

Dr. Naoko Imamoto Full Transcript

Chief Scientist (Ph.D.)

Cellular Dynamics Laboratory

RIKEN Cluster for Pioneering Research

This interview took place on December 7, 2022, in Wako, Japan, at the RIKEN Wako Bioscience Bldg. Room S455.

Career summary

1982 B.S. in Biology, Faculty of Science, Osaka University

1984 M.S. in Medical Science, School of Medicine, Osaka University

1988 M.D., Ph.D. in Medicine, School of Medicine, Osaka University

1988 JSPS Postdoctoral Fellow (general), Institute for Molecular and Cellular Biology, Osaka University

1990 JSPS Postdoctoral Fellow (cancer research),
Institute for Molecular and Cellular Biology, Osaka University

1992 Assistant Professor, Institute for Molecular and Cellular Biology, Osaka University

1993 Assistant Professor, Osaka University Medical School

2000 Associate Professor, National Institute of Genetics

2002 – present Chief Scientist, Cellular Dynamics Laboratory,
RIKEN Cluster for Pioneering Research

Adachi: This project, in which we speak with senior female leaders to hear helpful stories for young researchers aiming to become PIs one day, is thanks to Dr. Yuko Harayama, former Executive Director of RIKEN, and an Elsevier Foundation board member, who was eager to start up this project. Therefore, today's interview will be focused more on topics such as lab management and leadership, rather than science per se. Thank you for taking the time to talk with us.

Imamoto: I'm looking forward to it.

Adachi: I see from your curriculum vitae that you earned your doctorate in 1988 from Osaka University. At that time, what future did you envision for yourself as a researcher? Did you have a broad outline for the future?

Imamoto: When I received my doctorate, all I knew was that I wanted to go into research. I had no thoughts of becoming a PI or any other specific goal. It was just clear to me that I wanted to get on the path of a research career, when I acquired my degree.

Adachi: And the doctorate opened that path.

Imamoto: When I received my doctorate, I was eager to make my career in research. Specifically, in academia. When I was coming up, the conventional wisdom was that women were better off avoiding corporate careers. Because in the corporate world women would face discrimination. In a corporate workplace, even if a man and a woman were equally good at their jobs, and had joined the company at the same time, the gap between them would just grow and grow over time: a man would receive more promotions while a woman would hardly be promoted at all. That's what people were telling me. I wanted to pursue a research career when I received my doctorate, but I only considered doing so in academia.

Adachi: You expected to dedicate your entire life to being an academic researcher?

Imamoto: Yes. Well, maybe not as far as dedicating my life. I just wanted to be a researcher. There wasn't any grand ambition. I wasn't even concerned with details such as, "What kind of a researcher" and so on. My ambition began and ended with "I want to be a researcher."

Also, I may have had some wish of being irreplaceable, of doing a job no one else could... A vague idea that if I ever quit, no one else could fill my shoes. I wasn't thinking of becoming a PI in particular.

Adachi: In 1988, you became a postdoc (Research Fellowship for Young Scientists) of the Japan Society for the Promotion of Science (JSPS) in the lab where you earned your doctorate.

Imamoto: That's right, a JSPS postdoc. I had been a student of Dr. Tsuyoshi Uchida, and it was in his lab that I took that job as a postdoc. Dr. Uchida was himself a former Associate Professor under Dr. Yoshio Okada, the eminent scientist who received Japan's Order of Cultural Merit. This was right at the time when the Institute for Molecular and Cellular Biology (IMCB) was established at Osaka University by Dr. Okada. When the institute was founded, Dr. Uchida got his own independent lab, right next door to Dr. Okada's. The two of them worked hand in hand on all fronts, like they were one big lab, when it came to the work room, seminars, and so on. That was the environment there at the time. I just wanted to secure my postdoc position to do research in the Uchida Lab.

Adachi: So you spent four years attached to the Uchida Lab? As a postdoc, from 1988 to 1990. But then from 1990 to 1992, your CV says you were... a "postdoc for cancer research?"

Imamoto: Here's the story. Just when my postdoc period was coming to a close, Dr. Uchida told me, "I will make you an Assistant Professor next year." But then he passed away from cancer, and suddenly the post he was trying to get me into no longer existed. I was trying to make up my mind whether to go overseas or accept an offer to be the assistant of another professor. But then Dr. Okada came to me and said, in effect -- and here I'm really boiling down a complicated discussion -- "Don't be too hasty to leave the Institute... we'll come up with something for you somehow." I was on a "general research" program of the JSPS Research Fellowship at the time, but they also had a funding source for a "postdoc for cancer research," so he advised me to apply for that. "If that doesn't work out," Dr. Okada said to me, "Then we'll come up with some other post for you." But my "postdoc for cancer research" application did get accepted, and I had a second stint funded by JSPS. It was certainly an unusual thing to have on one's CV at that time.

Adachi: And in 1992, you did become an Assistant Professor, still at the Institute for Molecular and Cellular Biology (IMCB).

