In preparation for the presentation “Towards an independent career in the radiation sciences”, 17 scientists who have started their independent research program within the last few years responded to a survey about their experiences. This document lists their responses to the survey.

Survey questions:
1. What motivated you to pursue an independent research career?
2. Why radiation research?
3. What were the main determining factors that helped you get your first independent research position?
4. How has the type of institution affected your career? What was the main reason for you to select your institution?
5. Has your gender influenced your career path?
6. How does having a family affect your career? How do you balance work and family life?
7. Is there is anything else you would like to share about becoming an independent researcher?

Panel:
Nukhet Aykin-Burns, University of Arkansas for Medical Sciences, Little Rock AR
Amrita Cheema, Georgetown University, Washington DC
Catherine (Katie) Davis, Johns Hopkins Medicine, Baltimore MD
Nobuyuki Hamada, Radiation Safety Research Center, Central Research Institute of Electrical Power Industry, Tokyo, Japan + 5 anonymous Japanese panelists
Igor Koturbash, University of Arkansas for Medical Sciences, Little Rock AR
Vivien Mao, Loma Linda University, Loma Linda CA
Jacob Naduparambil, Ohio State University, Columbus OH
Rebecca Oberley-Deegan, University of Nebraska, Omaha NE
Rupak Pathak, University of Arkansas for Medical Sciences, Little Rock AR
Snehalata Pawar, University of Arkansas for Medical Sciences, Little Rock AR
Subhrajit Saha, University of Kansas Medical Center, Kansas City KS
Peter van Luijk, Groningen University, Groningen, The Netherlands

Panel responses:
1. What motivated you to pursue an independent research career?
   1.1 My mentor encouraged me to do so.
   1.1. To be able to organize my own research projects.
   1.2 The day I was in the lab for 36 hours straight and realized that sleep deprivation or hunger does not bother me one bit while I am working on my experiment or analyzing my results I knew that’s what I wanted to do for the rest of my life. Of course there are days that I complain and grumble, but every morning I am still anxious to come to work and look at my cells/mice.
1.3. As a postdoc I received a grant and could hire a PhD student and a technician. Through my university I worked with undergraduate students and found out how larger scientific questions can be answered by working in a team. So, being an independent investigator would give me that opportunity.

1.4. An independent position enables us to devote our effort to what we would really like to do.

1.5. My hope was to contribute to the great history of science.

1.6. Intellectual curiosity.

2. Why radiation research?

2.1. To keep the radiation field active.

2.2. My education in genomics/epigenomics triggered my interest in asking fundamental questions in biology. During my postdoc, my mentor urged me to ask mechanistic questions. Radiation was relevant to all that.

2.3. As a graduate student, I participated in animal studies focused on radiation-induced normal tissue injury and realized that knowledge in this field is limited.

2.4. I had been working in the field of oxidative stress, and radiation was a logical area to pursue, with clinical relevance.

2.5. Being raised just outside a nuclear power plant.

2.6. As a student, I was fascinated with technology and complex equipment such as used in nuclear and atomic physics. But also wanted to do something that has a direct meaning for people. Then, I was introduced to proton therapy. As a master's and graduate student I was able to work on instrumentation, first for patients and then for animal research. I then continued as a postdoc and modeled radiation toxicity (postdoc 1) and then moved into radiobiology (postdoc 2). The radiation field allowed me to combine technology with clinically relevant work.

2.7. Different fields were not so important to me when I started, but my first cell survival curves were enough interesting to attract me to this field.

2.8. I got fascinated when I was introduced to space radiation and its unique biological properties during my PhD. I realized that biological effects of radiation were still not understood.

2.9. I started a postdoc in this field and really enjoyed the work and the questions that I could ask about how the central nervous system responds to radiation exposure. While this is very different from my previous research, the tools I developed in my grad research really added to what I could bring to the radiation field to answer questions and provide novel solutions to the problems arising from radiation exposure.

2.10. My postdoctoral training is in the area of breast cancer research and since this field is very competitive, it was essential to find a niche to develop my independent research and extend my previous knowledge of cancer biology, gene regulation and signal transduction to a new problem-the side-effects of cancer radiotherapy. This enabled me to investigate a distinctly different area of research than that of my postdoctoral mentor.

