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2023 | 030

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RESEARCH AUSTRALIA SHOWCASES HEALTH & MEDICAL RESEARCH

HEALTH AND MEDICAL RESEARCH ADVANCES IN PAEDIATRICS

CELEBRATING 20 YEARS OF CLINICAL RESEARCH EXCELLENCE AT THE RESEARCH AUSTRALIA 2023 HEALTH & MEDICAL RESEARCH AWARDS

TRANSFORMING CHILDREN'S LIVES ONE GENE THERAPY AT A TIME

In 2018, the Sydney Children's Hospitals Network administered the first gene therapy for SMA in Australia.

Since then, over 50 patients with rare conditions have been treated successfully. Through the Kids Advanced Therapeutics program, a whole system approach enabled a significant increase of advanced therapeutics clinical trials to be implemented in the network.

The Sydney Children's Hospitals Network (SCHN) through the Kids Advanced Therapeutics (KAT) program, successfully conducted several advanced therapeutic clinical trials and is now an accredited treatment provider for Zolgensma (Onasemnogene abeparvovec) for SMA and Luxturna (Voretigene neparvovec) for children diagnosed with inherited retinal blindness.

Now we are recognised as a leader in advanced therapeutics, locally and internationally, and the workforce continues to gain experience in these rapidly emerging therapies. These successes are attributed to our own paediatric and scientific experts, in addition to the whole-system approach we continue to implement and refine.

THE KAT PROGRAM

The KAT program supports advanced therapeutics in both industry sponsored trials and investigator-initiated studies. Workforce education and health system readiness were critical pillars established to ensure the safe and efficient delivery of advanced therapeutics. A team was set up to lead clinical trials, focus on study start-up processes and drive the educational resources for the workforce, patients, and their families.

HEALTH TRANSLATION TIMELINE ON WARP SPEED

Previously, drug development took 10-15 years for therapies to move through clinical trials to post-market surveillance. Locally, therapeutic goods authority (TGA) approval and subsidised funding through the Pharmaceutical Benefits Scheme (PBS) added up to an additional two years. However, through continuous consultations with industry partners, patient advocacy groups and key government officials, gene therapy

investigational products have crossed the health translation timeline in less than 5 years. It is predicted that this will be the model for succeeding gene therapies that have proven efficacy in clinical trials.

IT STARTS AT DAY 0

Newborn screening is a recognized tool to identify conditions to enable early intervention. A bold initiative was led by Professor Michelle Farrar and Dr Sandi Kariyawasam, in partnership with NSW Health, wherein 400,000 babies were screened for SMA. Results showed that early diagnosis enabled pre-symptomatic treatment, which changed SMA from a lethal disease to being treatable. This paved the way for NSW and the ACT to be the first state and territory to offer routine SMA newborn screening, with subsequent expansion of screening to all of Australia.

EDUCATING THE MASSES ABOUT ADVANCED THERAPEUTICS

The first educational drives were through webinars, which featured the scientific basis and clinical application of advanced therapeutics. Since December 2020, the program has facilitated 13 webinars, attracted over 1200 attendees, including interstate and international attendees.

The KAT program will soon launch video resources on gene therapy, along with various fact sheets to further educate patients and families. Face-to-face teaching sessions are being conducted to upskill the multidisciplinary team who provide care to gene therapy patients. Online training via the Sydney Child Health Program will be available in 2024 for the workforce to learn more about AAV-mediated gene therapies.

IMPROVING EFFICIENCY IN REGULATORY PROCESSES THROUGH PROACTIVE ENGAGEMENT

The adeno-associated viral (AAV) vectors used in currently approved gene therapies are considered genetically modified organisms (GMOs), warranting proactive engagement with the Office of the Gene Technology Regulator (OGTR). The KAT program initiated various health system readiness activities such as clinically focused biosafety training to orient staff dealing with GMOs in line with the requirements of the OGTR. New hospital policies were required to ensure the workforce adheres to consistent and high-quality practices for GMO-related procedures. As subsequent trials were proposed to the network, it was noted that each OGTR license had similar requirements, regardless of the target condition. Through the guidance of Professor Ian Alexander, SCHN partnered with the OGTR to procure an overarching license to conduct clinical trials involving AAV therapies. This innovation streamlined clinical trial start-up, removing the 90-day application process, increasing SCHN's reputation as an attractive site for international gene therapy trials.

LEADING CLINICAL TRIALS GLOBALLY

In 2023, through the expertise of Clinical Professor Kristi Jones and Dr Michelle Lorentzos, three boys diagnosed with Duchenne Muscular Dystrophy received gene replacement therapy. They are the youngest in the world to take part in this clinical trial for boys under the age of four. A multi-disciplinary team approach was taken, ensuring holistic care was provided to the participants, inclusive of long-term monitoring.

> ***Due to the successful delivery of previous clinical trials, various industry sponsors have approached the network to conduct first-in-human trials, recognising the capacity of our hospitals and our ever-expanding expertise in advanced therapeutics.***

VISUALIZING THE FUTURE OF VIRAL VECTORS

As advanced therapeutics continue to change the landscape of medicine, scientists from our partner agency, the Children's Medical Research Institute (CMRI), continue to find ways to develop and manufacture gene therapies locally. The multi-million dollar funded viral vector manufacturing facility, currently in construction will accelerate NSW's capacity to produce viral vectors, essential in gene therapies, at a commercial scale. This will keep NSW at the forefront of advanced therapeutics research, development, and translation.

THE WORK KEEPS GOING

As the pipeline for advanced therapeutics expands, CAR-T cell, bacteriophage and gene therapies are being implemented across the network. This would not be possible without the support of Luminesce Alliance and Sydney Children's Hospital Foundation, helping us to ensure children and young people are living their healthiest lives possible.

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