Imamoto: Yes. After Dr. Uchida passed away, Dr. Okada brought in a Visiting Professor. I'm not sure how he arranged the details, but anyway, he set me up as an Assistant Professor under that Visiting Professor. The details of the position weren't clear, but it

was at IMCB. Then, it so happened that Dr. Yoneda, who had been working with Dr. Uchida, established his own lab at Osaka University Medical School. Dr. Yoneda was in his 30s at that time. He asked if I wanted to transfer over to his new lab with him, and I decided to accept the offer. That's how I became an Assistant Professor at Osaka University Medical School.

Adachi: Could you tell us what changed when you moved up from being a postdoc to being an Assistant Professor? More responsibility? More students to supervise?

Imamoto: When I was a postdoc, I really enjoyed it. It was just fun. (laughter) The research was fun and completely absorbing. And that remained true after becoming an Assistant Professor. One thing that changed was that when I was working under Dr. Uchida, as a grad student, he was so much older and more eminent than I was. But when I joined Dr. Yoneda in switching over to the Medical School, he had been just a few years ahead of me in graduate school, the gap was not so huge. So our relationship was more collegial, like, "Let's do this together." It didn't change how I thought about the job whether I was a postdoc or an Assistant Professor. Only, when I was still in grad school, I could enjoy working in labs under the auspices of these very eminent scientists, Dr. Okada and Dr. Uchida, and I was allowed to do my research and say whatever I wanted to. But when I went to the Medical School, it became about a fledgling lab's struggle to survive. Because Dr. Yoneda was young and not much older than me, and our lab was a small one just getting started. Moreover, my research topic was nucleocytoplasmic transport, which is also what Dr. Uchida had been working on. I would be able to keep doing the research that I wanted to do. I had a sense that I would have to pour every bit of my energy into it, in order to keep pace with other researchers around the world in that area. The situation was somewhat atypical, I think.

Adachi: So as a first-time Assistant Professor in a brand-new lab, did you feel that you were in a position to contribute to its success?

Imamoto: Yes, Dr. Yoneda and I were the two scientists who carried the fate of the lab on our shoulders. Especially Dr. Yoneda, who was devoting incredible effort to achieve success in his own research. I was very encouraged by that.

Adachi: You spent seven years of your career there?

Imamoto: Right. During that time, I made an important discovery: the nucleocytoplasmic transport receptor protein called Importin. I was one of the scientists who discovered it. And our lab was one of three that had made the discovery amid fierce global competition. Ironically, because we were credited with that discovery, it became impossible for me to go take a position in a lab overseas. How should I put it... There was a kind of pressure not to let my contributions slip out of Japan's hands into those of a foreign lab. I guess for myself and Dr. Yoneda as well, after the discovery of Importin, it spurred us on to not want to be overtaken by foreign labs in following up on it. We published our paper in 1995, and the discovery was considered so important that it made both of our names somewhat well-known worldwide. The competition in that area of research was so fierce that we had to push ourselves hard in order to not be left in the dust. So it was seven years working flat-out, full-power. That was when I started to think about becoming a PI. Yes, it must have been around that time that I decided becoming a PI was my goal.

Adachi: Was there anything specific that prompted you to set that goal to become a PI?

Imamoto: Wanting to do my own research.

Adachi: Rather than continuing to work with Dr. Yoneda, you wanted to run your own lab?

Imamoto: My contributions to the research were fully appreciated within the Medical School, but to the outside world they were considered the contributions of the full professor, not mine. That's just usually how it goes at medical school. Meanwhile Dr. Yoneda and I were frequently traveling overseas to attend academic conferences and so forth. We met many fellow researchers from around the world, and it seemed like almost all of them were setting up independent labs. Everyone gave the impression that becoming a PI was just the obvious step. During my seven years there, I started out just wanting to do the research itself, and the research was all that mattered to me, but along the way, I came to want a lab of my own to run.

Adachi: Is that something you started to think after making the big discovery?

Imamoto: Our big discovery came while we were pouring every last effort into not falling behind competing researchers. It was not so much the discovery itself, but the effort behind it, that made me decide, not that I wanted to be a PI per se, but that I needed to have my own lab. Maybe those around me were reaching the same conclusion.

Adachi: So you started to think about having your own independent lab. Were you considering whether to do it in Japan or outside Japan? Were both possibilities on the table?

Imamoto: Oh no, if I was going to get my own lab, it was definitely going to be in Japan.

Adachi: You never even considered doing it overseas?

Imamoto: Once or twice a year I would be invited to present at academic conferences, research conferences and so on, so I went abroad quite often. But I never went for any position abroad.

Adachi: Becoming a PI of your own lab at a university outside Japan, you never considered that?

Imamoto: Never. The idea of writing grant applications in English terrified me. So it was out of the question.

Adachi: In light of that, would it have been better if at an earlier stage, as a postdoc or young researcher, you had been in a position to go overseas and learn the ropes?

