



postdoc (noun post-doc | \ pōs(t)-däk)

by Sarah Ducamp, PhD and Julie Sesen, PhD

What is a “postdoc”? Did you ever try to find a definition? Did you wonder when the postdoc position was created?

We did it and googled the noun “postdoc” and honestly the results were not that good. We also tried pubmed: only 289 entries (less than the total number of postdocs at Boston Children’s Hospital), most of them not related to our research. Even if we use this noun every day, finding relevant information is not easy.

“Postdoc” has many synonyms: postdoctoral fellow, postdoctoral scholar, research fellow, researcher, etc. The noun itself was introduced in **1974**. During that year, the United States Congress enacted the National Research Service Act (NRSA) Program to ensure that trained scientists would be available in appropriate numbers to conduct the nation’s biomedical and behavioral research agenda. There were approximately 2000 academic post-doctorates in 1973 and over 4000 in 1979. The NRSA program funded both predoctoral and postdoctoral scholars, and in its early years is estimated to have supported approximately 33% of all postdoctoral fellows in biomedical research and helped to maintain a relatively stable population of PhDs at around 3000 per year until the mid-1980s (<https://post-docs.ucsf.edu/history> and Micolli and Wendell, 2018).

“I didn’t choose a postdoctoral position for any reason other than to learn a different and, to me, exciting area of science. (...) The postdoctoral position offered me a continuing education of sorts, perfect for those of us still trying to find our path and develop additional skills for a future not yet written. (...) Likewise, we were paid a fraction of the salaries our peers with real jobs enjoyed, and our term, at least for chemists, was never meant to exceed 2 years.”
 –Bertozzi, postdoc from 1993-1995

tion (BPDA), the **National Health Institute** (NIH), the **National Science Foundation** (NSF), the **National Postdoc Association** (NPA) and **Wikipedia**. A postdoc is defined as an individual holding a **doctoral degree** (PhD, MD, etc.) that is engaged in a **temporary AND mentored** period of full-time research and/or scholarly training with the intent to pursue a **career path** of his/her **choice**. Usually these careers involve either academic or industry positions. But now many alternative career paths exist, such as venture capitalist, editor or consultant. **Most of these definitions insist that one of the goals of your postdoctoral training is to acquire the professional skills required for your dream career path.**

According to Micolli and Wendell¹, the current postdoctoral population is roughly estimated to be between 45,000 and 85,000 individuals in the United States. Bertozzi² discusses how the postdoctoral experience has changed during this last decade and explains how “7-year postdocs” for biologists became more commonplace, and terms like “second postdoc” started to sound “reasonable”. Postdocs, she wrote, “in positions never meant to be permanent” are “now trapped, with no obvious exit strategy”. Similarly, Micolli and Wendell present the findings of the Trends in the Early Careers of Life Scientists report (1998). This report highlighted the increase in age at receipt of PhD (32-years old, on average), the doubling in the percentage of new PhDs who pursued a postdoctoral position (from 21% in 1973 to 53%

The infographic features a dark blue background on the left with the text 'NATIONAL POSTDOCTORAL ASSOCIATION' and 'WHAT IS A POSTDOC?' in white. On the right, it defines 'post-doc (pōs(t)däk) n.' as a postdoctoral scholar who is engaged in a temporary period of mentored research and/or scholarly training. It includes the logo of the National Postdoctoral Association at the bottom right.

We combined the different definitions found in the websites of the **Boston Postdoc Associa-**

"A successful postdoctoral experience ends with an individual no longer being a postdoc. That transition is at the heart of the problems facing our training system, and it is far more complex than how much money a postdoc is paid, how many vacation days he or she receives, or how long he or she is allowed to be called a postdoc."

–Micolli and Wendell

in 1995), the increased time spent in postdoctoral training (5 years), and increased age of the first permanent position (increasing by 8 years for tenure-track faculty positions over 1973).

Bertozzi suggests that this evolution emanated from the recent economic crisis, in which postdocs were unable to find many jobs. This slowed the rate at which postdocs left training positions, and consequently increased the pool of postdocs applying for each job listing. This increasing pressure in the job market was felt in academic and industry positions alike. With more competition, postdocs were required to enhance their job applications by obtaining more grant funding and publishing more papers, increasing the pressure on postdocs to work more. This observation challenges the notion that postdoc positions are temporary, effectively changing the definition of a postdoc. As Bertozzi discusses, *"the idealists among us still think postdocs should be short-lived positions that foster intellectual growth and career development. In this framework, the postdoc is not labor, but rather a labor of love. Money shouldn't matter. Of course, that romanticism is based on the assumption that a fulfilling job awaits every diligent postdoc."* However, this ideal definition of a postdoc is marred by reality, which features longer time spent earning low salaries, and the risk of not receiving adequate mentoring or training to make your next career steps.

