

Arkaitz Carracedo: If the scientific question is good, the result will be interesting

 Stephanie Houston 

Arkaitz Carracedo is a principal investigator at the Association for Cooperative Research in Biosciences (CIC bioGUNE) in Spain; his laboratory focuses on signaling and metabolic alterations in cancer. Arkaitz has investigated the regulation of fatty acid oxidation in cancer cells and how these changes could be manipulated therapeutically. We chatted with Arkaitz to find out about his career in science so far.

Where did you grow up?

I grew up in the north of Spain, in Bilbao (Basque Country). At the time, it was a predominantly industrial city, but it is now redirected toward tourism, and, to some extent, to biotechnology and biosciences.

When did your interest in science begin?

What was your first experience of science?

This is a recurring question with an unclear answer. My life has not been pre-meditatedly devoted to science, but in retrospect, I do not see myself doing anything else. I guess that my line of thought is structured to interpret life through the researcher's looking glass. My scientific interest emerged in high school and university, inspired by teachers. Then, it was nurtured and strengthened by my family. I believe that, as teachers, we have the capacity to shape the future careers of many. In turn, outstanding scientists should be close to academia and convey the motivation and passion for research to future generations. One interesting note is that after becoming a father, I realized that we pose this question incorrectly. We do not acquire interest in science; as kids, we are the best scientists we can be, constantly doing experiments that will forge our character. Most lose this curiosity, and those who retain it are the ones who pursue it as a way of living.

My first true scientific experience was with my mentor and friend, Guillermo Velasco. He was the spark that lit the fire of my scientific passion, and represents even

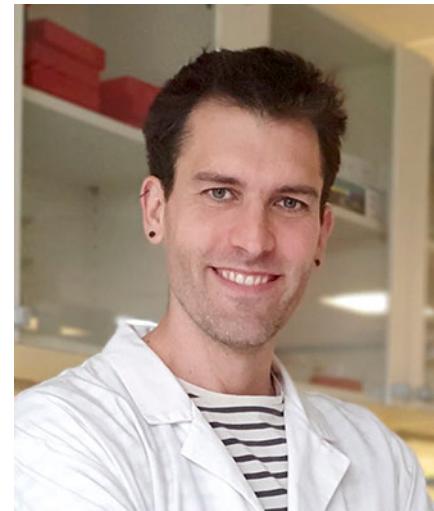
today the scientist I want to become when I grow up.

Where and with whom have you studied (undergraduate, graduate, postdoc)?

I studied biology in the University of the Basque Country in my hometown and moved to Madrid to focus my degree on biomedical sciences at the Complutense University. I met Guillermo in a practical course on genetic engineering, and his vision of science motivated me to join his laboratory as PhD student. Once I completed my PhD, my wife and I decided that living in the US would be both a personal and professional adventure, and we joined the laboratory of Pier Paolo Pandolfi in New York, whom we followed later that year to Beth Israel Deaconess Medical Center in Boston. In 2010, I returned to Bilbao to start my independent line of research.

What interested you about your current area of study?

At first, it was the clinical need of understanding the molecular basis of cancer. The complexity of the disease. The convoluted, yet intuitive, regulation of cellular signaling and metabolic homeostasis, and the versatility of tumor cells to overcome anticancer therapies. But in the past few years I have reformulated the way I perceive this deadly disease. Cancer is nature in a box: the rules of ecology and evolution packed in a few millions of cells that compete, adapt, evolve, and expire in the snap of a finger. If cancer did not represent the deadly disease we know, it would be the most fascinating biological context to understand life.



Arkaitz Carracedo

What are you currently working on?

What is up next for you?

My laboratory is interested in understanding the rapid adaptive changes that govern the process of cancer progression. Without underestimating the relevance of genomic aberrations, the volatile nature of the tumor microenvironment requires cancer cells to rely on epigenetic alterations (in the broad sense, including transcriptional and metabolic changes). I believe that this adaptability lies at the core of the capacity of tumor cells to outcompete nontransformed counterparts and represents the focus of our research.

What kind of approach do you bring to your work?

We are a core cell biology laboratory, with sufficient versatility to exploit mouse genetics,

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Current composition of the laboratory led by Arkaitz Carracedo at CIC bioGUNE.

biochemistry, molecular biology, and comparative pathology. However, my latest hobby is reducing the amount of indiscriminate wet laboratory experiments and taking advantage of computational biology in order to predict the “killer experiments” that could represent a turning point in a research question. This strategy has yielded exciting results in our recent studies (Torрано et al., 2016; Cortazar et al., 2018) or have allowed us to rule out alternative hypotheses (Zabala-Letona et al., 2017).

