

CURRICULUM VITAE

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Education

2010 B.S., University of South Dakota
2012 M.S., University of South Dakota (Neuroscience)
2017 Ph.D., University of Colorado School of Medicine, Anschutz Medical Campus, Aurora, CO (Neuroscience)
2019 Postdoctoral Fellowship (Neuroscience/Neurovirology), University of Colorado School of Medicine, Anschutz Medical Campus, Aurora, CO

Academic Appointments

2019-2021 Research Instructor, Department of Neurology, University of Colorado School of Medicine, Anschutz Medical Campus, Aurora, CO
2021-present Assistant Professor, Department of Neurology, University of Colorado School of Medicine, Anschutz Medical Campus, Aurora, CO

Other Professional Positions

2010-2012 Teaching Assistant, Biology Department, University of South Dakota

Honors, Special Recognitions and Awards

2006 National Honor Society Scholarship
2009-2012 Academic Dean's List, University of South Dakota
2012 Dr. Louella E. Cable Travel Award, University of South Dakota
2012-2013 University of Colorado School of Medicine, Neuroscience Program Trainee Fellowship
2014 American Society for Neural Therapy and Repair Travel Award
2015 AAAS/Science Program for Excellence in Science Membership Award
2015 CU Denver Outstanding Graduate Student Award
2015, 2016 C. Werner and Kitty Hirs Research Travel Award, University of Colorado School of Medicine
2018 Early Career Investigator in Training, International Society for NeuroVirology

Membership in Professional Organizations

2011-present Society of Integrative and Comparative Biology
2012-present Society for Neuroscience
2012-present Rocky Mountain Regional Neuroscience Group
2012-present Front Range Regional Neuroscience Group
2013-2014 Animal Behavior Society
2013-present International Neural Transplantation and Restoration

2014-present American Society for Neural Therapy and Repair
2017-present International Society for NeuroVirology
2017-present Colorado Alphaherpesvirus Latency Society
2022-present American Academy of Neurology

Major Committee and Service Responsibilities

2015 Symposium Co-Organizer, "The role of monoamines in modulating behavior", International Congress of Comparative Physiology and Biochemistry, Krakow, Poland
2017-2022 Conference Co-Organizer, Colorado Alphaherpesvirus Latency Symposium. Vail, Colorado

Inventions, Intellectual Property and Patents Held or Pending

Bubak, A.N., Nagel, M.A., "Neurokinin-1 receptor antagonists for the treatment of alphaherpesviruses", United States Patent, 2848-295-PROV.
Bubak, A.N., Nagel, M.A., Restrepo, D., "Treatment of coronaviruses and COVID-19"
Bubak, A.N., Nagel, M.A., "Prevention of immunosuppression by pathogens", CU Innovations File No. CU5223H.
Bubak, A.N., Nagel, M.A., Coughlan, C.M., Potter, H., "NK-1R antagonists block exosome transmission", CU Innovations File No. (to be assigned).
Bubak, A.N., Nagel, M.A., "Prevention and treatment of diabetes", CU Innovations File No. CU5201H.

Review Work

Editorial Boards:

Review Editor – *Frontiers in Virology*

Ad hoc reviewer for journals:

Biology Letters

Clinical Infectious Diseases

Current Zoology

Frontiers in Microbiology

Journal of Cell Transplantation

Journal of Insect Physiology

Journal of NeuroVirology

Proceedings of the Royal Society B

Scientific Reports

Viruses

Journal of Virology

Special Guest Editor, "The role of monoamines in modulating behavior", Special Issue, *Current Zoology*, 2016

Invited Lectures, Presentations and Research-Based Oral Presentations

2012 "Neural mechanisms underlying aggression in stalk-eyed flies", University of South Dakota IdeaFest, Vermillion, SD
2012 "Whole brain monoamine detection and manipulation in the stalk-eyed fly", South Dakota Academy of Science Conference, Vermillion, SD
2012 "The bioenergetics of neuronal excitability", Anschutz Medical School Seminar, Aurora, CO
2013 "Effects of fetal cell grafts in Parkinson's disease", Anschutz Medical School Seminar, Aurora, CO

