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Ketil Widerberg of the Oslo Cancer Cluster highlights how Norway's excellence in electronic health records can help the country stake out a position as a significant cancer research destination. Widerberg also highlights the Cluster's work to bridge seemingly disparate actors right across the oncology value chain, its collaboration with the other Nordic nations, and the challenges of translational science.

Can you begin by introducing yourself and your career trajectory?

I worked for several years as a brand director and director of business development at oncology-focused Norwegian biotech firm Photocure, the world leader in photodynamic technology, with sales teams and offices around the world. I also have experience working in the software industry; after leaving Photocure, I took on a role as VP business development at big data specialist Descartes. Drawing on my experiences in these different industries, I was invited to join Oslo Cancer Cluster as general manager in 2014.

What are some of the major trends in oncology research and treatment today?

The two most significant trends changing the way we look at and treat cancer are the proliferation of immunotherapies – using the body's own immune system to treat cancer – and precision medicine.

Precision medicine is changing cancer care for governments, companies, and, of course, patients. As cancer is in fact over 200 different diseases and rare cancers are now the most common form of the disease, we are increasingly identifying very small groups of patients that need specific and targeted treatments as opposed to blockbuster drugs made for large patient groups.

Combination therapies are an important part of this move towards precision medicine. By creating an individualised cocktail of therapies, including treatments developed by different companies, patients can receive a more precise treatment.

The challenge is that the number of patients receiving specific treatments is smaller, which means that the traditional methods of documenting and developing drugs is being challenged. Against this backdrop, drug developers are increasingly leaning on real-world health data of the kind we have in Norway via the electronic health records generated by our public health system.

Norway is one of the leading countries in the world in terms of electronic health records. For example, our cancer registers go back 50-60 years and represent excellent resources to draw on for researchers who are developing the next generation of efficacious cancer treatments.

How is Oslo Cancer Cluster responding to the rise of immunotherapies and precision medicine?

There is a clear need for convergence and knowledge sharing in this new paradigm. In general, pharmaceutical companies are not well set up to deal with health data and, similarly, the companies dealing with health data are not used to dealing with cancer.

At Oslo Cancer Cluster, we act as a bridge to bring stakeholders from different industries and backgrounds, such as tech and pharma, together to solve complex issues in cancer research and development. These initiatives occur at both a company level as well as an individual level, such as how a statistician at a university can work together with a biologist to gain new understandings and ultimately develop more precise cancer treatments.

Norway has not historically been a global or even a European protagonist in clinical development. Will adding this technology element allow nations such as yours to leap ahead in their clinical development footprint and catch up with leading nations?

We do have some experience where Norwegian registers have been used for Phase IV trials to document for FDA. However, you are correct in saying that Norway does not have a strong history of developing pharmaceutical companies or conducting large-scale clinical trials. That is about to change. With the need for more real-world data to prove the efficacy of drugs, both individually and in combination with other therapies, more and more firms will look towards countries like Norway with excellent electronic health records.

Norway has put a lot of effort into making the country's excellent health data more accessible to researchers from both universities and private industry. A few years ago, I sat on a Ministry of Health committee tasked with solving this accessibility challenge and a new project called Norwegian Health Analytics Platform (www.helsedata.no) has just been launched from this committee's recommendations, which could pave the way for greater accessibility in the future.

I also gave input to the government's white paper on the health industry that was presented last year by the Ministries of Trade and Health. This paper sets out Norway's plan to become a top clinical trial destination. We are now looking at how we can continue to utilise our health data and present this asset internationally. The aim is both to attract significant investment from international firms as well as to develop Norwegian companies. We don't have a company of the size of Novartis or Novo Nordisk located here. What we do have is health data and a government that is willing to invest to build a health industry.

Looking specifically at Oslo Cancer Cluster, what are the organisation's goals and why does it boast such a diverse group of members?

Our diverse membership group reflects the complexity of the translational medical value chain – moving research from the lab to help the patient. Many experts and competencies are needed to understand the physiology and biology of cancer, translate the knowledge into something that can be produced, and then see if it works in humans.

We realised early on that it was not enough to simply be an incubator linking professors with businesspeople and creating start-ups. That is not how this industry works. There is a great need for specialists at every level – from researchers to investors and consultants – whose expertise

needs to be pooled and combined. That is the goal of Oslo Cancer Cluster.

For this reason, the transport company Kuehne + Nagel is a member of Oslo Cancer Cluster. They are dedicated to the transport of individualised cell and gene therapies. Questions about transport and distribution are not limited to cell therapy. For example, the radiopharmaceutical drug Xofigo™, developed by the Norwegian firm Algeta, which was bought by Bayer in 2014, requires a value chain of huge logistical complexity in order to ship the drug globally and for it to have the desired effect on patients.

Our membership base also includes informatics companies like SAS, which has developed systems for many industries, including health. They are now looking at how their technology can help pharma companies and start-ups develop drugs quicker and more precisely.

Bringing together such a wide range of actors must be challenging, but what have Oslo Cancer Cluster's stakeholder collaboration efforts achieved so far?

One of our main areas of strength is immunotherapy and specifically cancer vaccines. Many of our members are active in this field and we have managed to attract high calibre international experts. This is not necessarily the most fashionable field within oncology research, but now, especially with the re-emergence of vaccines as a hot topic in the wake of the COVID-19 pandemic, we are very optimistic of making significant progress in this field.

