Interview: Laurent Levy â?? CEO, Nanobiotix, France

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Laurent Levy, CEO at Nanobiotix, is leading the way in nanomedicine with new market-disruptive developments, establishing a growing presence in European and global research labs and pushing back the frontiers in healthcare, for the industry and for patients

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What is the main focus of your work at Nanobiotix, a company you co-founded 12 years ago, and what are some of your core priorities?

At Nanobiotix, we do not work on personalized medicine, but rather medicine with a larger scope that is rooted in physics. Specific sub-populations of people are not our targets, but rather the medical needs of millions of patients. We develop products with this spirit in mind â?? how can we develop products that can be used by millions of patients, rather than a unique few.

We believe that the healthcare system is under a lot of constraints. To attempt to cure the worldâ??s ailments through personal medicine would be extremely difficult, especially if we want to have manageable prices. If we are able to create physical based treatments, it would mean many patients could then be treated with one approach. This is one of our main objectives.

Could you elaborate further on the physics you speak of, which is integral to your work?

We design objects on a nanoscopic level, meaning that they are so small that they can enter into cells. When these designed nanoparticles are able to enter into cells, they can deliver by themselves physical therapeutic effects within the cell while encountering no biological interference. Physics is by definition the same in every human body and could have more general rules for efficacy than biology or less non-expected specific interactions.

We are using these methods within the oncology field, and more specifically in radiotherapy treatments.

When dealing with tumors, practitioners are always limited by how much damage will be created in surrounding healthy tissues by the treatments. In principle, radiotherapy, even if the technology is more and more precise, does not discriminate between the types of living cells it kills. Therefore, we are striving to improve the efficacy of radiotherapy into the tumor without increasing the damage in surrounding healthy tissue.

This is the premise behind one technological breakthrough we have developed, NanoXray, a radio enhancer that is made of billions of nanoparticles designed to absorb x-rays in the tumor. These nanoparticles, dispersed in water, are delivered into the tumor with one injection the day before classical radiotherapy treatment begins. It aims to increase drastically the efficacy of the radiotherapy, but only into tumors cells, and not in the surrounding healthy tissues. However, more energy is directed directly to the tumor and less to the surrounding areas.

Understanding how to build a nanoparticle product atom by atom with specific physical properties, how to make an interface with biology that is compatible, and how to create a product that is non-toxic are all complex elements of our development. The concept itself is quite simple though â?? we are able to increase the dose within the tumor to kill it more efficiently, nevertheless the science to get there is complex.

The pharma industry has shown a growing interest in the potential of nanomedicine. In Europe, the market is expected to be worth between 97 and 129 billion dollars by 2016. What is it that makes Nanobiotix unique in this growing field?

We have seen the major players in the pharma industry adopt nanotechnology in the past few years. That said, most of the companies working exclusively with nanomedicine are developing first-generation products, meaning nanodrug delivery systems that seek to improve the bio-distribution of a drug within the body. This involves taking a pre-existing drug and encapsulating it in nano-object for better delivery of the treatment. This can lead to drugs that have less toxic side-effects, drugs that are able to more efficiently target tumors, or a combination of both.

We have been at the forefront of a small community of companies over the past decade that have developed the second generation of nanomedicine products, where the nanoparticle itself serves as the active principle in treatments. This means that we withhold the need for a drug, and rather create a nanoparticle that delivers a physical therapeutic effect throughout the cells. While this is also a concept in the concentration of nanomedicine, this is a completely different approach. This can be a game-changer in the treatment of patients, with products that can treat millions without the need to use chemistry or biology as seen when utilizing drugs. It is a total change of perspective.

Do you see the reach of these treatments going beyond just oncology?

Nanomedicines in this style can definitely be used outside of oncology. Currently about seventy percent of the developments in the field are directed towards treating cancers, but other developments are also being made with regenerative medicine and the treatment of neuro-degenerative diseases. There are many ongoing developments and the field is growing quite fast.

Looking at your internationalization strategy, you have expanded clinical trials for your products across Europe and the US, with projections for further growth. How has the progress been with these developments?

