BIOMEDICAL & VETERINARY SCIENCES

GRADUATE PROGRAM

ANNOUNCES

The Doctor of Philosophy Seminar and Examination of

Nicole Bracci

"Understanding Host-Pathogen Interactions of Rift Valley Fever Virus That Contribute to Viral Replication"

Thursday, March, 17th, 2022
12:30 PM
ILSB 1040 or Zoom
https://virginiatech.zoom.us/j/81026523055

Bio

Nicole Bracci is a Ph.D. candidate in Biomedical and Veterinary Sciences in the Virginia-Maryland College of Veterinary Medicine. Nicole obtained her two bachelor's degrees in forensic biology and biochemistry/molecular biology from The Pennsylvania State University. Nicole's Ph.D. journey started at George Mason University under the advisement of Dr. Kylene Kehn-Hall with her dissertation research focusing on characterizing the host-pathogen interactions that occur upon infection with arboviruses, like Rift Valley fever virus.

During her time at George Mason University, Nicole served as a graduate teaching assistant for six semesters with the final two being for the Enlisted to Medical Degree Preparatory Program sponsored by George Mason University and The Uniformed Services University of the Health Sciences. Upon following Dr. Kehn-Hall to Virginia Tech, Nicole continued to grow by pursuing the Future Professoriate Certificate, by becoming a fellow of the Virginia Tech Academy for Graduate Teaching Excellence, and being selected as a member of the 2022 cohort of the Global Perspectives Program.

Outside of research and teaching, Nicole stays active by being a group fitness instructor for Virginia Tech Recreational Sports. Within the community, Nicole serves as a co-organizer of Science on Tap: New River Valley and volunteers as a judge at local science fairs.

Upon graduation, Nicole hopes to obtain a postdoctoral research position where she can continue to grow as both a researcher and educator.

Funded by

VMCVM Office of Research and Graduate Studies

Lay Language Abstract

Rift Valley fever virus (RVFV) is a major biological threat due to its ability to replicate in both livestock and humans and be passed by mosquito bite. RVFV was first discovered in Africa in the early 1930s. To date, there is no approved therapeutic or vaccine. RVFV usually causes very mild disease but in a small percentage of cases, it progresses to include liver disease, vision loss, swelling of the brain, bleeding, and death. A virus itself is not alive, it needs a living host in order to replicate. To do this, it utilizes things naturally occurring inside the host. The purpose of this study is to identify host factors that the virus uses in order to efficiently make more progeny viruses. The first viral protein of interest is the glycoprotein, Gn, which is important for viral entry and assembly of the viral particles. It was determined that UBR4 is an interactor of Gn and that the inhibition of UBR4 decreases the amount of infectious virus being produced. Similarly, the host proteins, CK1α and PP1α, were found to be host-factor interactors of the L protein. The L protein is responsible for synthesizing the building blocks of the virus. It was determined that when CK1α and PP1α are inhibited, the L protein is less efficient at making these building blocks. Understanding the host factors the virus utilizes is important to the basic understanding of how RVFV infects the host and the development of therapeutics to combat an outbreak.

