

# Time for change in research careers

Are we as research organizations doing everything we can for postdocs?

Sandra Krull<sup>1,†</sup>, Ana Aranda Silva<sup>2</sup>, Dariya Afanasyeva<sup>1,‡</sup>, Sofie Christensen<sup>3</sup> & Marta Agostinho<sup>3,\*</sup>

Anne (name changed) is a postdoc in her 4<sup>th</sup> year and should have bright prospects for a career in academia. She has an excellent PhD, international experience and two prestigious fellowships (EMBO and Marie Skłodowska-Curie) in her CV. She also chose an internationally renowned laboratory for her postdoc research and is working hard to drive her projects forward. “I’m not sure I’m going to make it to being a group leader”, Anne says. “The competition is unbelievable, and so far, I’m still missing a very high-impact first-author paper. We’ve been scooped a couple of times, and that means I’m still trying to get the kind of publication that could make my career”.

In the life sciences, co-authoring high-impact papers is usually not enough for the step to independence; it is first-author positions on high-impact papers that increase the chance to be invited for interviews. Within this environment of competition and dependencies, with very narrow measures of scientific success, the clock is ticking for postdocs. “We are working with animal models, and each line of experiments takes a lot of time”, Anne explains. “I hope I can submit my first-author paper soon and that a really high-ranking journal will take it. The publication process itself also takes months, especially with revisions and maybe more experiments. Before all of that is done, I have no chance applying for a junior group leader position. And my contract will be running out soon. No idea yet, how long I still have. I’m preparing an application for a new fellowship these days. If that one works out, it might give me a bit more time”.

“Within this environment of competition and dependencies, with very narrow measures of scientific success, the clock is ticking for postdocs”

## From postdoc to PI

Some funding schemes are available to postdocs after their PhD to develop their research work independently, but these grants are rarer and less generous than grants for senior or independent researchers (PI—principal investigator or group leader). Moreover, not all grants or other funding come with a work contract that includes social security and retirement provisions. Contract periods of less than a year are still the reality in many academic institutions. Postdocs can often go from contract to contract and from one funding source to another without having a clear idea of how to manage their next career step and those who are planning a family face significant insecurities around salaries and contract lengths.

Anne remembers: “The whole process of becoming a group leader was a bit of a black box to me, initially. Then our Postdoc Office team made it possible for me to witness an actual hiring process for a junior group leader position at our institute. I was allowed to sit in with the hiring panel and listen to the discussions that usually happen behind closed doors. It was very illuminating. At first, I was a bit shocked at how high the requirements

actually were. And that, no matter how successful you are, if you are beyond the 6-year line after your PhD, you probably won’t be chosen, because you cannot apply for certain funding schemes anymore. But then, I thought: This is good. After all, you can’t play the game if you don’t know the rules, right? I now have a much better idea of how to proceed. And I’m also starting to think about careers outside of academia”.

“... many postdocs are caught in limbo and struggling to progress to the next career level”

Just like Anne, many postdocs are caught in limbo and struggling to progress to the next career level. Their struggle is further exacerbated by the high number of postdocs applying for a very limited number of junior PI positions—which is a major “bottleneck” in academic career progression. For example, at member institutes of EU-LIFE (see Box), the alliance of leading independent European research institutes in the life sciences, the ratio of postdocs to junior PIs positions is on average 12.4. Even if not all postdocs choose to pursue a position as PI, the bottleneck is also reflected in the number of applications that research institutions receive for each junior PI position. For example, in EU-LIFE institutes, it is common that 50 to 100 applications arrive for an open junior PI position (the extremes of two recent calls in one institute are 32 and 450 applications, respectively), which illustrates the high level of competition.