Keywords that still define our status are doctoral degree, temporary, mentoring, training and brilliant future. *Are those exciting promises reflecting how we are perceiving our status today?*

1. Micolli and Wendell, "The Postdoc Landscape - The Invisible Scholars" 2018, ch. 1. (Available at the Countway Library)

2. "Postdoc Labor Love" Bertozzi, 2016 ([PMID: 27413776](https://pubmed.ncbi.nlm.nih.gov/27413776/))

The **BCH-PDA career development committee** organizes monthly panel events to help you navigate your career. This past year we invited editors (Feb 2019), and former postdocs now holding PI positions in industry and in academia (Fall 2018). The PDA is continuing to work on new and exciting events, including our **annual All-Star mentoring event** organized by the mentoring committee where more than 15 mentors in a variety of scientific professions will present their career paths.

Your perception of a postdoc

by Sarah Ducamp, PhD and Ari Tabacc, PhD

In July 2019, the BCH postdoc association (PDA) Public Affairs committee was interested to know what it is like to be a postdoc? We asked the Boston Children's research community to define how they perceived postdocs with only three words. 76 people, the majority of which were postdocs (85%), answered our survey. We combined their answers to generate word clouds (**Figure 1**).



Figure 1. Summary of responses. Word clouds show the variety of responses with text size in proportion to their frequency.

The five most frequent words submitted were: **underpaid**, **poor**, **overworked**, **research** and **hardworking**. Most of the frequent terms have a negative connotation and underlined certain pessimism. Nevertheless, a total of 81 different words has been proposed. 33% of them



Figure 2. Submissions grouped by negative (left) or positive (right) connotations. Neutral words were not included.

have a negative connotation while 46% have a positive connotation. Interestingly, the negative terms focused mainly on the salary and amount of work associated with our research while the different positive terms are diluted in the variety of answers, particularly our skills, motivation and success. Despite Micolli and Wendell’s analysis, it seems that today’s postdoc problems are indeed an inadequate salary and work-life balance.

As depicted in **Figure 2**, when the terms are segregated by negative or positive connotation, this dichotomy is more obvious. Interestingly, when respondents are not postdocs themselves (n=10, e.g. research assistants, PIs, and lab managers), most, if not all, terms were positive. Thus, postdocs view themselves very differently than the people working with them. One step that may improve postdoc’s self-perception is receiving **annual assessments** from advisors. BCH policies now require that each postdoc meets at least once a year with their PI to evaluate their research accomplishments and discuss career aspirations. This assessment is a valuable tool for postdocs, allowing an open communication between the PI and postdoc, and can advise postdocs of their next steps in both research and career. As published in our 2019 March newsletter, the 2018 BCH PDA Annual Survey found that only 37% of our respondents received an annual assessment. The BCH-PDA advocacy committee is currently discussing with the BCH research administration to make sure that each postdoc receives an annual assessment in 2019.

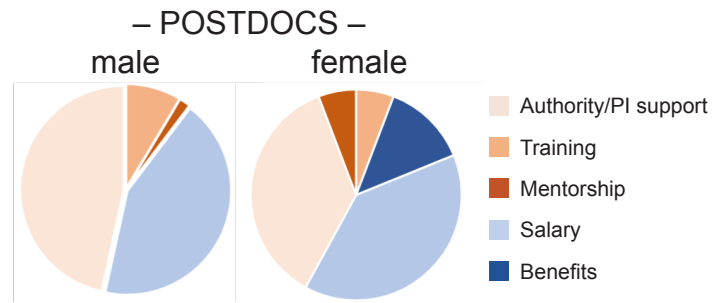


Figure 3. What enhancements would make postdocs feel more appreciated? (PDA Annual Survey, 2018)

