Hamid Salimi

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Summary:

My PhD thesis focused on understanding the mechanisms underlying HIV-1 neurotropism, and resistance to the CCR5 antagonist maraviroc, with the majority of the emphasis on Env structure and function. Through this work I demonstrated that macrophage-tropic viruses isolated from brain have altered CD4/CCR5 interactions (Salimi et al., *J. Leukoc. Biol*, 2013). In addition, I analyzed the basis for maraviroc resistance in subjects who developed resistance to this entry inhibitor *in vivo* (Roche et al., *Retrovirology*, 2013, Co-first author). Besides, during my PhD I contributed to several projects conducted in the lab, which resulted in a number of publications that I co-authored (in *Retrovirology*, *Virology* and *PLoS One*). My first postdoctoral research investigated the role of interactions between the HIV-1 Envs and the lipid membrane in maintaining structural and functional stability of the Env trimer. I found that disruption of these interactions causes dramatic conformational changes in this molecule leading to virus inactivation. Our data strongly suggested that the modulating the structure of the Env trimer and increasing its immunogenicity may contribute to HIV immunogen design. In addition, we hope that our new findings, which clarified the molecular mechanism of resistance to cholesterol depletion, will contribute to the revival of this approach for prevention of HIV-1 transmission. I am currently investigating the biology of innate immune signaling responses in the central nervous system (CNS) using innovative approaches in the context of two alphavirus (i.e. VEEV and WEEV) and a flavivirus (i.e. WNV). More specifically, I aim to determine which viral component is recognized by the BBB upon or during viral infection, and to delineate how these interactions can modulate blood-brain barrier (BBB) permeability allowing viral entry into the CNS. Additionally, my project involves screening a large panel of FDA approved drugs using a high-throughput assay to identify compounds that can inhibit arboviral transcytosis across BBB.

Education

2000-2002	Diploma of Veterinary, University of Zabol, Zabol, Iran.
2002-2004	Bachelor of Science in Laboratory Sciences, Urmia University, Urmia, Iran.
2004-2007	Master of Science in Medical Virology, University of Tehran, Tehran, Iran.
2010-2013	Doctor of Philosophy in Microbiology, Monash University, Melbourne, Australia.
2013-2015	Postdoctoral Scholar, Department of Microbiology, University of Iowa, Iowa City, USA.
2015-Now	Postdoctoral Research Associate, Department of Internal Medicine, Washington University, St Louis, USA.

Awards

- PhD scholarship by the Iranian Ministry of Health and Medical Education (2009)
- Monash postgraduate travel grants (2012)
- Postgraduate travel grant (Iranian Ministry of Health & Medical Education, 2012)
- Australian HIV/AIDS (ASHM) conference scholarship (2012)
- The Levitt Centre for Virology, University of Iowa, Travel Award (2015)

Laboratory Skills

- Molecular biology: PCR, RT-PCR, qPCR, Cloning, DNA, RNA, protein isolation and purification
- Tissue culture: well experienced in cell culturing (both primary cells and different cell lines), isolation and culture of peripheral blood mononuclear cell (PBMC), CD4/CCR5 Affinofile affinity assay, isolation and culture of primary murine brain endothelial cells, astrocytes and pericytes. Generating *in vitro* blood-brain barrier (BBB model).
- Virus work: producing GFP- and luciferase reporter viruses, virus ultracentrifugation, virus neutralization/inhibition assays and plaque assay.
- Proteomic: ELISA and Western Blot, Immunoprecipitation, Affinity Purification
- Fluorescence Activated Cell Sorting (FACS)
- Fluorescence Microscopy
- Serological techniques: Haemagglutination and Hemagglutinin Inhibition assays
- BSL3 trained
- Handling of mice (injections, perfusion, micro-dissection of the brain, tissue collection)

Computer Skills

- Microsoft Office, Endnote, Prism, FlowJo, CLC Sequence Viewer, Adobe Photoshop, Lasergene, Geneious

Work Experiences

- Sessional Teaching Associate, Department of Microbiology, Monash University, Melbourne, Australia. (July-December 2013)
- Sterilization Officer (casual), Burnet Institute, Melbourne, Australia. (Feb 2012- Jan 2013).
- Research Assistant, Churchill's Laboratory, Burnet Institute, Melbourne, Australia (voluntary work, Apr-Oct 2013).
- Postdoctoral Scholar, Department of Microbiology, University of Iowa, Iowa City, IA, USA (2013-2015).
- Postdoctoral Research Associate, Department of Internal Medicine, Washington University, St Louis, MO, USA (2015-current).

