

OptiPrep™ Reference List RV06

GROUP VI VIRUSES

- ◆ **Viruses are listed alphabetically within the Baltimore scheme: Family, Genus and Species. Publications are listed alphabetically by first author and, where necessary, references are further divided according to research topic**
- ◆ **Multiple entries from the same first author are listed chronologically.**
- ◆ **For a detailed methodology of Group VI viruses see OptiPrep™ Application Sheets V29-V35. V06 is a methodological review of OptiPrep™ technology.**
- ◆ **For a comparative structural analysis of all Group VI viruses refer to: Martin, J.L., Cao, S., Maldonado, J.O., Zhang, W. and Mansky, L.M. (2016) *Distinct particle morphologies revealed through comparative parallel analyses of retrovirus-like particles* J. Virol., **90**, 8074-8084**

1. Alpharetroviridae

Rous sarcoma virus

Lee, E-G., Yeo, A., Kraemer, B., Wickens, M. and Linial, M.L. (1999) *The Gag domains required for avian retroviral RNA encapsidation determined by using two independent assays* J. Virol., **73**, 6282-6292

Ochsenbauer-Jambor, C., Delos, S.E., Accavitti, M.A., White, J.M. and Hunter, E. (2002) *Novel monoclonal antibody directed at the receptor binding site on the avian sarcoma and leukosis virus env complex* J. Virol., **76**, 7518-7527

2. Betaretroviridae

Mason-Pfizer Monkey virus (Simian retrovirus)

Fuzik, T., Pichalova, R., Schur, F.K.M., Strohalmova, K., Křížová, I., Hadravova, R., Rumlova, M., Briggs, J.A.G., Ulbrich, P. and Ruml, T. (2016) *Nucleic acid binding by Mason-Pfizer monkey virus CA promotes virus assembly and genome packaging* J. Virol., **90**, 4593-4603

Gottwein, E., Bodem, J., Müller, B., Schmechel, A., Zentgraf, H. and Kräusslich, H-G. (2003) *The Mason-Pfizer monkey virus PPPY and PSAP motifs both contribute to virus release* J. Virol., **77**, 9474-9485

Voráčková, I., Ulbrich, P., Diehl, W.E. and Ruml, T. (2014) *Engineered retroviral virus-like particles for receptor targeting* Arch.Virol., **159**, 677-688

Wildová, M., Hadravová, R., Štokrová, J., Křížová, I., Ruml, T., Hunter, E., Pichová, I. and Rumlová, M. (2008) *The effect of point mutations within the N-terminal domain of Mason-Pfizer monkey virus capsid protein on virus core assembly and infectivity* Virology, **380**, 157-163

3. Deltaretroviridae

Human T-cell lymphotropic virus (HTLV-1)

Cao, S., Maldonado, J.O., Grigsby, I.F., Mansky, L.M. and Zhang, W. (2015) *Analysis of human T-cell leukemia virus type 1 particles by using cryo-electron tomography* J. Virol., **89**, 2182-2191

Hémonnot, B., Molle, D., Bardy, M., Gay, B., Laune, D., Devaux, C. and Briant, L. (2006) *Phosphorylation of the HTLV-1 matrix L-domain-containing protein by virus-associated ERK-2 kinase* Virology, **349**, 430-439

Martin, J.L., Mendonça, M., Marusinec, R., Zuczek, J., Angert, I., Blower, R.J., Mueller, J.D., Perilla, J.R. et al (2018) *Critical role of the human T-cell leukemia virus type 1 capsid N-terminal domain for Gag-Gag interactions and virus particle assembly* J. Virol., **14**: e00333-18

Meissner, M.E., Mendonça, L.M., Zhang, W. and Mansky, L.M. (2017) *Polymorphic nature of human T-cell leukemia virus type 1 particle cores as revealed through characterization of a chronically infected cell line* J. Virol., **91**: e00369-17-pfizer

Møller-Larsen, A. and Christensen, T. (1998) *Isolation of a retrovirus from multiple sclerosis patients in self-generated iodixanol gradients* J. Virol. Methods, **73**, 151-161

