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CELL SCIENTISTS TO WATCH

Cell scientist to watch – Kivanc Birsoy

Kivanc Birsoy graduated in molecular genetics from Bilkent University, Turkey, and joined the laboratory of Jeffrey Friedman at Rockefeller University, New York City, for his PhD to work on transcriptional regulation and cell programming in adipogenesis. In 2010, Kivanc moved to the Whitehead Institute of Massachusetts Institute of Technology (MIT), Boston, as a postdoctoral fellow with David Sabatini. There, he studied how cancer cells adapt their metabolism in nutrient-deprived environments, and the links between metabolism and mitochondrial dysfunction. Since January 2016, Kivanc has been an Assistant Professor and independent group leader at Rockefeller University. His research focuses on the metabolic pathway changes in cancer and metabolic dysfunction. Kivanc is the recipient of numerous awards such as the Pew-Stewart Scholar Award, Searle Scholar Award, AACR NextGen Award for Transformative Cancer Research, NIH Director's New Innovator Award and the Pershing Square Sohn Prize 2018.

Kivanc Birsoy

What inspired you to become a scientist?

I come from a family of doctors and, up until high school, I was inclined to become a physician. My family wasn't too keen on me becoming a scientist then; a career in basic science wasn't something one would do in Turkey. But I was pretty determined because I was interested in finding new things rather than just applying them. But I realized that physicians do a lot of routine tasks and that it is a very different job to being a scientist. Also, I wasn't suited to being a doctor – I think it would have been a disaster!

What questions are your lab trying to answer just now?

We study metabolic pathways and there are three main areas we're interested in. Firstly, we'd like to understand the role of mitochondrial metabolism in cancer. There's a lot of evidence that mitochondria are important for the proliferation and survival of cancer cells in their environment, but it is still unclear why that is the case. Secondly, we investigate the reasons why cancer cells are sometimes highly dependent on nutrients for survival. The best example of that is asparagine auxotrophic leukaemia – these cancer cells just can't live without asparagine. But for some reason, it's like we forgot that such auxotrophies could be exploited for cancer therapy. Furthermore, the nature of many other auxotrophies has not been determined, so we are using systematic approaches to identify these auxotrophies to learn something new with regards to cell biology and metabolism, but also with an eye on clinical relevance. Thirdly, we use genetic tools such as CRISPR/Cas9 to identify new components of cellular metabolism – enzymes, regulatory partner and transporters.

There's a growing interest in cellular metabolism. How do you see the prospects of the field?

It is definitely is a trendy topic right now. Everyone is approaching metabolism from their own angle of cell biology, recognizing the value of studying metabolism and its links to different biological processes. I feel like there's great potential and, in the next 10 years or so, we will learn a lot. Decades ago, when you said biochemistry, metabolism was what you meant, right? But ∼30 years ago, fundamental research on metabolism stalled because we realised we knew 'everything' about these pathways. Now, in the post-genomic era, we can go back to those pathways and ask about their importance in different cellular processes, or address the role of numerous enzymes and transporters that we still do not know the function of. What do they transport? What does the enzyme do? There's still a lot to learn in cellular metabolism.

Does the complexity of the signalling pathways make it challenging to study metabolism?

Redundancies in metabolic pathways can be a problem. You shut down one pathway and cells use another one to compensate. Also, there are multiple isoforms of enzymes with similar functions, or metabolites that use a different enzyme after you knock a target enzyme out. So we have to work on it a bit more and dig deeper to get to where we want to be.

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What challenges did you face when starting your own lab that you didn't expect?

When I first started it was just me and a laptop, and that's an interesting situation to be in. But the most challenging thing was to

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Kivanc enjoying time with his son Efe.

recruit people and to get a critical mass of students and postdocs to get projects going. It takes time. In the end, we expanded quite fast in the first three years, to ten people currently, but advice I got from senior researchers was to wait for the right candidates. At Rockefeller, we're lucky in that we are a small but an extremely supportive university, so that makes things much easier for recruiting graduates and postdocs. I would say recruitment is even more of a limiting factor than money, because, in most cases, you get a start-up or junior investigator grant, but in order to hire the right people for your group, you have to be patient.

Are you still doing experiments yourself?

I really tried initially because I love doing experiments! But one of my senior colleagues at Rockefeller told me "you've got to stop once your cell cultures have dried up more than twice" and this had already happened more than three times. [laughs] So sadly, it was time for me to stop.

How are the challenges that you're facing now different?

I feel that we're entering the next phase now, because we published some of our work and some of my graduate students are about to finish their PhDs. It feels good and it tells me we have accomplished the first things. The next step now is where to take the projects afterwards.

"…my role with students is to help them figure out what they really want to do with their careers."

How do you achieve a work–life balance when you're trying to establish yourself as an independent investigator?

Unfortunately, there's no simple solution how to deal with this! The most important thing is that my wife, who has a faculty position at the Sloan Kettering Center, and I support each other and take turns regarding work, private life duties and our child. It's never easy, but you just have to try and deal with it and live through it together.

Are universities providing enough support for scientists with families?

Rockefeller University provides incredible amounts of support – we actually have an on-site day-care facility on campus for students, postdocs and faculty, and I feel that is something that every institute should have. Universities should prioritise childcare facilities for their staff. It certainly improves the work–life balance, because my kid is on campus and that's extremely helpful.

What is the best science-related advice you ever received?

Jeff and David recommended that I live close to the lab and that's great advice. I couldn't imagine driving an hour to work every day. It's maybe less of a problem in Europe, but in the US, a lot of people commute quite long distances. It's important to live close to your lab and not to lose time during your commute.

What advice or guidance do you pass on to your students?

I think times are changing; when I was a student, it was almost frowned upon if you told someone you want to leave the bench and go into industry. Now, companies do a lot of exciting work, so I feel my role with students is to help them figure out what they really want to do with their careers. I make sure they experience all aspects of being in academia and science: they do presentations, go to meetings, they review papers, and they contribute to writing papers and making figures, submitting to journals. At each of these steps, I make sure they are involved and get to know how it is to be a scientist and to be independent. It's not the easiest job in the world, so graduate students need to know what they are going to have to do when they aim for this job. At the end, whatever they want to do, I support them and I give them a candid view on whether they would be suited to this job because I think it's very important to be honest.

How do you get the most out of the meetings you attend, particularly in the early stages of your career?

Interestingly, I got mixed advice from senior faculty on this. Some said 'focus on your science, don't go to too many conferences', others said 'go to conferences, network, meet people and get your name out there'. I settled for something in between in the first couple of years. It also depends on your personality – if you like to interact with people and that's what makes you creative, just go to a lot of conferences.

Could you tell us an interesting fact about yourself that people wouldn't know by looking at your CV?

Apart from science, the thing I like to do the most is to go to restaurants and to try new food. We actually have a small group of faculty members that goes to a different restaurant with a certain ethnic cuisine every month. New York is great for this – you open the world map and just point at anything and you will find a cuisine for that country.

Kivanc Birsoy was interviewed by Manuel Breuer, Features & Reviews Editor at Journal of Cell Science. This piece has been edited and condensed with approval from the interviewee.