Project 3.8 Design and preparation of the stable cell lines for modified viruses and viral-like particles production

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Background:

The number of visually impaired people is increasing, and this trend will continue as the population ages. This dramatically impacts the lives of those affected, making daily activities difficult and leading to a loss of independence. That is why it is crucial to look for solutions that can form the basis of vision disorder therapies that slow down the disease progression and restore vision. To date, various approaches have been used to restore some visual functions in affected patients, primarily human derived retinal organoids and gene therapies. First directly administered Adeno-associated virus (AAV) based gene therapy approved by U.S. Food and Drug Administration (FDA), Luxturna, significantly improved the vision of patients with retinal dystrophy at low light levels. Nevertheless, there are still difficulties with restoring high-resolution vision that need to be overcome. This project aims to develop a novel proof-of-concept approach to therapeutic gene delivery using a modified Rabies virus and viral-like particles as a vectors specific to bipolar cells. We propose that specific targeting of the surviving cell population within the degenerated retina, especially bipolar cells (BC) by our modified viral and viral-like particles, may constitute a new strategy of gene therapy in retinal diseases. We hypothesize that the proposed viral approach can reach many BCs thanks to the interactions with the TRPM1 channels and deliver light-gated opsins to restore vision.

Aim:

The specific goal of this project is to develop stable cell lines that will be used to produce modified and pseudotyped viral and viral-like particles based on the Rabies virus.

Requirements:

- experience in a work with various viruses like Lentiviruses, Rabies and AAV,
- experience in cell culture work,
- strong dedication and motivation,
- knowledge about cell biology and the retina,
- experience in gene cloning and mammalian cell modifications,
- basic techniques in molecular biology