

Enhancing The Connections Between Institutions and Organizations to Advance Postdoctoral Training

Adriana Bankston¹, Adam P. Fagen, Gary S. McDowell¹, Kearney Gunsalus^{1,3}, Sonia Hall^{1,4},

¹ The Future of Research, Abington, MA

² Siena College, Loudonville, NY

³ Genetics Society of America, Bethesda, MD

Corresponding Author:

Sonia Hall*

Genetics Society of America, Bethesda, MD

Email address: SHall@genetics-gsa.org

Abstract

Postdoctoral scholars are no longer the “invisible” population they once were. While they are considered independent researchers, they still require a considerable amount of training and career preparation. Recently, there have been numerous efforts from a variety of stakeholders to enhance professional development for postdoctoral scholars. While these enhancements are valuable, there is a need to ensure that these efforts are coordinated across stakeholders to maximize investment and minimize duplication. The workshop described here, held at the 2017 National Postdoctoral Association meeting, was designed with this goal in mind. Representatives with various perspectives on postdoctoral training discussed the strengths and challenges they faced in training postdoctoral scholars. This conversation included discussions of career preparedness, methods for collection and dissemination of training and career outcomes data, specific roles that these stakeholders play in enhancing postdoctoral training, and potential partnership models for collaboration to enhance postdoctoral training.

Introduction

Over the last two decades, there has been a much-needed increase in the services available to postdoctoral scholars. From the establishment of postdoctoral offices and associations at research institutions to increasing recognition by funding agencies, the National Academies, and other national organizations, postdoctoral scholars are no longer the “invisible” population they once were (Curtis 1969; National Academy of Sciences 2014). However, the training that postdoctoral scholars currently receive within their institutions often does not match their career development needs both within and outside of academia. The recognition of this disconnect has led some postdoctoral scholars to take charge of their professional development by engaging in both local and national conversations around career development and other training areas (McDowell et al. 2014). Yet many postdoctoral scholars report an inability to be independently proactive due to training barriers such as the availability of time away from the lab to engage in these activities, lack of confidence, insufficient time management skills, and lack of funding provided by universities to participate in this type of training at scientific conferences.

As attention to postdoctoral issues has increased, many organizations now seek to provide career development and other support to this population of junior scientists. Much of the leadership in this area has occurred at the campus level—including postdoctoral offices and associations, career centers, and other institutional offices. Although the resources provided to postdoctoral scholars vary across institutions, local efforts often focus on 1) providing both individual and group training and 2) addressing some of the common concerns of the postdoctoral population.

More recently, there have been increasing efforts to serve postdoctoral scholars across institutions. Many of these activities have been led by professional societies and other non-profit organizations, who are in a position to address the needs of postdoctoral scholars within and across disciplines and bring various groups together across university, state, and national boundaries (DePellegrin 2016; Gelling 2017; National Postdoctoral Association 2017). Postdoctoral associations have also established guidelines for training, created discipline-specific programs and opportunities, provided online and in-person professional development courses, and connected those with an interest in postdoctoral issues to each other. Several of these organizations address postdoctoral issues at national meetings and other forums. Part of the national conversation around postdoctoral training and professional development aims to gain input from the postdoctoral scholars themselves about their career development needs (Goodwin et al. 2015; Bankston and McDowell 2017). In addition to national meetings, local meetings provide an opportunity for postdoctoral scholars to discuss the resources needed for career development and additional training areas within a particular geographical region. Other efforts towards improving postdoctoral training have focused on online career development programs, training certificates, and different types of credentials meant to supplement the work taking place on individual campuses.

While giving postdoctoral scholars access to a greater variety of resources and providers is beneficial, there is a need to ensure that activities at various levels are coordinated to minimize duplication. To address this goal, we organized a workshop at the 2017 National Postdoctoral Association Annual Meeting entitled “Enhancing the Connections Between Institutions and Professional Societies in Advancing Postdoctoral Training.” Adam Fagen and Sonia Hall conceptualized and proposed the workshop, which was then conducted and summarized by Adriana Bankston and Sonia Hall (Bankston and Hall 2017).

