many articles have been published highlighting the challenges and difficulties that women faculty members face in academia, along with possible reasons for the unequal representation of women in faculty positions (3–15).

As a follow up to the initial survey, the AAI Committee on the Status of Women examined the same 27 programs to determine whether advances had been made in the representation

of women faculty members in the intervening 15 years. In particular, the committee sought to confirm whether the women who comprised approximately half of the graduate students in immunology in 2001 had progressed over the 15 years to complete their doctorates and postdoctoral fellowships, and remain in academia to obtain employment as either assistant or associate professors. Surveys were sent to faculty members at each of the 27 programs or departments in the 2001 analysis. Of the 27 departments contacted, 25 departments and programs returned the surveys. For the two programs that did not return the surveys, information regarding the number and rank of women faculty members was obtained from publicly available information published on their institutions' websites. In addition to the data collected in the original survey concerning the number and percentage of women faculty members in the immunology departments or programs, the current survey also broke down the representation of women and men in an assistant professor (nontenured but tenure track), associate professor (tenured or tenure track) or professor (tenured, tenure track) position as well as research or adjunct faculties at any stage (nontenure track). The committee assessed the representation of women faculty members in leadership positions by examining whether the current department or program chair was female, and whether the program or department had ever had a female chair. Information was also requested on the gender of current graduate students and postdoctoral fellows. The data are summarized in Table I.

In 2001, the aggregate percentage of women faculty members in these immunology departments or programs was 21.4%, with a median percentile per program or department of 21.9% and a median of five women faculty represented in the immunology department or program. In 2016, the percentage of women in these same 27 institutions rose to 29.1% (280/961) with medians of 28.8% and nine women faculty members per program or department. These results are shown as a scatter plot in Figure 1. The changes in the numbers and percentages of women at each institution between 2001 and 2016 were statistically significant. Interestingly, in 2016, women comprised 39.6% (74/187) of

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Abbreviation used in this article: AAI, The American Association of Immunologists.

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Table I. Summary of the data on the representation of women in immunology

	Total Faculty	Assistant Professor	Associate Professor	Professor	Nontenure Track	Postdoctoral Fellow	Graduate Student
2001	178/830 (21.4%)	ND	ND	ND	ND	ND	357/742 (48.1%)
2016	280/961 (29.1%)	74/187 (39.6%)	61/192 (31.8%)	94/422 (22.3%)	51/137 (37.2%)	376/768 (49%)	384/760 (50.5%)

The aggregate data on the representation of women in immunology from the surveys conducted in 2001 and 2016 are shown in the table.

tenure-track assistant professors, 31.8% (61/192) of tenured associate professors, and 22.3% (94/422) of tenured professors. We did not find that women were disproportionately over-represented in nontenure track (research track or adjunct) positions, compared with tenure-track assistant professor positions. Women comprised 37.2% (51/137) of the non-tenure-track pool, compared with 39.6% (74/187) of the tenure-track assistant professor pool. As in 2001, when women comprised 48.1% (357/742) of immunology graduate students, women in 2016 comprised 50.5% (384/760) of graduate students. Although we

do not have any data from 2001 regarding the representation of women among postdoctoral fellows, in 2016 49% (376/768) of postdoctoral fellows were women. Therefore, at least in immunology, we did not detect a “leaky pipeline” in the transition from graduate student to postdoctoral fellow. Rather, women became underrepresented among immunology faculty members starting at the assistant professor stage (39.6%), with continued decline in representation moving up to the associate professor (31.8%) and professor (22.3%) ranks. The leaky pipeline becomes more of a factor, in academia at least, the higher one climbs in the academic ranks, for the underrepresentation of women is even more pronounced in leadership positions. Only 3 out of the 25 (12%) responding departments or programs currently had a woman serving as chair. In total, 16 of 25 of these departments or programs had never had a woman serve as chair.

One striking difference between the results of the two surveys arose from this analysis. In 2001, out of 830 faculty members at 27 institutions, 178 were women. In 2016, these same institutions increased the number of total faculty members to 961, of which 280 were women. The net result is that over the last 15 years, a total of 131 additional faculty positions were added to these 27 institutions. If we simply compare the changes in total faculty members from 2001 to 2016, 29 men were added to the immunology faculties whereas 102 women were added. This is probably an underestimate of total hires, as replacement recruitment (retirement followed by a replacement) are not reflected in this analysis. Only the net increase in faculty members was measured over the 15 years. These changes are deemed likely to result from concerted departmental efforts to enhance gender equity.

Even as the AAI Committee on the Status of Women is encouraged by the changes, we recognize there is some distance to be covered before full gender equity is achieved in all faculty ranks and leadership roles. We look with great interest at the prospect of measuring further positive changes over the next 15 years. Meanwhile, the AAI Committee on the Status of Women is committed to fostering awareness of the challenges for women in academic research and to initiatives leading to equal treatment of all professional immunologists on the basis of merit.

Disclosures

The authors have no financial conflicts of interest.

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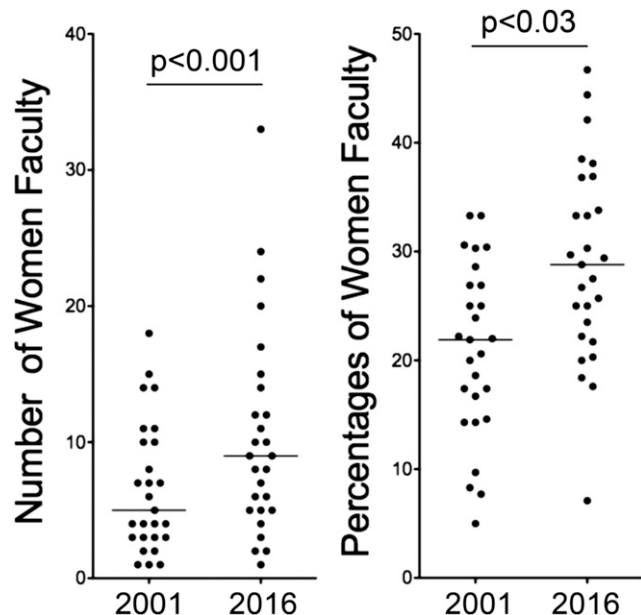


FIGURE 1. Comparison of the number and percentage of women faculty members, 2001–2016. The absolute number or percentages of women faculty members across 27 institutions were analyzed, and each number or percentage from a single institution is represented with a dot. The line represents the median in each group. Differences between the groups were analyzed by two-way ANOVA using GraphPad Prism and found to be statistically significant as denoted in the figure. The programs and departments compared in 2001–2016 are as follows: Scripps Department of Immunology, University of Washington Department of Immunology, Baylor College of Medicine Department of Immunology, Mayo Clinic Department of Immunology, University of Toronto Department of Immunology, University of Colorado Health Science Center Department of Immunology, Duke University Department of Immunology, Yale University Section of Immunobiology, University of Texas Southwestern Center for Immunology, University of Minnesota Center for Immunology, Washington University in St. Louis Center for Immunology, University of Chicago Committee on Immunology, University of Pennsylvania Graduate Group in Immunology, MD Anderson Cancer Center Graduate Group in Immunology, University of California at Berkeley Division of Immunology, and the Immunology Programs at the University of Texas Health Science Center, Cornell University, University of Pittsburgh, University of Iowa, University of Virginia, Emory University, Harvard University, Memorial Sloan-Kettering Institute, Dartmouth Medical School, LaJolla Institute of Allergy and Immunology, Boston University and Stanford University.

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