

Charles Preston Neff

Assistant Professor
Department of Allergy and Clinical Immunology
University of Colorado, Anschutz Medical Campus
12700 E. 19th Ave. Room 10400D
Aurora, CO 80045
(303) 638-7183
Charles.Neff@cuanschutz.edu

EDUCATION

Ph.D. Cell and Molecular Biology, 2011

Colorado State University, Fort Collins, CO

Advisor: Dr. Ramesh Akkina

Dissertation Title: Evaluation of Novel Therapeutics for HIV Prevention and Treatment in a Humanized Mouse Model

B.S. Biology, 2007

Colorado State University, Fort Collins, CO

PROFESSIONAL APPOINTMENTS

Mar 2020 – current

Assistant Professor, University of Colorado, Anschutz Medical Campus

- Development of novel aptamer-based SARS-CoV-2 antigen detection assays
- Characterizing factors that mediate gut microbiota dysbiosis and chronic immune activation during HIV
- Evaluating how diet and gut microbiome interactions influence inflammatory disease in HIV
- Characterizing alveolar macrophages in the lung of HIV-infected subjects using CyTOF

Oct 2013 – Mar 2022

Technical Director ACI/ID Flow Cytometry Facility

- Training investigators on the use of flow cytometry analyzers and cell sorters
- Designing and optimizing panels and experiments for traditional flow cytometry, CyTOF and ImageStream
- Performing flow cytometry-based research for academic and contract research organizations

Jul 2018 – Feb 2020

Instructor, University of Colorado, Anschutz Medical Campus

- Characterizing factors that mediate gut microbiota dysbiosis and metabolic disease in HIV patients
- Examining how diet and gut microbiome interactions influence inflammatory disease in HIV patients
- Evaluating IL-1R8/SIGIRR expression in CD14⁺ PBMCs, M1 and M2 differentiated macrophages

Aug 2013 – Jul 201

Post-doctorate Fellow, Palmer Lab, University of Colorado, Anschutz Medical Campus

- Describing the role of HIV-specific T cells in the lung of HIV-infected subjects
- Examining how HIV mediated changes in the microbiome effect the regulation of the immune system
- Investigating how immunodeficiency leads to increased pulmonary infection and inflammation
- Characterizing PD-L1 expression and its role on HIV infected cells

Jan 2013 – Jul 2013

Post-doctorate Fellow, Levy Lab, University of California, San Francisco

- Deriving HIV-1 resistant induce pluripotent stem cells
- Investigating the role of macrophage autophagy in HIV infected long term non-progressors

Jan 2012 – Jan 2013

Post-doctorate Fellow, Akkina Lab, Colorado State University

- Developing HIV-1 resistant immune cells in humanized mice by lentiviral gene delivery
- 454 Deep sequence analysis of HIV-1 co receptor switching
- Developing multiplex qRT-PCR for Dengue virus serotype co-infection analysis
- Utilizing a PD-L1 mAb to reduce HIV-1 replication and increase T cell proliferation in HIV-1 infected humanized mice

Nov 2007 – Dec 2011

Graduate Research Assistant, Akkina Lab, Colorado State University

- Development and application of anti-HIV gp120 aptamer-siRNA chimeras in humanized mice
- *in vivo* siRNA delivery via nanoparticles in RAG-hu mice
- Evaluation of anti-HIV-1 prophylaxis by oral administration of antiretrovirals in humanized mice
- Anti-retroviral microbicide development in HEC gel formations
- Characterization of HIV-1 and HIV-2 infection in humanized mice

Dec 2004 – May 2007

Undergraduate Research Assistant, Wilusz Lab, Colorado State University

- Investigate the role of RSE 3 of Sindbis Virus (SIN) and SIN Deadenylation to study host RNA decay

TEACHING EXPERIENCE

BZ 350 Molecular and General Genetics
LIFE 102 General Biology

Graduate Teaching Assistant
Graduate Teaching Assistant

Spring 2008
Fall 2007

GRANTS AND FELLOWSHIPS

Ongoing

K01 DK121864

9/1/2019 - 5/31/2023

NIH/NIDDK

“Interactions of Intestinal Epithelial Cells, The Innate Immune System and Gut Microbiota During Dysbiosis.”

