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Stem cell technology can play a key role in improving the drug discovery process. The CEO of Pluriomics, a biotech company focused on development of fully functional human assay systems for use in drug discovery and development, explains the vision behind the creation of the company as well as the benefits of this technology.

Can you please tell us about the market need you identified in founding the company back in 2010?

The drug discovery & development market needs reproducible, predictive and translatable human cellular models to facilitate decisions about drug candidates in the drug discovery and development process. If you look at the R&D pipeline of big pharma, we are used to seeing a big funnel that starts with many compounds, a small number of compounds go into clinical development but only a tiny fraction make it to the market. We all know drug development is incredibly expensive and not very efficient. As a stem cell biologist, I realized that stem cell technology allows you to build human models that can support drug discovery & development. By using predictive human biology you can improve decision making in the pre-clinical phase, which is crucial.

We quickly identified that big pharma has a panel of different models lined up for safety pharmacology and undertakes a lot of work to make sure that two or three preclinical candidates are safe. With human cells you have the chance to optimize your molecule before moving into the preclinical transition. We started thinking about this in 2008, when I still was in academia. From there we founded the company, decided to work with large drug manufacturers, and developed our first Pluricyte cardiomyocyte product, which came to the market last year.

Following five years as CSO, you assumed the position of CEO in July this year. What top priorities have you established for yourself and Pluriomics?

My top priority is to translate fundamental research into products and solutions that can be used in the pharma industry. My personal thrive is to generate an impact. For Pluriomics this means that we develop fully functional human cells, screening assays using these cells and prove that these models can accelerate the drug discovery & development process. Overall, it is most meaningful to have a product on the market or to see a technology is developed to a point that it gets widely accepted by users.

Funding is a significant challenge for biotech start-ups, especially in Europe. How did Pluriomics manage to secure funding for EUR 4.5 million?

The key in the whole pipeline is the availability of capital. In fundamental research there are great ideas, but research is only moving forward if it receives capital. We were able to develop our product with non-dilutive funding, with a grant we received when we were still at the university, then got our first contacts with big pharma, and received more investment. This was an interesting period because we had to survive with few resources and were thus very focused. When we developed our first product we wanted to accelerate the use of our technology, as one of the most important aspects for a biotech company is to show the added value of its product.

Hence, we moved our production to a separate site to work under a quality management system and ensure that we can generate batches that are consistent in terms of quality. Secondly, we invested heavily in assay development capabilities to prove the added value of the cells. Thirdly, we started looking at the development of other interesting cell types, which will probably come out next year. As a result, today we have a great focus on safety pharmacology, which allows us to work with well-validated compounds with clinical data. Our three axes are: biology, translatability, and assays. While we are getting more confidence in them we can also start applying the tech to drug discovery and move it earlier in the pipeline.

Drug development takes an inordinate amount of time and unless new innovations come into play, these times will only grow. How do Pluriomicsâ?? Pluricyte Cardiomyocytes help cut down the time necessary for drug development?

We are developing cell models that replicate the human heart. This allows us to integrate human biology in all its complexity, earlier in the drug discovery process. Safety pharmacology should be done as early as possible because it allows you to take better decisions. I do not know if one day we can say we are able to reduce the length of the drug development process, but we know we are having an impact on costs. Scientists still believe in assays that are not so predictive. Especially for the cardiovascular field you have to rely on animals as they are very close to humans, and the general public and scientists do not like that, so it makes a lot of sense to use human technology and replace animal test with human cells.

Upon your appointment as CEO you stated that, â??in particular, I am excited by the opportunity to further shape the strategy to implement disruptive cell technologies in drug discovery and developmentâ?•. Why would you qualify your technologies as disruptive?

Our stem-cell based technology is disruptive because we intend to change how safety pharmacology is done. Instead of going all the way to a preclinical candidate, we are moving safety testing to an earlier stage in the process and thereby changing the field. The availability of human cardiomyocytes will improve cardiovascular safety pharmacology. Also on the efficacy side, cell-based assays are incredibly important in the drug candidate selection process. They are currently done with cellular models that do not recapitulate human biology. The moment you are trying to use more complex human biology you introduce biological relevance much earlier in the pipeline, and this is definitely disruptive.

What kinds of projects would these technologies best contribute to and what would be the typical profile of your clients?

Right now the typical profile of our clients is within the safety pharmacology field. We know attrition because of cardio-safety issues is rising, so clients are looking at how to use more predictive human biology early on in the pipeline. We see a global trend in pharma to outsource this process, but, at the same time, itâ??s a new technology they may be interested to have in-house. We operate with

two models: we supply our cells to the companies and also offer the services from our own lab.

Where do most of your clients come from?

We have clients in Europe and in the US and we just appointed a distributor in Japan to serve that market as effectively as possible. Although the Netherlands doesnâ??t have large pharmaceutical companies we have Dutch clients, who undertake interesting projects, but they are not our typical clients.

Pluriomics hosts a production facility in Belgium. Why locate this function outside the Netherlands?

For a biotech company, it makes sense to separate the production site from R&D, because demands and working processes are completely different. With that in mind, we always wanted to be in a place where there is high density of knowledge and relevant companies around us. We discovered that in the Wallonia region there are several companies in the cell therapy space and we found interested local investors. Furthermore, we are not in the position yet, as other larger companies, to build our own facilities in Leiden. Going to Belgium came at the right moment and the conditions were there. Also, non-dilutive funding schemes are more favorable for companies.

Pluriomics is involved in such partnerships as the Netherlands Institute of Regenerative Medicine PPP, Plurimes, and Crack-It. How important are partnerships to the companyâ??s future growth?

They are really important because we try to extrapolate what people do in animal models and do it instead in cellular models. In order to do that you need biology, measurement technology, and software. Our own core focus is biology and assay development, so we rely heavily on partners to provide the other technology. We are also working in a Pan-European Horizon 2020 project with companies such as Philips, who is working on a pilot line for electrical device manufacturing. We are interested also in these projects because it helps us define technology development requirements early on and make sure the tech is developed such that it fits the needs of our scientists.

What moment has made you most proud so far in the Pluriomics journey?

I was working as a scientist in fundamental research and when I started thinking what was the next step, I realized my personal ambition was to develop technology and make sure people would use it. At Pluriomics, we managed to grow from a tiny idea to a company which today employs 20 people, managed to build a team with the right people on board, and develop the product, makes me really proud.

In five years time, what milestones would you have liked to achieve on behalf of Pluriomics?

The future is the drug discovery space. We see that a number of molecules in the CNS field went into Phase I of clinical trials because of the power of Induced Pluripotent Stem Cell technology. I would like to ensure we can scale the technology so it can be used earlier in the pipeline, and it is key to decide if a molecule goes into clinical trials. We want to be the tech provider that can develop the right cellular models and screening assays to accelerate the drug discovery process both on the safety and efficacy side.

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