Case Study: Developing pioneering cancer treatments

How Elsevier’s R&D Solutions are helping Arctic Pharma develop inhibitors that target a metabolic pathway of cancer cells

Scientists at a drug development startup reveal how access to Elsevier solutions helps them develop new cancer therapies.
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Arctic Pharma was among a select group of biotech start-ups invited to participate in The Hive when the initiative launched in 2016. The company was an ideal candidate for this innovative program, which Elsevier designed to help boost early stage drug discovery and development. Arctic had a groundbreaking goal in cancer therapy development, innovative candidate molecules, a new CEO, and a newly established group of five scientists bringing together the ideal combination of expertise for the company’s particular niche in oncology. In the two years since then, the progress the small biotech has made is nothing short of remarkable, accomplishing key milestones in the development program of its drug candidates.

Pursuing a different approach

Arctic was founded in 2012 as a spinoff from Spermatech, a Norwegian drug development company specializing in contraception and fertility.

“In the past, Norway has focused most of its research efforts on oil and fish. Arctic Pharma is one of the few companies doing drug discovery and development in Norway. We have taken an approach to anticancer therapeutics, where we target the energy supply to tumor cells. Essentially we are developing drugs to starve cancer cells” explains Arctic’s CEO, Dr. Claudia McDonald Bøen. “Many other companies are developing drugs to treat cancer, of course, but Arctic Pharma’s niche is focused on targeting the metabolism of cancer cells.”

The startup is developing small organic molecule inhibitors that target the metabolic profile of cancer cells. By blocking a pathway specifically used by cancer cells and not by normal healthy cells, Arctic’s inhibitors will avoid the side effects commonly experienced with chemotherapies, one of the current ‘go-to’ treatments for cancer.6-5

“Other companies have tried similar approaches, but there have been few drug candidates reaching the clinic,” Dr. McDonald Bøen explains. And with just two scientists on board and limited capabilities to modify the properties of the candidate compounds, Arctic’s progress during its initial four years had been limited. At that point, Dr. McDonald Bøen joined the company, and over the last two years, she reports, “Arctic has gone quite far in the process of developing potential anticancer therapies with this approach, and that is what makes us so excited.”
Speeding up R&D

The first step Dr. McDonald Bøen undertook was to build a team with expertise in medicinal chemistry and enzymology, as well as structural, molecular, and cellular biology. She also knew it was important to couple that expertise with powerful informatics and knowledge management solutions. “Tools like Reaxys, ScienceDirect, and PharmaPendium give us the ability to be competitive in a field as complex and rapidly evolving as oncology,” observes Dr. McDonald Bøen. “Incorporating their use came at the best possible time, because it was when the core team was forming and that allowed us to really take off,” she adds. “The trajectory we had followed in the prior four years was nothing compared to the progress we have made since using these tools.”

Arctic’s daily operations rely on ScienceDirect and Reaxys, which allow the scientific team to quickly accomplish their goals in early discovery and development. Dr. Steffi Lundvall and Dr. Kathrin Hnida, Arctic’s biochemistry scientists, stress the importance of ScienceDirect to effectively evaluate literature, set up alerts for new key publications, and streamline the access to published information. These capabilities have allowed the scientists to establish all the necessary assays to test the activity of their compounds. Dr. Karl J. Bonney, Arctic’s Senior Scientist in Medicinal Chemistry, uses Reaxys to evaluate possible chemical synthesis pathways. The highly intuitive solution provides information on the “building blocks” required and facilitates identifying sources for the reagents needed, allowing the team to move quickly on the development of compounds. “An incredibly powerful aspect is the ability to use Reaxys’ synthesis planner, a really powerful tool for evaluating which synthetic pathways are most likely to work,” says Dr. Bonney. “You can build a virtual decision tree of different possible synthesis routes you could take, in a very simple and visual way.”

As Arctic prepares to move beyond the Petri dish, PharmaPendium is proving essential for the design of its first studies of efficacy in animals. This fully searchable database of FDA/EMA drug-approval and drug-safety documentation allows Dr. Anja Oldenburg, a Senior Scientist in Cellular Biology, and her colleagues to evaluate reference animal and clinical studies, anticipate challenges, and design studies with the most likelihood of success.

Achieving milestones

Access to Elsevier’s solutions has helped Arctic reach the two milestones that the company had set when Dr. McDonald Bøen joined Arctic: identification and development of a portfolio of compounds with potent and selective antitumor activities in laboratory assays, and protection of intellectual property. “Without Elsevier’s tools, we would not have been able to do all the synthetic modifications required to optimize our lead compounds, to quickly assess the intellectual property landscape, or to be ready in such a short time to file our patents,” says Dr. McDonald Bøen.

Not only is Arctic now ready to move beyond tests in cell cultures to studies in animals, but it is also in a stronger position to attract funding, at a larger scale. Arctic is now closing in on yet another milestone, as it gets ready to test its innovative compounds in animal studies. “We are of course hoping to show efficacy but, even if we don’t see the best initial results, we feel ready to learn from the studies and equipped with Elsevier’s tools to design better drugs with enhanced efficacy,” says Dr. McDonald Bøen. At the same time, even as the existing pipeline of drug candidates is developed, a startup like Arctic is always looking for the next molecules or the next drug targets, and Elsevier’s suite of tools is enabling the company to remain at the cutting edge of research.

References

1. www.arcticpharma.com/