Publications

1. Behnia, M., Baer, A., Skidmore, A., Lehman, C., **Bracci, N**., Kehn-Hall, K., & Bradfute, S. (2022). Inactivation of Venezuelan equine encephalitis virus genome using two methods. *Viruses*. https://doi.org/10.3390/v14020272
2. **Bracci, N**., de la Fuenta, C., Saleem, S., Pinkham, C., Narayanan, A., Garcia-Sastre, A., Balaraman, V., Richt, J., Wilson, W., & Kehn-Hall, K. (2021). Rift Valley fever virus Gn V5-epitope-tagged virus enables identification of UBR4 as a Gn interacting protein that facilitates Rift Valley fever virus production. *Virology*. https://doi.org/10.1016/j.virol.2021.12.010
3. Tang, K. T., Chen, H. H., Chen, T. T., **Bracci, N. R**., & Lin, C. C. (2021). Dendritic Cells and Antiphospholipid Syndrome: An Updated Systematic Review. Life (Basel, Switzerland), 11(8), 801. https://doi.org/10.3390/life11080801
4. Chuo, W. H., Tung, Y. T., Wu, C. L., **Bracci, N. R**., Chang, Y. K., Huang, H. Y., & Lin, C. C. (2021). Alantolactone Suppresses Proliferation and the Inflammatory Response in Human HaCaT Keratinocytes and Ameliorates Imiquimod-Induced Skin Lesions in a Psoriasis-Like Mouse Model. Life (Basel, Switzerland), 11(7), 616. https://doi.org/10.3390/life11070616
5. Dahal, B., Lehman, C.W., Akhrymuk, I., **Bracci, N.R.**, Panny, L., Barrera, M.D., Bhalla, N., Jacobs, J.L., Dinman, J.D., Kehn-Hall, K. (2021). PERK Is Critical for Alphavirus Nonstructural Protein Translation. *Viruses*. 13(5):892. https://doi.org/10.3390/v13050892
6. Lin, S. C., Lehman, C., Stewart, A. K., Panny, L., **Bracci, N**., Wright, J., Paige, M., Strangman, W. K., & Kehn-Hall, K. (2021). Homoseongomycin, a compound isolated from marine actinomycete bacteria K3-1, is a potent inhibitor of encephalitic alphaviruses. *Antiviral research*, *191*. https://doi.org/10.1016/j.antiviral.2021.105087
7. Lehman, C. W., Kehn-Hall, K., Aggarwal, M., **Bracci, N.**, Pan, H. C., Panny, L., Lamb, R. A., & Lin, S. C. (2021). Resveratrol Inhibits Venezuelan Equine Encephalitis Virus Infection by Interfering with the

AKT/GSK Pathway. *Plants (Basel, Switzerland)*, *10*(2), 346. https://doi.org/10.3390/plants10020346

8. **Bracci, N**., Pan, H., Lehman, C., Kehn-Hall, K., Lin, S. (2020). Improved Plaque Assay for Human Coronaviruses 229E and OC43. *PeerJ Journals*, *8*, e10639. https://doi.org/10.7717/peerj.10639
9. Lin, S., Lin, C., Li, S., Lin, W., Lehman, C., **Bracci, N.,** & Tsai, S. (2020). Alleviation of Collagen-Induced Arthritis by Crotonoside through Modulation of Dendritic Cell Differentiation and Activation. *Plants (Basel, Switzerland)*, *9*(11), E1535. https://doi.org/10.3390/plants9111535
10. Wu, C. S., Lin, S. C., Li, S., Chiang, Y. C., **Bracci, N**., Lehman, C. W., Tang, K. T., & Lin, C. C. (2020). Phloretin alleviates dinitrochlorobenzene-induced dermatitis in BALB/c mice. *International journal of immunopathology and pharmacology*, *34*, 2058738420929442. https://doi.org/10.1177/2058738420929442
11. Carey, B. D., Akhrymuk, I., Dahal, B., Pinkham, C. L., **Bracci, N.,** Finstuen-Magro, S., Lin, S. C., Lehman, C. W., Sokoloski, K. J., & Kehn-Hall, K. (2020). Protein Kinase C subtype δ interacts with Venezuelan equine encephalitis virus capsid protein and regulates viral RNA binding through modulation of capsid phosphorylation. *PLoS pathogens*, *16*(3), e1008282. https://doi.org/10.1371/journal.ppat.1008282
12. Lin, S. C., Carey, B. D., Callahan, V., Lee, J. H., **Bracci, N.,** Patnaik, A., Smith, A. K., Narayanan, A., Lepene, B., & Kehn-Hall, K. (2020). Use of Nanotrap particles for the capture and enrichment of Zika, chikungunya and dengue viruses in urine. *PloS one*, *15*(1), e0227058. https://doi.org/10.1371/journal.pone.0227058
13. Gogovi, G. K., Almsned, F., **Bracci, N.,** Kehn-Hall, K., Shehu, A., & Blaisten-Barojas, E. (2019). Modeling the Tertiary Structure of the Rift Valley Fever Virus L Protein. *Molecules (Basel, Switzerland)*, *24*(9), 1768. https://doi.org/10.3390/molecules24091768
14. Lin, S., Chen, M., Liu, S., Callahan, V., **Bracci, N.**, Lehman, C., Dahal, B., de la Fuente, C., Lin, C., Wang, T., & Kehn-Hall, K. (2019). Phloretin inhibits Zika virus infection by interfering with cellular glucose utilization. *International journal of antimicrobial agents*, *54*(1), 80–84. https://doi.org/10.1016/j.ijantimicag.2019.03.017