Another area of strength linked to cancer vaccines is our work in machine learning and advanced analytics. This field is often characterised as esoteric and over-hyped, but we have already seen success there. Two researchers, Richard Stratford and Trevor Clancy, came into our incubator five to six years ago with the idea that changes in genes have an impact on the design of cancer vaccines and the patient's response to immunotherapy. Stratford and Clancy founded OncoImmunity, which was later acquired by the Japanese company NEC. NEC is now laying out its health strategy for Europe from the offices of Oslo Cancer Cluster. These kinds of dynamics from industries that may not necessarily seem to be related are very interesting.

Norway is very well known for its technical skills in the oil and gas (O&G) industry, to what extent are you able to draw from this and other non-related industries in terms of translational science for oncology?

We have collaborated with O&G clusters in the past and will continue to do so. For example, the O&G industry has a lot of expertise in data analytics, which we can learn from in our work. However, the transfer of knowledge and human capital between industries is a lot more difficult than politicians make it out to be. That is why we take care to make concrete projects and initiatives that represent a win for all parties involved.

In terms of other industries, a new EU project called DIGI-B-CUBE, digital innovations disrupting medical diagnostics value chainhas brought together interesting companies at the convergence between biobanking, bioimaging, and biosensing. This is an area where there are currently no standards – we only know that we need more data and better images – but there are no incumbent companies to define how that should be done. We have brought together a pool of researchers and companies to solve this problem by sharing their ideas and developing the field further.

What is your assessment of translational science in Norway? What fine-tuning needs to be made to transform more projects into tangible businesses?

We have had several success stories within Oslo Cancer Cluster. Thermo Fisher Scientific's 'Dynabeads' technology that makes faster and cheaper DNA-sequencing accessible was tested and developed here. Moreover, Bayer's USD 2.9 billion acquisition of Algeta in 2019 was a major boost to the Norwegian economy. Norwegian translational research is having a real impact on both patients and the country's overall economic standing.

However, we have many ideas and projects that have not materialised. In Norway, as in many countries, there is a situation where researchers explore something new and, when they discover how it works, become disinterested and move on to something else. We need people who are willing to look at how this knowledge can be applied and how it can be useful in a clinical setting. As part of our work at Oslo Cancer Cluster, we look at how to build incentive structures for academics and researchers to move into translational research.

We also work with high schools and universities to show that researchers and entrepreneurs are the real rock stars and to raise awareness of translational research. Additionally, we are launching a collaboration with Oslo Science City to bring more scientific investment to the city and inspire both research and start-ups.

How would you characterise the importance of integration and collaboration with your Nordic neighbours, especially countries such as Sweden and Denmark with more well-established footprints in healthcare research?

It is important to note that we are not in competition with our neighbours – if Norway is going to build and develop a domestic health industry, it will be done together with the rest of the Nordics.

In the Nordics, we have very good cancer research as well as some large companies working with cancer, but we are not as strong in cancer innovation and translating that science into new companies and new projects. The aim of Oslo Cancer Cluster is to become a hub for developing and sharing knowledge on cancer innovation – what works, how it should be set up, and how a balance can be struck between governments' need for control, foundational science, and companies' need for revenues. We have already had some real results from this endeavour over the past decade.

We have a good ongoing dialogue with our Nordic neighbours and some of our employees work from Sweden and Denmark. Each country wants to develop their own industry, but also needs to stand together. For example, if a US company wanted to use new innovative ways to work with health data in clinical studies, the Nordic countries would need to come together to present a unified offer, since each individual country's population is too small to be really attractive. This is especially true for precision medicine, where you need a population base of at least 20 million. Our national strategies may not necessarily be perfectly aligned, but there is an understanding – strengthened by innovation centres such as Oslo Cancer Cluster – that the Nordic countries need to work together.

Currently, Norway does not host any oncology manufacturing. However, the manufacturing hubs for precision medicines, such as cell and gene therapies, have not yet been defined. Does Norway offer an attractive value proposition for advanced manufacturing in the future?

I believe Norway can play a big role in this although I do not yet have all the answers as to how we will reach that point. Currently most of the Norwegian health industry's exports (worth NOK 23 billion (EUR 2.18 billion) or eight percent of total exports) are diagnostic products, largely from GE Healthcare, which acquired a company and technology in Norway.

Although Norway is relatively expensive and has a limited amount of people, most of the country's production facilities are of a very high standard and very efficient. We won't succeed in all fields,

but we have some areas of research, including immunotherapy and cell monitoring, which we are very strong in.

Big Pharma acts more like a farmer than a hunter here in Norway; nurturing and growing the ecosystems that have good innovation competencies. There is a great opportunity for Norway to utilise capital knowledge from international companies to develop domestic projects and help Norwegian companies fulfil their potential.

What would you like to highlight about Norway to potential international sponsors and partners?

The development of new cancer treatments is changing rapidly under the influence of immunotherapy and precision medicine. To be able to leverage and build on that, there is a need for ecosystems that are prepared to be tested for faster innovation and faster use of health data.

Oslo Cancer Cluster has been working in this intersection. Having already established a few successes, we are going to continue to work together with government, companies, and clinicians to develop further in the future.

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