

Avectas

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Avectas: engineering the future of cell therapy

Avectas is developing Solupore, a next-generation cell-engineering tool for ex vivo immune cell therapy.

If the home buyer's mantra is "Location! Location! Location!", the drug developer's could well be "Delivery! Delivery! Delivery!". From small molecules to gene-editing cargos, ensuring therapies get to the right place is the first step toward seeing their benefits. Avectas, a small biotech company based in Dublin, Ireland, specializes in the ex vivo delivery of advanced molecules such as mRNA, proteins and gene-editing payloads like CRISPR-Cas9 for cell-engineering applications using its proprietary Solupore technology.

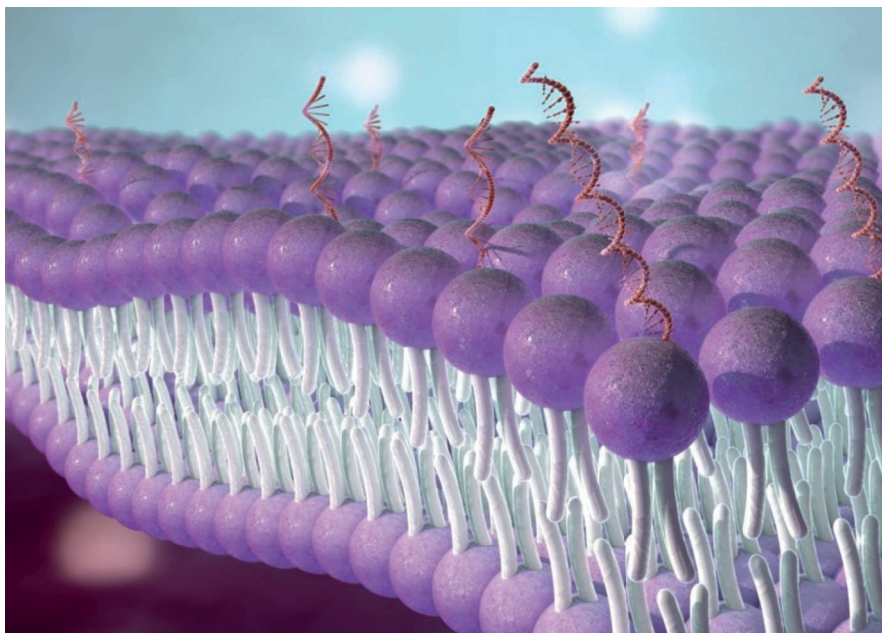
Avectas was cofounded as a university spin-out in 2012 by Shirley O'Dea, now the company's CSO, and Michael Maguire, Avectas's CEO, as gene therapy and cell-based medicine re-emerged as attractive therapeutic modalities with applications in immuno-oncology and beyond. Cell engineering, to restore lost functionality or to introduce new functions to cells, is central to both endeavours, and forms Avectas's core focus. In its mission to be the leading cell-engineering company, Avectas brings together 24 biologists, immunologists, and engineers all working under the same roof in the company's laboratories, with many of the company's leadership team and investors coming from a background in drug delivery.

Today, cell engineering is usually achieved using electroporation or viral vectors, both of which have drawbacks. Drug developers are looking for new ways to engineer cells at scale that are aligned with clinical manufacturing standards for cell-based medicines. Avectas's commercial model is to partner with and license the Solupore technology to therapeutic developers working on immune cell-based medicines for cancer and other diseases. Avectas has already partnered with a number of leading therapeutic companies and cancer institutes in North America and the UK.

Engineering cells with Solupore

Solupore combines novel chemistry and device technology to achieve more effective engineering of cells. The chemistry, which has been published in *PLoS One* and cited in a number of high-profile journals, promotes cell permeability to enable the uptake

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of various kinds of molecular cargo, and then reseals the cells, after which they can continue proliferating and expressing the newly incorporated material. The device, which is capable of very precise fluid handling, takes a population of cells in suspension and adds just enough of a cell membrane permeabilization reagent to achieve transfection.

A key feature of Solupore that differentiates it from other tools is that it is effective yet gentle, with minimal perturbation of treated cells. Cells engineered with Solupore show enhanced functionality and proliferative capacity compared with other techniques such as electroporation. Avectas recently won the 2019 Bio Science Laboratory of the Year Award at the Irish Laboratory Awards, beating competitors from big pharma, in recognition of the cross-disciplinary nature of Solupore and its cutting-edge position in helping to usher in the next wave of cell-based, biologically engineered medicines. In addition to scientific accolades, Avectas recently received two votes of investor confidence, the first being \$10 million in equity financing awarded in April 2019 and the second being €2.2 million awarded by Horizon 2020 in 2018. This funding provides the company with the financial resources to accelerate the scale-up, validation and ultimate commercialization of the Solupore technology.

Growth of cell engineering

Cell engineering is a burgeoning therapeutic area. Chimeric antigen receptor-T cell, natural killer cells and gene-editing approaches are among the

fastest-growing segments, and are currently being explored in more than 1,000 clinical trials. By 2027, the market for cell therapies is estimated to reach \$10 billion. Avectas would be an ideal partner for companies seeking a competitive advantage in the quality, cost of production and associated manufacturing challenges of their cell-based medicines. Solupore can be moulded and modified to suit the needs of specific companies and to support multiple programs within companies, each with slightly different cell-engineering requirements.

Avectas is seeking to partner with companies that have a strong focus on immuno-oncology or other therapeutic areas that involve gene editing and other cell-modification techniques, that are pursuing multiple programs that are in the clinic or nearing clinical trials and that are looking ahead to develop next-generation treatments with new, better tools. "It's exciting to think that cell engineering will be used in most next-generation advanced therapeutic products and where Solupore technology will improve the efficacy and manufacturability of these potentially curative products," said Maguire.

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