Methods

The workshop introduction framed the overall discussion and was followed by a panel discussion designed to identify the strengths and challenges that various stakeholders bring to the table in working together to enhance postdoctoral training. Following the panel, we held five concurrent breakout sessions on specific topics related to both challenges to and potential solutions for improving postdoctoral training. To end, a summary of the major themes from the panel and breakout sessions was presented to all attendees.

Panel Discussion

We aimed to map out a framework by which multiple stakeholders may 1) work together to enhance professional development for postdoctoral scholars while 2) maximizing individual contributions and 3) minimizing duplication. To this end, we invited panelists as representatives of their respective groups, including student and postdoctoral affairs ([Bill Lindstaedt](#), UCSF; [Lisa Kozlowski](#), Thomas Jefferson University; [Sarah Hokanson](#), Boston University), recruitment and diversity services ([Marcela Hernandez](#), The Ohio State University), non-profit organizations ([Gary McDowell](#), Future of Research), and scientific societies ([Corrie Kuniyoshi](#), American Chemical Society). Each panelist highlighted the type of programming or service offered by their organization, as well as the strengths and challenges faced by their group for improving postdoctoral training (**Table 1**). We discussed the ways in which each of the panelists view career preparedness, methods for collection and dissemination of training and career outcomes data, the specific roles they play in enhancing postdoctoral training, and potential partnership models for collaboration to enhance postdoctoral training. This conversation provided workshop participants with a clear understanding of areas that are complementary and/or in conflict among the various stakeholders.

To continue the discussion of how various stakeholders could work together to improve postdoctoral training, we asked the panelists about the types of interactions they had with other sectors of the workforce that employ PhDs. Their answers highlighted career consultants and industry/corporate connections, as well as scientific societies. The most effective means for them to make connections were attending conferences, listening to talks or webinars, being active on social media, joining a listserv or newsletter, and taking personal action to speak up for and promote the need to centralize data for the benefit of all stakeholders involved, including the postdoctoral scholars themselves.

Table 1. Strengths and challenges of improving postdoctoral training identified by various stakeholders during the panel discussion. These items can serve as an initial platform for building collaborative efforts. *Note:* some items (*) were viewed as both strengths and challenges by the panelists.

Strengths	Challenges
Professional engagement*	Professional engagement*
Programming/resources	Postdoctoral scholar engagement
Flexible program/structure	Availability of programs/offices
Local/national network	Credibility with faculty
Faculty support for events*	Faculty support for events*
Faculty advice/empathy	Centralization of information
Provides a voice for scientists	Size/type of network
Evidence-based policies	Population needs/conversations

The panelists also discussed effective opportunities and training experiences that institutions and professional societies can provide to postdoctoral scholars and discussed which group would be the most appropriate to provide a particular opportunity. They noted that professional societies and non-profit organizations are particularly well positioned to provide career and professional development resources to postdoctoral scholars—in particular to those who may not have these opportunities readily available at their institution. Many professional societies and non-profit organizations have created positions for graduate students and postdoctoral scholars to serve in leadership positions on their committees and boards. These types of opportunities, provided by non-academic organizations, allow junior scientists to circumvent many of the challenges faced on their local campus, such as cultural barriers and lack of career resources.

Panelists recommended multiple ways for junior scientists to enhance interactions with professional societies and nonprofit organizations and indicated specific resources (**Table 2**).

Table 2. Recommendations from panelists on ways for junior scientists to enhance interactions with professional societies and nonprofit organizations. *Note:* this table contains a few general examples (and is thereby not comprehensive), including additional resources that were not discussed in the workshop.