The result of this summer survey is not surprising. In our 2018 annual survey, we showed that **almost a third of respondents do not feel like they are appreciated** (score below 5 on a scale of 1 to 10, 10 being “feeling highly appreciated”). When asked what would make them feel more appreciated, the postdocs’ answers were mainly related to their income, PI’s feedback, and benefits, as represented in **Figure 3**, suggesting that not all postdocs may be receiving effective training. Moreover, most postdocs are reporting that they work over 50 hours a week, and 11% work more than 70 hours a week. 62.4% of postdocs also reported that they have to or feel like they have to work on weekends. Overall, 146 postdocs state that their workload is due self-motivation, 50 feel they are asked to by their PI or peers, and 48 state all three reasons. Added to a salary relatively low compared to Boston rent’s price and general cost-of-life, this explains why the poverty of postdocs is central in their self-perception.

“Pay us more so that one day we could do crazy things like buy a house or have children.”
 –Anonymous 2018, PDA Annual Survey

A **new annual survey** will be launched at the **end of September**. It is important that we hear from as many postdocs as possible. With numbers in hands, the PDA can better identify issues postdocs are struggling with, discuss them with the BCH hierarchy and **advocate for better rights and working conditions**.

Postdocs, Past and Present

by Shreya Gosh, PhD and Kimberly Wong, PhD

On September 23rd, 2019, the BCH PDA, in conjunction with the 150th anniversary of BCH, is hosting an event to celebrate the “**Past, Present, and Future**” of postdocs at Boston Children’s Hospital. The event, which is open to the public will feature presentations from **Postdoc Past:** postdoc alumni Drs. Robert Langer, Trista North, and Elizabeth Engle, **Postdoc Present:** research presentations from current postdocs, and the Keynote lecture will feature Dr. Harvey Lodish, a founding member of MIT’s Whitehead Institute to speak about **Postdoc Future**.



Drs. Harvey Lodish, Robert Langer, Elizabeth Engle, and Trista North, from left to right.

The Public Affairs committee interviewed the panel of alumni presenters about their time spent at BCH as a postdoc. Dr. Robert Langer (**RL**) is a postdoctoral alumni from 40 years ago, and currently leads a biotechnology and material science laboratory at MIT investigating novel drug delivery systems. Dr. Elizabeth Engle (**EE**) is a postdoctoral alumni from 20 years ago, and currently runs a lab at BCH in the F.M. Kirby Neurobiology Center investigating cranial motor nerve development and disease. Dr. Trista North (**TN**) is a postdoctoral alumni from 10 years ago, and currently leads a lab at BCH that focuses on developmental hematopoiesis as a key to un-



Drs. Sarah Hersman and Ari Tabacc.

covering general principles of stem cell function, self-renewal and tissue regeneration. Drs. Sarah Hersman (**SH**) and Ari Tabacc (**AT**) are our current PDA co-presidents, and work in the dep-

artments of Neurobiology and Division of Adolescent Medicine and the Center for Gender Surgery, respectively.

What was your experience being a postdoc 40/20/10 years ago?

RL: It was a terrific experience and changed my life. I was the only engineer there and it gave me all kinds of ideas about how to apply engineering to medicine.

EE: Not to date myself, but I started my postdoc 27 years ago! I am trained as an MD, and entered the lab following 7 years of residency and with little scientific experience, so it was all very new to me. I was thrilled that Lou Kunkel and Alan Beggs took a risk and let me join the lab. Once in, I was surrounded by great scientists and great science, and had a terrific time learning how to address questions raised by the patients I cared for on the neurology service.

TN: I definitely worked hard, but really enjoyed my time as a postdoc in the Zon lab at Boston Children’s. In addition to trying a different model and mastering a ton of new skills, I learned so much about how to be a scientist, met a ton of amazing faculty, colleagues and friends, and felt very well integrated and connected to the larger Hematology/Oncology community. There were certainly high expectations, but it was a privilege to have the opportunity to train here.

How do you think your experience was different from being a postdoc now?

RL: Not that much except very few engineers did postdocs in the 1970s. But now it’s quite common to do so.

EE: As you all know, research (and life) has become more fast-paced and more big-data and technology driven. That said, I think the same principles hold – success often requires a huge dedication of time and effort, and a combination of meticulous perseverance and creativity.

TN: I don’t anticipate that my overall experience was very different then from what everyone is doing now. I had a supportive and outgoing PI

who made sure to highlight his trainees' work and introduce them to other leaders in the field, which is not always the case. However, I do think there is a much larger and more formal support network for career development now, which is quite helpful, and more connections between postdocs from other labs and departments which can keep people from feeling isolated experimentally or emotionally.