The goal of this research is to determine how gut microbiota compositional changes in HIV-infected individuals is related to a high prevalence of chronic gut inflammation and how the innate immune system and epithelial cells are involved. I am also investigating the immune-modulatory properties of specific bacteria that correlate with disease.

Role: PI

Completed

U01HL152405-02S1

9/2020 – 9/2022

NIH/NHLBI

“Development of a Point of Care SARS-CoV-2 ELASA”

A SARS-CoV-2 Enzyme Linked Aptamers Sorbent Assay (ELASA, aka ELONA) is similar to an ELISA test for virus detection but uses less expensive and more reproducible aptamers rather than antibodies. The aim of this project is to identify a suitable aptamer pair against the nucleocapsid protein of SARS-CoV-2 to develop an ELASA. The selection of capture and detection aptamers documents feasibility of the aptamer approach. POC testing will be replacing these antibodies with aptamers to greatly improve cost, malleability, and selectivity especially against emerging viral strains.

Role: PI

I-Corps Seed Grant “Development of a Point of Care SARS-CoV-2 ELISA” Customer Discovery for Market Research	11/2021-1/2022
No Number GALIIP PILOT AWARD “Identifying Inflammatory Peptidoglycans associated with HIV infection” Role: PI	11/2019-10/2021
No Number NIH Loan Repayment Program This program is designed to support young researchers by paying a portion of the education loans accrued during their formal education. Role: Awardee	07/2017-07/2021
T32 AI007405-23 Immunology Training Grant This program is sponsored by the NIH-NIAID and provides support for post-doctoral trainees to do impactful basic and translation research in Immunology at the University of Colorado. Role: Trainee	07/2014-07/2017

HONORS AND AWARDS

The American Association of Immunologists Early Career Faculty Travel Grant 2020
Neff CP, Campbell T, Fontenot A and Palmer BE, HIV Infection Is Associated with Loss of Anti-Inflammatory Alveolar Macrophages
Immunology, Honolulu, HA. May 2020

New Investigator Travel Award, Conference on Retroviruses and Opportunistic Infections 2019
Neff CP, Campbell T, Fontenot A and Palmer BE, HIV Infection and Smoking Differentially Regulate Alveolar Macrophages CROI, Seattle, WA. March 2019

New Investigator Travel Award, Conference on Retroviruses and Opportunistic Infections 2018
Neff CP, Lozupone C, and Palmer BE, Fecal Microbiota From HIV-Infected Subjects Increases Innate Immune Activation CROI, Boston, MA. March 2018

New Investigator Travel Award, Conference on Retroviruses and Opportunistic Infections 2014
Neff CP, Rhodes ME, Mazmanian S, Fontenot AP, Lozupone C, and Palmer BE, Gut Microbiota enriched in HIV+ Subjects Induce Inflammatory Cytokines but not T Regulatory Cells, CROI, Boston, MA. March 2014

High Honors Cell and Molecular Biology Annual Graduate Poster Symposium Spring 2011
C. P. Neff, J. Zhou, L. Remling, J. Kuruvilla, J. Zhang, H. Li, J. J. Rossi, R. Akkina. Anti-HIV- dendrimer-siRNA complexes efficiently suppress viral loads and protect from helper CD4 T cell loss in a humanized mouse model.

First Place Graduate Poster Competition Rocky Mountain American Society of Microbiology Fall 2010
C. P. Neff, J. Zhou, L. Remling, J. Kuruvilla, J. Zhang, H. Li, J. J. Rossi, R. Akkina. Combinatorial Aptamer-siRNA chimera therapy suppresses HIV-1 viral loads and protects from CD4 T cell loss in humanized (RAG-hu) mice.

First Place Undergraduate Poster Competition RMB-ASM Branch Meeting, October 2006
C. P. Neff, N. Garneau, C. Wilusz, J. Wilusz. The Development of a Mutant Sindbis Strain to Investigate the Role of RSE 3 in Cell Culture.