3. What were the main determining factors that helped you get your first independent research position?

3.1. After a postdoc in which I learned mass spectrometry, I received an offer to develop an –omics core facility. I took the offer, even though it was out of my comfort zone and spent several years building and learning things as business models. It slowed down my initial scientific productivity, but eventually gave me the opportunity to do research in radiation biomarkers.
3.2. I stayed at the same institution an additional 4 years as a research scientist following my postdoctoral years. However, it was hard to get research funding without a tenure track position and my independence kept being questioned in all my grant applications. The moment I was aware of a position elsewhere that was well aligned with my research interest I applied.

3.3. I worked as a research associate and was able to publish several papers. Then, an opportunity for a faculty position became available in the same institution.

3.4. I used a network of people I knew to get my position.

3.5. I had some level of success in securing funding during graduate and postdoc training. I worked hard to be recognized as a good colleague, paying attention to details and advising students.

3.6. Recognition through publications and presentations at conferences. Training of graduate students and postdocs.

3.7. Number of (first author) publications, recommendation letters, relative uniqueness of research program.

3.8. According to current standards I seem to have done everything I could to prevent myself from becoming an independent scientist: I never left the university in which I obtained my MSC (and PhD) and even stayed within the same group of researchers working on proton therapy and normal tissue damage within the university. To my own surprise, however, the work we published has been rather influential in the field. Over time I started to realize that this may have been due to the same reason I never left my institution: though I never had a clear picture on how to realize a career, I did have a very clear picture of what I wanted to achieve in that career and pursued that consistently. I think being consistent in pursuing your aims (career-wise and/or in terms of what you want to achieve scientifically) is a trait that may appeal to people that you have to convince to offer you an opportunity (referees on grants, colleagues elsewhere that may recommend you to their boss, job interview, …)

3.9. Scientific motivation, and I received a big research grant.

3.10. I don’t know why my bosses selected me to my positions actually. However, I think the main factors were the number and significance of the original articles that were published as the first author.

3.11. Advice from my boss.

3.12. I wanted to continue because I loved my days in the laboratory.

3.13. Getting a peer-reviewed federal grant that allowed me to transfer to a different institution.

3.14. There are several factors that played an important role. I think my self-motivation, self-confidence, hard work and research mentor’s role helped me a lot to get first independent faculty position. Independent thinking and finding a research niche also helped me to be an independent faculty.

3.15. I negotiated with my department to submit grants as PI while still a post-doc, with the understanding that I would be promoted to faculty if one of them came through. I also had the support of my division, chair, department chair, and department’s vice chair of research and included letters from all of those individuals in my grant submissions. This support, however, came without any university support – I am fully responsible for paying my salary and funding my lab.

3.16. 1) One of the critical factors was a supportive postdoctoral mentor as well as my current mentor when I moved to my current institution. With their support and guidance, I got my first independent position. 2) Additionally, more importantly without the support of my life partner, this would not be a reality. 3) Lastly, I would like to emphasize that networking, helped my CV land at the right time at the right place.
4. **How has your type of institution affected your career?**

4.1. I am no big fan of teaching, so I made sure I found a place where the teaching load is small.

4.2. I selected my institution because it is multi-disciplinary in nature, since radiation research needs expertise in physics, engineering, biology, etc. Research institutes may have a more steady stream of funding, but projects are more often determined by the institution (weigh funding against freedom).

4.3. I selected my institution because it has strong programs for undergraduate and graduate students that gives a vibrant environment. Also, it is associated with a large hospital that gives opportunities to be involved in clinical trials.

4.4. Location (closer to my family). I first worked in a private institution, but it did not provide a supportive environment for research, so obtaining funding was difficult. I am now at a state supported institution that supports my research.

4.5. I have worked in the same small non-profit private institution. Since it is small, getting research funding seems difficult.

4.6. You need to decide how much time you want to spend on teaching and research. Smaller institutions may require more teaching, but also provide undergraduate and graduate students as hands in the lab.