Imamoto: Yes. I actually lived in the U.S. as a child. One reason that I became a researcher was that it was an international career. A job that wouldn't be limited to Japan, but that could take me anywhere in the world. That is why I set my sights on becoming a researcher. And once I was working in that job, I absolutely did want to do a stint overseas. But because of the tragic circumstances with Dr. Uchida, that chance was lost. Instead I became an Assistant Professor under Dr. Yoneda. After working for him for a while I said, "I want to go overseas." But his advice was that if I did it, I would be around

35 years old when I returned to Japan, and at that point, it would be challenging to aim for becoming a PI. So according to him, considering the timing in my career, I had to basically choose one of the other: take a posting overseas for a few years, or aim to become a PI in Japan... but not both. And given those options, I chose to forego an overseas posting. There were all kinds of reasons that factored into why I didn't ever work in a lab overseas early in my career.

Adachi: Would you say that choice you made greatly influenced how your career turned out?

Imamoto: Yes. Why did I want to become a PI? I feel like it was just the obvious thing to do. I'm not sure why. That was just a presupposition of mine.

Adachi: In any case, that presupposition came to pass in 2000 when you moved to the National Institute of Genetics (NIG) as an Assistant Professor.

Imamoto: Right. They reached out, I applied, I was hired, and I was able to run my own lab.

Adachi: Meaning that there wasn't some full professor above you in charge of the lab?

Imamoto: No, at the NIG, I was appointed an Associate Professor in charge of my own lab.

Adachi: What kind of lab did you want to establish?

Imamoto: I wanted my lab to be a place where everyone feels like they belong. I have always believed that people are a key resource, right from the beginning. Graduate students, or Assistant Professors that we might hire. Postdocs perhaps. I wanted to build a lab where all these different staff members could feel that they belonged. It wasn't that I wanted to pursue a specific research topic. I had a clear topic of my own, so I think I didn't have to focus on that when building up the lab. For example, one thing that was consistent when I was working for Dr. Uchida, Dr. Okada, and Dr. Yoneda was that everyone, including myself, was eager to study, eager to seek out information from

outside the lab. And, let's say, when I would replicate an experiment I read about in a paper and get a different result from what was published. Well, colleagues would put their faith in the results I got in our own lab. Do you see the point I'm making? Even if outsiders are saying something different, we believed in the experimental results we were seeing in our own lab. Then we would discuss the difference in results with a determination to figure out what was causing it. That kind of openness makes for a lab where people feel they belong, and that is the kind of lab I wanted to run myself as a PI. For example, considering the different types of people who are working in a lab, including grad students, I never wanted to lay down a rigid rule about what time the workday starts and ends. In general, I just really dislike being ordered around by people. That's my nature. When I know something needs to be done and someone says, "Do it!" it actually makes me not want to do it. And so, in the same way, I really don't like ordering other people around. So, I never made a policy, "Be at the lab by this time, and don't leave before that time." I cut down the policy to a bare minimum of core hours: "Be in the lab between 11 a.m. and 3 p.m. Other than that, I don't care if you prefer to come in super-early in the morning or stay super-late at night." I wanted to make the lab a place where people feel they belong. That was always my goal anyway, I don't know how successful I was.

Adachi: What factors do you emphasize when hiring people, with your goal of a lab where staff feel a sense of belonging in mind?

Imamoto: Can they engage in conversation (about our common interests)? You might think, "Well, anyone could do that." But, for example, when hiring researchers, it is not just the applicant's ability and track record, although those are essential of course, but given that those criteria are met, is this someone whose interests align with mine? When I talk about interests being aligned, I mean, "Can the two of us come up with something that we want to work on together?" It is having shared interests with respect to research areas that enables us to pursue common goals.

Adachi: It sounds like you are looking to hire people with whom you can engage in lively discussion about common research interests. Is that it?

Imamoto: Yes, that's it. Of course personality is a factor, but the ability to sustain a conversation, where they are interested in what I have to say, and I'm interested in what they have to say, is a baseline prerequisite. And then on top of that, ideally, they also bring something extra to the table.

Adachi: You were only at the NIG for two years, and then you moved on to RIKEN as a PI. What brought you to RIKEN?

Imamoto: That's because RIKEN recruited me. That was in an era when things worked much differently than they do now. Even though I was broadcasting that I wanted to run my own lab, I never went through the experience of sending out applications, job-hunting, and so on. The NIG had recruited me, and that's why I applied there. Of course I put plenty of effort into making my application good, but the fact is that as soon as I applied, they gave me the job.

And then when I was at the NIG, RIKEN recruited me (and I ended up moving here) . I fretted over the decision a little bit, but then opted for RIKEN. Why? Well, it has to be said that location-wise, in comparison to Osaka, I consider the NIG way out in the countryside. I mean, it's a very nice location. There are fantastic scientists at the NIG and I was very happy there, but RIKEN's location is urban and it is a larger institution. Not that larger is necessarily better. And there was the fact that the RIKEN offer was a promotion.

Adachi: Yet you did fret over whether to take RIKEN's offer, you said?