PUBLICATIONS

1. Garneau, N. L., Sokoloski K. J., Opyrchal M., **Neff C. P.**, Wilusz C. J., and Wilusz J. 2008. The 3' untranslated region of Sindbis virus represses the deadenylation of viral transcripts in mosquito and mammalian cells. *J. Virol*
2. Zhou J., Swiderski P., Li H., Zhang J., **Neff C. P.**, Akkina R., Rossi J. J. 2009. Selection, characterization and application of new RNA HIV gp 120 aptamers for facile delivery of Dicer substrate siRNAs into HIV infected cells. *Nucleic Acids Res*
3. **Neff C. P.**, Ndolo T., Tandon A., Habu Y., Akkina R. 2010. Oral Pre-Exposure Prophylaxis by Anti-Retrovirals Raltegravir and Maraviroc Protects against HIV-1 Vaginal Transmission in a Humanized Mouse Model. *PLoS ONE*
4. **Neff C. P.**, Zhou J., Remling L., Kuruvilla J., Zhang J., Li H., Smith D. D., Swiderski P., Rossi J. J., Akkina R.. 2011. An aptamer-siRNA chimera suppresses HIV-1 viral loads and protects from helper CD4+ T cell decline in humanized mice. *Sci. Transl. Med*
5. **Neff C. P.**, Kurisu T, Ndolo T, Fox K, Akkina R. 2011. A topical microbicide gel formulation of CCR5 antagonist maraviroc prevents HIV-1 vaginal transmission in humanized RAG-hu mice. *PLoS One*.
6. Akkina R, Berges BK, Palmer BE, Remling L, **Neff C. P.**, Kuruvilla J, Connick E, Folkvord J, Gagliardi K, Kasso A, Akkina SR. 2011. Humanized Rag1^{-/-} γ c^{-/-} mice support multilineage hematopoiesis and are susceptible to HIV-1 infection via systemic and vaginal routes. *PLoS One*.
7. Zhou J. *, **Neff C. P.** *, Liu X., Zhang J., Li H., Smith D. D., Swiderski P., Peng L., Akkina R., and Rossi J. J. Systemic administration of dendrimer-siRNA complexes efficiently suppresses HIV-1 infection, *Mol Ther*. 2011. (***equal first author contribution**)
8. Veselinovic M., **Neff C. P.**, Remling L., Akkina R., 2012 Topical gel formulation of broadly neutralizing anti-HIV-1 monoclonal antibody VRC01 confers protection against HIV-1 vaginal challenge in a humanized mouse model. *Virology*
9. Zhou* J., **Neff C. P.***, Swiderski P, Li H, Smith DD, Aboellail T, Akkina R and Rossi J. 2013. Functional in vivo delivery of multiplexed anti-HIV-1 siRNAs via a chemically synthesized aptamer with a sticky bridge. *Mol Ther*.
10. Palmer B. E., **Neff C. P.**, LeCureux J., D'Souza M., Fontenot AP, Akkina R. 2013. In vivo blockade of the PD-1 receptor suppresses HIV-1 viral loads and improves CD4+ T cells levels in humanized mice. *J. Immunol*.
11. **Neff CP**, Akkina RA, 2014 Targeted Delivery of Aptamers and siRNAs for HIV Prevention and Therapies in Humanized Mice. *Humanized Mice for HIV Research First Edition*. Springer
12. **Neff CP**, Chain JL, MaWhinney S, Martin AK, Liderman DJ, Flores SC, Campbell TB, Palmer BE, Fontenot AP, 2015 Lymphocytic Alveolitis Is Associated with Accumulation of Functionally Impaired HIV-Specific T Cells in the Lung of Antiretroviral Therapy-Naïve Subjects. *Am J Respir Crit Care Med*
13. Li S, **Neff CP**, Barber K, Hong J, Luo Y, Azam t, Palmer BE, Fujita M, Garlanda C, Mantovani A, Kim S, Dinarello CA 2015. Extracellular forms of IL-37 inhibit innate inflammation in vitro and in vivo but require the IL-1 family decoy receptor IL-1R8. *Proc Natl Acad Sci USA*
14. Akhmetzyanova I, Drabczyk M, **Neff CP**, Gibbert K, Dietze KK, Werner T, Liu J, Chen L, Lang KS, Palmer BE, Dittmer U, Zelinsky G. 2015. PD-L1 Expression on Retrovirus-Infected Cells Mediates Immune Escape from CD8+ T Cell Killing. *PLoS Pathog*.
15. Cavalli G, Hayashi M, Jin Y, Yorgov D, Santorico SA, Holcomb C, Rastrou M, Erlich HA, Tengesada I, Dagna L, **Neff CP**, Palmer BE, Spritz RA, Dinarello CA, 2015. MHC Class II Super-Enhancer Increases Surface Expression of HLA-DR and HLA-DQ and Affects Cytokine Production in Autoimmune Vitiligo *Proc Natl Acad Sci U S A*.
16. Lozupone CA, Rhodes ME, **Neff C. P.**, Fontenot AP, Campbell TB, Palmer BE 2014. HIV-induced alteration in gut microbiota: Driving factors, consequences, and effects of antiretroviral therapy. *Gut Microbes*
17. **Neff CP**, Rhodes ME, Arnolds KL, Collins CB, Donnelly J, Nusbacher N, Jedlicka P, Schneider JM, McCarter MD, Shaffer M, Mazmanian SK, Palmer BE, Lozupone CA. 2016 Diverse Intestinal Bacteria Contain Putative Zwitterionic Capsular Polysaccharides with Anti-inflammatory Properties. *Cell Host Microbe*.
18. Li SX, Armstrong A, **Neff CP**, Shaffer M, Lozupone CA, Palmer BE. 2016. Complexities of Gut Microbiome Dysbiosis in the Context of HIV Infection and Antiretroviral Therapy. *Clin Pharmacol Ther*.
19. Jones D, **Neff CP**, Palmer BE, Stenmark K, Nagel MA. 2017. Varicella zoster virus-infected cerebrovascular cells produce a proinflammatory environment. *Neurol Neuroimmunol Neuroinflamm*.

