

Science & Society

The postdoctoral
blueprint part one:
creating a niche

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Current postdoctoral fellows have a range of career options; however, following a career path into academia can be daunting. Here, we discuss essential elements needed to transition the postdoctoral position into faculty candidates. Furthermore, we provide critical hacks to help postdoctoral fellows to be well prepared to navigate the application and interview processes.

Initial steps for success

A blueprint is a roadmap. The blueprint is needed to facilitate the postdoc-to-faculty transition. However, there is no one blueprint to follow when preparing to transition from a postdoctoral fellow to a faculty position. Postdocs usually learn this process from communicating with their mentors, but the mentor's experience as a postdoc themselves may have been years ago. If they have not been recently involved in faculty recruitment, mentors may not recall some of the details or many of the stressors involved in the postdoc experience. Postdocs can also learn about the process of seeking a faculty position by talking to peers who recently went through the same process. However, keep in mind that their time may be limited while they are working to make their own transition. Needless to say, postdocs often do not have the right tools or knowledge to make informed decisions as they prepare to enter the faculty job market. Here, we discuss some of the

key steps to take during postdoc training to best equip you to successfully navigate the faculty job hunt.

Postdocs often fail to make a smooth transition because they are not aware of essential details that are often not recognized as critically important early in the process. Before starting this endeavor, remember three critical concepts: (i) give yourself sufficient time; (ii) get involved in many opportunities; and (iii) stay focused. During your postdoctoral training, the focus should be on cultivating your technical skills and building your reputation in your field by publishing papers, giving talks, presenting posters at meetings, and networking, all of which will be needed to become an independent, tenure-track faculty member. Developing a well-defined scientific niche will allow you to establish yourself as an expert in the field and will set you apart from your colleagues [1]. A postdoc must invest time not only to make a well-organized plan of action in the laboratory but also to plan for a smooth and successful transition from being a postdoc to becoming an independent faculty member.

Making a well-organized research plan means being able to manage several interrelated but distinct research projects simultaneously. At least one of these projects should be a high-risk and high-reward type. If this project is successful, it will be paradigm shifting! Think of this project like investing in Bitcoin: if you are right with your investment, you will be rich. However, you do not want to invest all your money in one investment and end up with nothing. Therefore, also develop lower risk projects that are highly likely to result in publishable data but might not get published in the highest-ranking journal. These projects are like investing in government bonds: you will make some money but, in the long run, you will not get rich overnight with this type of risk-averse investment. If you have both types

of research in your portfolio, you will arm yourself with a diverse research repertoire that will be an asset during your faculty job hunt.

After becoming established in a lab and generating some research results in your first year, we suggest that you start looking for one or two long-lasting opportunities at your institution or scientific organization. This will allow you to participate in activities that will build your 'soft' or 'transferrable' skills. Consider joining an organization that will provide you with opportunities to engage with people who will be beneficial to your career trajectory or will help you learn or expand skills, such as teaching, mentoring, leadership, or communication. One way to get started is to mentor undergraduates, post-baccalaureate students, and/or graduate students not only in, but also beyond the lab, as they navigate the path to their own goals.

If your institution has a postdoctoral association, find ways to get involved with that group, which will provide additional opportunities. If you do not have access to a postdoctoral association, consider joining the National Postdoctoral Association. Organizational memberships can be a great 'soft' skill builder, allowing you to gain a robust network of peers, work on your branding on and off of social media, and take a break from bench work. Meeting others who may be a step or two ahead of you in the faculty search process can significantly help you traverse that path and develop camaraderie.

Critical hacks unlocked

It is easy to get distracted or, even worse, get caught up in fear of missing out during your postdoc to faculty transition. Your enthusiasm for your future plans may diminish when things are not going well or when you become overwhelmed. To combat these crucibles, start practicing the following steps so that you are equipped to handle them successfully prior to becoming a

faculty member (Figure 1): (i) first, celebrate both small and significant accomplishments (Figure 1); (ii) second, identify the kinds of opportunities you wish to pursue in the future so that you can develop further relevant skills during your postdoctoral period (Figure 1); and (iii) finally, establish long-term goals to help position your postdoctoral experience into a better perspective. Starting with something as simple as a hand-written goal sheet provides structure to your professional development and can fan the flames of your enthusiasm for a faculty position (Figure 1).