- 2013 “Genetic regulation of color vision in drosophila”, Anschutz Medical School Seminar, Aurora, CO
- 2015 “Serotonergic mediation of aggression and opponent assessment in stalk-eyed flies”, International Congress for Comparative Physiology and Biochemistry (ICCPB), Krakow, Poland
- 2015 “Can the brain make new dopamine neurons for Parkinson’s disease repair?”, Special symposium, *The Repairable Brain*. University of Colorado School of Medicine, Aurora, CO
- 2015 “Assessment strategies and fighting patterns in animal contests: a role for serotonin?”, Department of Integrative Biology Seminar, University of Colorado Denver, Aurora, CO
- 2015 “The role of serotonin in fly aggression: a simplified system to investigate a complex behavior”, University of Colorado Denver Anschutz Medical Campus, Aurora, CO
- 2017 “Serotonin-mediated aggression: sex-dependent roles in regulating neuropeptides”, Society of Integrative and Comparative Biology, New Orleans, LA
- 2018 “The role of astrocytes in varicella zoster virus”, *Molecular and Cellular Neurology Conference*, University of Colorado Anschutz Medical Campus, Aurora, CO
- 2018 “Varicella zoster virus induces nuclear translocation of the neurokinin-1 receptor, promoting viral spread in spinal astrocytes”, Early Career Investigator in Training Presentation, International Society for NeuroVirology Conference, Chicago, IL
- 2018 “Knowing when to fight: a neural mechanism of collective organization in ants”, University of Colorado Anschutz Medical Campus Annual Neuroscience Conference, Estes Park, CO (Best Oral Presentation Award)
- 2019 “Varicella zoster virus-induced alterations in neuropeptide signaling in trigeminal ganglia: implications for head and face pain”, Pathways of Migraine Symposium, University of Colorado Anschutz Medical Campus, Aurora, CO
- 2023 “Central nervous system vulnerability induced by varicella zoster virus exosomes”, Neuroscience Innovation Initiative, University of Colorado-Anschutz Medical Campus, Aurora, CO

Grant Awards and Additional Support

Active/Current Funding

- 1, Federal NIH/NIA P01-AG032958
A Major Contributor of Serious Multisystem Disease in the Elderly: Varicella Zoster Virus-induced Inflammation
Project 2: Investigating the VZV-Induced Epigenetic Modifications of Vascular Adventitial Fibroblasts that Contribute to Persistent Inflammation and VZV Vasculopathy
Principal Investigator of Project 2, 60% effort
03-01-2018 to 12-31-2023
\$11,750,912 (total direct and indirect costs/5 years)
\$2,319,395, Project 2 (total direct and indirect costs/5 years)
2. Federal NIH/NIA P01 AG032958-14S1
Contributions of Varicella Zoster Virus Exosomes to Alzheimer's Disease Pathology
Administrative Supplement
Co-Principal Investigator, 2.5% effort
06-01-2022 to 12-31-2023
\$388,711 (total costs)
3. SPARK/REACH Program, University of Colorado Anschutz Medical Campus
Repositioning Neurokinin-1 Receptor (NK-1R) Antagonists as Antiviral Agents against Human Herpesviruses
Co-Investigator (Maria Nagel, PI), 5% effort
09-01-2020 to 08-31-2022
\$100,000 (total costs/2 years)
4. SPARK/REACH Program, University of Colorado Anschutz Medical Campus
Novel Anti-viral Treatment for Herpes Simplex Virus Type 1 (HSV-1)
Co-Principal Investigator, 5% effort
06-01-2022 to 05-31-2024
\$100,000 (total costs/2 years)
5. Federal NIH/NIMH RF1 MH1288657
Scalable 3D molecular imaging and data analysis for cell census generation.
Co-Investigator (Douglas Shepherd, PI), 10% effort
09-15-2021 to 09-14-2024
\$2,234,299 (total costs/3 years)
6. Federal NIH/NIA R01 AG079193-01A1
Virus and olfactory system interactions accelerate Alzheimer's disease pathology.
Co-Investigator (Diego Restrepo, PI), 30% effort
04-01-2023 to 03-31-2028
\$5,427,895 (total cost, 5 years)