Imamoto: I did, because the NIG was a great place to be. The research environment there was excellent, and I loved the people there. My specialty is in cell biology, but at the NIG, my lab was the only one covering that area. Of course there were other labs covering developmental biology and other fields, but only mine in cell biology, so that felt a little bit isolating. One of the reasons that RIKEN recruited me was that apparently they had plans at the time to make a push in cell biology and set up a number of groups centered on that area of research. So I was attracted to the idea of having a lot of colleagues in my own research area around and being able to interact with them. It was great to have been recruited by the NIG and they provided me with a wonderful environment where I felt I belonged. I was extremely happy there. I felt like I had not

really gotten much done yet in the short time I had been there which made me feel hesitant about whether moving to RIKEN was the right thing to do. I remember talking it over with people I trusted like Dr. Yoneda and my father.

Adachi: Ultimately, your motivation for deciding to make the move to RIKEN was, as you said, cell biology?

Imamoto: Yes, I was hearing that RIKEN wanted to strengthen its research program in cell biology. And that was what drew me in.

Adachi: You said that you found the NIG to be a place where you felt you belonged. How was the environment at RIKEN, by comparison?

Imamoto: As different as night and day. RIKEN is, needless to say, a superb environment for scientific research. And the NIG was outstanding also. What was different, first of all, was the basis on which I was running my own lab. As an Associate Professor at the NIG versus a Chief Scientist at RIKEN. But I found the responsibilities much more taxing at RIKEN after moving. There was a drastic increase in administrative duties. Right now there is an initiative to get the proportion of female researchers up to 30%, right? Well, the 30% women goal was already in place back then, from the time when I was still an Associate Professor. The proportion hasn't budged. At the NIG, I didn't have so much paperwork piled on my shoulders. Maybe that was because other people were dealing with all that on my behalf. When I came to RIKEN, the floodgates opened, and the paperwork came down on me. Just to comply with what I was told was necessary, I had to fill out the paperwork for the KAKENHI, which is the Grants-in-Aid for Scientific Research program from JSPS, as well as internal funding from RIKEN, the Special Postdoctoral Researchers Program, and so on, and so on. There must have been over 1,000 forms in a single year, if you tallied up all the documents and approvals and applications and everything. Dealing with that for a while completely wore me out. Which is why I say that as a researcher, I was happiest when I was a postdoc. Once I became an Assistant Professor, the competition got more intense and that was draining in a way, but it was the research itself that my energy was poured into. But once I had a PI post at RIKEN, for the first time in my career, I felt, quite honestly, "I don't like working here because it's just too demanding." And I felt that way for several years. Even though the

research activities were interesting. I was able to add more people to my lab team and hold seminars. That was a lot of fun, seeing the lab members present their work and discussing it among ourselves. But in the background there was always that burden of red tape. Maybe I shouldn't call it "red tape."

And then the whole issue of 30% women. I understand what's driving that, I really do, but... until recently, I never thought about asking female researchers to take on extra committee work and the like. Or even just asking them for a favor. And I also didn't want others approaching me on the same basis. I always thought that it was illogical to say, "I should do such-and-such just because I'm a woman." And as a result, I was opposed to gender equality initiatives. But now, all these years later, I think that something has to be done about the situation of women in science.

Adachi: Clearly you had a painful experience with "red tape" but how did you overcome that?

Imamoto: I don't really remember, other than that I tried very hard. And as I was trying my best, at some point I figured out which things I could say no to. When I took the post at RIKEN all the other Chief Scientists were men. For example, RIKEN doesn't hire postdocs on the JSPS Research Fellowship. Since RIKEN has a bunch of its own programs such as the Special Postdoctoral Researchers Program. Despite RIKEN not being involved much in JSPS programs, I was asked to serve as a member of the Screening Committee for them. I said, "Hold on, I can decline this kind of role, can't I?" But people told me, "That's not a request you should turn down." So I ended up taking on all those kinds of assignments at first, but eventually I figured out that there were things I could and should turn down. That wasn't a solution to the whole issue, but the gradual understanding over time of what I didn't have to pile on to my workload eventually gave me some breathing room.

Adachi: Did you come to RIKEN with an idea of the management style you wanted to implement in your lab?

Imamoto: Perhaps I should have given that some thought. RIKEN had a lot of labs that are doing "big science" but I myself was not at all oriented toward "big science" style research. I was never trying to do that. However, maybe there should be certain research

that is possible only at RIKEN. I have the impression that in the past, labs led by a Chief Scientist, because those posts fall under permanent employment, RIKEN asked them to focus on fundamental research. In the case of a university, a biology lab would be grouped in the biology department of the faculty of science, but at RIKEN, engineering and physics and chemistry and biology all come under a single system of Chief Scientist laboratories. That really appealed to me. Although interdisciplinary research was not my motivation to take a post at RIKEN, once I was here, I really enjoyed being able to interact with people from many different fields. It was both fun and informative, and I believe that it still offers advantages to this day. I didn't come to RIKEN originally because I wanted to access big funding to do big science, and I still don't. What sets RIKEN apart from other universities and research institutions is that you can interact with scientists doing research in all kinds of other fields besides your own, which is a tremendous benefit. I wasn't aware of that at first, but I realized it after being at RIKEN for a while.

Adachi: When you are talking to scientists from other disciplines, do you ever find that differences in jargon or culture impede communication?

Imamoto: It may be difficult to grasp what someone else's research is about right away -- but for me that's what makes this kind of communication so interesting.