Publications (141 citations in total)

1. **Salimi H**, Mokhtari-Azad T, Sarijloo M, Baesi K, Gooya M, Esteghamati A, Nategh R (2007). Seroepidemiology of rubella infection in 5-25 year old age group before and after measles/rubella mass vaccination on December 2003 in Iran. Journal of Infectious Disease and Tropical Medicine**,** 2007, 12(38): 39-42.

2. Roche M, Jakobsen MR, Ellett A, **Salimi H**, Jubb B, Westby M, Lee B, Lewin SR, Churchill MJ, Gorry PR (2011). HIV-1 predisposed to acquiring resistance to maraviroc (MVC) and other CCR5 antagonists in vitro has an inherent, low-level ability to utilize MVC-bound CCR5 for entry. Retrovirology; 2011, 8(89). **37 citations**

3. **Salimi H**, Roche M, Webb N, Gray LR, Chikere K, Sterjovski J, Ellett A, Wesselingh SL,Ramsland PA, Lee B, Churchill MJ, Gorry PR (2013). Macrophage-tropic HIV-1 variants from brain demonstrate alterations in the way gp120 engages both CD4 and CCR5. J Leukoc Biol, 2013, 93(1): 113-26. **24 citations**

4. Roche M*, **Salimi H***, Duncan R, Wilkinson B, Chikere K, Moore M, Webb N, Zappi H, Sterjovski J, Flynn JK, Ellett A, Gray LR, Lee B, Jubb B, Westby M, Ramsland PA, Lewin SR, Payne R, Churchill MJ, Gorry PR (2013). A common mechanism of clinical HIV-1 resistance to the CCR5 antagonist maraviroc despite divergent resistance levels and lack of common gp120 resistance mutations. Retrovirology, 10:43. *** Contributed equally, 44 citations**

5. Flynn JK, Paukovics G, Moore MS, Ellett A, Gray LR, Duncan R, **Salimi H**, Jubb B, Westby M, Purcell DF, Lewin SR, Churchill MJ, Gorry PR, and Roche M (2013). The magnitude of HIV-1 resistance to the CCR5 antagonist maraviroc imparts a differential alteration in HIV-1 tropism for macrophages and T-cell subsets. Virology 2013, 442(1):51-8. **15 citations**

6. Gray LR, Turville SG, Hitchen TL, Cheng WJ, Ellett AM, **Salimi H**, Roche MJ, Wesselingh SL, Gorry PR, Churchill MJ. HIV-1 entry and trans-infection of astrocytes involves CD81 vesicles. PLoS One, 2014 28; 9(2). **18 citations**

7. **Salimi H**, Cain MD, Klein RS. Encephalitic Arboviruses: Emergence, Clinical Presentation, and Neuropathogenesis. 2016; 13(3):514-34. **3 citations**

8. Johnson J, Zhai Y, Espy N, **Salimi H**, Eichelberger N, DeLeon O, O'Malley Y, Courter J, Smith III A, Madani N, Sodroski J, and Haim H. Mobilization of HIV-1 Env from the Native State to Metastable Forms Enhances Virus Sensitivity to Antibodies and Microbicides. (2016, Journal of Virology, submitted).

9. DeLeon O, Hodis H, O'Malley Y, Johnson J, **Salimi H**, Zhai Y, Winter E, Remec C, Eichelberger N, Van Cleave B, Puliadi R, Harrington R, Stapleton JT, Haim H. Accurate Predictions of the Evolving Structure of HIV-1 Env in Patients Using a Volatility-controlled, Restrained Diffusion Model. (2016, PloS Bioloy, under revision).

