

INTERVIEW WITH RANA SANYAL: THE FUTURE OF NANOMEDICINES

In this interview with TPQ, Rana Sanyal explains the importance of increasing the quantity of clinical trials in the local health sector, while elaborating on her work on targeted drug delivery technology. Prof. Sanyal states that although Turkey has placed itself on the map for novel drug medication, there is still room for improvement in terms of clinical trials. In her remarks, Sanyal stresses ways in which institutions can encourage entrepreneurship while emphasizing on the importance of sparking children's interest in STEM.

Rana Sanyal*



* Prof. Dr. Rana Sanyal is the Co-Founder & CSO of RS Research and an Academic at Boğaziçi University, Department of Chemistry.

After completing your bachelor's degree at Boğaziçi University, you pursued your doctoral degree at Boston University. From your observations, what are some practices that Turkish and American academic institutions can exchange with each other and benefit from?



I decided to pursue my higher education in US after my undergraduate degree in Turkey. At the time, the options for experimental research was quite limited. Now, 30 years later, the students do have quite a bit of options. Today, Turkey possesses international level labs which has the capacity to conduct high level experimental work to pursue higher education. Still, we encourage our PhD students to spend some time in the US, because there is still something to learn there. It is not about the technique, but more about the speed. I have stayed in the US for 10 years and learned more than I can explain, but the most important thing I have learned was the emergency of the research question. Science cannot wait until tomorrow. If you can do an experiment today, you do not wait until tomorrow. So in the US, you get up to speed; and of course, the students – the brains – we share with the US academicians are our best imports. So it is a win-win for both parties.

As co-founder of RS Research, a biotechnology company based in Turkey involved in developing “novel nanomedicines” that are used in cancer research and treatment, could you elaborate on the importance of the research you are doing and its impact on the local health sector?

Basically, I work on targeted drug delivery technology for cancer. We take chemotherapy agents and specifically target them to the tumor. Chemotherapy, usually kills all cells that are reproducing. Unfortunately, it is not only the tumor cells that are constantly dividing but also many other cells like bone marrow. Thus, results in serious side effects. By targeting the chemotherapy agent to the tumor, we are saving the rest of the body from unwanted toxicity. This also saves the drug from the body, so they do not get chewed up until they reach the tumor. It is a win-win situation for both the drug and the body. There are nanomedicines already in the market, however targeted nanomedicines are much rarer. For example, there are antibody-drug conjugates in the market, but only three are approved. So, this is a relatively new field in the world as well.

“Starting clinical trials in Turkey will have a huge impact on the local environment in academia and the pharmaceutical industry.”

At RS Research, we are making novel nanomedicines that are going to be used globally, so our research has a global impact beyond our local community. We started from synthesis and finished preclinical experiments. Now, we are ready for clinical trials. We are the first team ever in Turkish history, who started from synthesis, has a novel compound and has made it to clinical trials, for which we received an approval from the Turkish health authority.

During my career at Amgen Inc., I experienced how to take a molecule all the way to the clinic. I learned this in the US and brought it back to Turkey. Of course, research in pharmaceuticals and biotechnology requires considerable amount of infrastructure. The whole process which brought us to clinical phase was possible because of the infrastructure at Boğaziçi University – Center for Life Sciences and Technologies. RS Research scientists enjoy the privilege of using this infrastructure through our university-industry collaboration.

Starting clinical trials in Turkey will have a huge impact on the local environment in academia and the pharmaceutical industry. Our work has already inspired and encouraged other researchers. Globally, it has promoted Turkey and boosted its potential to receive investments in a field that was thought as unprosperous before. From now on, there will be more investments from the US and others that will be attracted into the local market, as Turkey is now on the map for novel drug development.

What do you think of Turkey’s place in the world in the health sector? How would you evaluate Turkey’s position with regards to clinical trials?

For clinical research, Turkey offers a number of opportunities since hospitals are equipped with state of the art tools along with well-trained medical staff. The population is highly diverse with unique concentration of some of the rare diseases. For more common diseases, we have a large population with constant access to high quality hospitals and qualified doctors to conduct clinical research. There is still room to improve regarding Turkey’s position in quantity of clinical trials. Life can be much easier for companies who are trying to invest in clinical trials in Turkey; it is certainly more cost-effective than running a trial in the US or Europe. Patients

are interested in joining clinical trials because it gives early access to new drugs and technologies. Especially for cancer, where time is of the essence, there is even higher interest from public for clinical trials.

As a business person whose roots are embedded in academia, what are your opinions on the role of academic institutions in encouraging entrepreneurship and contributing to fund initiatives?