20. Marchetti C, Swartzwelter B, Gamboni F, **Neff CP**, Richter K, Azam T, Carta S, Tengesdal I, Nemkov T, D'Alessandro A, Henry C, Jones GS, Goodrich SA, St Laurent JP, Jones TM, Scribner CL, Barrow RB, Altman RD, Skouras DB, Gattorno M, Grau V, Janciauskiene S, Rubartelli A, Joosten LAB, Dinarello CA. 2018. OLT1177, a β -sulfonyl nitrile compound, safe in humans, inhibits the NLRP3 inflammasome and reverses the metabolic cost of inflammation. *Proc Natl Acad Sci U S A*.
21. **Neff CP**, Krueger O, Xiong K, Arif S, Nusbacher N, Schneider JM, Cunningham AW, Armstrong A, Li S, McCarter MD, Campbell TB, Lozupone CA, Palmer BE. 2018. Fecal Microbiota Composition Drives Immune Activation in HIV-infected Individuals. *EBioMedicine*.
22. Armstrong AJS, Shaffer M, Nusbacher NM, Griesmer C, Fiorillo S, Schneider JM, **Neff CP**, Li SX, Fontenot AP, Campbell T, Palmer BE, Lozupone CA. 2018. An exploration of Prevotella-rich microbiomes in HIV and men who have sex with men. *Armstrong AJS, Microbiome*.
23. Logue EC, **Neff CP**, Mack DG, Martin AK, Fiorillo S, Lavelle J, Vandivier RW, Campbell TB, Palmer BE, Fontenot AP. 2019. Upregulation of Chitinase 1 in Alveolar Macrophages of HIV-Infected Smokers. *J Immunol*.
24. Jin Y, Roberts GHL, Ferrara TM, Ben S, van Geel N, Wolkerstorfer A, Ezzedine K, Siebert J, **Neff CP**, Palmer BE, Santorico SA, Spritz RA. 2019. Early-onset autoimmune vitiligo associated with an enhancer variant haplotype that upregulates class II HLA expression. *Nat Commun*.
25. Li S, Amo-Aparicio J, **Neff CP**, Tengesdal IW, Azam T, Palmer BE, López-Vales R, Bufler P, Dinarello CA. 2019. Role for nuclear interleukin-37 in the suppression of innate immunity. *Proc Natl Acad Sci U S A*.
26. Jones D, Como CN, Jing L, Blackmon A, **Neff CP**, Krueger O, Bubak AN, Palmer BE, Koelle DM, Nagel MA. 2019. Varicella zoster virus productively infects human peripheral blood mononuclear cells to modulate expression of immunoinhibitory proteins and blocking PD-L1 enhances virus-specific CD8⁺ T cell effector function. *PLoS Pathog*.
27. Li SX, Sen S, Schneider JM, Xiong KN, Nusbacher NM, Moreno-Huizar N, Shaffer M, Armstrong AJS, Severs E, Kuhn K, **Neff CP**, McCarter M, Campbell T, Lozupone CA, Palmer BE. 2019. Gut microbiota from high-risk men who have sex with men drive immune activation in gnotobiotic mice and in vitro HIV infection. *PLoS Pathog*.