4. *Gammaretroviridae*

Moloney murine leukaemia virus

- Courtney, D.G.**, Chalem, A., Bogerd, H.P., Law, B.A., Kennedy, E.M., Holley, C.L. and Cullen, B.R. (2019) *Extensive epitranscriptomic methylation of A and C residues on murine leukemia virus transcripts enhances viral gene expression* mBio **10**: e01209-19
- Eckwahl, M.J.**, Sim, S., Smith, D., Telesnitsky, A. and Wolin, S.L. (2015) *A retrovirus packages nascent host noncoding RNAs from a novel surveillance pathway* Genes Devel., **29**, 646–657
- Leblanc, P.**, Alais, S., Porto-Carriero, I., Lehmann, S., Grassi, J., Raposo, G. and Darlix, J.L. (2006) *Retrovirus infection strongly enhances scrapie infectivity release in cell culture* EMBO J., **25**, 2674-2685
- Onafuwa-Nuga, A.A.**, King, S.R. and Telesnitsky, A. (2005) *Nonrandom packaging of host RNAs in moloney murine leukemia virus* J. Virol., **79**, 13528-13537
- Qu, K.**, Glass, B., Doelžal, M., Schur, F.K.M., Murciano, B., Rein, A., Rumlová, M., Ruml, T., Kräusslich, H.G. and Briggs, J.A.G. (2018) *Structure and architecture of immature and mature murine leukemia virus capsids* Proc. Natl. Acad. Sci. USA, **115**, E11751–E11760
- Segura, M.M.**, Garnier, A., Di Falco, M.R., Whissell, G., Meneses-Acosta, A., Arcand, N. and Kamen, A. (2008) *Identification of host proteins associated with retroviral vector particles by proteomic analysis of highly purified vector preparations* J. Virol., **82** 1107-1117

Murine oncornavirus

- Fujisawa, R.**, McAtee, F.J., Favara, C., Hayes, S.F. and Portis, J.L. (2001) *N-terminal cleavage fragment of glycosylated Gag is incorporated into murine oncornavirus particles* J. Virol., **75**, 11239-11243

5 *Lentivirus*

Feline immunodeficiency virus

- Ammersbach, M.** and Bienzle, D. (2011) *Methods for assessing feline immunodeficiency virus infection, infectivity and purification* Vet. Immunol. Immunopathol., **143**, 202– 214

Human endogenous retroviruses

- Li, M.**, Radvanyi, L., Yin, B., Li, J., Chivukula, R., Lin, K., Lu, Y., Shen, J.J., Chang, D.Z. et al (2017) *Downregulation of human endogenous retrovirus type K (HERV-K) viral env RNA in pancreatic cancer cells decreases cell proliferation and tumor growth* Clin Cancer Res., **23**, 5892–5911

Human immunodeficiency virus-1 (HIV-1)

Actin

- Popova, S.**, Popova, E., Inoue, M., Wu, Y. and Göttlinger, H. (2018) *HIV-1 gag recruits PACSIN2 to promote virus spreading* Proc. Natl. Acad. Sci. USA, **115**, 7093–7098
- Stauffer, S.**, Rahman, S.A., de Marco, A., Carlson, L-A., Glass, B., Oberwinkler, H., Herold, N., Briggs, J.A.G., Müller, B., Grünewald, K. and Kräusslich, H-G. (2014) *The nucleocapsid domain of Gag is dispensable for actin incorporation into HIV-1 and for association of viral budding sites with cortical F-actin* J. Virol., **88**, 7893–7903

Adenosine deaminase

- Orecchini, E., Federico, M., Doria, M., Arenaccio, C., Giuliani, E., Ciafrè, S.A. and Michienzi, A. (2015) *The ADAR1 editing enzyme is encapsidated into HIV-1 virions* Virology, **485**, 475–480

Antiretroviral agents/therapy

- De Silva Feelixge, H.S.**, Stone, D., Pietz, H.L., Roychoudhury, P., Greninger, A.L., Schiffer, J.T., Aubert, M. and Jerome, K.R. (2016) *Detection of treatment-resistant infectious HIV after genome-directed antiviral endonuclease therapy* Antiviral Res., **126**, 90-98
- Frezza, C.**, Grelli, S., Federico, M., Marino-Merlo, F., Mastino, A. and Macchi, B. (2016) *Testing anti-HIV activity of antiretroviral agents in vitro using flow cytometry analysis of CEM-GFP cells infected with transfection-derived HIV-1 NL4-3* J. Med. Virol. **88**, 979–986
- Henriet, S.**, Mercenne, G., Bernacchi, S., Paillart, J-C. and Marquet, R. (2009) *Tumultuous relationship between the human immunodeficiency virus type 1 viral infectivity factor (Vif) and the human APOBEC-3G and APOBEC-3F restriction factors* Microbiol. Mol. Biol. Rev., **73**, 211-232
- Ingemarsdotter, C.K.**, Zeng, J., Long, Z., Lever, A.M.L. and Kenyon, J.C. (2018) *An RNA-binding compound that stabilizes the HIV-1 gRNA packaging signal structure and specifically blocks HIV-1 RNA encapsidation* Retrovirology, **15**: 25