1 Max Delbrueck Center for Molecular Medicine in the Helmholtz Association, Berlin, Germany

2 Instituto Gulbenkian de Ciência, Oeiras, Portugal

3 EU-LIFE Alliance, Barcelona, Spain

\*Corresponding author. E-mail: marta.agostinho@eu-life.eu

†Present address: Research and Excellence Strategy, University of Tuebingen, Tuebingen, Germany

‡Present address: GISMA Business School, University of Applied Sciences, Potsdam, Germany

DOI 10.15252/embr.202154260 | EMBO Reports (2022) 23: e54260 | Published online 28 December 2021

**Box: EU-LIFE**

EU-LIFE is an alliance of research institutes whose mission is to support and strengthen European research excellence by acting as a voice for researchers and research institutions in European science policy; and by promoting and sharing good institutional practices in scientific research across Europe including on careers promotion, skills development, gender equality, diversity and inclusivity, funding of research, knowledge transfer, technology development and engagement of the society with science. EU-LIFE members are leading research institutes in their countries and internationally renowned for producing excellent research, widely transferring knowledge and nurturing talent. ([www.eu-life.eu](http://www.eu-life.eu)).

**EU-LIFE Partners**

Center for Genomic Regulation (**CRG, Spain**) | Central European Institute of Technology (**CEITEC, Czech Republic**) | European Institute of Oncology (**IEO, Italy**) | Flanders Institute For Biotechnology (**VIB, Belgium**) | Friedrich Miescher Institute for Biomedical Research (**FMI, Switzerland**) | Institut Curie (**IC, France**) | Institute for Molecular Medicine Finland (**FIMM, Finland**) | Instituto Gulbenkian de Ciência (**IGC, Portugal**) | Institute of Molecular Biology & Biotechnology (**IMBB FORTH, Greece**) | International Institute of Molecular and Cell biology in Warsaw (**IIMCB, Poland**) | Max Delbrück Center for Molecular Medicine in the Helmholtz Association (**MDC, Germany**) | Research Center for Molecular Medicine of the Austrian Academy of Sciences (**CeMM, Austria**) | The Babraham Institute (**Babraham, United Kingdom**) | The Netherlands Cancer Institute (**NKI, The Netherlands**) | The University of Copenhagen Biotech Research & Innovation Centre (**BRIC, Denmark**).

**Preparation for leadership**

Furthermore, in what is too often a publish-or-perish culture, preparation for a leadership position is too much focussed on journal impact factors, author list positions and high levels of citations of scientific papers—which can take years to accumulate. The dependence on a few metrics such as the impact factor not only puts a lot of pressure on the individual scientist, but also does not do justice to the plethora of other contribution researchers make to science and society. It may even reduce the innovative character of science, forcing scientists to bet

on safe publishable projects, instead of embracing new and risky ideas (Laudel, 2006). Moreover, this pressure can lead to scientific misconduct (Edwards & Roy, 2017). Even though initiatives such as the San Francisco Declaration for Research Assessment (DORA: <https://sfdora.org/>), called almost 10 years ago for a change in research assessment to be less reliant on publication metrics, with some exemplary exceptions, scientists are still to a large extent being evaluated on the impact factor of the journals they publish in. At the same time, many postdocs lack structured support from scientific advisory panels, as is today's norm for PhD candidates, and are left to their own devices when it comes to developing their profile as scientific experts and when starting to mentor students.

Postdocs in many universities and research organizations could benefit from better access to transferable skill training or coaching to prepare them for the next career step. Getting the opportunity to apply for their own project funding and being able to demonstrate their scientific independence such an application requires, would greatly help their career development. This, however, is not a trivial point. In most cases, postdocs in the life sciences work along the main research line of their group. Especially if the group is headed by a non-tenured PI, conflicts of interest can arise around the question of whether a postdoc can take ownership of a project to build his/her own research group, thereby becoming a potential competitor.

.....  
*“Postdocs in many universities and research organizations could benefit from better access to transferable skills training or coaching to prepare them for the next career step”*  
 .....

Whereas postdocs must be the ones in the driving seat when it comes to defining their career goals and pursuing them, there is a lot that research organizations, funders and policy makers can do to help them. In the recent communication of the new European Research Area (<https://op.europa.eu/en/publication-detail/-/publication/f232e2ec-0345-11eb-a511-01aa75ed71a1>), the European Commission

has set ambitious goals for Europe's research and innovation landscape. One of the objectives is to create an effective and creative knowledge market through a strong focus on skills, career development and mobility in research, both within and beyond academia. Besides the obvious measure of appropriate funding for research, policy makers need to enact regulatory and legislative measures that allow postdocs to pursue rewarding and successful careers with lower levels of precariousness. This includes promoting access to more diverse career paths and recognizing that success in science can have many different outcomes. Together with funding agencies and research organizations, they can implement programmes for mobility, networking and training. Importantly, policy makers, funders and research organizations have the means to promote a change in culture that values responsible research and innovation, including a work environment that is fair, transparent, inclusive and ethical with concrete policies and measures that support the relevant aspects of the professional life of all staff, including work-life balance.