Understanding your mentor

During your postdoctoral training, it is in your best interest to develop a strong, consistent, and effective communication style with your mentor. Having a mentor who engages with you, whether in a small or big lab, is key to your research success. It also lends itself to advancing your career

and gaining confidence in your leadership potential. As a postdoctoral fellow, learn to understand your mentor's style, find win-win opportunities, determine what is not negotiable, identify what your mentor considers high currency [e.g., fellowships, awards, papers, mentoring; diversity, equity, and inclusion (DEI)], and teach for them. Over the course of your career, you will be working with all sorts of people, and you will be most successful if you can build good rapport even with difficult people; therefore, practice building those skills during your postdoc position. Use the conversations with your mentor to glean information needed to progress your career. However, recognize that mentors cannot give you everything you want or solve all your challenges. As a postdoc, creating a broad network along your journey will help you obtain other support systems. During years 3 and 4 of your postdoctoral training, a strong mentoring relationship will be

essential to work out the details of how much time and independence your mentor will agree you need to successfully create your own projects and what projects and data you agree to take with you to start your independent laboratory. Remember that some of these projects can continue in collaboration with your mentor, but one or more of them should be exclusively yours to work on independently without competing with your postdoctoral mentor. In the end, you will need your mentor to support you and provide you with a stellar letter of recommendation attesting to your skills and potential as a faculty member.

Critical hacks unlocked

Mentors can help alleviate postdoctoral job-related stress. Thus, postdocs should ask for feedback on obtaining a faculty position from multiple mentors (Figure 1). Mentors do not need to be from your institution. They can be from other institutions or organizations. Postdocs who do not have much confidence may need this nurturing relationship to feel that they can be independent and are ready to leave a laboratory [2–4] (Figure 1).

Define your niche

After settling into your postdoctoral position, it is crucial to make a plan that will allow you to refine and build your general scientific acumen and step beyond previous expertise that was developed in graduate school. What makes you unique as a scientist? The answer is not always easy, especially for early-career researchers. Distinguishing a research niche is a lengthy process that includes developing independent thinking and a strong commitment to the worth of your ideas [1]. A 'niche' is built by evaluating, rejecting, or identifying gaps in previous work [1]. Developing and articulating a niche will help you to successfully navigate the scientific pipeline [5]. Your job application will be one of hundreds for just one or several openings, making it critical that you differentiate yourself and your

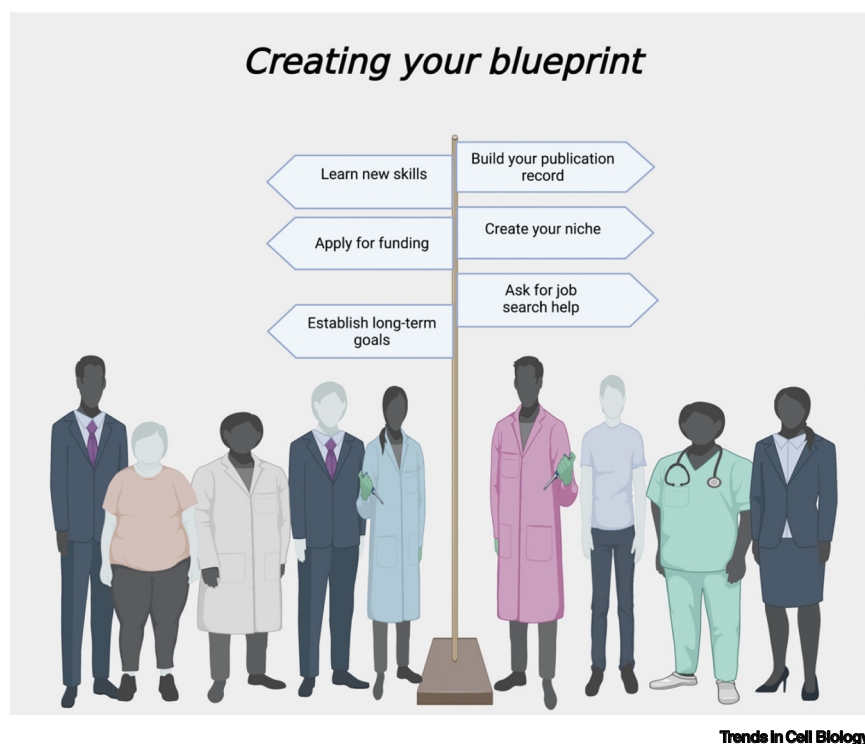


Figure 1. Creating a blueprint to thrive. This illustration depicts essential critical hacks to creating a successful postdoc experience.

research program from other candidates and from your previous or current advisor(s). Make sure that your application clearly articulates the specific aims of your most relevant proposed research and how your work will expand upon the core strengths of the department you are applying to, while simultaneously diversifying and collaborating with other faculty within the university (e.g., emerging research fields, state-of-the-art technologies, or novel applications).