- Lassen, K.G.**, Wissing, S., Lobritz, M.A., Santiago, M. and Greene, W.C. (2010) *Identification of two APOBEC3F splice variants displaying HIV-1 antiviral activity and contrasting sensitivity to Vif* J. Biol. Chem., **285**, 29326–29335
- Mangeat, B.**, Turelli, P., Caron, G., Friedil, M., Perrin, L. and Trono, D. (2003) *Broad antiretroviral defence by human APOBEC3G through lethal editing of nascent reverse transcripts* Nature, **424**, 99-103
- Soros, V.B.**, Yonemoto, W. and Greene, W.C. (2007) *Newly synthesized APOBEC3G is incorporated into HIV virions, inhibited by HIV RNA and subsequently activated by RNase H* PLoS Pathog., **3**:e15
- Yukl, S.A.**, Shergill, A.K., McQuaid, K., Gianella, S., Lampiris, H., Hare, C.B., Pandori, M., Sinclair, E., Günthard, H.F., Fischer, M., Wong, J.K. and Havlir, D.V. (2010) *Effect of raltegravir-containing intensification on HIV burden and T-cell activation in multiple gut sites of HIV-positive adults on suppressive antiretroviral therapy* AIDS, **24**, 2451–2460
- Yukl, S.A.**, Gianella, S., Sinclair, E., Epling, L., Li, Q., Duan, L., Choi, A.L.M., Girling, V., Ho, T., Li, P., Fujimoto, K., et al (2010) *Differences in HIV burden and immune activation within the gut of HIV-positive patients receiving suppressive antiretroviral therapy* J. Infect. Dis., **202**, 1553–1561

Autophagy

- Campbell, G.R.**, Rawat, P., Bruckman, R.S. and Spector, S.A. (2015) *Human immunodeficiency virus type 1 Nef inhibits autophagy through transcription factor EB sequestration* PLoS Pathog **11**: e1005018
- Campbell, G.R.**, Bruckman, R.S., Chu, Y-L., Trout, R.N. and Spector, S.A., (2018) *SMAC mimetics induce autophagy-dependent apoptosis of HIV-1-infected resting memory CD4⁺ T cells* Cell Host & Microbe **24**, 689–702

Budding

- Carlson, L-A.**, Briggs, J.A.G., Glass, B., Riches, J.D., Simon, M.N., Johnson, M.C., Müller, B., Grünewald, K., Kräusslich, H-G. (2008) *Three-dimensional analysis of budding sites and released virus suggests a revised model for HIV-1 morphogenesis* Cell Host Microbe **4**, 592-599
- Leblanc, P.**, Alais, S., Porto-Carriero, I., Lehmann, S., Grassi, J., Raposo, G. and Darlix, J.L. (2006) *Retrovirus infection strongly enhances scrapie infectivity release in cell culture* EMBO J., **25**, 2674-2685
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- Stuchell, M.D.**, Garrus, J.E., Müller, B., Stray, K.M., Ghaffarian, S., McKinnon, R., Kräusslich, H-G., Morham, S.G. and Sundquist, W.I. (2004) *The human endosomal sorting complex required for transport (ESCRT-I) and its role in HIV-1 budding* J. Biol. Chem., **279**, 36059-36071
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- Zhao, W-L.**, Zhang, F., Feng, D., Wu, J., Chen, S. and Sui, S-F. (2009) *A novel sorting strategy of trichostatin for hijacking human immunodeficiency virus type 1* Biochem. Biophys. Res. Commun., **384**, 347–351