10. **Salimi H**, Johnson J, Eichelberger N and Haim H. Structural and Functional Integrity of the HIV-1 Env Trimer is Maintained through Multiple Contact Points with the Cytoplasmic Membrane. (2016, Manuscript under preparation).

11. Cain M, **Salimi H**, Hou J, Yang L, Hamilton S, Miller MJ, Klein RS. Two-photon imaging of blood-brain barrier disruption during alphavirus entry into the brain via the olfactory route. (Manuscript submitted, Journal of Neuroimmunology, Dec 2016).

Presentations at conferences

1. **Salimi H,** Gray L, Roche M, Webb N, Chikere K, Ellett A, Sterjovski J, Duncan R, Wesselingh SL, Ramsland PA, Lee B, Churchill M, Gorry PR (2012). The functional characterisation of HIV-1 Envs derived from the CNS and their role in HIV-associated dementia. 2nd Iranian PhD student conference, Melbourne, Australia, April 2011.

2. **Salimi H**, Gray L, Roche M, Webb N, Chikere K, Ellett A, Sterjovski J, Duncan R, Wesselingh SL, Ramsland PA, Lee B, Churchill M, Gorry PR (2012). Neurotropic HIV-1 variants with highly efficient macrophage entry adopt conformations in gp120 that simultaneously alter the way in which the Env interacts with both CD4 and CCR5. Australian Centre for HIV & Hepatitis Virology Research (ACH2) 8th National Scientific Workshop, Adelaide, SA, Australia, June 2012.

3. **Salimi H**, Gray L, Roche M, Webb N, Chikere K, Ellett A, Sterjovski J, Duncan R, Wesselingh SL, Ramsland PA, Lee B, Churchill M, Gorry PR (2012). Neurotropic HIV-1 variants with highly efficient macrophage entry that persist in the central nervous system adopt distinctive Env conformations that simultaneously alter gp120-CD4 interactions and the mechanism by which CD4-bound gp120 engages CCR5. 19th International AIDS Conference (AIDS 2012), Washington DC USA, July 2012.

4. **Salimi H**, Gray L, Roche M, Webb N, Chikere K, Ellett A, Sterjovski J, Duncan R, Wesselingh SL, Ramsland PA, Lee B, Churchill MJ, Gorry PR (2012). Neurotropic HIV-1 variants have alterations in their Env glycoproteins, which alter the way they engage both CD4 and CCR5. Australasian HIV/AIDS Conference 2012 (ASHM 2012), Melbourne, VIC, Australia, October 2012.

5. **Salimi H**, Gray L, Roche M, Webb N, Chikere K, Ellett A, Sterjovski J, Duncan R, Wesselingh SL, Ramsland PA, Lee B, Churchill M, Gorry PR (2012). Neurotropic HIV-1 variants have alterations in which their Env glycoprotein engages both CD4 and CCR5. 3rd Iranian PhD student conference, Brisbane, Australia, April 2012.

6. **Salimi H**, Roche M, Gray L, Duncan R, Wilkin B, Sterjovski J, Flynn J, Ellett A, Moore M, Chikere K, Lee B, Jubb B, Westby M, Churchill MJ, Gorry PR (2013). A common mechanism of clinical HIV-1 resistance to the CCR5 antagonist maraviroc despite divergent resistance levels and lack of common gp120 resistance mutations. Australian Society for Medical Research (ASMR) Student Research Symposium, Royal Melbourne Hospital, Melbourne, Victoria, Australia, June 2013.

7. **Salimi H**, Roche M, Gray L, Duncan R, Wilkin B, Sterjovski J, Ellett A, Moore M, Chikere K, Lee B, Jubb B, Westby M, Churchill MJ, Gorry PR (2013). A common mechanism of clinical HIV-1 resistance to the CCR5 antagonist maraviroc despite divergent resistance levels and lack of common gp120 resistance mutations. Melbourne Protein Group Student Symposium 2013, Bundoora, Victoria, Australia, July 2013.

