AAVrh10

Systemic delivery of self complementary (sc) adeno-associated-virus vector of serotype 9 (AAV9) was recently shown to provide robust and widespread gene transfer to the central nervous system (CNS), opening new avenues for practical, and non-invasive gene therapy of neurological diseases. More recently, AAV of serotype rh10 (AAVrh10) was also found highly efficient to mediate CNS transduction after intravenous administration in mice. However, only a few studies compared AAV9 and AAVrh10 efficiencies, particularly in the spinal cord. In this study, we compared the transduction capabilities of AAV9 and AAVrh10 in the brain, the spinal cord, and the peripheral nervous system (PNS) after intravenous delivery in neonatal mice. As reported in previous studies, AAVrh10 achieved either similar or higher transduction than AAV9 in all the examined brain regions. The superiority of AAVrh10 over AAV9 appeared statistically significant only in the medulla and the cerebellum, but a clear trend was also observed in other structures like the hippocampus or the cortex. In contrast to previous studies, we found that AAVrh10 was more efficient than AAV9 for transduction of the dorsal spinal cord and the lower motor neurons (MNs). However, differences between the two serotypes appeared mainly significant at low dose, and surprisingly, increasing the dose did not improve AAVrh10 distribution in the spinal cord, in contrary to AAV9. Similar dose-related differences between transduction efficiency of the two serotypes were also observed in the sciatic nerve. These findings suggest differences in the transduction mechanisms of these two serotypes, which both hold great promise for gene therapy of neurological diseases [1)].

Sehara et al., compared the transduced gene expression of AAVrh10 to AAV5 in gerbil hippocampus using three different promoters, including cytomegalovirus (CMV), chicken β-actin promoter with the CMV immediate-early enhancer (CAG), and the Synapsin 1 (Syn1) promoter. Four-week-old male gerbils underwent stereotaxic injection with 1 × 1010 viral genome of AAV carrying green fluorescent protein (GFP). Quantification of the GFP-positive areas 3 weeks after injection showed that AAVrh10-CMV and AAVrh10-CAG were the most efficient ($p < 0.001$, compared with the control) and AAVrh10-Syn1 and AAV5-CMV were the next most efficient ($p < 0.05$, compared with the control). On the other hand, AAV5-Syn1 showed little expression, which was only observed at the injected site. In conclusion, we should note that some combinations of viral capsids and promoters can result in failure of gene delivery, while most of them will work appropriately in the transgene expression in the brain [2)].

1)
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2)
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