Adachi: Could you give an example of something you found interesting that deepened your interactions with fellow RIKEN scientists?

Imamoto: Well, I wouldn't say our relationships were deepened too much. But my lab had the opportunity to do some joint research with the atomic physics lab run by Dr. Yasunori Yamazaki, who has since retired. That was interesting in its own way. They had ways of thinking about the problem that we didn't, and we had ways of thinking that they didn't. Yet we were able to make discoveries together on a topic of mutual interest. That was great. He had a postdoc who later returned to Germany, but whenever that alumnus of the Yamazaki lab visits Japan, we still get in touch.

Adachi: To the layman, it might seem that such different fields of science wouldn't have any points of overlap. So how did the joint research between your lab and Dr. Yamazaki's come about?

Imamoto: Dr. Yamazaki was working on irradiating cells with something like a laser (ion beam).

Adachi: So Dr. Yamazaki came to you?

Imamoto: Yes. In order to use an ion beam, you need to work in a vacuum. Our lab is using a technology called microinjection (which uses a very fine glass capillary to inject liquids inside cells). But the inside of the glass capillaries was not held in a vacuum state. There was a series of discussions between our lab staff and Dr. Yamazaki's lab. He had the idea to introduce a vacuum within the glass capillary, which would allow an ion beam to pass through it. And we, on the cell biologist side, were interested in what we could find out about a cell by probing it with an ion beam. We taught the postdocs in the Yamazaki lab how to handle the cell and adapt the microinjection technique for this purpose. We jointly published a number of papers.

Adachi: How did it come about? Did Dr. Yamazaki happen to hear you presenting your research at a chief scientist meeting or something and came to you?

Imamoto: I don't remember exactly what led him to contact me.

Adachi: When he did get in touch with you, did you immediately understand what he was proposing? Or was his research field too different from yours to understand?

Imamoto: I believe that it was actually Dr. Yamazaki's idea to use ion beams to probe cells and that he approached me with that proposal. So it was not so much an issue of me understanding his field, as of him understanding mine. It wasn't that our only interaction was this scientific collaboration. For years and years, until COVID came along, the Chief Scientists used to gather on various occasions, to hear each other's research presentations, or to go out and socialize over drinks. I'm not sure how much I understood of whatever research presentations he made, but we also knew each other through those sorts of workplace social gatherings, not only through research presentations.

Adachi: So you have been a PI since leaving your post of Associate Professor at the NIG.

Imamoto: That's right.

Adachi: And what have been your most celebratory moments as a PI?

Imamoto: When the lab's research produced results. And we had quite a few results, including the joint research with Dr. Yamazaki and many more. There's no better feeling than when your research goes well and leads to an interesting research findings.

Adachi: And that's something you would never have experienced without becoming a PI?

Imamoto: I wouldn't say that, no. The results of the research never depended on me being the PI. The research is not mine alone, it is the work of the whole lab. So when that research yields an interesting discovery, when it is going promisingly, or when it is not going promisingly but then there is a breakthrough of the impasse, all those scenarios spark joy. And that feeling comes irrespective of being a PI or not. Becoming a PI brings with it lots of responsibilities that are not at all enjoyable, like the red tape, but amid all that, the moments of joy arise from when your lab's research pays off. Whenever the thrill of discovery runs through the lab. Or when I've had to be away from the lab dealing with other stuff, but the lab staff calls me in and says, "Take a look at this!" That feeling of excitement that reminds me why science is so fascinating is what keeps me going through the parts that are an exhausting slog.

Adachi: You mentioned finding a breakthrough when the research seems to be at an impasse, and that is one thing that sparks joy.

Imamoto: Absolutely.

Adachi: How did you handle things when the research didn't go well?

Imamoto: All you can do is thoroughly debate the matter with people. I bring my experience, the other people involved bring their experience, and we come up with something to try. That's basically the strategy. Setting aside grad students, lab members who are researcher-level and above are pros at what they do. So we pool all our collective

experience, and what we've observed, and have a big discussion. And out of that discussion emerges a direction that we should try. It makes me happy when that gets the research back on track.

Adachi: When you have discussions like that, are there certain principles that you follow?

Imamoto: No. Although I believe that there actually are principles that should be followed. Maybe what I try to do is to listen. Listen attentively. Listen to what each person in the discussion is saying about what they are actually doing, what kind of data they are actually getting, what they are actually thinking. Unless you make it a point of principle to listen, you end up doing the talking, and that is not good. It's bad to keep on interjecting with your own thoughts first.

Adachi: Do these kinds of discussions among researchers tend to take a long time?

Imamoto: That depends on the specific situation. Sometimes the discussion might be one on one, sometimes it might be me and three staff. There are also weekly seminars which are a bit different.

Adachi: Do you feel that your style of lab management is consciously modeled on how, say, Dr. Okada or Dr. Uchida ran their labs?