Currently 29 centers in 8 countries in Europe and others around the world are using our products in our Soft Tissue Sarcoma trial. Oncology is not just a European problem, but a global issue. We are focusing in Europe, because that is where the developments have started, but we also have started developments in Asia with our partner PharmaEngine. Furthermore, in the US, in December 2015, the FDA approved our Investigational New Drug for NBTXR3 in a new clinical study in prostate cancer. We are a medium sized company, but our progress is consistent and done step by step. Currently our product is tested in 6 different indications.

Noting this partnership with PharmaEngine in Asia, what importance will partnerships play in your internationalization strategy beyond Europe and how would you describe your global partnership strategy today?

We have the unique chance to follow the full lifecycle of our products from development to the market â?? we have the luxury as a smaller company in a budding field to not face the same burdens that biotech companies may have, spending hundreds of millions on clinical trials on thousands of patients. This is thanks to the nature of our approach.

One issue that has come up repeatedly is the overall lack of venture capital available for the pharma industry to fund innovation in France. With finances naturally serving as a necessity for expansion, what avenues are you considering to finance future projects?

Internationalization is a natural course for many companies today. Regarding raising funds, it is always a challenge, but we have been finding success for our initiatives. Sometimes we see that comparable biotech developments in the US can find financial backing tenfold of what can be obtained in Europe. Even so, good projects can find funding here, and when reviewing the numbers, there is still a significant amount of money allocated towards science throughout Europe.

On a more personal note, you completed your studies in the US. Why, then, did you decide to come back from France? What are the advantages that come with setting up a business in France?

Both can be good environments for good innovation. When someone is hired in Europe, I believe that there is a greater capacity for employee retention, with employees that come to stay and remain dedicated to the project for several years. This is critical, because when there are high turnover rates, there are inefficiencies in losing knowledge within the company and constantly needing to train specialists. When a company is small, everyone has a critical role to play in the development of a project. In Europe, we uphold good basic research standards. Compared to some markets, such as Boston in the US, however, it is difficult in Europe to find such hubs of research and science where resources are quite literally a walk across the street. This, and the fact that, as mentioned, sometimes secured funding doesnâ??t reach the high rates in Europe as it may in the US. I believe that both the US and the European markets have their competitive benefits, and for future ventures we will focus on both areas.

In 2013 you were awarded the UB Entrepreneurship Award from the University at Buffalo. How do you see the state of entrepreneurship in France?

Entrepreneurship is not something that can be learned â?? I believe that it is an inherent state of mind. That said, over the past 10-15 years, there is a growing spirit of entrepreneurship in France, which wasnâ??t as prevalent before. This evolution of culture with more ambitious people that wish to change the world can only be a good shift for the future of France.

You are the author of more than 35 international publications and communications, hold several patents and have completed various postdoctoral works. How useful has your dual

background in both the academic and commercial worlds been when it comes to your role as CEO of Nanobiotix?

As a company, we give preference to developing patents over publications in scientific journals, yet we understand the importance of sharing what we are doing with the scientific community. Being a CEO with a scientific background definitely has its benefits in todayâ??s market, especially when a company is working in fields with new technologies. The role of the CEO is to lead a company and analyze risk, and when a company is working on new projects in the field of science, a thorough understanding of the research methods and the science is critical to take decision. In the case of our company, what we are creating is not a conventional development, and in many ways we are paving the way for a new pathway in the industry. Thereby, having a high competency in the sciences is crucial to the success of an initiative. Having a diverse team with those trained in different sciences, as well as business development, IT, and marketing are all important for the overall success of a contemporary company in our field.

You founded Nanobiotix 12 years ago. What will the next 12 years bring?

All possibilities are open. What is certain is the fact that we will strive to continue to have all of the factors necessary for our team to continue on our development. Our company, as well as the nanomedicine field at large, is moving in an exciting direction. I believe that the world is evolving, and the â??winnersâ?• of yesterdayâ??s healthcare industry may not necessarily be the â??winnersâ?• of the coming years. We are working with market-disruptive innovations, and the industry must see such disruptions as a natural evolution in our field.

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