Method	Resource
Organize workshops at meetings	American Society for Cell Biology (ASCB) Early Career Meetings Future of Research Regional Meetings Genetics Society of America (GSA) Career Development Symposia
Build professional skills	GSA Early Career Leadership Opportunities GENETICS Peer Review Training Program American Association for the Advancement of Science (AAAS) Career Development Center ASCB COMPASS Blog American Society for Microbiology (ASM) Professional Skills Building
Seek leadership opportunities	Future of Research Board of Directors GSA Early Career Scientist Leadership and Professional Development Program Association for Women in Science (AWIS) Chapters & Affiliates ASM Volunteer Opportunities
Join professional society committee	ASCB COMPASS National Postdoc Association (NPA) Committees Society for the Advancement of Chicanos and Native Americans in STEM (SACNAS) Committees
Build a broad network	AAAS meeting ASCB meeting NPA meeting American Society for Biochemistry and Molecular Biology (ASBMB) meeting GSA Early Career Scientist Leadership and Professional Development Program
BEST program resources	Vanderbilt ASPIRE Program Center for Biomedical Career Development University of Massachusetts Medical School MIND Program University of California San Francisco

Panelists then offered specific advice on how junior scientists might make such connections with professional societies and nonprofit organizations (**Table 3**).

Table 3. Advice from panelists on specific ways in which junior scientists can make connections with professional societies and nonprofit organizations. *Note:* this table contains a few general examples (and is thereby not comprehensive), including additional resources that were not discussed in the workshop.

Method	Resource
Scientific society job board	NPA Career center ASCB job board Graduate Career Consortium (GCC) Careers GSA Careers American Chemical Society (ACS) Careers ASBMB job board ASM Career Connections Inside Higher Ed Job board
Joint society memberships	NPA - GSA NPA - ASBMB (and others)
Postdoctoral associations	Boston PDA UCSF PDA SURPAS (Stanford)
Network with university alumni	Yale Career Network Georgetown Alumni Career Network University of British Columbia Alumni Association
Participate in local networking events	MIT PDA Boston PDA AWIS Chapters & Affiliates

Breakout Sessions

During the five breakout sessions outlined below, we discussed specific topics relevant to the issues discussed by the panelists and brainstormed barriers to enhancing postdoctoral training, as well as potential solutions.

Defining & Measuring Career Preparedness (Breakout Session #1)

Career development for postdoctoral scholars is imperative for a successful scientific enterprise, encompassing both academics and non-academics. While defining career preparedness for postdoctoral scholars is complicated by various career options requiring different skill sets, many skills are required for several career tracks. The lack of knowledge in terms of which skills both graduate students and postdoctoral scholars need to develop and how to obtain them in order to achieve their career goals is a symptom of a larger systemic issue within the scientific enterprise (Biomedical Research Workforce Working Group 2012; Hitchcock et al. 2017).

The current system is not adequately preparing postdoctoral scholars for career success within or outside academia (National Academy of Sciences 2014). As a result, many barriers exist to assessing their own career preparedness. One such barrier is the lack of exposure to career options during training, resulting in junior scientists' pursuing multiple postdoctoral appointments for various reasons: lack of non-academic career plans, lack of knowledge of, or confidence in, subsequent career steps, and the general perception that spending more time at the bench equals increased productivity in academia. A second barrier is the idea that postdoctoral training can provide better training within a particular research area, thereby pursuing a second round of postdoctoral training may be viewed as a profitable option towards long-term goals. A third barrier consists of the metrics currently used to measure career advancement, which are quantifiable items such as papers, presentations, and posters, whereas the utility of developing non-technical skills necessary for career preparation is difficult to measure (St Clair et al. 2017; Sinche et al. 2017). In addition, there is a lack of resources for postdoctoral scholars to develop these skills. Overall, these issues are part of a larger question about whether pursuing a postdoctoral position should be a goal in itself or rather a stepping stone for career progression.

This session offered a few potential resources to help junior scientists decide whether to pursue multiple postdoctoral appointments. An important aspect of this process is evaluating the career interests, passions, goals, and backup plans of postdoctoral scholars at the start of their training. This practice will ideally shape their training in a positive way, towards an enjoyable career path in which they can also be successful. Providing specific resources for postdoctoral scholars to explore their career passions and interests would be critical for this goal. A few such resources were suggested during the workshop and include general career resources ([myIDP](#)), professional society resources ([NPA core competencies](#), [training workshops](#)), resources for networking ([informational interviews](#)), and considering other non-academic careers. While many other

resources are needed for postdoctoral scholars to discover and achieve their career goals, this list provides a useful starting point for continued career exploration.

