Building successful nanomedicine start-ups

Two comments analyse the aspects that allowed four nanomedicine start-ups to overcome the biotech valley of death and build timely businesses

In an editorial from 10 years ago (https://www.nature.com/articles/nnano.2012.179), we specified that we are "interested in the highest-impact work, and are therefore agnostic about the pure/applied divide"; this is something we will never be tired of repeating. But there is no denying that many fundamental discoveries in nanoscience have been translated into devices or approaches with direct practical implications. Moreover, the push for research that can solve the most pressing societal issues has resulted in the journal publishing a lot of solution-driven works, albeit most of them remain at low technological readiness (at best reaching a TLR of 5–6, or pre-clinical stage in the nanomedicine area).

In the current issue, we investigate the translational aspects of nanotechnology with two pieces that analyse the key factors that allow nanomedicine start-ups to tackle the challenges of the so-called 'biotech valley of death'. This notion refers to the period when biotech companies often spun out of academic research, have to attract capital to transform an interesting concept into a scalable and marketable product.

The first Comment, by Park et al., focuses on the company AbCellera Biologics Inc. (https://www.abcellera.com), which has been at forefront of the fight against COVID-19 since March 2020. In partnership with the pharma giant Eli Lilly, AbCellera developed the first SARS-CoV-2-neutralising antibody to receive emergency use authorisation from the Food and Drug Administration.

The second Comment by Elnathan et al., looks at the birth and development of three nanoneedle companies: Cytosurge (https://www.cytosurge.com/), Basilard BioTech (https://basilardbiotech.com/) and Aligned Bio (https://alignedbio.com/).

Albeit different in their details, these four success stories share common messages. A very important one is that the strategic decisions undertaken before forming a start-up, are fundamental to guarantee rapid product development post-formation. In this respect, budding research–entrepreneurs should be aware from the start of the challenges involved in running a company; researchers need to radically switch their mind-set to be able to cope with the demands of the industrial world, made of concrete deliverables and time-sensitive milestones. Savvy scientists–entrepreneurs demonstrate technology-market matching capabilities that allow them to deeply understand what their product can bring to the market and who their target consumers are. Carl Hansen, CEO and co-founder of AbCellera, developed his microfluidic technology very early in his academic career, specifically targeting antibody research. For Basilard BioTech the market need was non-disruptive gene delivery, particularly relevant for CAR-T cell technology; Cytosurge aimed at developing a technology for precise delivery or drawing of femtoliter volumes to/from cells for drug delivery and biopsies; and Aligned Bio targeted biomarker detection and DNA sequencing. A high-quality publication record ensured in each case the credibility needed for fundraising and early patenting, fundamental to guarantee protection of intellectual property.

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Nanomedicine and medtech companies are considered high risk investments, due to their long development times, the high commercialisation costs, potential regulatory issues and patient involvement. Early university funding can help build the technology, and in some cases, such as Cytosurge, angel investors might provide the amount of capital necessary for expansion and diversification. Minimising the business risks might however prove a more efficient strategy: AbCellera for example established early partnerships around an AI-based antibody discovery platform, which complemented its wet-lab approach and provided the initial funding for efficient product scale-up and company expansion. Clearly, a solid business plan helps build credibility and attract venture capital. Entrepreneurial mentoring also plays an important role. Many start-up founders have been mentored in labs with strong entrepreneurial ethos, and have themselves mentored students who, armed with the necessary know-how, have then moved to leadership positions within the company.

Finally, having the backup of supportive academic institutions is key to allowing start-ups to flourish. Support might come from advantageous intellectual property deals between scientists–entrepreneurs and the university, such as the one in place at the Melbourne Centre for Nanofabrication, which allows academic and industry clients to retain all the IP generated. But support could also be the possibility of long incubation times within the university campus, as happened for AbCellera, which remained based at the University of British Columbia for six years after formation. This allowed for lowering operational overheads, developing the scientific goals of the company, accessing complementary expertise and experience from other labs on campus and raising the initial investment rounds that allowed product scalability. Other aspects that universities could consider to support entrepreneurship are reduction of the teaching burden for scientists–entrepreneurs; establishment of entrepreneurial mentorships and training programs for PhD students; and re-evaluation of the classical university awarding system based on scientific publications and teaching commitment to also include recognition of translational and entrepreneurial activities.

With these two pieces we'd like to signal our interest in hearing more from the scientists in different areas of nanotechnology who have ventured into the business world: their motivations, their challenges and their insights. We hope our community enjoys reading them, and finds them inspirational. ❐

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