Imamoto: No, I don't think I consciously model my management after theirs. I believe that communication is the foundation of leading a lab. In my mind, a lab where I feel like I belong and where others feel like they belong is a lab where the internal communication is good. If that communication is lacking, then people will start to feel out of place there. Starting discussions, listening to what the other person is saying, and making sure that they understand what you are saying: that is good communication. And it's not something I am modeling on labs where I previously worked. It's simply the right way to do things. That's what I believe, anyway, probably because of my upbringing. Or I should probably say that's how I was treated.

Adachi: Earlier you spoke about how dealing with red tape is what you found really draining about becoming a PI, so maybe that is the answer, but is there anything else you would describe as the hardest part of being a PI?

Imamoto: I think any PI would say the same, but one thing that is very hard to take is when you fail to raise money. And not because you couldn't secure your research funding (but because it directly affects money for personnel). That funding pays to employ postdocs and technical staff. I scramble for funding, knowing that people will be laid off unless I bring in money. In one sense, that is just an obvious reality. But in another sense, it is a very demanding reality. That is why it's so painful if you ever fail at getting funding. Just painful. And it happened more than once. But no matter how painful, you have to just try again for the next source of funds.

Adachi: Have you had to let members of your staff go due to being unable to get external funding?

Imamoto: No, that never happened. It was always possible to scrounge up some support, but maybe that is only because it's RIKEN. And RIKEN has its own group grants. It's not like that money comes to you automatically without doing anything, but when you have colleagues at RIKEN and fellow Chief Scientists, you can cobble some support together from the group funds to tide you over, even if you fail to receive your own KAKENHI funding (Grant-in-Aid from JSPS).

Adachi: In that case, making connections within RIKEN, doing joint research and so on, would be really important. Was it for you?

Imamoto: Networking with other scientists is important both within RIKEN and outside RIKEN. I built connections with a lot of researchers outside Japan. I considered it very important to network with people in my field, and in other countries, from all the way back when I was an Assistant Professor. I enjoy socializing, personally. And there is a lot that those connections can do to help you, and a lot that you can learn from them. Of course, I also want to do things for them. Even to this day, I don't think of that kind of networking as a burden, like red tape, but as integral to my work.

Adachi: Looking back on becoming a PI, over the course of your career, what were the “big jumps”? The moments where you made a big decision that took you to a higher stage?

Imamoto: When the NIG came to me and said I should apply to be an Associate Professor running my own lab, and I took them up on it and was hired. That was definitely the biggest jump. Because I went from not being a PI, just an Assistant Professor, to having my own lab.

Adachi: What were you thinking about when you faced that change? Did you feel hesitancy, like things would never be the same again?

Imamoto: Was there any step I didn't feel hesitancy over? That's the question. (laughter) Getting a lab of my own to run, obviously, meant that I would have to secure the funding to operate that lab. Getting the funding and managing the lab would all become my responsibility. That's when I became acutely conscious for the first time that every purchase I made had to come out of that money. In order to do research, I need a certain amount of experimental apparatus and material. I need lab space, and of course I need people. And I have to pull all of that together myself. It is a huge jump, isn't it?

Adachi: Did you have to feel your way through these brand-new challenges that cropped up in front of you? And did you get the hang of it over time?

Imamoto: There was some fumbling around at the beginning, as well as asking for advice and help from others. Some things I figured out and carried out on my own, but there were things where I just needed help. In retrospect I'm impressed that I made it work. It wasn't that I followed some advanced strategy. I just kept telling myself, “It will work out somehow, probably.” Nowadays, young people certainly have a lot of things to worry about, but the more you dwell on your worries, the larger they loom. As long as they have research that they want to do. As long as they have that desire to run a lab, to investigate some area of science, to make the effort to draw in others who will pursue that research with them... as long as that underlying research drive is there, that is what keeps you going against the odds. If you don't have that inner drive, maybe you don't need to become a PI.

Adachi: Looking back, would you change anything about your research career? Do anything different, as a researcher?

Imamoto: Probably too many things to list. (laughter) It's hard to know what I could have done in the past that would have resulted in a better present. I'm sure there are plenty of mistakes to reflect on, especially if I dig into the details. But I don't carry any major regrets. Maybe that's just because I have forgotten whatever I should be regretting.

Adachi: Did you think you should have stayed longer at the NIG, for example?

Imamoto: But who knows how things would have turned out if I had stayed longer at the NIG? One can only speculate, so there's no way to compare whether doing that would have been a better choice than moving to RIKEN when I did. I do think that the timing of my arrival at RIKEN was good. At that time, I enjoyed support from everyone, and of course from RIKEN itself. But even the NIG was exceptionally supportive of me. People at the NIG wished me success when I announced that I was moving on to RIKEN. My new post at RIKEN was due to start in April, if I recall correctly, but there was construction work needed on the lab in RIKEN, so I couldn't actually physically move into my lab space for six months. The NIG generously allowed me to temporarily remain based there in the interim. Today, I feel glad that I moved to RIKEN when I did. And it was only possible because I had so much help from people on both sides, from the NIG and from RIKEN.

Adachi: You have already touched on the topic of the 30% women goal under the gender equality initiative. That was already in place when you came to RIKEN.

Imamoto: Yes, it was. But it has not rectified the situation at all, has it?