In academia, we invest our time in our students and research. Our most valuable product is our graduates, then comes publications. Until recently, as academicians we thought of this as the ultimate point. Now, the expectation from us has risen: the research we do has to benefit the community. So, when you have a solution to a real world problem, academic institutions encourage you to follow that up. In our case, in the medical field, it is very difficult to start from an academic lab and sustain it without an entrepreneurship component. When I saw the data, I knew I had to advance that molecule to the clinic. In order to move forward, I had to start a company to find other funding opportunities. If you had asked me 10 years ago whether the universities are interested in entrepreneurship, I would have said no. Just like everything else in the ecosystem, this is also changing. In fact, today it is frowned upon if a university does not have any entrepreneurship programs. There are many different methods the institutions can support academicians who are interested in starting their companies. When they truly understand the impact they will gain, the encouragement will follow. First, the institutions need to recognize that the start-ups connect them to the stakeholders in the ecosystem that they would not be associated otherwise. Second, the expectation is that the start-up will eventually increase its worth and lead to monetary gain for the home institution. This is only a partial perspective; it is not a matter of whether the start-up becomes a success story at the end or not, the entire process could become a winning endeavor for both the institution and the start-up. With this realization comes the extra support that is much needed by entrepreneur academicians.

In what ways do you think educational institutions can encourage primary and secondary-level students to engage with scientific fields? How can they help spark the curiosity and creative spirit of young students?

I have two answers to this question. Kids come with inherent curiosity. If we manage not to kill it, it is already there. The question of “why” comes when they are three years old. If we foster an environment in which children can continuously ask questions, we don’t need anything further. But an environment in which we constantly provide information, as opposed to feeding their curiosity, means we

encourage memorization. The children should be the ones asking the questions, rather than us imposing information on them. Secondly, there are many programs in terms of engaging secondary level students in the scientific field — even so for primary students. It is a matter of them being exposed to options. If kids know that science is an option for them, and that it is not scary nor difficult, and in fact, is fun, they will start enjoying it. Once they enjoy it, they study it and become successful. Usually, when somebody is successful in a field, they choose it as a career. I, for one, was very good at chemistry in high school, and therefore, have chosen it as a career. I do not know if my interest in the field sparked first or whether being successful came first. However, I studied very hard, and as a result, became successful. Then I truly liked it. I feel the same will apply to all students. If they study science and technology, and see that they are capable, they will pursue it. Let us show them that science is fun, and allow them to study it, so that they can choose science as a career.

“When you have a solution to a real world problem, academic institutions encourage you to follow that up.”

After co-founding your company, you received “Turkey’s Promising Woman Entrepreneur” award in the annual Turkey’s Woman Entrepreneur Competition held by the Women Entrepreneurs Association of Turkey (KAGIDER). As an experienced member of the scientific and business communities, how do you think women’s participation and representation can be increased in these sectors that are widely perceived as being dominated by your male counterparts? Furthermore, how do you think businesses and academic institutions alike can support women, especially young women who aspire to be in STEM, in pursuing their aspirations? What kind of initiatives and partnerships can the business world and academia undertake in that regard?

I have joined many programs in STEM, both in the US and in Turkey. The whole thing about women in STEM, again, is a matter of how people are perceived. Let me explain with a real story. One of my very close friends, also a scientist, is in the US. When her daughter was in elementary school, the class was asked to draw a picture of a scientist. In her class, everybody had drawn a man, except for her. Since her mom is a scientist, the first thing that came to her mind was a female scientist. When you see something in front of you all the time, the first thing that comes to mind would naturally be the same. Perceptions are shaped based on what you see, and in this case, because you see less of something. The more you see women in biology,

chemistry, physics, technology, and engineering, then it will start becoming natural. However, this does not settle in one generation.

I am very pleased to say that in Turkey we observe better conditions than the US in this aspect. In my perspective, we have easier lives for women in STEM in Turkey. For sure it's not possible to say that all women in Turkey are in better shape than the women in the US in all aspects of life. However, in terms of engineering and science, people who are highly educated, the ratio of women are much higher compared to the US. So, I truly believe we both have something to learn from each other. We need proper role models and we should not be afraid to put forward these role models. We should let people see women scientists, engineers, and doctors. This does not deduct anything from men. It gives a message to our children that they can be anything they want to be. Academia and business communities both have responsibilities to reach this ultimate goal. Both sectors do quite a bit to promote this message both in Turkey and the US. Is it enough? I don't think it could ever be.