Inactive/Prior Funding

1. Federal NIH/NIDCD R01 DC00566
Complex Odor Recognition of the Main Olfactory Bulb
Administrative Supplement
Co-Investigator (Diego Restrepo, PI), 20% effort
05-01-2020 to 04-30-2021
\$250,000 (total direct costs/1 year)
2. Federal NIH/NINDS R01 NS093716
Neurobiology of Varicella Zoster Virus
Co-Investigator (Randall Cohrs, PI), 50% effort
07-01-2015 to 06-30-2021
\$2,228,285 (total direct and indirect costs/5 years)
3. Federal NIH/NIDCD R01 DC014253
Olfactory Receptors for Semiochemical Detection in the Main Olfactory Epithelium,
Administrative Supplement
Co-Investigator (Diego Restrepo, PI), 10% effort
07-01-2020 to 06-30-2021
\$194,375 (total direct costs/1 year)
4. Federal NIH/NIA P01 AG032958-13S1
The Role of VZV Infection in Hippocampal Neurons to Alzheimer's Disease
Pathogenesis
Administrative Supplement
Co-Investigator (Maria Nagel, PI), 20% effort
05-01-2021 to 04-30-2022
\$250,000 (total direct costs/1 year)

Bibliography

Peer-Reviewed

1. **Bubak, A.N.**, Swallow, J.G., Renner, K.J.: Whole brain monoamine detection and manipulation in a stalk-eyed fly. *J. Neurosci. Methods* 219:124-130, 2013.
2. **Bubak, A.N.**, Renner, K.J., Swallow, J.G.: Heightened serotonin influences contest outcome and enhances expression of high-intensity aggressive behaviors. *Behav. Brain Res.* 259:137-142, 2014.
3. **Bubak, A.N.**, Grace, J.L., Watt, M.J., Renner, K.J., Swallow, J.G.: Neurochemistry as a bridge between morphology and behavior: perspectives on aggression in insects. *Curr. Zool.* 60:778-790, 2014.
4. **Bubak, A.N.**, Rieger, N.S., Watt, M.J., Renner, K.J., Swallow, J.G.: David vs. Goliath: Serotonin modulates opponent perception between smaller and larger rivals. *Behav. Brain Res.* 292:521-527, 2015.
5. **Bubak, A.N.**, Redmond Jr, D.E., Elsworth, J.D., Roth, R.H., Collier, T.J., Bjugstad, K.B., Blanchard, B.C., Sladek Jr., J.R.: A potential compensatory role for endogenous striatal tyrosine hydroxylase-positive neurons in a nonhuman primate model of Parkinson's disease. *Cell Transplant.* 24:673-680, 2015.
6. **Bubak, A.N.**, Elsworth, J.D., Sladek, J.R.: Animal models in regenerative medicine. In: *Stem Cells in Regenerative Medicine: Science, Regulation and Business Strategies* (Vertes, A.A., Qureshi, N., Caplan, A.I., Babiss, L.E., eds.), Wiley-Blackwell Publishing, Oxford, Chap. 16:301-316, 2015.
7. **Bubak, A.N.**, Yaeger, J.D., Renner, K.J., Swallow, J.G., Greene, M.J.: Neuromodulation of nestmate recognition decisions by pavement ants. *PLoS One* 11:e0166417, 2016.
8. Swallow, J.G., **Bubak, A.N.**, Grace, J.L.: (Editorial) The role of monoamines in modulating behavior. *Curr. Zool.* 62:253-255, 2016.
9. **Bubak, A.N.**, Gerken, A.R., Watt, M.J., Costabile, J.D., Renner, K.J., Swallow, J.G.: Assessment strategies and fighting patterns in animal contests: a role for serotonin? *Curr. Zool.* 62:257-263, 2016.
10. Hoover, K.M., **Bubak, A.N.**, Law, I.J., Yaeger, J.D., Renner, K.J., Swallow, J.G., Greene, M.J.: The organization of societal conflicts by pavement ants *Tetramorium caespitum*: an agent-based model of amine-mediated decision making. *Curr. Zool.* 62:277-284, 2016.
11. **Bubak, A.N.**, Como, C.N., Blackmon, A.M., Fietze, S., Mescher, T., Jones, D., Cohrs, R.J., Paucek, P., Baird, N.L., Nagel, M.A.: Varicella zoster virus induces nuclear translocation of the neurokinin-1 receptor, promoting lamellipodia formation and viral spread in spinal astrocytes. *J. Infect. Dis.* 218:1324-1335, 2018.
12. Nagel, M.A., **Bubak, A.N.**: Varicella zoster virus vasculopathy. *J. Infect. Dis.* 218:S107-S112, 2018.