Another type of barrier that exists to providing adequate career training for postdoctoral scholars is the lack of data on postdoctoral scholars on multiple fronts, including career outcomes. One of the confounding problems with tracking postdoctoral scholars stems from the variations in their classification and the multitude of titles under which they are employed in universities at the national level (McDowell 2016; Schaller et al. 2017; Pickett et al. 2017). This issue has existed since 1969, as highlighted in a report by the National Research Council. One of the reasons for this issue is the lack of a suitable system to assess postdoctoral population trends (Curtis 1969). These trends are largely analyzed currently using the National Science Foundation's NCSES Survey of Graduate Students and Postdoctorates in Science and Engineering (GSS), which is an unreliable indicator of postdoctoral trends in the biological sciences (Pickett et al. 2017).

While the methods for evaluating career preparedness for postdoctoral scholars are overall scarce, multiple organizations have begun to develop improved resources to track postdoctoral career trajectories and evaluate career success (Blank et al. 2017). One proposed solution from our session was using entry and exit surveys for postdoctoral scholars participating in workshops, in order to evaluate the effectiveness of this training towards their overall career goals. Another possible option is using the training-related sections of National Institutes of Health grants (such as T32) to evaluate career progression, which is beneficial for academic careers. Another common method is simply examining the CV of individual postdoctoral scholars for the number of publications, the main way to evaluate academic success. Clearly, some of these methods are flawed and do not necessarily reflect the ability of postdoctoral scholars to succeed in their careers, particularly outside of academia. In addition, the skills gained by postdoctoral scholars in academia (such as identifying active research projects and developing other credentials) are also necessary for multiple other career paths.

Methods for Assessment & Dissemination (Breakout Session #2)

A recurring problem related to graduate and postdoctoral training is lack of data regarding the type and extent of career and professional development received by junior scientists. Advancing their training requires sharing resources, best practices, assessment data, and associated career outcomes (Polka et al. 2015; Hitchcock et al. 2017; Pickett 2017). Unfortunately, there is a lack of community-wide practice for assessing training experiences and their effectiveness as it relates to career outcomes (St Clair et al. 2017; Sinche et al. 2017). This goal requires data collection and analysis on graduate students and postdoctoral scholars, both during their training as well as in a longitudinal fashion following their training.

Stakeholders need to join together to define learning goals that contribute to the career preparedness of postdoctoral scholars. This will allow them to utilize a research-based approach to evaluate postdoctoral training interventions (including performance evaluations and optional workshop trainings) (Gibbs et al. 2015). In addition, partnering with social scientists to build assessments and design data collection instruments is critical for measuring behavioral outputs and associated longitudinal career outcomes. Establishing measurable career outcomes is critical, as it will allow for evaluation of junior scientists both within and across programs, enabling the identification of areas for improvement, growth, and collaboration. Additionally, using a research-based approach to postdoctoral training enables the identification of interventions that may currently either positively or negatively affect this population.

The coordination of efforts both within and across institutions and organizations requires a systematic approach to disseminate these data and associated resources. Accomplishing this goal requires a community-wide effort to identify effective resources (such as lesson plans and workshops) in order to obtain measurable outcomes. One potential approach is to develop a [centralized repository](#) for this content and associated data, and make it available for use by the community. Data specific to the training progression of graduate students and postdoctoral scholars, their career preparedness, and their career outcomes should be widely disseminated in the community (Polka et al. 2015; Hitchcock et al. 2017; Pickett 2017). This broader goal requires the participation of funding agencies, as well as institutions, faculty, and staff who train postdoctoral scholars, and from graduate students and postdoctoral scholars themselves (Fuhrmann 2016).

Tools for Overcoming Dissemination Challenges (Breakout Session #3)

Encountering barriers to dissemination of valuable data and resources for postdoctoral scholars is inevitable. The entire scientific community would benefit from the ability of individual groups collecting data on postdoctoral training to share their findings in a format that is both useful and accessible. In addition, this practice would contribute to minimizing duplication of efforts from other groups with similar interests and motivations, especially given the competing demands for time and resources on both academics and administrators.