4.7. I work in a mid-size university that provides a flexible and collegial environment. I have always been allowed to be flexible with my time.

4.8. I think there were two reasons for me to stay at my institution: Firstly there never was a reason to leave. From the scientific point of view, all the tools I needed were present and my topic nicely fit in the departmental focus. Secondly, besides the characteristics of the institute, I believe that a good match with people is critical. The group I work in was a good place to do what I wanted to do, leading to the position I have now.

4.9. I’m belonging to a national university now. I love my present position because I like both education and research. In order to get a position in universities, education experience as well as scientific achievements is important. From this point of view, universities give you many good opportunities for your career developments.

4.10. The type of research that is done attracted me.

4.11. The research style matches my style.

4.12. I am working in a small institution where researchers of many areas are working together. This helps my work to make new discoveries.

4.13. Important are start-up support and academic niche.

4.14. I am pursuing my research career in a state-supported medical university, which provides various types of core facilities that are essential to conduct cutting-edge research. The Office of Grants and Scientific Publications helps a lot in editing my grants and manuscript before submission. Our University has a Transgenic Mice Core Facility that allows to generate new mouse models, an essential tool to address scientific issues. Considering all these facilities I selected my institution.

4.15. My selection of institution was based on several things, including that I wanted to stay in the geographic location in which I am currently in due to family and other personal reasons. While I don’t think being at a large research institution is ideal for everyone, I think if you are willing to take a chance at it, you might just be successful. Not having a hard money salary has made things difficult at times and sometimes slow going, given that I might not have enough money to cover new pieces of equipment or additional trainees (e.g., postdocs), since I have to cover my own salary and fringe, in addition to my technicians and paid collaborators. I do often think about moving to a hard money university, if a nice
opportunity came along. Knowing the structure of your department and if there is any opportunity to receive some hard money salary is something to look into and ask about, even if you are interviewing at a place that is all soft money. I’m a PhD in a clinical department at a school of medicine, so there is no opportunity for salary support – however, basic science departments at the same school (so PhDs or MDs in basic science departments) do receive some university-supplied salary support – in exchange for teaching and other types of service. These things can all be negotiated and it is something I wish I knew before signing my appointment letter. Take the time to ask these types of questions about the university at which you might want to work – you might be surprised what you end up with just for asking! Also, ask about resources within the building and/or campus you will work. While there are several campuses for my university, I’m located on a satellite campus that doesn’t have all of the resources our main campus does – so traveling between the two can be time consuming and difficult for certain experimental manipulations. It can also be an added direct expense, such as shipping subjects and/or samples between campuses.

4.16. I think it is important to focus on your priorities and what you are good at. If teaching is your main interest, then you can look for opportunities in smaller institutions where teaching is the main job and there is less focus on research. On the other hand, if research is what drives one, then you want to look for opportunities at universities affiliated with Medical Schools/Pharmacy Schools.

5. Has your gender influenced your career path?
5.1. My career path has been driven by my inherent interest in clinical and translational research, rather than my gender [f].
5.2. Hope not [m]
5.3. In my country, if two faculty applicants have the same credentials, we should hire the female applicant. This may increase female faculty but will also affect the men [m].
5.4. No [m]
5.5. Yes, I think initially being a female made it more difficult to become independent. I was seen as the person who ran my mentor’s lab rather than conducting my own research. There seem to be a lot of females who are good scientists and are stuck in this position. However, after becoming an independent researcher, I think being a female has made it easier to succeed. There are not many female tenure track investigators and a lot of academic departments need more females to fill this gender gap [f].
5.6. Maybe a little in a good way. I think in general, female scientists are being treated more generously and less critical than male scientists [f].
5.7. No. In my family you excel, regardless of your gender [f].
5.8. No [m]
5.9. Yes, I experienced during a process of professor selection. After the 1st screening based on publication list and CV of each applicant, both I (male) and a female researcher got a chance to proceed to the 2nd screening (presentation about research activities, discussion and interview). Then, although we got the same score in the 2nd screening, the female researcher eventually got the professor’s position because the university had a policy to support female researchers. [m]
5.10. Yes. At the beginning of my career, my boss thought that I would quit my job soon to get married. My career path was not planned for me. [f]
5.11. No [m]
5.12. No [m]
5.13. I have never thought from a gender perspective. [f]