13. **Bubak, A.N.**, Como, C.N., Blackmon, A.M., Jones, D., Nagel, M.A.: Varicella zoster virus differentially alters morphology and suppressed proinflammatory cytokines in primary human spinal cord and hippocampal astrocytes. *J. Neuroinflammation* 15:318; doi: 10.1186/s12974-018-1360-9, 2018.
14. Como, C.N., **Bubak, A.N.**, Blackmon, A.M., Jones, D., Mueller, N.H., Davidson, R., Nagel, M.A.: Varicella zoster virus induces differential cell-type specific responses in human corneal epithelial cells and keratocytes. *Invest. Ophthalmol. Vis. Sci.* 60:704-711, 2019.
15. **Bubak, A.N.**, Watt, M.J., Renner, K.J., Luman, A.A., Costabile, J.D., Sanders, E.J., Grace, J.L., Swallow, J.G.: Sex differences in aggression: Differential roles of 5-HT₂, neuropeptide F and tachykinin. *PLoS One* 14:e0203980, 2019.
16. Jones, D., Como, C.N., Jing, L., Blackmon, A., Neff, C.P., Krueger, O., **Bubak, A.N.**, Palmer, B.E., Koelle, D.M. Nagel, M.A.: 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.* 15:e1007650, 2019.
17. Blackmon, A.M., Como, C.N., **Bubak, A.N.**, Mescher, T., Jones, D., Nagel, M.A.: Varicella zoster virus alters expression of cell adhesion proteins in human perineurial cells via interleukin 6. *J. Infect. Dis.* 220:1453-1461, 2019.
18. Nagel, M.A., **Bubak, A.N.**: (Editorial) Herpes zoster, a rash of cerebrovascular events. *Mayo Clin. Proc.* 94:742-744, 2019.
19. **Bubak, A.N.**, Watt, M.J., Jazmine D. W. Yaeger., Renner, K.J., Swallow, J.G.: The stalk-eyed fly as a model for aggression - is there a conserved role for 5-HT in aggression between vertebrates and invertebrates? *J. Exp. Biol.* 223:jeb132159, 2020.
20. **Bubak, A.N.**, Como, C.N., Coughlan, C.M., Johnson, N.R., Hassell, J.E. Jr., Mescher, T., Niemeyer, C.S., Mahalingam, R., Cohrs, R.J., Boyd, T.D., Potter, H., Russ, H.A., Nagel, M.A.: Varicella-zoster virus infection of primary human spinal astrocytes produces intracellular amylin, amyloid- β , and an amyloidogenic extracellular environment. *J. Infect. Dis.* 221:1088-1097, 2020.
21. Nagel, M.A., Niemeyer, C.S., **Bubak, A.N.**: Central nervous system infections produced by varicella zoster virus. *Curr. Opin. Infect. Dis.* 33:273-278, 2020.
22. **Bubak, A.N.**, Beseler, C., Como, C.N., Tying, S.K., Haley, C., Mescher, T., Hassell, J.E. Jr., Cohrs, R.J., Potter, H., Nagel, M.A.: Acute zoster plasma contains elevated amyloid, correlating with A β 42 and amylin levels, and is amyloidogenic. *J. NeuroVirol.* 26:422-428, 2020.
23. Hudish, L., **Bubak, A.N.**, Triolo, T., Niemeyer, C.S., Sussel, L., Nagel, M.A., Taliaferro, M.J., Russ, H.A.: Modeling hypoxia induced neuropathies using a fast and scalable human motor neuron differentiation system. *Stem Cell Reports* 14:1033-1043, 2020.

