DENUSHA SHRESTHA
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Research statement

I am an Assistant Professor of Veterinary Anatomy, and my research focuses on pulmonary inflammation and infectious pulmonary diseases. As a graduate student, I was actively involved in understanding lung inflammation induced by organic dust and hydrogen sulfide exposure in different *in vitro* models (human bronchial epithelial cells, primary cell cultures, air-liquid interface cultures, precision lung slice cultures) and *in an in vivo* model (mice), and in how exposure to organic dust and hydrogen sulfide increased the susceptibility of mice to Klebsiella pneumoniae infection. Currently, I am focusing on developing lung organoid models from different farm animals, including pigs, cattle, and bison. I plan to use this in vitro model (pig lung organoid) to study influenza virus-induced lung inflammation.

Education

PhD in Veterinary Anatomy, Iowa State University 2016-2022
BVSc & AH, IAAS, Nepal 2009-2014

Professional experience

Assistant Professor (Veterinary Anatomy) in College of Veterinary Medicine, Arkansas State University 07/2026-present

Assistant Professor (Veterinary Anatomy) in Department of Veterinary Biomedical Sciences, South Dakota State University 03/2023-05/2026

Teaching

- Primary instructor for veterinary anatomy, Microscopic anatomy and Non-traditional Pets
- Design course and develop lecture material

Research

- Understand the influenza virus induced lung inflammation in lung organoid model

Service

- Member for Dean's Faculty Advisory Committee (2024-2026)
- UMN DVM scholarship committee for the University of Minnesota (2024)

Mentoring

a. Master's student
   i. Ashma Pandey, MS 2024, "WIC infant formula: A comparative analysis of winning and losing bids from major manufacturers."

Graduate representative

ii. Mahmuda Akter, MS 2025, "Impact of Laccase enzyme on the functionality of. Milk protein concentrate and micellar casein concentrate."
Graduate representative

b. Doctoral Student
Ramchander Nadipelly, 2023-present, PhD candidate in Mor lab
Committee member/Co-advisor

Assistant Teaching Professor (Veterinary Anatomy) in Department of Biomedical Sciences, Iowa State University 08/2022-03/2023

Postdoc Research associate in Veterinary Parasitology, Iowa State University 06/2022-08/2022

- Cell isolation from gut of nematode

Scientist at Nepal Agriculture Research Council, Khumaltar, Kathmandu, Nepal. 09/2015-07/2016

Technical officer at Winrock, Nepal 07/2015-09/2015

Lab intern at Central Veterinary Laboratory, Kathmandu, Nepal 02/2014-07/2015
Lab techniques (ELISA, Culturing)
Intern at Central Veterinary Hospital, Kathmandu, Nepal

- Attending medical and surgical cases under the supervising veterinarian
- Case preparation and support and overall management of clinic activities

Research Associate at Development Vision Nepal (A non-profit organization) 02/2014-05/2014

- Study of Priority Zoonotic Diseases in Palpa district, Nepal
- Evaluation of Socio-economic Impact of zoonotic diseases, report preparation

Teaching experience

1. Vet 622/622L- Anatomy II -(2+2 PPVM) I (1st year DVM) Spring 2026/2025/2024
2. Vet 63- Non-Traditional Pets- (2+2 PPVM) I (1st year DVM) Spring 2026
3. Vet 603/603L- Anatomy I - (2+2 PPVM) I (1st year DVM) Fall 2023/2024/2025
4. Vet 601/601L- Microscopic Anatomy I-(2+2 PPVM) I (1st year DVM) Fall 2025
5. BMS 331- Principles of Morphology II (1st year DVM) Spring 2023
6. BMS 330- Principles of Morphology I (1st year DVM) Fall 2022