How was/is your experience as a postdoc at Boston Children's Hospital?

RL: It was great as mentioned above.

EE: It was wonderful – I was able to learn completely new ways of thinking and a completely new daily routine that formed the basis of my career. Critical to my success was being able to define a research niche that complemented my clinical expertise and being able to learn how to ask and answer questions under the primary mentorship of Alan Beggs.

TN: I had a very positive experience as a postdoc. Despite the ups and downs of science, and long hours at the bench, I was fortunate to find myself in a project space that was both fruitful and of interest the Hematology and developing Stem Cell Biology communities due to its conservation across species and translational potential. I also had the good luck to be situated in a bay, lab and floor that was very collaborative and I took full advantage of that to propel my science forward faster at a time when I think many were still trying to do it all themselves. Teamwork was definitely the key to the successes I experienced.

SH: BCH has overall been a great place to work. My experience of it is different at each level of the organization. My lab is brand new, so helping to develop lab culture, data analysis pipelines, and the initial foray into a relatively understudied research area has been a lot of fun. The department is full of colleagues with complementary skill sets, and I've been able to grow by working alongside others. And at the hospital level, I've enjoyed my work in the postdoctoral association, both in creating events for postdocs

and advocating for postdocs with the hospital administration.

AT: BCH has been a pretty exciting setting to work in, especially given its focus on LGBTQ+ research. For the first time in my research career, I'm surrounded by other trainees and PI's who have expertise studying LGBTQ+ health, and I've really had so many opportunities to collaborate and develop my own research beyond what was possible in graduate school. The ability to study transgender health through clinics like the Center for Gender Surgery has also been a unique experience, and I've met some really great colleagues I know I'll be working with throughout the rest of my career.

What excited/excites you the most about your postdoctoral research?

RL: The people, the new science, and working with my advisor, Judah Folkman, who was a wonderful mentor.

EE: I was excited to get a break from nights on-call in the hospital and, instead, to focus on specific research questions raised by the children I had cared for.

TN: My excitement was always driven by the possibility of finding something unknown and examining new data in a seeing-is-believing kind of way that was perfect for the Zebrafish model. I had a tendency to ask very open-ended questions, look carefully at the results of an experiment and then make some educated guesses about what might be happening and what I should try to determine next. I think I was equally happy, if not more intrigued, if something totally flew in the face of my initial assumptions rather than working as I expected. I still tell my trainees now that if you could fully anticipate how everything worked in advance, then Biology would be quite boring.

SH: I study the relationship between stress and anxiety, and how activity patterns in the brain create these experiences. I use mini-microscopes to image the activity dynamics of neurons in the lateral septum in order to understand this rela-

tionship, and to hopefully discover targets for therapeutic intervention. I'm most excited about getting to observe neurons firing in real time, as the mouse behaves, and wondering what that activity pattern might mean.

AT: I study disparities related to health communication and both sexual and reproductive health and cancer among sexual minority women (gay, lesbian, bisexual, etc.) and transgender individuals. My background is in health psychology and my current training is in epidemiology, so my work focuses on identifying both risk and protective factors that contribute to outcomes like contraceptive use or Pap testing. I'm also very interested in research questions about improving survey methodology, particularly concerning psychometrics and gender identity data collection.

What were the cutting-edge technology/methods when you were a postdoc?

RL: For us, it was bioassays in eggs and rabbit eyes to study blood vessel growth.

EE: The first automated PCR thermocycler had just been introduced to market, Taq polymerase had been named molecule of the year, and the first short tandem repeat markers had just been published.

TN: This will date me, but at the time I started working with Zebrafish, using live embryos in chemical screens was still quite new, so the bioactive screen that I performed, looking for pathways rather than individual compounds that influence a particular phenotype of interest (in this case blood stem cell number) was cutting-edge. I will be honest, I have always been a much better user/combiner of techniques toward a new purpose than an inventor of novel technology. Together with my colleagues in the Zon lab, I think we played a leading role in helping to adapt the zebrafish model toward more quantitative analyses with the use of FACS and qPCR, and combining gene knockdown with transplantation and fluorescent reporter imaging.

Tell us of a memorable incident/fun fact from your postdoc days at Boston Children's.