5.14. I think my personality makes it slightly easier for me to survive amongst a male-dominated field and university – I’m not shy or quiet, am outgoing, outspoken, and opinionated (things that get me labeled as “bossy” and “b*tchy” – I’ve learned to not care about these labels), and I stir the pot when I don’t feel that I’m getting what I need (this has taken years to learn). I take every opportunity to interact with others in my department and let my chair know who I am – after years of not doing so and losing out on opportunities with possible collaborators. I feel that these things are now starting to work to my advantage. My best advice to everyone, male or female, is to let people know who you are and what you do – be open to collaboration when it benefits both parties, but learn (importantly) to say no to things that do not fit with your mission and purpose – choose where you spend your time wisely, so you have more time to spend on the things that matter, including your family and friends. Women especially – don’t be the “go-to” person in your department for “housekeeping” things, e.g., organizing work-related events, team meetings, etc. – or the only person who will actually do something – say no to these requests. Give those responsibilities to some else. Be the “go-to” person for your opinion in your field or the person that people seek as a collaborator. The best advice ever given to me was this: Be ruthless and get what you need at work. “Ruthless” can be defined in many ways, but it should be your theme. You don’t need to offend or make people dislike you (and at some point, you need to stop worrying if you do), but you ultimately need to keep an eye out for things that will benefit you and your career and to learn how to nicely turn down things that won’t advance your personal mission. Sometimes, this means making some noise and making people uncomfortable or going against a mentor’s advice or going against the “way we always do things”. It’s taken me years and several leadership classes to learn these things. Talk to others who are like you in your situation and learn from them.

6. How does having a family affect your career? How do you balance work and family life?

6.1. Having an extremely supportive husband helps (though he makes sure he is appreciated and acknowledged for his efforts 😊).

6.2. Definitely difficult to balance, especially when my kids were younger. I am careful to separate my roles at work from those at home. Having family support also promotes me to be more successful.

6.3. Difficult, especially when my kids were young. However, I am happier with my family. I compartmentalize my time.

6.4. I am lucky that my wife currently is a stay home mom.

6.5. Support from family is critical. I try to have at least one meal a day together with my family. But it is difficult not to get tied up in work.

6.6. Balancing is difficult. However, having your family’s support is key to your success at work. One of my reasons to pursue a career in academia is the flexibility to work from home at times and burn the midnight oil at other times.

6.7. Before I had kids, I spent most of my time at work. After we started a family, I wanted to spend my breakfasts and dinners with them. My wife has a full-time job as well. I try to do the “desk” work such as reading and writing at home after hours, while doing experiments in the lab during the day. Earlier, I did everything while at work.

6.8. Having a family influenced my research life but did not affect my career. Before I got married, I went to lab every day, but after that I decided to have a holiday at least on Sunday.

6.9. I make efforts not to waste time (e.g. long-time chattering and too much rest) in my work to spare time for my family life.
6.10. No effect of family, I spend time with them in weekends.

6.11. Fortunately, I am single and I haven’t had to think about balance between work and family life so far. However, I might need to think about providing care for my aged parents in the not-so-distant future.

6.12. This is a challenge in almost every profession. Develop good time management skills.

6.13. I feel having a family always helps to move the research career forward. Family support is essential to be established in the research field and to minimize the research-related stress. I got my motivation for research from my family. However, striking a balance between family and career is not an easy task always; proper time management and prior planning helped me a lot in this regard.