24. Baxter, B.D., Larson, E.D., Feinstein, P., Polese, A.G., **Bubak, A.N.**, Niemeyer, C.S., Hassell, J. Jr., Merle, L., Shepherd, D., Ramakrishnan, V.R., Nagel, M.A., Restrepo, D.: Transcriptional profiling reveals TRPM₅-expressing cells involved in viral infections in the olfactory epithelium. *bioRxiv* doi: 10.1101/2020.05.14.096026, 2020.
25. **Bubak, A.N.**, Traina-Dorge, V., Como, C.N., Feia, B., Pearce, C.M., Doyle-Meyers, L., Das, A., Looper, J., Mahalingam, R., Nagel, M.A.: Elevated serum substance P during simian varicella virus infection in rhesus macaques; implications for chronic inflammation and adverse cerebrovascular events. *J. NeuroVirol.* 26:945-951, 2020.
26. **Bubak, A.N.**, Beseler, C., Como, C.N., Coughlan, C.M., Johnson, N.R., Hassell, J.E. Jr., Burnet, A.M., Mescher, T., Schmid, D.S., Coleman, C., Mahalingam, R., Cohrs, R.J., Boyd, T.D., Potter, H., Shilleh, A.H., Russ, H.A., Nagel, M.A.: Amylin, A β 42, and amyloid in VZV vasculopathy cerebrospinal fluid and infected vascular cells. *J. Infect. Dis.* 223:1284-1295, 2020.
27. Mescher, T., Boyer, P.J., **Bubak, A.N.**, Hassell, J.E. Jr., Nagel, M.A.: Detection of varicella zoster virus antigen and DNA in two cases of cerebral amyloid angiopathy. *J. Neurol. Sci.* 422:117315, 2021.
28. Baxter, B.D., Larson, E.D., Merle, L., Feinstein, P., Polese, A.G., **Bubak, A.N.**, Niemeyer, C.S., Hassell, J. Jr., Shepherd, D., Ramakrishnan, V.R., Nagel, M.A., Restrepo, D.: Transcriptional profiling reveals potential involvement of microvillous TRPM₅-expressing cells in viral infection of the olfactory epithelium. *BMC Genomics* 22:224, 2021.
29. Niemeyer, C.S., Mescher, T., Griggs, R., Orlicky, D.J., Wilkerson, G.K., **Bubak, A.N.**, Hassell, J.E. Jr., Feia, B., Mahalingam, R., Traina-Dorge, V., Nagel, M.A.: Histopathological analysis of adrenal glands after simian varicella virus infection. *Viruses* 13:1245; doi: 10.3390/v13071245, 2021.
30. **Bubak, A.N.**, Mescher, T., Mariani, M., Fietze, S.E., Hassell, J.E. Jr., Niemeyer, C.S., Como, C.N., Burnet, A.M., Subramnian, P.S., Cohrs, R.J., Mahalingam, R., Nagel, M.A.: Targeted RNA sequencing of formalin-fixed, paraffin-embedded temporal arteries from giant cell arteritis cases reveals viral signatures. *Neurol. Neuroimmunol. Neuroinflamm.* 8:e1078; doi: 10.1212/NXI.0000000000001078, 2021.
31. **Bubak, A.N.**, Como, C.N., Hassell, J.E. Jr., Mescher, T., Fietze, S.E., Niemeyer, C.S., Cohrs, R.J., Nagel, M.A.: Targeted RNA sequencing of VZV-infected brain vascular adventitial fibroblasts indicates that amyloid may be involved in VZV vasculopathy. *Neurol. Neuroimmunol. Neuroinflamm.* 9:e1103; doi: 10.1212/NXI.0000000000001103, 2022.
32. Niemeyer, C.S., Mescher, T., **Bubak, A.N.**, Medina, E.M., Hassell, J.E. Jr., Nagel, M.A.: VZV infection of primary human adrenal cortical cells produces a proinflammatory environment without cell death. *Viruses* 14:674; doi: 10.3390/v14040674, 2022.
33. Sarkar, L., Oko, L., Gupta, S., **Bubak, A.N.**, Das, B., Gupta, P., Safiriyu, A.A., Singhal, C., Neogi, U., Bloom, D., Banerjee, A., Mahalingam, R., Cohrs, R.J., Koval, M., Shindler, K.S., Pal, D., Nagel, M., Das Sharma, J.: *Azadirachta indica* A. Juss bark extract and its Nimbin isomers restrict β -coronaviral infection and replication. *Virology* 569:13-28, 2022.