Cultural barriers reported by postdoctoral scholars prevent their participation in programs that may provide valuable resources for career preparedness. These cultural barriers are in addition to the time constraints, lack of confidence, and ineffective approaches to communication that postdoctoral scholars from any background often face. Funding agencies and institutions need to build in policies to overcome some of these barriers by requiring a percentage of postdoctoral time be allocated for professional development activities, not solely related to developing research related skills and competencies (Fuhrmann 2016). The transparent dissemination of available training resources by all stakeholders with an interest in improving postdoctoral

training will also lessen these challenges and reinforce cultural acceptance of improved training and preparation for careers for postdoctoral scholars.

Multiple groups need to be involved in the process of disseminating data and resources benefitting postdoctoral scholars to the community at both local and national levels. This includes faculty, department chairs, university administration, organizations, and postdoctoral scholars themselves. Knowledge of the tools necessary to collect and disseminate data is a challenge, as well as the minimal level of outcomes reporting from both state and federal grant funding recipients. Finally, very little funding exists to cover the time which staff can input into these activities, and the incentives and rewards for staff at individual institutions to contribute to these activities are lacking.

Increasing the transparency related to institutional resources available for postdoctoral scholars can be an attractive tool for recruitment by highlighting potential opportunities for professional and career development. This goal can be accomplished through formal publishing mechanisms as well as more informal mechanisms (newsletters, blog posts) and dissemination via social media.

Identifying Roles for Enhancing Postdoctoral Training (Breakout Session #4)

Providing comprehensive career training for postdoctoral scholars requires various stakeholders to utilize their individual strengths and provide specific resources towards this goal. These stakeholders may act either at the local or national level—both are necessary in order to provide postdoctoral scholars with a broad career preparation.

One of the barriers to career training for postdoctoral scholars from this group was their lack of knowledge of the resources which scientific societies and other organizations can provide for them. An obvious solution for this is encouraging postdoctoral scholars to become more involved in their own training and thereby seek out these resources at the national level. In addition, societies need to further advertise the resources and opportunities available to junior scientists—travel awards to attend their meetings, webinars on topics of interest, and remote training programs—prior to and during sessions at meetings. Societies could also make a valuable contribution by visiting campuses for greater local-level impact.

One way to locally engage postdoctoral scholars in this training would be holding multi-institutional events (which may be easiest in larger cities) connecting postdoctoral scholars with university alumni, who may be invited to discuss their career paths. These efforts would increase connectivity between past, current, and future junior scientists at the university, which was a highly desired outcome by our workshop participants.

Overall, workshop participants generally agreed that postdoctoral scholars themselves need to become more involved in shaping their own training, and scientific societies and other organizations can aid in this endeavor by encouraging them to become involved in committees and utilize online resources.

Testing a Partnership Model for Collaboration (Breakout Session #5)

Facilitating collaborations among stakeholders to work together efficiently is a critical endeavor for providing the best possible training to postdoctoral scholars. One potential way organizations may expand collaborations is by offering postdoctoral scholars joint membership options with other organizations to maximize the resources offered. Another possibility is providing subscription-based access to a portal that contains career development content, which some societies already offer.

Workshop participants suggested specific resources which they would like to have in order to improve their training. This includes resources used to improve credentials, opportunities to practice specific types of skills (e.g., negotiation and speaking in the community) and other general resources for career development. Finally, participants also desired local opportunities to put into practice some of the things learned from their professional societies.

Conclusions

This workshop highlighted a few major themes related to improving training for postdoctoral scholars. First, multiple stakeholders working together can be a very effective way to discover what is and isn't currently working in the realm of training postdoctoral scholars, as well as to minimize duplication. Second, transparency in data related to the postdoctoral population is critical for determining the areas of potential overlap and complementarity between various groups with common interests. Third, junior scientists themselves need to take charge of their own career and professional development by taking advantage of resources they may have available both at the local and national level.

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