6.14. My husband and I are thinking about children. It’s very stressful to think about what happens if we both need to travel or if one of us couldn’t pick our child up from daycare. My university does not have a formal maternity leave process; this fact is distressing. Many women are forced to take short-term disability and decreases in pay and this added financial stress is something that worries me. This is an issue for both men and women, given that men at my university don’t have an opportunity for paternity leave either. This could be the one thing that moves me from a university with a soft money salary to a hard money position, possibly outside of academia, if necessary. The academic life is not easy for parents. I know several women who decided that not having children was best for their careers. I struggle to balance work and life. I’m in my office 7am – 4pm, 5 days/week, but still do work around these hours at home (my commute is one hour each way, too). My husband and I make a point to run each night after work and walk our dogs – it’s something we look forward to and a way to reconnect after hectic days. Often, after dinner, I’m back to working (usually writing or reading). I do try to spend weekends work free meaning not going to the office/lab (unless experimentally it can’t be avoided), so I can spend time with family and friends. Sometimes “work free” means getting up early on Saturday and Sunday mornings to work in my home office before the day starts. I don’t like this schedule and am working to change how effectively I work during the weekdays. I also don’t like that people in academia are “expected” to put in ungodly numbers of hours each week. Numerous lines of evidence suggest that this work style is detrimental, so I’m trying to make changes to work more efficiently. One of those changes was setting strict office hours – and not staying after for any reason – only meetings with my chair are something for which I stay after 4pm. These small changes have really helped because now I get home in time to work out, walk my dogs, and cook dinner. However, I still have a ways to go to not feel like a workaholic.

6.15. Having a family certainly affects one’s career, particularly if you have young children. You need to make time for the personal as well as professional life. The support of your life partner is very crucial as science is a demanding profession.

6.16. Honestly speaking, I am mostly in work-life imbalance. The only way to maintain sanity when things seem to go out of control, is to try to keep my focus on things that work and try not to dwell too much on things that are not working either at home or at work. I try to put in longer hours during the week and then take a complete break whenever possible to spend time with my family over the weekends.

7. If there is anything else you would like to share?

7.1. Work hard to get as many papers as possible and get to know as many people as possible. Don’t be afraid to take decisions, but think twice before you take them.

7.2. Get good mentoring and ask for help as needed. Be a good team player.

7.3. Scientific productivity. Building a unique skill set will help you to stand out and will help you add to the team-science of these days.
7.4. I think to succeed, especially in this career, is to be persistent. I wrote grants for 8 years and didn’t get a single one funded. It was very discouraging and I was starting to look for alternative careers when I finally got R01 funding. Networking and going to meetings helps you along your career path. The more people you know in your field, the more likely you will succeed as well.

7.5. Faculty jobs are hard to get these days, but if you have a chance make sure to pick an institution where you be well integrated with the rest of the department/division etc. If you are the person whose general research interest is absolutely different than the overall theme of the group, you will have a hard time.

7.6. Scientific productivity, broad friendships, strong communication skills (both in plain and scientific language). Being active at RRS is useful to learn many things. The number of radiation research laboratories is decreasing worldwide. I hope young members will stay enthusiastic to maintain or start new radiation research labs!

7.7. I think it is important to seek a research theme (what you have interests in and what you would like to focus on after getting an independent position) during young days.

7.8. I would like to mention two different points for graduate students and postdocs. Graduate students: Select a lab where you see a track record for postdocs getting independent faculty job. Postdocs: If you are within your 1st year of postdoctoral training please prepare for a K99 grant from NIH. You will get only 3 more years for that. If you are more senior, look for K01 or other type of grants.

7.9. To be an independent researcher, I would recommend all the RRS graduate students and postdocs, learn the art of writing grants, the only criterion that can make you a established independent faculty.

7.10. I think an important point is to always keep an open mind to learning new things, be it new techniques, and even if your lab environment is not particularly supportive seek mentors outside your lab, talk to people. If you are not passionate about science and if new questions don’t excite you, this is not the path for you. Having an independent lab is like a 24/7 job, because there is always something to be done and new directions to take. Only if you like these constant challenges, then go for it.

7.11. Funding is tight and the demands of an academic life are tough. However, if this is something you want to do, go for it! There will always be people telling you how hard it is. Listen to the tips and strategies of those who have recently succeeded at it and learn from them. But, don’t feel guilty about not wanting to deal with this way of life. There is no shame is using your exceptional training in some other way, such as working for a non-profit, government agency, or law firm. You are smart, talented, hardworking people and have ample opportunities for success, even if you don’t stay in academia.