Poster presentations

1. CVM Summer Scholar Research Day, August 2017- Poster "Swine Barn Dust Induced Lung Inflammation and Expression of Transient Receptor Potential Ankyrin 1 (TRPA1)".
2. Global Toxicology CSSOT, Sept 2017- Poster "Swine Barn Dust Induced Lung Inflammation and Expression of Transient Receptor Potential Ankyrin 1 (TRPA1)".
3. American Thoracic Society, May 2019- Poster "Hydrogen sulfide exposure modulates innate responses to lipopolysaccharide and organic dust"
4. American Thoracic Society, May 2020- Poster "Repeated Exposure to H_2S and Organic Dust Increases Susceptibility to Klebsiella pneumoniae Infection of the Airway Epithelium" (Accepted)
5. CVM Research Day, August 2020- Poster "Repeated Exposure to H_2S and Organic Dust Increases Susceptibility to Klebsiella pneumoniae Infection of the Airway Epithelium"
6. International Society Cell and Gene therapy, May 2021- Poster "In Vitro Evaluation of Umbilical Cord Tissue-Derived Mesenchymal Stromal Cells to Alleviate Occupational Lung Disease."
7. American Thoracic Society, May 2022- Poster "NRF2- activation via RTA-408 partially rescues organic dust induced lung inflammation and increased systemic invasion of Klebsiella pneumoniae in a mouse model"

Awards

1. Iowa State University Research Excellence Award, 2022
1. The Lora and Russ Talbot Graduate Fellowship- Iowa State University, 2020
2. Won 3rd place in poster presentation in ISU CVM Research Day 2020
3. CGRER travel award, 2020
4. GPSS-PAG travel award, 2020
5. Iowa State University Teaching Excellence Award (BMS 538X), 2019
6. CGRER travel award, 2019
7. GPSS-PAG travel award, 2019
8. International Graduate Student Travel Award, 2019
9. Awarded with University Merit Scholarship by IAAS Rampur, Chitwan, Nepal (Based on academic performance, this award provided fee waiver for 8 of the 9 semesters of BVSc & AH study)
10. Scholarship for 3-week Diploma Course on Global Health organized in August 2015 by Tribhuwan University and University of Tampere.

Grant

1. "Reducing Disease Risks and Strengthening Producer Profitability Through an Integrated Animal Housing–Controlled Environment Agriculture System" - Co-PI
   Granting agency- USDA-NIFA
   Under review

Publications

1. Nyzil Massey, Sanjana Mahadev Bhat, **Denusha Shrestha**, Emir Malovic, Locke A Karriker, Shivani Choudhary, Alan P Robertson, Hai Minh Nguyen, Heike Wulff, Anumantha G Kanthasamy, Chandrashekhar Charavaryamath. Kv1. 3 as an upstream regulator of oxidative stress-mediated neuroinflammation following organic dust exposure in murine in vitro, ex vivo, and in vivo models. Frontiers in Toxicology, 2026 March 2026. https://doi.org/10.3389/ftox.2026.1765108
2. **Denusha Shrestha**, Nyzil Massey, Sanjana Mahadev Bhat, Tomislav Jelesijević, Orhan

Sahin, Qijing Zhang, Kristina Bailey, Jill A. Poole, Chandrashekhar Charavaryamath. Nrf2 activation protects against organic dust and hydrogen sulfide exposure induced epithelial barrier loss and K. pneumoniae invasion. Frontiers Cellular and Infection Microbiology, 2022 April 19. https://doi.org/10.3389/fcimb.2022.848773