Capsid assembly/disassembly and structure

- Martin, J.L.**, Mendonça, L.M., Angert, I., Mueller, J.D., Zhang, W. and Mansky, L.M. (2017) *Disparate contributions of human retrovirus capsid subdomains to Gag-Gag oligomerization, virus morphology, and particle biogenesis* J. Virol., **91**: e00298-17
- Mattei, S.**, Flemming, A., Anders-Össwein, M., Kräusslich, H-G., Briggs, J.A.G. and Müller, B. (2015) *RNA and nucleocapsid are dispensable for mature HIV-1 capsid assembly* J. Virol., **89**, 9739-9747
- Rankovic, S.**, Varadarajan, J., Ramalho, R., Aiken, C. and Rousso, I. (2017) *Reverse transcription mechanically initiates HIV-1 capsid disassembly* J. Virol., **91**: e00289-17
- Rankovic, S.**, Ramalho, R., Aiken, C. and Rousso, I. (2018) *PF74 reinforces the HIV-1 capsid to impair reverse transcription-induced uncoating* J. Virol. **92**: e00845-18

Cellular interactions/entry/transfer

- Akiyama, H.**, Miller, C., Patel, H.V., Hatch, S.C., Archer, J., Ramirez, N-G.P. and Gummuluru, S. (2014) *Virus particle release from glycosphingolipid-enriched microdomains is essential for dendritic cell-mediated capture and transfer of HIV-1 and Herpesvirus* J. Virol., **88**, 8813–8825
- Dobrowsky, T.M.**, Zhou, Y., Sun, S.X., Siliciano, R.F. and Wirtz, D. (2008) *Monitoring early fusion dynamics of human immunodeficiency virus type 1 at single-molecule resolution* J. Virol., **82**, 7022-7033
- Gilbert, C.**, Cantin, R., Barat, C. and Tremblay, M.J. (2007) *Human immunodeficiency virus type 1 replication in dendritic cell-T-cell co-cultures is increased upon incorporation of host LFA-1 due to higher levels of virus production in immature dendritic cells* J. Virol., **81**, 7672-7682
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- Izquierdo-Useros, N.**, Lorizate, M., Contreras, F-X., Rodriguez-Plata, M.T., Glass, B., Erkizia, I., Prado, J.G. et al (2012) *Sialyllactose in viral membrane gangliosides is a novel molecular recognition pattern for mature dendritic cell capture of HIV-1* PLoS Biol., **10**: e1001315
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- Popova, S.**, Popova, E., Inoue, M., Wu, Y. and Göttlinger, H. (2018) *HIV-1 gag recruits PACSIN2 to promote virus spreading* Proc. Natl. Acad. Sci. USA, **115**, 7093–7098
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- Smith, A.L.**, Ganesh, L., Leung, K., Jongstra-Bilen, J., Jongstra, J. and Nabel, G.J. (2007) *Leukocyte-specific protein 1 interacts with DC-SIGN and mediates transport of HIV to the proteasome of dendritic cells* J. Exp. Med., **204**, 421-430
- St-Pierre, C.**, Ouellet, M., Tremblay, M.J. and Sato, S. (2010) *Galectin-1 and HIV-1 infection* Methods Enzymol., **480**, 267-294
- Zhao, W-L.**, Zhang, F., Feng, D., Wu, J., Chen, S. and Sui, S-F. (2009) *A novel sorting strategy of trichosanthin for hijacking human immunodeficiency virus type 1* Biochem. Biophys. Res. Commun., **384**, 347–351

Chikungunya virus assay

- Kishishita, N.**, Takeda, N., Anuegoonpipat, A. and Anantapreechac, S. (2013) *Development of a pseudotyped-lentiviral-vector-based neutralization assay for Chikungunya virus infection* J. Clin. Microbiol., **51**, 1389–1395

Cholesterol (membrane)

- Campbell, S. M.**, Crowe, S. M. and Mak, J. (2002) *Virion-associated cholesterol is critical for the maintenance of HIV-1 structure and infectivity* AIDS, **16**, 2253-2261
- Campbell, S.**, Gaus, K., Bittman, R., Jessup, W., Crowe, S. and Mak, J. (2004) *The raft-promoting property of virion-associated cholesterol, but not the presence of virion-associated Brij 98 rafts, is a determinant of human immunodeficiency virus type 1 infectivity* J. Virol., **78**, 10556-10565
- Pollock, S.**, Nichita, N.B., Böhmer, A., Radulescu, C., Dwek, R.A. and Zitzmann, N. (2010) *Polyunsaturated liposomes are antiviral against hepatitis B and C viruses and HIV by decreasing cholesterol levels in infected cells* Proc. Natl. Acad. Sci. USA, **107**, 17176–17181
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Cytotoxicity

- Alshafi, N.**, Bakouche, N., Kazemi, M., Richard, J., Ding, S., Bhattacharyya, S., Das, D., Anand, S.P. et al (2019) *An asymmetric opening of HIV-1 envelope mediates antibody-dependent cellular cytotoxicity* Cell Host Microbe, **25**, 578–587

