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Newco news

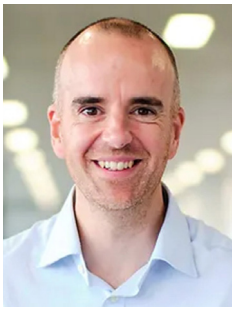
Sania targets neural circuit dysfunction with R-scan, Neu-scan

By Nuala Moran, Staff Writer

Sania Therapeutics Inc. is setting out its stall at the American Society of Gene & Cell Therapy (ASGCT) conference in Los Angeles this week, after generating proof of concept for its chemogenetics approach to treating motor disorders.

The company has engineered adeno-associated viral (AAV) vectors that can be targeted to specific cell types. It will use these to deliver well-characterized ion channels to dysfunctional motor neurons. The ion channels will then be selectively controlled by an activating drug, which is taken orally.

Titrating the dose will enable control of excitability of neurons. "The precision that you can get from matching up [the ion channel] that you're expressing [with] the exogenous drug, really gives you a great therapeutic index, because you can specifically target those cells and titrate activity," said Andy Murray, Sania CEO.



Andy Murray, CEO and co-founder, Sania

The lead program, in spasticity, is still some way from the clinic, but since closing a $6.5 million seed round in March 2022, the University College London spin out has moved into its own lab and made strides with the underlying technology platforms.

The first, R-scan, uses diverse populations of induced pluripotent stem cells to recreate human neural circuits in microfluidic systems, which provide the basis for the directed evolution of cell-specific AAVs.

Another platform, Neu-scan, is the testbed for the ion channels. The data being presented at ASGCT on May 17 and 18 demonstrate it is possible to use AAV vectors to deliver ion channels to specific neural subtypes, and to normalize dysfunctional neurons, with no effect on healthy neurons.

"We have a system that allows us to very precisely control activity of human neurons," Murray said.

The AAV vectors and their cargos will be administered by intramuscular injection. The AAVs infect the synaptic terminals and then get transported to the spinal cord and express the ion channels. "That's one of what we think is our big advantages, in that we don't do any kind of systemic delivery," Murray told *BioWorld*.

Because neurons can't divide, it is expected that transgenes will be resident long term.

"There are some animal studies that show the transgene will stick around for years and years," Murray said. "We could hope it's going to be a one-time treatment."

The crux of the R-scan technology is the ability to recreate human neural circuits in vitro. "That's really important. Other previous work has shown that when you do directed evolution, trying to find new types of viruses that will target particular tissues or cell types, because the evolution is so specific you get things that work well in animals but don't translate across species," said Murray. "We've built a system where you can in effect do [directed evolution] in humans, or close to human."

The proof of principle data includes showing that some AAV capsids generated in mice reach the desired cell type in mice in vivo, and also can deliver to human neural circuits in vitro.

"It's not a linear correlation. Not all the capsids that work in mice are equally enriched in humans, but that allows us to pick out the ones that will be the most effective across species for preclinical studies," Murray said.

Safety switch

The fact that the ion channels are inert – until activated by a small molecule – acts as a safety switch and also opens up a different commercial model for this type of gene therapy, said Raj Dattani, co-founder of Sania.

"People have always thought about gene therapy as being a very high initial cost model, but because we would have IP and method of use patents around the combination of the small-

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molecule activator with the ion channel, it opens up a much more value-based pricing model," Dattani told *BioWorld*.

As a locally delivered therapy, the doses needed would be much smaller, so there would be a difference in the basic cost, as well as the commercial model.

The small-molecule activators will be approved drugs. "So we're not stacking biology risk on biology risk," Dattani said. The drugs "are a validated way of modulating neural circuits."

The seed round takes Sania through the next 12 months and the company plans to raise a $15 million to $25 million series A at the start of 2024.

In addition to developing the platform and getting the spasticity program underway, the company also has begun work on two other programs, but it is not disclosing any details at this stage.