3. Nyzil Massey, **Denusha Shrestha**, Sanjana Mahadev Bhat, Piyush Padhi, Chong Wang Locke A. Karriker, Jodi L. Smith, Anumantha G. Kanthasamy, Chandrashekhar Charavaryamath. Mitoapocynin attenuates organic dust exposure induced neuroinflammation and sensory-motor deficits in a mouse model: Relevance to the role of lung-brain axis in the pathogenesis of chronic neurological diseases during environmental organic dust exposure. Frontiers in Cellular Neuroscience, 2022 April 13. doi: 10.3389/fncel.2022.817046
4. Sanjana Mahadev Bhat, Nyzil Massey, **Denusha Shrestha**, Locke A Karriker, Tomislav Jelesijevic, Chong Wang, Chandrashekhar Charavaryamath. Transcriptomic and ultrastructural evidence indicate that anti-HMGB1 antibodies rescue organic dust-induced mitochondrial dysfunction. Cell Tissue Res. 2022 March 4. https://doi.org/10.1007/s00441-022-03602-3
5. Sanjana Mahadev Bhat, **Denusha Shrestha**, Nyzil Massey, Locke A Karriker, Anumantha G Kanthasamy, Chandrashekhar Charavaryamath. Organic dust exposure induces stress response and mitochondrial dysfunction in monocytic cells. Histochemistry and Cell Biology. 2021. https://doi.org/10.1007/s00418-021-01978-x
6. Nyzil Massey, **Denusha Shrestha**, Sanjana Mahadev Bhat, Naveen Kondru, Adhithiya Charli, Locke A Karriker, Anumantha G Kanthasamy, Chandrashekhar Charavaryamath. Organic dust-induced mitochondrial dysfunction could be targeted via cGAS-STING or cytoplasmic NOX-2 inhibition using microglial cells and brain slice culture models. Cell Tissue Res. 2021. 10.1007/s00441-021-03422-x
7. Cristina M. Santana, Phillip Gauger, Amber Vetger, Drew Magstadt, Dong-Suk Kim, **Denusha Shrestha**, Chandrashekhar Charavaryamath, and Wilson K. Rumbeiha. "Ambient hydrogen sulfide exposure increases the severity of influenza A virus infection in swine." Archives of Environmental & Occupational Health (2021): 1-13. https://doi.org/10.1080/19338244.2021.1896986

8. **Denusha Shrestha**, Sanjana Mahadev Bhat, Nyzil Massey, Cristina Santana Maldonado, Wilson K. Rumbeiha, Chandrashekhar Charavaryamath. Pre-exposure to hydrogen sulfide modulates the innate inflammatory response to organic dust. Cell Tissue Res. 2021 Jan 6. doi: https://doi.org/10.1007/s00441-020-03333-3
9. S Mahadev Bhat, **D Shrestha**, N Massey, LA Karriker, A Kanthasamy, C Charavaryamath. Organic Dust Exposure Induces Mitochondrial Damage and Mitochondrial DNA Release and Organelle Targeted Antioxidant Therapy Appears Protective. American Thoracic Society (May 2019). https://www.atsjournals.org/doi/pdf/10.1164/ajrccmhttps://www.atsjournals.org/doi/pdf/10.1164/ajrccm-conference.2019.199.1_MeetingAbstracts.A2767conference.2019.199.1_MeetingAbstracts.A2767
10. Nyzil Massey, **Denusha Shrestha**, Sanjana Mahadev-Bhat, Locke A Karriker, Anumantha G Kanthasamy, Chandrashekhar Charavaryamath. Organic Dust Induces Mitochondrial and ER Stress Response in Activated Microglia. The FASEB Journal. The Federation of American Societies for Experimental Biology, 2019. https://www.fasebj.org/doi/abs/10.1096/fasebj.2019.33.1_supplement.451.3 https://www.fasebj.org/doi/abs/10.1096/fasebj.2018.32.1_supplement.781.7
11. **D Shrestha**, S Mahadev Bhat, N Massey, C Santana, WK Rumbeiha, LA Karriker, C

Charavaryamath. Hydrogen Sulfide Exposure Modulates Innate Responses to Lipopolysaccharide and Organic Dust. American Thoracic Society (May 2019). https://www.atsjournals.org/doi/pdf/10.1164/ajrccm-conference.2019.199.1_MeetingAbstracts.A2770