What did you learn during your PhD and postdoc that helped prepare you for being a group leader? What were you unprepared for?

I was unprepared for the vast majority of aspects related to becoming a group leader. This is in my view a common theme in research. We are born in science as marionettes directed by our PhD supervisors, which allows us to learn to differentiate right from wrong in the scientific method. As we grow, we untie laces and learn to think critically, to build ideas, to write and to discuss with our peers. Then (and not before), we are granted a PhD, and we embark on the development of research projects inspired by us, with mentors who should provide us with resources, infrastructure, guidance, and support. After one, two, or more postdocs, we might get the chance to become group leaders.

Then everything changes. No matter how proficient we are at thinking, writing, discussing, and pipetting, our fate is linked to something that we barely faced before: leading others. When I started my laboratory, I struggled to define who I wanted to be as a group leader, trying not to be influenced by the pressure of producing papers. Perhaps empirically, I chose my path based on two premises: to copy what I admired and to reject what I found toxic for the

motivation of my laboratory members. In a nutshell, I have tried (and try every day) to build a team where attitude is the essential ingredient. Attitude comprises motivation, creativity, and teamwork. Without these ingredients, our productivity and research quality drops. I hire based on attitude, emphasizing that every person in this team, in any role or research stage, is important for the success of the laboratory. Another aspect that was clear to me from the beginning was that I wanted to avoid building a laboratory composed of “mercenaries of science,” defined as researchers who devote their life to science at the expense of their personal-professional balance. I experienced this before, and I believe that only a good balance can make us the best researchers we can be.

What has been the biggest challenge in your career so far?

I guess that my biggest challenge has been always associated with reaching the expectations of others, or my own. The uncertainty of not knowing whether the strategy I follow as a group leader is the best worries me. The results only float in at the endpoint, and for a group leader who bases his work on building a motivated team of research, retrospective evaluation might imply that it is too late for amendments.

What is the best advice you have been given?

If the scientific question is good, the result will be interesting. This was the motto of my PhD supervisor Guille. I live by it: I encourage people not to get “contaminated” with the idea of building papers, but rather answering a scientific question. When the answer of your question is at 75% from completion, then how you tell the story will unveil the experimental and scientific gaps. Only then does thinking on a paper provides an advantage. Doing it too early will force you to expect an answer built with few premises and will most likely drive you to oversimplification and frustration.

What hobbies do you have?

Running to stay fit, cooking to stay distracted, and doing anything and everything with my two daughters and wife to stay in balance.

I would say more. With the amount of administrative workload that we have in

research, sometimes scribbling hypotheses, pathways, and ideas around a project becomes a luxury, and a hobby.

Any tips for a successful research career?

It is hard to give advice when I have little proof that my strategy was the best choice for a career in research. It was only my choice. However, I did find inspiration in things I heard and read to build my path.

When I started my laboratory, I found a series of papers by Uri Alon to be of great help for choosing a scientific question, disseminating knowledge, and building a motivated team in research (Alon, 2009a,b, 2010). I encourage every researcher to read them and to use them as a source of new strategies in their research path.

Throughout my years as a group leader, my recruitment strategy evolved, with more implication of laboratory members, more emphasis on attitude versus knowledge, and more gut than brain. I once read that the value of a person is measured as $Value = (knowledge + ability) \times attitude$. The key point here is that knowledge and ability are additive (and will likely increase during the stay in the laboratory), but attitude multiplies the value, therefore representing the key feature to take into account.

Research is a quest that we cannot do solo. It is our choice whether to be secretive about our results or share them with colleagues to seek feedback and synergies. In an era in which publishing is the predominant readout, competition might be perceived as fierce. However, in my view, the gain derived from open discussions is greater than the risk of being scooped. The majority of my projects have turning points associated with the feedback and new collaborations that I established with friends and colleagues over coffee, lunch, happy hour, or a relaxed scientific discussion.

- Alon, U. 2009a. *Mol. Cell.* <https://doi.org/10.1016/j.molcel.2009.10.007>
- Alon, U. 2009b. *Mol. Cell.* <https://doi.org/10.1016/j.molcel.2009.09.013>
- Alon, U. 2010. *Mol. Cell.* <https://doi.org/10.1016/j.molcel.2010.01.011>
- Cortazar, A.R., et al. 2018. *Cancer Res.* <https://doi.org/10.1158/0008-5472.CAN-18-1669>
- Torрано, V., et al. 2016. *Nat. Cell Biol.* <https://doi.org/10.1038/ncb3357>
- Zabala-Letona, A., et al. 2017. *Nature.* <https://doi.org/10.1038/nature22964>