“My PI is very interested in my projects and supports me in publishing or looking for new funding sources”, Anne says, “but I don't have the impression that he is interested in my career at all. We never talk about my future perspectives, and he would not dream of introducing me to his network or helping me to build collaborations”. When asked how her organization could support her better, Anne answers: “It's different things. Having a Postdoc Office is already very helpful, because you have a team of people who care about helping you and offering you training opportunities and career advice. For me, even thinking about a career outside of academic research used to feel like failure. These days, I think that a position in a biotech company could actually be great for me. I will see how things develop, but if I need to leave academia, it won't feel like the end of the world anymore”.

A major factor in a postdoc's career success is certainly the support from the PI or group leader, especially when it comes to publications, third-party funding and networking. Many postdocs have excellent and supportive PIs. Some do not. How can we, as research-performing organizations, support all postdocs to reach their career goals? How can we assure that these highly

educated professionals are able to maximize their contribution to society, be it within academia or beyond?

*“A major factor in a postdoc’s career success is certainly the support from the PI or group leader, especially when it comes to publications, third-party funding and networking”*

At EU-LIFE, member institutes believe that through sharing common values, pushing for cultural change and implementing concrete programmes within each research institute, we can contribute to better postdoctoral career development—and hopefully inspire others with our “lessons learned”. Within the EU-LIFE Recruitment and Training Working Group (<https://eu-life.eu/research-excellence/working-groups-task-forces/recruitment-training>), we developed a joint hands-on guide for research-performing organizations for the support of postdoctoral researchers with suggestions on how to support postdoctoral career development (Fig 1; <https://eu-life.eu/newsroom/publications/best-practices-postdoc-career>). We also suggest recommendations for policy makers and funding agencies in a short policy brief (<https://eu-life.eu/newsroom/publications/policy-brief-postdoc-career>).

### Key actions to support postdoctoral researchers’ careers

An important aspect, as mentioned by Anne, is to ensure that research organizations have a point of contact, a dedicated Postdoc Support Office, since postdocs often are not recruited through a structured programme as is usually the case with PhD candidates. Postdocs mostly apply directly to a specific research group or lab, and successful candidates work without the structured support that exists for PhD training, regarding setting objectives, reporting and assessing training requirements. Such a Postdoc Office should have dedicated, professional staff including a coordinator for training and/or a counsellor for advice on career development who help postdocs to establish clear objectives and timelines for their careers, so that progression can be measured over time. This assessment and feedback should follow the same guidelines used for any research staff



Figure 1. Summary of the EU-LIFE hands-on guide for research institutions

by human resources. The Postdoc Office should offer orientation sessions, courses, career counselling, mentoring and coaching to help postdocs to develop their own career within or beyond academia. It should also coordinate with the institution's training programmes to provide training on publication strategies and skills such as writing, data sharing and journal selection.

*“An important aspect [...] is to ensure that research organizations have a point of contact, a dedicated Postdoc Support Office ...”*

Promoting postdocs to reach scientific independence as early as possible should be a key objective for their supervisors and institutions. There are multiple ways to do this, for example, by allowing and encouraging postdoctoral researchers to apply for independent funding as project leaders or by allowing them to develop a new field of research within the group. This way, postdoctoral researchers can acquire leadership and management skills by carrying responsibility for managing staff and project-related expenses.

Promoting early independence can mean a dedicated development track for postdocs, including the possibility to publish as last author—the position usually reserved for the PI—whenever the scientific input justifies it. Scientific independence of postdocs may be difficult to achieve if resources are very limited and group leaders, especially early-career group leaders, are not recognized for their role in promoting independence of postdocs. Thus, scientific assessment and funding decisions for group leaders should include positive incentives for promoting postdoctoral researchers' career development and independence. Furthermore, funding agencies and research institutions should fund more grant schemes for postdocs to pursue their own research ideas.

