THE CHALLENGES OF PERFORMING A PHASE I AND PHASE II STUDY WITH AN AUTOLOGOUS STEM CELL PRODUCT NEURO-CELLS® TO COMBAT NEURODEGENERATION

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Introduction: Neuro-Cells® is a fresh autologous bone marrow derived naïve stem cell mixture developed to treat acute and subacute traumatic spinal cord injured patients. De main effects of Neuro-Cells® are offering cell protection against programmed cell-death and reducing the secondary inflammation following a primary insult of the spinal cord. Preclinically, we demonstrated proof of principle in 2 rodent models of acute spinal cord injury. The mode of action was stimulating polarization of activated microglia and macrophages resulting in a significant lowering of the inflammatory cytokines. A head-to-head comparison between Neuro-Cells® and a high dosage of Methylprednisolone confirmed the superiority of Neuro-Cells® in combating inflammation following an acute traumatic lesioning of the spinal cord in rodents. Additionally, Neuro-Cells® was able to improve the outcome in preclinical models for Alzheimer's Disease, Frontotemporal Dementia, Amyotrophic lateral Scleroses and finally in a preclinical model mimicking a closed traumatic brain injury.

Phase I and Phase II studies: From 2020 to 2023 a Phase I study with 10 chronic traumatic spinal cord injured patients was performed in Toledo Spain. The total follow-up was 2 years. Neuro-Cells® was administrated by lumbar puncture into the cerebrospinal fluid. No product-related adverse events were reported during the total follow-up period of 2 years. From 2022 to 2024 a double-blinded placebo controlled randomized trial was performed with 16 patients with a (sub)acute traumatic spinal cord injury in Toledo Spain and Copenhagen Denmark. No adverse events were reported up to date and the treatment was well tolerated by the patients. Neuro-Cells® was able to improve significantly bowel functioning, the intensity of the neuropathic pain and the normalization of the vital functions in (sub)acute spinal cord injured patients compared to the placebo treatment. In the presentation, the analyzed data of phase I and phase II will be presented in more detail.

Special topics: Special topics to be highlighted are the short life expectancy of the product, the necessity of a good logistic chain and all kinds of regulatory aspects related with dosage, release testing and the GMP compliant production of a ATMP cell product. The administration route of intrathecal injection is justified in more detail with the special advantages.

Conclusion: Treating acute/chronic diseases/disorders with a fresh autologous cell product is possible and especially when someone wants to address cellular inflammation and programmed cell-death following an insult of the spinal cord and/or the brain. Timing is crucial.