Negative Strand RNA Viruses

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Retro- and Anterograde Transport of RABV in Rat Dorsal Root Ganglia

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Rabies virus (RABV) enters the central nervous system by retrograde axonal transport. Although RABV is thought to be exclusively transported in the retrograde direction, typical accumulations of virus protein in axons of infected neurons let assume that with onset of virus gene expression at least sub-viral complexes are transported also in the anterograde direction. To investigate the axonal transport of virus particles and subviral complexes, we used chambered rat dorsal root ganglia (DRG) cultures for directed infection of DRGs with fluorescence tagged RABV in which GFP was fused to phosphoprotein P (GFP-P). After infection at distal growth cones, exclusive retrograde axonal transport of fluorescent RABV virions (average velocity of 1.5 µm / sec) was visualized by high speed live imaging. After two days of infection, however, axonal transport of abundant GFP-P particles was detectable in both, the retro- and anterograde direction. With an average velocity of 1.6 µm / sec retrograde transport of newly synthesized GFP-P particles was comparable to retrograde transport of virions. Anterograde transport of GFP-P particles was two times faster. Interestingly, anterograde transport of GFP-P particles was lost in the absence of viral glycoprotein G, indicating that this transport was not simply a result of GFP-P expression and leading to the assumption that in DRGs newly synthesized G-containing RABV particles are indeed transported into the anterograde direction.

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