Some research institutions have internal funding to promote early independence of postdocs, for instance, the Centre for Genomic Regulation CRG, in Barcelona, Spain. Their committee for Postdocs supports an open call for funding postdocs or postdocs in collaboration with a PhD student to explore their own research idea independently from their supervisor(s). Other examples are the “time out scheme” at the Babraham Institute, in

Cambridge, UK, which funds postdocs for up to 6 months to develop their independent research direction; and CEITEC, in Brno, Czech Republic where postdocs get the opportunity to be the PI of a project (<https://gamu.muni.cz/en>). It is also important that research institutions encourage and support postdocs to apply early for independent funding such as, for example, the “Lundbeck experiment” in Denmark (<https://lundbeckfonden.com/uddelinger-priser/ansoegere/apply-grants/lf-experiment>), the ELIDEK grants in Greece ([https://www.elidek.gr/en/call\\_category/postdocs/](https://www.elidek.gr/en/call_category/postdocs/)), the SNF Ambizione in Switzerland (<https://www.snf.ch/en/N18L3oGWomTSS-GkF/funding/careers/ambizione>), or the Elise Richter Programme in Austria (<https://www.fwf.ac.at/en/research-funding/fwf-programmes/richter-programme-incl-richter-peek>).

*“... scientific assessment and funding decisions for group leaders should include positive incentives for promoting postdoctoral researchers' career development and independence”*

Since career progression in science highly depends on the publication record, promotion of early independence is closely connected to publication strategy. PI and postdoc may disagree on the timing for publication of scientific achievements, depending on their own career needs. It is therefore important to address the needs of all parties involved and reach agreements that promote postdocs' careers. Also, in situations where postdocs get the opportunity to gain independence within a larger research group, it is crucial to establish clear guidelines and agreements concerning accountability on potential problems regarding authorship, good scientific conduct, work safety and so on.

Postdoctoral researchers are usually employed on fixed-term contracts, the conditions of which depend on many factors from the legislative framework of the country they work in to the stipulations of the funding agencies and research organizations they are supported by. A critical issue is contract duration. It is important that institutions and funders issue contracts that, at least, cover the time of the research project and its associated qualification aims, for example, to gather

enough data and/or publications to become competitive for the next stage of their career. The promotion of postdoctoral researchers to permanent contracts, wherever possible, must be a transparent and well communicated process that provides equal opportunities to internal and external candidates.

*“Since career progression in science highly depends on the publication record, promotion of early independence is closely connected to publication strategy”*

There are many options for providing training to postdocs. The important aspect to keep in mind is to invest in formats that hone certain key skills, such as problem solving and critical thinking. This includes regularly challenging established scientific ideas and supporting the development of new ideas. Similarly, career support for postdoctoral researchers should focus on widening their view on career options and enabling them to deliberately pursue their preferred path.

## The way forward

In EU-LIFE, we believe that international networks of research organizations sharing the same values and goals can provide inspiration and incentives to improve institutional support for postdoctoral researchers and promote research careers within and beyond academia. More importantly, it is up to us, the scientific community, to promote changes in the current system and offer long-term perspectives with the support from policy makers and funding organizations. We need to ensure that the success of future generations of scientists is defined by more than impact factors and we need to re-define leadership as something more than just scientific expertise. It is also time to clarify that innovation and creativity are not restricted to academic careers, so that postdocs can be prepared and qualified to become future leaders in different realms of our society.

## Acknowledgements

Sandra Krull and Dariya Afanasyeva were partially financed by the program “Helmholtz Career Development Center for Researchers (HCDCR)” during their time at the MDC. This article resulted from

data gathered within the EU-LIFE Training and Recruitment Working Group, and we are thankful to all contributions from its members. We thank Monica Bettencourt-Dias, Rene Medema, Henri van Luenen and Michela Bertero for their helpful comments on the text and Ana-Belen

Fernandez and Esther Dorado Ladera for the infographics.

### References

Edwards MA, Roy S (2017) Academic research in the 21st century: Maintaining scientific

integrity in a climate of perverse incentives and hypercompetition. *Environ Eng Sci* 34: 51–61

Laudel G (2006) The art of getting funded: how scientists adapt to their funding conditions. *Science and Public Policy* 33: 489–504