

**Written Testimony  
of  
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Subcommittee on Research and Science Education  
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Chairman Baird, Ranking Member Ehlers and members of the Subcommittee, I greatly appreciate the opportunity to testify before you today. I am an Assistant Professor of Physics at The City College of New York (CCNY), where I have been since 2004. I am currently funded by the National Science Foundation through two programs: a CAREER award, the signature NSF program for young investigators, and a NIRT grant, a nanotechnology-oriented, interdisciplinary program that I run in partnership with three other investigators at CCNY and the University of California at Berkeley.

These programs intersect three of the issues before this committee today: first, how to nurture young scientists; second, how to catalyze novel, cutting-edge research through cross-disciplinary teams and third, how to effectively integrate academic and industry activities. These are complex topics, and they do not lend themselves to simplistic analysis. I hope, however, that my thoughts may constructively help you in developing wise public policy as you proceed with the National Science Foundation Reauthorization Bill.

Before I begin, let me say a word about my personal history. I was born in Argentina and received my undergraduate and graduate degrees in my native country. I came to the United States in 2000 as a Berkeley “postdoc” before joining the faculty at CCNY in 2004. I left my homeland because my passion for science led me to seek the best opportunities for a young researcher. I believed and still believe that those opportunities are greatest in the United States, although complacency and federal budgetary strictures could place that status at risk.

For young scholars, the Faculty Early Career Development (CAREER) Program is arguably the most important federal activity supporting scientists at the early stage of their careers. It is also one of the very few that allows the participation of individuals who, as in my case, teach at American universities but were born and raised abroad. Finally, it is a program that integrates research and education and, as such, serves as a model for other science agencies in the Americas and overseas.

Unfortunately, from my anecdotal experience with other young scientists, many of them truly outstanding, the CAREER program appears to suffer from significant lack of resources, leading many worthy applicants to submit proposals two or three times before they achieve success. Proposal writing is arduous and time-consuming, and having to wait two or three years to land a CAREER grant, while the tenure clock is ticking, can put an end to a promising career.

Although shortage of money is a significant problem, it is not the only one. The NSF seems to evaluate junior faculty proposals on the basis of the same traditional merit review criteria it uses for established investigators. While I believe the NSF must stress quality and the likelihood of success of a research project, I believe that the NSF CAREER program would benefit enormously if reviewers were instructed to place greater emphasis on creativity and originality when judging proposals from junior scientists.

The early career enterprise in academia is a highly non-linear process. A minimum, threshold infrastructure is required to produce the very first piece of significant data. At times this proves a formidable task, especially in universities and colleges that do not emphasize research as strongly or that lack an adequate human and physical infrastructure. Even in an adverse environment young scientists are, by nature, the most prone to take risks and think in a different, perhaps more creative manner. Therefore, I suggest that, especially for younger scientists, NSF program managers identify and nurture the most inventive ideas, even if the chances of success are not completely locked in.

For extremely high-risk creative proposals, NSF could consider a preliminary award of somewhat shorter duration to achieve a proof of principle. Taking into consideration that decisions on tenure are often made after only five years, the CAREER program should also have a more flexible chronogram, for instance, with proposals accepted two times during the year, rather than one, as is currently the case.

For young, inexperienced investigators, problems may be encountered even after they obtain initial funding. Sometimes costs exceed those originally envisioned, unforeseen difficulties render progress slower or family responsibilities require attention. Unfortunately, the last applies in particular to female scientists when a child is born. But emergencies can also arise when any family member requires special care. Program managers and university administrators ought to work closely with each other to maximize the possibility of a successful outcome of the research.

Let me now turn to the interplay between scholarly research and industrial application. This ought to be a potent driving force in a successful model of science policy. Yet, university-industry partnerships are far from widespread, and junior faculty often find it difficult to initiate one, particularly at middle and small-size universities where scholarly work has traditionally remained disconnected from industrial needs. The NSF should invigorate existing programs by broadening the range of opportunities.

Cooperation based solely on industry cost sharing seems unrealistic to me – more so in the case of young investigators – because companies tend to be very conservative and risk averse. The federal government ought to provide greater incentives by amending the R&D tax policy to grant a company, at the very least, the same credit for partnering with a university as it now receives for research it conducts on its own.

But NSF ought to encourage other avenues of partnerships; for example, short-term student industrial internships. Internships are indeed an important ingredient in programs such as the Integrative Graduate Education and Research Traineeship (IGERT) program, but the large

scale of these initiatives makes them unlikely to prosper in places other than those already having strong ties with industry. Smaller-size educational programs that emphasize academia-industry partnerships should be also considered and nurtured, especially when they are initiated and led by junior faculty. The Committee might also consider requesting the Foundation to explore the feasibility of establishing an NSF-wide mission office to serve as a liaison between industry and academia. Such an office could serve as a forum to facilitate contact between (young) scholars and entrepreneurs and coordinate the efforts of the various NSF divisions in areas ranging from education to instrumentation development.

Let me conclude by observing that many future scientific breakthroughs will occur across the boundaries of the traditional scientific disciplines. The Committee should encourage NSF to be ever cognizant of these interdisciplinary opportunities and to ensure that interdisciplinary proposals do not fall between the cracks of NSF disciplinary offices.

Once again, I thank you for the opportunity to testify, and I look forward to responding to any questions the members of the committee may have.