Adachi: Despite 20 years or so of efforts, the situation with the gender ratio has not changed. Do you have any thoughts on why that is?

Imamoto: I really don't know, honestly. First of all, I have to point out that currently women face very few negative career factors here. I wouldn't use myself as an example

at this point because I'm at the tail end of my career, but there are young, outstanding female scientists running their own labs at RIKEN who take on multiple roles. It may sound nice to be relied on, but the reality is that you have to show up and be involved in various things and PIs just don't have the time for it, because they are crushingly busy as it is. In terms of reaching the 30% women target, they are focusing on the PI level. But, let me give some context for you. At the graduate school level, up to the master's degree level, there are equal numbers of exceptional male and female students. No gender gap there.

And there may be a number of female students in the process of getting a doctorate, or in the case of RIKEN, postdocs employed under the fixed-term researcher system. But when it comes to tenured employees, we see the proportion of women drop drastically. Given the scarcity of these non-PI level women researchers, no matter how emphatically you say that you will reach 30% women at the PI level, there's just no way it will happen. Here's an example: I'm a member of the Japanese Biochemical Society's board, and the lack of female board directors is considered a huge problem there. But how is a woman going to get on the board? First, she has to be a councilor of the organization. Under the current system, you can't be a councilor of the JBS unless you are a PI. Now, since there are already just a tiny fraction of women among the councilors, of course there can't be many women directors. No matter how hard you try to recruit for those high-level positions, because the number of women professors is so small, they are deluged with offers to serve on boards and committees. (It's also demanding to hold those top positions, to the point of being crushing if things go wrong.) So, a more up-from-the-roots approach is needed. What is causing that gender disparity to emerge at that point, I wonder?

Adachi: And what about your own hiring of researchers, Dr. Imamoto?

Imamoto: Personally, I have only ever hired male researchers. I wasn't able to hire any women, even though I would have been just as willing to hire a woman as a man. Whenever I reviewed the applications that were submitted and picked who to hire, it turned out to be a man. That is a fact. I have received very few applications from women in any case.

Adachi: What is the gender ratio in your lab among the grad students?

Imamoto: Among grad students, it's just about 50-50 male and female at the masters' level. For doctoral level, because I have quite a few non-Japanese students, there are some women. I also serve as a Visiting Professor at Yokohama City University and there are plenty of excellent students, both male and female, in the master's course. But most of those women choose not to go into academia, not to enter doctoral programs. Maybe that's a smart move on their part here in Japan, I don't know. What I can say is that in other countries, the system is different, something must be different, because women make up half of PIs in my field of science. Many of them have great positions and are doing fantastic work. In Japan, it's not just the lack of women professors, the problem starts a level below that. For example, though I can't speak to the current situation at universities, I wonder if the same can be said for assistant professors. When I became an Assistant Professor at the Osaka University Medical School, I'm not sure if there were any women at all; if it wasn't zero, it was a very small number. Maybe now that number has gotten a little better.

Adachi: So you mean, even if you want to bring in a female researcher, you are not getting many women applicants, and that means not many qualified candidates.

Imamoto: Exactly. I can't honestly say that I was making a conscious effort to hire women proactively. But the sheer lack of candidates was also a factor. If we take the pool of women at the masters' level, only a tiny fraction of them go on to a doctoral program. And without a doctorate, getting hired to work as a lab researcher is out of the question. There really are just so few women in my field anyway, I wonder how it is in other fields.

Adachi: Actually, the life sciences have the highest proportion of women. In physics and computer science, the ratio of women is under 10%. If we are to lift that floor, so to speak, we are talking about launching a 10-year plan, starting with middle schoolers.

Imamoto: It's often said that in the U.S., there are plenty of women in the field, but that doesn't mean it was easy to achieve. Even in America, when I talk to women who are full professors and PIs, they tell me it's because of gender quotas. When an open position is posted, they do a screening, and if there were no suitable women candidates, the opening is canceled, and then next time they post an open position again for women. It

can take years of hiring searches to fill the quota position with a good woman candidate, but apparently in the U.S., there are universities that are doing exactly that. I don't think many institutions in Japan are going to those lengths. And in some cases, they may accept women candidates who cover the basics rather than patiently waiting for someone exceptional to apply.

Adachi: What do you think you would have done if when RIKEN recruited you, it was to fill a gender quota position?

Imamoto: I thought that RIKEN actually did recruit me because I'm a woman. I thought so at the time but the bottom line was still that they were offering me the job, so I took it. Back then there were no official job postings based on gender quotas. If you told a candidate she was being hired to fill a gender quota she would probably be opposed to it. But now I believe that gender quotas are OK, for hiring I mean. But let's say when they look at her resume and if they feel it is less impressive in some way or missing something, they should be able to finish the screening without hiring anyone and post an opening again next time. Shouldn't we make that much effort? Especially for a post that is set aside for a gender quota.

Adachi: Especially when you were an Assistant Professor with Dr. Yoneda's lab, you were in a highly competitive field and fiercely competing with other labs around the world. You mentioned that you poured everything into your research work back then. What did that mean for your work-life balance? Were you in the lab until late at night doing experiments?

