

HIV-1 capsid interacts with cytoskeletal-associated proteins for intracytoplasmic routing to the nucleus

Juliette Fernandez, Kathleen Gärtner, Andreas Becker, Anne Danckaert, Sandie Munier, Anaba Zambo, Spencer Shorte, Yves Jacob, Pierre Charneau, Nathalie Arhel

► **To cite this version:**

Juliette Fernandez, Kathleen Gärtner, Andreas Becker, Anne Danckaert, Sandie Munier, et al.. HIV-1 capsid interacts with cytoskeletal-associated proteins for intracytoplasmic routing to the nucleus. *Retrovirology*, BioMed Central, 2013, 10 (Suppl 1), pp.P34. <10.1186/1742-4690-10-S1-P34>. <inserm-00868815>

HAL Id: inserm-00868815

<http://www.hal.inserm.fr/inserm-00868815>

Submitted on 2 Oct 2013

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



POSTER PRESENTATION

Open Access

HIV-1 capsid interacts with cytoskeletal-associated proteins for intracytoplasmic routing to the nucleus

Juliette Fernandez¹, Kathleen Gärtner^{1*}, Andreas Becker¹, Anne Danckaert², Sandie Munier³, Anaba Zambo¹, Spencer Shorte², Yves Jacob³, Pierre Charneau⁴, Nathalie J Arhel¹

From *Frontiers of Retrovirology: Complex retroviruses, retroelements and their hosts* Cambridge, UK. 16-18 September 2013

Background

During infection, the Human Immunodeficiency Virus type 1 (HIV-1) uses the host cytoskeleton to traffic across the cytoplasm to the nucleus where its genome integrates into the host DNA. We have previously shown that HIV retrograde transport (i.e. towards the nucleus) results from the successive transfers from fast microtubule-directed movement to slower actin-mediated movement closer to the nuclear compartment, resulting in docking at the nuclear pore [1]. However, neither the cellular cytoplasmic component(s) nor the viral protein(s) that interact to mediate transport have yet been identified. Recent data show that HIV-1 uncoating does not occur immediately after cell entry but near the nuclear membrane, suggesting that the viral structure interacting with the cytoskeleton during early retrograde trafficking might be the capsid.

Materials and methods

Based on this hypothesis, we carried out a yeast-two-hybrid screen using HIV-1 monomeric capsid protein (p24) as bait. We then characterised the identified proteins for their ability to associate with assembled capsids and their effect on infectivity, trafficking, and nuclear import.

Results

Our yeast-two-hybrid assay identified 34 new putative interaction partners for HIV p24, including four cytoskeletal components. Interaction with assembled HIV capsids was confirmed for two of the four cytoskeletal

proteins. Their depletion using RNA interference led to a profound reduction in HIV-1 infectivity in single cycle infection assays, pointing to a key role in the early steps of HIV-1 replication. Furthermore, confocal microscopy revealed a characteristic accumulation of HIV-1 capsids away from the nuclear membrane and an overall defect in nuclear import.

Conclusion

This work identifies assembled HIV-1 capsid as the viral determinant of transport to the nucleus and two cytoskeletal proteins as new HIV capsid interaction partners that mediate viral retrograde transport.

Authors' details

¹Inserm U941, University Institute of Hematology, Saint-Louis Hospital, Paris, France. ²Imagopole, Institut Pasteur, Paris, France. ³Paris VII University, Institut Pasteur, CNRS UMR3569, Molecular Genetics of RNA Viruses Unit, Virology Department, Paris, France. ⁴Molecular Virology and Vaccinology, Institut Pasteur, Paris, France.

Published: 19 September 2013

Reference

1. Arhel N, Genovesio A, Kim KA, Miko S, Perret E, Olivo-Marin JC, Shorte S, Charneau P: **Quantitative four-dimensional tracking of cytoplasmic and nuclear HIV-1 complexes.** *Nat Methods* 2006, **3**:817-824.

doi:10.1186/1742-4690-10-S1-P34

Cite this article as: Fernandez et al: HIV-1 capsid interacts with cytoskeletal-associated proteins for intracytoplasmic routing to the nucleus. *Retrovirology* 2013 **10**(Suppl 1):P34.

¹Inserm U941, University Institute of Hematology, Saint-Louis Hospital, Paris, France

Full list of author information is available at the end of the article