RL: I spent hours scrapping meat off cow bones—maybe 40 hours a week—to get enough material to isolate the first angiogenesis inhibitors (published in Science in 1976)

EE: It was the early days of the Genome Project and each chromosome had an international research group dedicated to its mapping. When I mapped the first CFEM gene to chromosome 12, I was invited to join the small chromosome 12 meetings – the most memorable of which was on the French Riviera.

TN: There are a lot of memorable incidents - good and bad - that shaped my postdoc days. But looking back, as a fun fact, I can say without a doubt that the people that will sit up with you all night in the common area to talk about your project, or commiserate about Reviewer 3, while you wait for a 2am experimental time point and then hang around just to see if it worked are your friends for life, no matter the time or distance between where each of you are now.

SH: Right after I came to BCH, my PI was in charge of the departmental happy hour. As he used to be in a band, he decided to do an open mic night. Once he found out I could sing, I too was on the hook to perform. It turned out fine, but I am still introducing myself to postdocs who respond, "Oh, you have such a nice voice." It takes a moment to remember the context.

AT: I can't say I've had any special incidents, but I'm pretty bad at leaving either my phone, wallet, or keys locked in my office (or my PI's office!) after 5 PM. I suppose the memorable part is that you'd think I'd remember at this point, but it's been over a year now...

What would be your one piece of advice for the postdocs of today?

RL: Do something very different from your graduate work. It will give you new ideas and stretch you in new directions.

EE: Know that hard work and long hours are unavoidable. That said, try to find ways to renew and

care for yourself both within and outside the lab.
TN: Simply to stick with it and be open about your ideas. Scientific progress requires collaboration and the “failures” tend to reveal more about how the biology is actually working than the best intentioned plans.

SH: Establish a support network before you need one. Find one or two mentors who are not your PI who you can occasionally talk with about your work, your career plans, and other topics. Also, the OFT and the PDA can be great resources!

AT: I definitely agree with Sarah that establishing a support network is essential. Finding alternative mentors, other postdocs outside your lab (or even institution) to speak with, and having some type of social hobby outside of work are really important!

We thank all the interviewees for their responses. We are excited to see you all at our event in September!

BCH Postdoc Achievements!

If you would like to share a recently published a paper or won an award, contact us at postdoc-publicaffairs@childrens.harvard.edu (provide your full name, lab, title and journal for publications and information on sponsor for awards). Congrats to the authors and awardees!

Publications from BCH Postdocs

Michael Molnar, Burns Lab: “Effects of Polyamine Binding on the Stability of DNA i-Motif Structures” in ACS Omega, 2019. [doi.org/10.1021/acsomega.9b00784]

Cameron David Nereim, Adolescent & Young Adult Medicine program: “A primary care pediatrician’s guide to problematic interactive media use” in Current Opinion in Pediatrics, 2019. [[PMID: 31033606](https://pubmed.ncbi.nlm.nih.gov/31033606/)]

Mehdi Pirouz, Gregory lab: “Exonuclease requirements for mammalian ribosomal RNA biogenesis and surveillance” in Nature Structural and Molecular Biology, 2019. [[PMID: 31160785](https://pubmed.ncbi.nlm.nih.gov/31160785/)]

Abhinav Dhall, Shi lab: “Intersection of Epigenetic and Metabolic Regulation of Histone Modifications in Acute Myeloid Leukemia” in Frontiers in Oncology. [[PMID: 31192132](https://pubmed.ncbi.nlm.nih.gov/31192132/)]

Jacqueline Lauer, Duggan lab: “Markers of Systemic Inflammation and Environmental Enteric Dysfunction Are Not Reduced by Zinc or Multivitamins in Tanzanian Infants: A Randomized, Placebo-Controlled Trial” in Journal of Pediatrics, 2019. [[PMID: 30952509](https://pubmed.ncbi.nlm.nih.gov/30952509/)]

Emmanuel Stephen Victor, Chatila lab: “Microbiota therapy acts via a regulatory T cell MyD88/RORyt pathway to suppress food allergy” in Nature Medicine, 2019. [[PMID: 31235962](https://pubmed.ncbi.nlm.nih.gov/31235962/)]

Simon Yuan Wang, Greer lab (Heritable Epigenetics) published: The demethylase NMAD-1 regulates DNA replication and repair in the *Caenorhabditis elegans* germline in PLOS Genetics, 2019. [[PMID: 31283754](https://pubmed.ncbi.nlm.nih.gov/31283754/)]