28. Siebert JC, **Neff CP**, Schneider JM, Regner EH, Ohri N, Kuhn KA, Palmer BE, Lozupone CA, Görg C. 2019. VOLARE: visual analysis of disease-associated microbiome-immune system interplay. *BMC Bioinformatics*.
29. Armstrong AJS, Shaffer M, Nusbacher NM, Griesmer C, Fiorillo S, Schneider JM, **Neff CP**, Li SX, Fontenot AP, Campbell T, Palmer BE, Lozupone CA. An exploration of Prevotella-rich microbiomes in HIV and men who have sex with men. *Microbiome*. 2020
30. Coleman SL, **Neff CP**, Li SX, Armstrong AJS, Schneider JM, Sen S, Fennimore B, Campbell TB, Lozupone CA, Palmer BE. Can gut microbiota of men who have sex with men influence HIV transmission? *Gut Microbes*. 2020
31. **Neff CP**, Atif SM, Logue EC, Siebert J, Görg C, Lavelle J, Twigg H, Campbell TB, Fontenot AP, Palmer BE. HIV Infection Is Associated with Loss of Anti-Inflammatory Alveolar Macrophages. *J Immunol*. 2020
32. Yamada E, Martin CG, Moreno-Huizar N, Fouquier J, **Neff CP**, Coleman SL, Schneider JM, Huber J, Nusbacher NM, McCarter M, Campbell TB, Lozupone CA, Palmer BE. Intestinal microbial communities and *Holdemanella* isolated from HIV⁺ men who have sex with men increase frequencies of lamina propria CCR5⁺ CD4⁺ T cells. *Gut Microbes*. 2021
33. Tengesdal IW, Menon DR, Osborne DG, **Neff CP**, Powers NE, Gamboni F, Mauro AG, D'Alessandro A, Stefanoni D, Henen MA, Mills TS, De Graaf DM, Azam T, Vogeli B, Palmer BE, Pietras EM, DeGregori J, Tan AC, Joosten LAB, Fujita M, Dinarello CA, Marchetti C. Targeting tumor-derived NLRP3 reduces melanoma progression by limiting MDSCs expansion. *Proc Natl Acad Sci U S A*. 2021.
34. Arnolds KL, Yamada E, **Neff CP**, Schneider JM, Palmer BE, Lozupone CA. Disruption of Genes Encoding Putative Zwitterionic Capsular Polysaccharides of Diverse Intestinal Bacteroides Reduces the Induction of Host Anti-Inflammatory Factors. *Microb Ecol*. 2022
35. Littlefield KM, Watson RO, Schneider JM, **Neff CP**, Yamada E, Zhang M, Campbell TB, Falta MT, Jolley SE, Fontenot AP, Palmer BE. SARS-CoV-2-specific T cells associate with inflammation and reduced lung function in pulmonary post-acute sequelae of SARS-CoV-2. *PLoS Pathog*. 2022
36. Tengesdal IW, Li S, Powers NE, May M, **Neff CP**, Joosten LAB, Marchetti C, Dinarello CA. Activation of Host-NLRP3 Inflammasome in Myeloid Cells Dictates Response to Anti-PD-1 Therapy in Metastatic Breast Cancers. *Pharmaceuticals (Basel)*. 2022