12. KM Feye, Joseph S Smith, Lionel Sebbag, AE Hohman, Sreemoyee Acharya, Benjamin K Schneider, JT Tucker, Lucia A Cherep, BR Nordeng, AL Richardson, Meghan C Gage, Diou Luo, **Denusha Shrestha**, Patricia Izbicki, Emir Malovic, MA Jefferson, Sireesha Manne, Pongrat Jaisil, Naveen Kondru, Nyzil Massey, Brandon S Klinedinst, Steve A Carlson. Veterinary Considerations for the Theoretical Resurrection of Extinct Species. Journal of Veterinary Science & Animal Husbandry (2018). https://www.researchgate.net/profile/Sireesha_Manne/publication/330929529_Veterinary_Considerations_for_the_Theoretical_Resurrection_of_Extinct_Species/links/5c6c7176a6fdcc404ebee71a/Veterinary-Considerations-for-the-Theoretical-Resurrection-of-Extinct-Species.pdf
13. Nyzil Massey, Sreekanth Puttachary, Sanjana Mahadev-Bhat, **Denusha Shrestha**, Anumantha G Kanthasamy, Chandrashekhar Charavaryamath. Ethyl Pyruvate Reduces Swine Barn Dust Exposure Induced Brain Microglial Cell Inflammatory Responses via Targeting HMGB1-RAGE Signaling. The FASEB Journal. The Federation of American Societies for Experimental Biology 2018.
14. Garrett R Schmidt-McCormack, Kristina M Feye, Sreemoyee Acharya, Gregory SA Mlynarczyk, Stephen A Anderson, Patricia Izbicki, Emir Malovic, KC Luna, Joseph S Smith, Matthew A Jefferson, Aron Nakama, Kasandra Diaz Santana, Naveen C Kondru, Michael D Kleinhenz, James G Tipton, Shivani Choudhary, Robin D Kokemuller, Sireesha Manne, Marson R Putra, Nyzil Massey, **Denusha Shrestha**, Diou Luo, Shaunik Sharma, Pongrat Jaisil, Carrie A Berg, Steve A Carlson. Theoretical Engineering of the Gut Micro biome for the Purpose of Creating Superior Soldiers. Journal of Medical and Health Sciences (2017). https://lib.dr.iastate.edu/vdpam_pubs/133/
15. Nyzil Massey, Sreekanth Puttachary, Sanjana Mahadev-Bhat, **Denusha Shrestha**, Anumantha G Kanthasamy, Chandrashekhar Charavaryamath. Swine Barn Dust Exposure Activates Microglia through Induction of Oxidative Stress and the Resultant Neuroinflammation Appears to Involve HMGB1 and RAGE Signaling. The FASEB Journal. The Federation of American Societies for Experimental Biology 2017. https://www.fasebj.org/doi/abs/10.1096/fasebj.31.1_supplement.747.2
16. Gaurav Rawal, **Denusha Shrestha**, & Sikesh Manandhar. Nettle as immunomodulator and growth promoter in Poultry. www.farm.com.np
17. Gaurav Rawal, **Denusha Shrestha**. Sero-detection of Leptospira hardjo in Cattle of Bhaktapur District of Nepal. International Journal of Applied Sciences and Biotechnology, 2019.
18. **Denusha Shrestha**, Gaurav Rawal, Balaram Thapa, Santosh Dhakal & Bishwas Sharma. 2015 "Prevalence of the Demodectic Mange in canines of Kathmandu Valley having skin disorders & its associated risk factors". in International Journal of Applied Sciences and Biotechnology.
19. Gaurav Rawal, **Denusha Shrestha**. & Pragya Koirala. 2014 'Sero-prevalence of Leptospira hardjo in Cattle of Bhaktapur district, Nepal' published in the Proceedings of Scientific Presentation and Conference Information, 2014.

Leadership

1. Advisor for Nepalese Student Association in SDSU (2024-2025)
2. Member of the American Thoracic Society

3. Vice president (Membership) at Toastmaster International Club, Ames, Iowa (July 2018-April 2019)
4. Social Chair of Nepal Student Association (NSA) Ames, Iowa from 2017-2018
5. Secretary at Toastmaster International Club, Ames, Iowa (May 2017-June 2018)
6. Elected Research and Communication coordinator of Nepal Veterinary Student Association 16th committee, 2012
7. Coordinated several animal health camps and cultural programs
8. Past member of the Red Cross and the Rotaract Club of Narayangarh