8. **Salimi H**, Roche M, Gray L, Duncan R, Wilkin B, Sterjovski J, Ellett A, Moore M, Chikere K, Lee B, Jubb B, Westby M, Churchill MJ, Gorry PR (2013). A common mechanism of clinical HIV-1 resistance to the CCR5 antagonist maraviroc despite divergent resistance levels and lack of common gp120 resistance mutations. AMREP ECR Conference 2013, Australia, August 2013.

9. **Salimi H,** Johnson J, Eichelberger N and Haim H, (2015). Contribution of interactions between the envelope glycoproteins of HIV-1 and viral membrane to structural stability of the trimer. All Iowa Virology Symposium, University of Iowa, Iowa City. March 2015.

10. **Salimi H,** Johnson J, Eichelberger N and Haim H, (2015). Structural integrity of the HIV-1 Env trimer is maintained through multiple contact points with the cytoplasmic membrane. CSHL, Retroviruses, Cold Spring Harbor, Long Island, USA, May 2015.

11. **Salimi H**, Cain M, Hou J, Daneman R. and Klein R (2016). Cellular tropism and neuropathogenesis of encephalitic alphaviruses. Center for Neuroimmunology and Neuroinfectious Diseases (CNND) 4th Annual Symposium. Washington University, St Louis, USA, October 5th 2016.

12. **Salimi H**, Cain M, Hou J, Daneman R. and Klein R (2016). Neurotropism and neuropathogenesis of encephalitic alphaviruses. SLU Center for Neuroscience 2nd Annual Research Symposium, St Louis University, St Louis, USA. November 4th 2016.

13. **Salimi H**, Cain M, Hou J, Daneman R. and Klein R (2017). Encephalitic Alphaviruses: Neurotropism and Mechanisms of CNS Entry. Neuroimmune Communication in Health & Disease at Gordon Research Conference. Ventura Beach Marriott, Ventura, CA, USA. Jan 15-20, 2017.

14. **Salimi H**, Cain M, Hou J, Daneman R. and Klein R (2017). Encephalitic Alphaviruses: Neurotropism and Mechanisms of CNS Entry. 13th Annual Postdoc Scientific Symposium. Washington University, St Louis, USA, March 30th 2017.

15. **Salimi H**, Cain M, Hou J, Daneman R. and Klein R (2017). Encephalitic Alphaviruses: Neurotropism and Mechanisms of CNS Entry. 2017 Global Health & Infectious Disease Conference and Trainee Oral Symposium, Washington University, St Louis, USA, March 31th 2017.

Workshops

1. Responsible Conduct of Research (RCR) workshop, September 14, 2016, Washington University, Medical School.

Judge for Journals & Conferences

1. The Iranian 7th international congress of laboratory and Clinic & 1st Conference of Clinical Virology. 25-Jan-2015
   Number of abstracts reviewed: 15

2. Journal of Medical Virology; (JMV-16-5662) 07-Dec-2016
   Article's Name: Cytolytic Virus Activation Therapy and Treatment Monitoring for Epstein-Barr Virus Associated Nasopharyngeal Carcinoma in a Mouse Tumor Model

3. Journal of Medical Virology; (JMV-16-5671) 27-Dec-2016
   Article's Name: Efficacy and safety of nucleoside-sparing regimen based on raltegravir and ritonavir-boosted darunavir in treatment-experienced patients

4. Journal of Medical Virology; (JMV-16-5601)18-Jan-2017
   Article's Name: Down regulation of TRIF, TLR3 and MAVS in HCV infected liver have potential role with the outcome of infection

Professional Membership

1. Australian Society for Medical Research (ASMR, 2011- 2013)
2. International AIDS Society (IAS, 2012 - 2014)
3. Iranian Society for Virology (ISV, 2004 - 2007)
4. National Postdoctoral Association, Affiliate Individual Member, Postdoc. (2015-2016).
5. American Society for Virology, (2017-current)
6. Washington University Postdoc Society, Secretary (2017-current).

References

Prof. Robyn Klein,
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