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Poster P2

SCREEN4PN: Efficient evaluation of therapeutic compounds for Charcot-Marie-Tooth disease using patient-derived induced motor neurons and neuromuscular organoids

N. Donies (1), T. van Wermeskerken (1), B. Bekaert (1), S. in 't Groen (1), T. Vangansewinkel (1), V. Timmerman (1)

(1) Peripheral Neuropathy Research Group, Department of Biomedical Sciences, University of Antwerp, Antwerp, Belgium

Charcot-Marie-Tooth (CMT) disease is the most common peripheral neuropathy, affecting over 2.5 million people worldwide. CMT research is slow due to its genetic and phenotypic heterogeneity. CMT1 primarily involves myelin degeneration, whereas CMT2 is marked by axonal degeneration. Each category includes multiple subtypes with distinct genetic causes, further complicating therapeutic development.

To address this challenge, we developed SCREEN4PN, a service platform designed for efficient drug testing. It utilizes 2D motor neuron and 3D organoid cell models derived from induced pluripotent stem cells (iPSCs). We identified several pathological phenotypes shared across CMT genotypes, enabling SCREEN4PN to facilitate therapeutic screening despite disease heterogeneity. Treatment effects are evaluated using microscopy, qPCR, and protein biomarkers.

SCREEN4PN utilizes iPSCs from CMT patients with various genotypes, along with isogenic and healthy controls. These cells are differentiated into models tailored to specific subtypes. The 2D motor neuron model assesses axonal degeneration in CMT2, while the 3D organoid model enables myelin formation to study the CMT1 phenotype.

Additionally, our cell banks undergo rigorous quality control to ensure standardized, high-quality cells for research and therapeutic applications.

So far, we have completed two services using 2D motor neuron cultures. In the future, we aim to expand SCREEN4PN to other diseases, optimize existing models, and incorporate advanced systems such as assembloids and microfluidics.

By reducing the time, cost, and reliance on animal models compared to traditional approaches, SCREEN4PN offers a more ethical and efficient platform for pharmaceutical companies, clinical research organizations, and academic partners.