Finally, take advantage of any nonacademic expertise that you have acquired. Have you previously worked in industry or consulted? Would these former and future relationships lead to unique opportunities or additional funding for your lab? If so, suggest unusual avenues of additional research and funding. Think of creative alternatives and diversify your future funding portfolio to differentiate your research program. Finally, your stated niche may need to be modified to best fit the needs of different universities that you are applying to [1].

Funding for the transition phase

Even if your postdoc project already has funding, securing your own funding streams during this time will set you apart from the crowd in academic development. A significant way to demonstrate independence and success as a researcher is to obtain your own funding as a principal investigator [6]. However, many faculty positions are obtained without having independent funding [6]. Grants, awards, and individual fellowships also give you leverage in your current position and leverage you to get future parent grants. Postdoc to faculty transition awards [e.g., National Institutes of Health Maximizing Opportunities for Scientific and Academic Independent Careers Postdoctoral Career Transition Award to Promote Diversity (MOSAIC NIH K99-R00)], NIH Pathway to Independence Award (NIH K99-R00ⁱⁱ), Burroughs Wellcome Fund Career Awards at the

Scientific Interface (BWF CASIⁱⁱⁱ), United Negro College Fund/Bristol-Myers Squibb E.E. Just Postgraduate Fellowship in the Life Sciences Fellowship (UNCF-BMS EE JUST^{iv}), Hughes Medical Institute (HHMI) Hanna H. Gray Fellows^v, and NIH Mentored Research Scientist Career Development Award (NIH K01^{vi}) are designed to support postdoctoral research fellows during their training fellowship phase and help them transition to an independent faculty research position. These resources are awarded to an individual researcher (rather than to a lab or university) to work on a research project for a designated period. This funding is intended to cover your salary; fringe, relocation, and travel costs; and research expenses. Senior postdocs are often eligible to apply for large grants to start their lab or research group. These grants usually require having an excellent training record that shows promise and productivity. Thus, plan early and make sure you have enough high-quality preliminary data to be competitive. Strive to be the first person to do something, such as thinking about a problem in a new way and taking an approach that overcomes limitations in existing paradigms.

Critical hacks unlocked

Start early to find funding and remember that getting funding for one project can lead to more research funding. Use your funding to hire undergraduates or a research technician to advance your research program. Having research funds that you can take with you will make you a very desirable candidate and will give you leverage in negotiating for a new position (Figure 1). Funding is not always required to secure a faculty position [6]. However, having an exciting niche or expertise will increase your chances of obtaining a faculty position (Figure 1).

Ask friends and colleagues for samples of successful grant applications. Collaborative networks and social media platforms can provide opportunities to connect with

colleagues willing to share their research proposals. We suggest casting a wide net in finding grant writing resources (Figure 1).

Next steps

In summary, start early, do research, build a network, establish your niche, and apply for funding of your own. It is important to take risks in your scientific journey [7]. Ask the critical questions that are lingering in your field. Do not be afraid to think outside of the box when approaching your science or preparing for your transition [7] and remember, above all, being unique is an asset to be celebrated and valued.

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Declaration of interests

The authors declare that they have no competing interests.

Resources

ⁱwww.nigms.nih.gov/training/careerdev/Pages/MOSAIC.aspx

ⁱⁱwww.nigms.nih.gov/training/careerdev/Pages/PathwayIndependence.aspx

ⁱⁱⁱwww.bwffund.org/funding-opportunities/interfaces-in-science/career-awards-at-the-scientific-interface/

^{iv}<https://uncf.org/news/uncf-bristol-myers-squibb-announce-e-e-just-postgraduate-fellowship-in-the>

^vwww.hhmi.org/programs/hanna-h-gray-fellows-program

^{vi}<https://researchtraining.nih.gov/programs/career-development/k01>

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