15. Pinkham, C., Ahmed, A., **Bracci, N.,** Narayanan, A., & Kehn-Hall, K. (2018). Host-based processes as therapeutic targets for Rift Valley fever virus. *Antiviral research*, *160*. https://doi.org/10.1016/j.antiviral.2018.10.004
16. Almsned, F., Gogovi, G., **Bracci, N**., Kehn-Hall, K., Blaisten-Barojas, E., & Shehu, A. (2018). Modeling the Tertiary Structure of a Multi-domain Protein. *Proceedings of the 2018 ACM International Conference on Bioinformatics, Computational Biology, and Health Informatics - BCB 18*. doi: 10.1145/3233547.3233702
17. Pinkham C, Dahal B, de la Fuente CL, **Bracci N**, Beitzel B, Lindquist M, Garrison A, Schmaljohn C, Palacios G, Narayanan A, Campbell CE, Kehn-Hall K. Alterations in the host transcriptome in vitro following Rift Valley fever virus infection. Sci Rep. 2017 Oct 30;7(1):14385. doi: 10.1038/s41598-017-14800-3. PMID: 29085037; PMCID: PMC5662566

Presentations

American Society of Virology Annual Conference 2021 – Presentation
Title: Impact of UBR4 on Rift Valley Fever Virus Replication

Biomedical and Veterinary Science Research In Program Seminar 2021- Presentation
Title: The Impact of UBR4 on Rift Valley Fever Virus Replication

Virginia Tech Center for Communication Science Nutshell Games 2020 – Presentation
Title: Viruses Do Not Work Alone

American Society of Virology Annual Conference 2020 – Poster (Cancelled)
Title: Understanding the protein-protein interaction between Rift Valley Fever Virus's L Protein and Host Casein Kinase 1

American Society of Virology Annual Conference 2019 – Poster
Title: Impact of UBR4 on Rift Valley Fever Virus Replication

George Mason School of Systems Biology Student Research Day – Poster
2019 Title: The Effect of UBR4 on Rift Valley Fever Virus Replication
2018 Title: Rift Valley Fever Virus Replication In UBR4 Knockout Cells

Awards and Academic Achievements

- Selected for the Future Professoriate: Global Perspectives Program, 2022
- Selected as a Fellow of the Virginia Tech Graduate Academy for Teaching Excellence, 2021
- George Mason University Outstanding Biology Graduate Student Teacher, 2020
- George Mason University Core Course Teaching Award, 2019
- Selected for GMU's STEM GTA Workshop Series, 2019
- Bioscience Academic Year Fellowship, 2018-2019
- Bioscience Summer Fellowship,2018 and 2019

Examination Graduate Committee

Major Advisor/Chair:

Kylene Kehn-Hall, MS, PhD
Professor
Biomedical Sciences and Pathobiology

Graduate Advising Committee Members:

Andrea Bertke, PhD
Associate Professor
Population Health Sciences

Clayton Caswell, PhD
Associate Professor
Biomedical Sciences and Pathobiology

Nisha Duggal, PhD
Assistant Professor
Biomedical Sciences and Pathobiology

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