Tao Li, Piao lab: “Adhesion G Protein-Coupled Receptors as Drug Targets for Neurological Diseases” in Trends in Pharmacological Sciences, 2019. [[PMID: 30871735](https://pubmed.ncbi.nlm.nih.gov/30871735/)]

Bilal AlWattar, Heidary team: “A Novel Algorithm for Visual Field Testing in Pediatric Neuro-Ophthalmic Disease Using Saccadic Vector Optokinetic Perimetry” in AAPOS 2019 Abstract Book, page 34, paper #29, and got an oral presentation at the AAPOS 2019 – San Diego

Aijun Zhang, Michelson lab: “Downregulation of UBE2T can enhance the radiosensitivity of osteosarcoma in vitro and vivo” in Epigenomics, 2019. [[PMID: 31355678](https://pubmed.ncbi.nlm.nih.gov/31355678/)]

Awards to BCH Postdocs

Cynthia Gubbels, Yu lab: “ACMG Foundation/PerkinElmer Diagnostics Travel Award”

Jacqueline Lauer, Duggan lab: “Nutrition Obesity Research Center at Harvard (NORCH) Pilot and Feasibility Award”

Amélie Julé, Henderson lab: “the Young Investigator Award” from Adaptive Biotechnologies to support her research on T cell repertoire in oligoarticular Juvenile Idiopathic Arthritis

Esteban Orellana Vinueza, Gregory lab: “Pew charitable Trusts - Pew Latin American Fellow” - August 2019 and “Damon Runyon Cancer Research Foundation - Damon Runyon Fellow” - August 2019

Sumana R. Chintalapudi, D’Amato lab: “2019 Charles D. Kelman, MD Postdoctoral Scholar Award” from the International Retinal Research Foundation (IRRF)

Yang Lee, Chen lab: “2019 Travel Award” from the Lymphatic Education & Research Network for attending 2019 Lymphatic Forum-North America Vascular Organization.

Richard Smith, Walsh lab: K99/R00 – Pathway to Independence Award from NIH for “Role for Ion Conducting Proteins in Cortical Malformation Diseases”

Recent Events

- Longwood area PDA Summer BBQ: June 27th



- Beyond the NIH Grants: June 25th
- Communicating Your Science: Aug 1st
- Boston Harbor Islands Ferry Cruise: August 17th



Travel Awards: June - September Round



And the winners are...

James Inkster (Radiology)
Stephen Treaster (Genetics and Genomics),
Hsin-Hsiao (Scott) (Urology).
Congratulations!

The next round of travel awards will be announced in the Fall, stay tuned!

Follow us to find out more about our great events and postdoc community!

Leaving soon? If you or a labmate recently moved on from your postdoc, please invite them to join our Alumni network! Send us your personal email address at postdoc@childrens.harvard.edu to register as BCH Alumni and share your career path with the postdoc community!



Upcoming Events

Keep up to date on upcoming events with our calendar: <https://tinyurl.com/BCHPDACalendar>

- Elevator Pitch: September date TBA
- Merck Networking Event: October date TBA
- All-Star Mentoring Night: October 24, Longwood Galleria.

BCH 150th Anniversary Events:

BCH Postdoc Association presents

Postdocs Past – Present – Future

Monday September 23rd 1:45pm - 5pm
Folkman Auditorium

Postdoctoral researchers play a vital role in advancing the scientific discoveries at BCH, and this event is to celebrate these achievements with the entire research community at BCH!

Past – BCH Postdoc Alumni speakers

40 years ago

Bob Langer (MIT)

20 years ago

Elizabeth Engle (BCH)

10 years ago

Trista North (BCH)



Prestigious speakers!

Present – Live and video science presentations

Current postdocs can apply at:

postdocs@childrens.harvard.edu

You can contribute!

Future – Keynote lecture



Harvey Lodish
(Whitehead Institute, MIT,
Board of Trustees – BCH)

The future of postdocs!

Reception will follow at Longwood Galleria at 5pm!

All are welcome!



Postdoc Association



- **Stem cell Day:** Dr. Shinya Yamanaka, 2012 Nobel Prize in Physiology or Medicine, Kyoto University. Oct 21, 9 am-5 pm, Martin Center