Human adenoviruses induce nuclear actin formation in A549 cell line

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Adenoviruses are nonenveloped, double-stranded DNA viruses. Human adenoviruses (HAdV) are ubiquitous in populations worldwide. HAdV are classified into seven species (A to G). Due to the different tissue tropism, adenoviruses can be an etiological factor of infections of upper respiratory tract, digestive tract, urinary tract, eyes and the central nervous system. Children and adults with impaired immunity are particularly susceptible for infection. The aim of this study was to assess the changes in the actin cytoskeleton in A549 cells (adenocarcinomic human alveolar basal epithelial cells) after infection with different types of HAdVs. In the current study, three types of HAdVs were used: HAdV4, HAdV5 and HAdV7. Filament structures of actin were visualized using TRITC-phalloidin conjugate. Polyclonal antiserum ADENO MAB conjugated to FITC was used to detect viral antigens. Cell nuclei were stained with Hoechst 33258. Infected cells exhibited morphological changes, followed by cell lysis at the final step of infection. In A549 cells infected with HAdV4, 5 and 7 (at 12, 24 and 48 h p.i.), CPE consisted of disintegration and degradation of a nucleus, changes in a cell shape and rearrangements of the actin filaments. Furthermore, HAdVs used in this study caused actin accumulation in the nuclei of infected cells. Cells which did not undergo lysis showed high amounts of viral antigens in the cytoplasm. In the present study, we demonstrate that all used types of HAdVs are able to infect A549 cells, without the need for initial adaptation. The infection causes changes in cell morphology and cytoskeleton rearrangements. That may indicate that actin cytoskeleton is crucial for penetration into the cells, viral transport and transcription of viral genome.

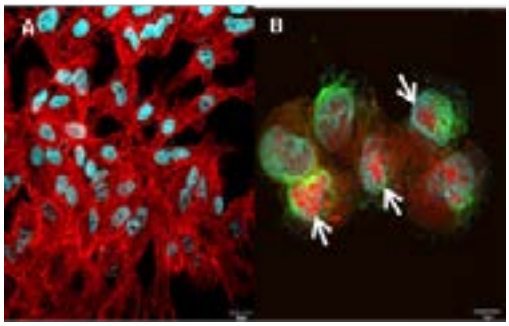

Fig.1 Structure of actin cytoskeleton in non-infected A549 cells (A) and rearrangements of the actin filaments in cells infected with HAdV5 after 48 h post infection (B). Arrows indicate nuclear actin.

Recent Publications

1. Cymerys J, Slonska A, Chodkowski M, Przybylski M and Banbura M W (2016) Primary murine neurons as *in vitro* model for studying neuroinfections caused by human adenoviruses. Acta Virologica 60:417-422.
2. Fuchsova B, Serebryannyy L A and de Lanerolle P (2015) Nuclear actin and myosins in adenovirus infection. Experimental Cell Research 338:170-182.
3. Dzieciatkowski T, Rola A and Midak Siewirska A (2008) Adenoviral infections in humans. Postepy Mikrobiologii 47:15-22.
4. Slonska A, Polowy R, Golke A and Cymerys J (2012) Role of cytoskeletal motor proteins in viral infection. Postepy Higieny I Medycyny Doswiadczalnej 66:810-817.

Biography

J Brzezicka is a PhD Student in the Department of Preclinical Science, Faculty of Veterinary Medicine, Warsaw University of Life Sciences. Her scientific interests include the impact of viral infection on the cytoskeleton, molecular virology and neuroinfections.