Imamoto: My "balance" was 100% work. I admire people who are able to manage a different balance than mine. It's not that anyone forced me to devote my life to work, I just chose to do things that way. When I was an Assistant Professor, my life really was almost totally, 100% work. And it was that way for a while after I became a PI. Now, finally, I do give some thought to my home life and to non-work, after working hours.

Adachi: Was there anything in particular that led to that change?

Imamoto: It's just that I have the room to breathe now. I was always pressed to the limit before. I think that is because with my level of ability, I had to push that hard. So I totally immersed myself in the work, and let it drive me completely. If I had to reflect and found anything to regret, it would probably be that. That I should have carved out some space to have a better work-life balance. That might be something to regret.

Adachi: Do you have more room to breathe now because with experience, you have become better at managing your time?

Imamoto: That's certainly part of it. And I have more support now, people I can get advice from. And I know how and when to ask for advice.

Adachi: How is the work-life balance of your lab staff?

Imamoto: I think they are striking a good balance. That's how it appears to me.

Adachi: That's all the questions I have, thank you very much.

Matsuo: At the beginning of the interview you mentioned that you aspired to be someone who was irreplaceable in your career. Could you comment further on how you developed that mentality?

Imamoto: That doesn't apply only to science, actually. It would be the same for any kind of work. Maybe it was just that I hated the idea that if one person suddenly died, the organization would just say, "OK, since that person is gone, we'll replace that person with this person." It's not so much about wanting to be irreplaceable but rather being valuable. So valuable that the good you contribute outweighs the trouble caused when you die.

Matsuo: So you felt you had to live up to that kind of standard.

Imamoto: I think yes, I wanted to be valued that much, I did.

Matsuo: When you moved from the NIG to RIKEN, you said you had to consider whether to prioritize a promotion or a unique research environment. And that you got advice from

various people you trusted. You have built a strong network of connections over the course of your career. What is your philosophy about that?

Imamoto: Probably, I'm the type who gets along well with people who I can have a good conversation with. If there is someone who I can't talk on the same wavelength with, I usually just don't talk to them much at all. That's just my personality. My network is the people that I have connected with by being able to relate to in a normal way, using normal language. I don't flatter people or boast about myself, it's just not in my nature. I stay connected to people that I can have good conversations with, and there have been quite a few of them, who have stood by me through the years.

Matsuo: Hearing you tell it, the jump to PI seems to have gone very smoothly for you. But every career has its peaks and valleys. Is there a "valley" experience that you could share with us?

Imamoto: One was when I was an Assistant Professor. We discovered Importin, something everyone was chasing after, so I was so thrilled about it. But then it became a fierce competition, and there was even interference with the peer review process of our paper. I had always loved foreign countries, but at that time, I started to hate hearing the English language. Previously, I would watch foreign movies to help me learn English. I would try to avoid looking at the Japanese subtitles and just listen to the English audio. But I was so beaten down, psychologically, that for about 18 months, I just couldn't stand to listen to English and couldn't watch foreign movies anymore. I tried to champion my own research results and challenge the mainstream opinions. It took a while before we were properly acknowledged, and that really depressed me. It sapped the energy from my research. It was a year and a half before people started to speak up and say, "Imamoto was right." And then I got myself back together. That was a valley, you might say.

Matsuo: Thank you for sharing that.

Imamoto: And there was a point when I was so excessively busy at RIKEN that I suffered from physical health problems. Not sure how I got over it. Eventually I got better somehow. I suppose you could call that a valley too.

Matsuo: One last question. You stated that you wanted to build a lab where the staff felt like they belonged. Now that you have many years as a PI behind you, is your vision of what a lab should be still evolving? Is there anything you have given up?

Imamoto: That's a tough question.

Matsuo: Would you say you have maintained that original stance?

Imamoto: Maybe I have given up on certain aspects. I'm not sure. For example, originally I wouldn't have been satisfied with less than 100 out of 100 people being happy. But I started to think that maybe if two or three people didn't turn out to be happy, I could live with it. In the past, I wouldn't have given up on those last holdouts, but now I might. I wouldn't say that I've evolved, more like that I have retreated.

Matsuo: Thank you for your time speaking with us.

Adachi: Finally, what would your message be to young scientists who are aspiring to become PIs?

Imamoto: I always say to everyone, "Look, even I was able to become a PI." If you have the drive, you can also become a PI. If you have children and a family, and have no time to spare, it will be tough, and you will probably need the support of the people around you. But if you are telling yourself that because you have kids, because you have a family, you will never be able to make that jump: stop telling yourself that! Not having children or a family myself, perhaps I can't imagine how difficult it would be. But even if it seems impossible, if you really want to do it, and you make the moves to do it, you will find people there to help you do it. This only applies to people who have that drive, that desire, wired into them; if you don't have that, then the path to PI is probably not for you. But if you feel that pull, don't hold back and talk yourself out of trying: tell yourself that you WILL do it. It takes a lot of energy to accomplish anything in this world, and it won't happen unless you really get moving, but there are people out there who will help you make it happen. You can be sure of that. So if you want it, go for it. That is my message.

Adachi: Thank you very much.

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