TAMED VIRUSES SERVE SCIENCE AND MEDICINE

Summary

Viruses may be used in science and medicine as efficient carriers and gene suppliers to various organs and tissues. They developed the ability to invade alien cells for self propagation with the use of the genome of the host. To use them with no risk, the scientists have to tame them. That is achieved by removal of the majority of their genes, including the genes responsible for replication. The modified viral particles are subjected to genetic modification of the viral capsid aimed to increase its infectivity and to target a virus to the specific cell. After introduction of the therapy-targeted genes they become viral vectors. Not all viruses can be used as vectors; among those which are safe for humans and cause a long-term transduction are adeno-associated viruses AAV, promising for human somatic gene therapy. Till now, experimental therapies carried out with AAV-based vectors have shown improvement of function following brain and spinal cord injuries in rats. Such vectors are currently used in clinical trials of Parkinson and Alzheimer diseases. In basic science, AAV vectors have been recently used to transduce neurons with opsins, receptor channel proteins sensitive to light and able to convert a photon light into an electrochemical signal. They become a promising tool in optogenetics, an emerging field in neuroscience which allows to investigate changes in function of neuronal circuits after light-induced or inhibited activity of a single cell.