34. Mahalingam, R., Feia, B., Coleman, C., Anupindi, K., Saravanan, P., Luthens, A., Bustillos, A., Das, A., de Haro, E., Doyle-Meyers, L., Looper, J., **Bubak, A.N.**, Niemeyer, C.S., Palmer, B., Nagel, M.A., Traina-Dorge, V.: Simian varicella virus pathogenesis in skin during varicella and zoster. *Viruses* 14:1167; doi: 10.3390/v14061167, 2022.
35. **Bubak, A.**, Swallow, J., Adeola, F., Lailvaux, S.P.: Maximum performance expression is affected by octopamine and antennae removal in *Acheta domesticus*. *Behavioral Ecology*, arac036, 2022.
36. Laurel Darragh, Michael Knitz, Eric Clambey, Junxiao Hu, Jennifer Backus, Andrew Dumit, **Andrew Bubak**, Casey Greene, Timothy Waxweiler, Von Samedi, Sanjana Mehrotra, Jacob Gadwa, Shilpa Bahtia, Thomas Bickett, Miles Piper, Kareem Fakhoury, Arthur Liu, Joshua Petit, Daniel Bowles, Kimberly Attiyeh, Julie Goddard, Adrie Van Bokhoven, Kimberly Jordan, Angelo D'Alessandro, David Raben, Antonio Jimeno, Jessica McDermott, and Sana Karam: Towards a mechanistic understanding of patient response to neoadjuvant SBRT with anti-PDL1 in human HPV-unrelated locally advanced HNSCC: Phase I/Ib trial results. *Nature Cancer*, 2022. pp. 1-18.
37. **Bubak, A.N.**, Coughlan, C., Posey, J., Saviola, A.J., Niemeyer, C.S., Lewis, S.W.R., Bustos Lopez, S., Solano, A., Tying, S.K., Delaney, C., Neeves, K.B., Mahalingam, R., Hansen, K.C., Nagel, M.A. Zoster-associated prothrombotic plasma exosomes and increased stroke risk. *J. Infect. Dis.*, 2022.
38. **Bubak, A.N.**, Merle, L., Niemeyer, C.S., Dnate' Baxter, B., Polese, A.G., Ramakrishnan, V., Gomez, J., Madrigal, L., Villegas-Lanau, A., Lopera, F., Macklin, W., Fietze, S., Nagel, M.A., Restrepo, D. Signatures for viral infection and inflammation in the proximal olfactory system in familial Alzheimer's disease. *Neurobiology of Aging*. 2023 Mar 1;123:75-82.
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Non-peer reviewed

1. **Andrew N. Bubak**, "Chickenpox and shingles virus lying dormant in your neurons can reactivate and increase risk of stroke – new research identified a potential culprit" *The Conversation*. Dec. 20, 2022. <https://theconversation.com/chickenpox-and-shingles-virus-lying-dormant-in-your-neurons-can-reactivate-and-increase-your-risk-of-stroke-new-research-identified-a-potential-culprit-194627>
2. **Andrew N. Bubak**, Diego Restrepo, Maria A. Nagel, "Vaccination to prevent dementia? New research suggests one way viral infections can accelerate neurodegeneration" *The Conversation*. Jan. 18, 2023. <https://theconversation.com/vaccination-to-prevent-dementia-new-research-suggests-one-way-viral-infections-can-accelerate-neurodegeneration-197009>