Defective core virus

- Joshi, P.**, Sloan, B., Torbett, B.E. and Stoddart, C.A. (2013) *Heat shock protein 90AB1 and hyperthermia rescue infectivity of HIV with defective cores* Virology, **436**, 162–172

Endosomal sorting complex

- Meng, B.**, Ip, N.C.Y., Prestwood, L.J., Abbink, T.E.M. and Lever, A.M.L. (2015) *Evidence that the endosomal sorting complex required for transport-II (ESCRT-II) is required for efficient human immunodeficiency virus-1 (HIV-1) production* Retrovirology, **12**: 72

Envelope components/structure/function

- Alsahafi, N.**, Bakouche, N., Kazemi, M., Richard, J., Ding, S., Bhattacharyya, S., Das, D., Anand, S.P. et al (2019) *An asymmetric opening of HIV-1 envelope mediates antibody-dependent cellular cytotoxicity* Cell Host Microbe, **25**, 578–587
- Aneja, R.**, Rashad, A.A., Li, H., Sundaram, R.V.K., Duffy, C., Bailey, L.D. and Chaiken, I. (2015) *Peptide triazole inactivators of HIV-1 utilize a conserved two-cavity binding site at the junction of the inner and outer domains of Env gp120* J. Med. Chem., **58**, 3843–3858
- Bailey, L.D.**, Sundaram, R.V.K., Li, H., Duffy, C., Aneja, R., Bastian, A.R., Holmes, A.P., Kamanna, K., Rashad, A.A. and Chaiken, I. (2015) *Disulfide sensitivity in the Env protein underlies lytic inactivation of HIV-1 by peptide triazole thiols* ACS Chem. Biol., **10**, 2861–2873
- Barat, C.**, Martin, G., Beaudoin, A.R., Sévingy, J. and Tremblay, M.J. (2007) *The nucleoside triphosphate diphosphohydrolase-1/CD39 is incorporated into human immunodeficiency type 1 particles, where it remains biologically active* J. Mol. Biol., **371**, 269–282
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- Bastian, A.R.**, Ang, C.G., Kamanna, K., Shaheen, F., Huang, Y-H., McFadden, K., Duffy, C., Bailey, L.D. et al (2017) *Targeting cell surface HIV-1 Env protein to suppress infectious virus formation* Virus Res., **235**, 33–36
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- Gurer, C.**, Cimarelli, A. and Luban, J. (2002) *Specific incorporation of heat shock protein 70 family members into primate Lentiviral virions* J. Virol., **76**, 4666–4670
- Habermann, A.**, Krijnse-Locker, J., Oberwinkler, H., Eckhardt, M., Homann, S., Andrew, A., Strelbel, K. and Kräusslich, H-G. (2010) *CD317/tetherin is enriched in the HIV-1 envelope and downregulated from the plasma membrane upon virus infection* J. Virol., **84**, 4646–4658
- Henderson, R.**, Lu, M., Zhou, Y., Mu, Z., Parks, R., Han, Q., Hsu, A.L., Carter, E. et al (2020) *Disruption of the HIV-1 Envelope allosteric network blocks CD4-induced rearrangements* Nat. Comm., **11**: 520
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- Herrera, C.**, Klasse, P.J., Michael, E., Kake, S., Barnes, K., Kibler, C.W., Campbell-Gardeneer, L., Si, Z., Sodroski, J., Moore, J.P. and Beddows, S. (2005) *The impact of envelope glycoprotein cleavage on the antigenicity, infectivity, and neutralization sensitivity of Env-pseudotyped human immunodeficiency virus type 1 particles* Virology, **338**, 154–172
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- Huarte, N.**, Carravilla, P., Cruz, A., Lorizate, M., Nieto-Garai, J.A., Kräusslich, H-G., Pérez-Gil, J., Requejo-Isidro, J. and Nieva, J.L. (2016) *Functional organization of the HIV lipid envelope* Sci. Rep., **6**: 34190
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- Lu, M.**, Ma, X., Castillo-Menendez, L.R., Gorman, J., Alsahafi, N., Ermel, U., Terry, D.S., Chambers, M., Peng, D., Zhang, B. et al (2019) *Associating HIV-1 envelope glycoprotein structures with states on the virus observed by smFRET* Nature, **568**, 415–419

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6 Spumaviridae

Spumavirus – Foamy virus

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