

Pavan Muttil, Ph.D.

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EDUCATIONAL HISTORY

2006 *Ph.D.* Division of Pharmaceutics
Central Drug Research Institute, Lucknow, India.
Thesis title: "Targeted delivery of inhalable microparticles for pulmonary tuberculosis"
Thesis Mentor: Amit Misra, Ph.D.

2001 *M.Pharm.* Birla Institute of Technology & Science, Pilani, India

1999 *B.Pharm.* Dr. K.N. Modi Institute of Pharmaceutical and Educational Research, Modinagar, India

EMPLOYMENT HISTORY

2016 - Present Associate Professor
Department of Pharmaceutical Sciences
College of Pharmacy
The University of New Mexico
Albuquerque, NM, USA

2010 - 2016 Assistant Professor
Department of Pharmaceutical Sciences
College of Pharmacy
The University of New Mexico
Albuquerque, NM, USA

2006 – 2009 Post-doctoral fellowship
Advisor- Anthony J. Hickey, Ph.D.
School of Pharmacy, The University of North Carolina, Chapel Hill, USA

2001 – 2002 Cadila Pharmaceuticals Ltd., Ahmedabad, India
Formulation & Development (F&D) Scientist

CONCURRENT AFFILIATIONS AT UNM

2011 – present The University of New Mexico School of Medicine, Center for Infectious Disease and Immunity (CIDI)
Role- Member

2010 – present The University of New Mexico, Comprehensive Cancer Center

2010 – present Role- Full Member in Cancer Therapeutics: Technology, Discovery, and Targeted delivery
The University of New Mexico, School of Engineering Nanoscience and Microsystems Engineering (NSMSE) Graduate Program
Role- Faculty Member

2010 – present The University of New Mexico, Cancer Nanotech Training Center
Role- Faculty Mentor

RESEARCH SUPPORT

Current Grant and Contract Funding:

NIH/NICHHD R21 (HD095100) 08/01/2018- 07/31/21

Aqueous-based two-step spray drying as a taste masking drug delivery platform

PI: Linda Felton

Percent Effort: 10%

My role: Co-PI- To formulate an oral pediatric taste-masking formulation using the spray drying technique

NIH/NIAID R43 (AI 141311) 09/01/2018- 05/31/21

An inhaled clofazimine formulation for the treatment of tuberculosis

PI: Jared Mike (Lynntech Inc.)

Percent Effort: 5%

My role: Co-PI- To formulate a dry powder formulation containing clofazimine for pulmonary delivery against tuberculosis

NIH/NHLBI (1R43HL147749-01A1) 09/01/2020- 03/30/21

Development of NH101: A Simple and Efficient Outpatient Dry Powder Amphotericin B-DryNeb(dry powder nebulizer) for Treatment of Susceptible and Multidrug-Resistant Aspergillus/ Fungal Infections

PI- Dr. Pavan Muttill

Percent Effort: 5%

My role- To characterize dry powders for inhalation and a novel dry powder inhaler using a Next Generation Impactor (NGI)

Total budget: **\$30,000**

NIH/NIGMS STTR (UT2GM130175) 07/01/2020- 06/30/21

Multi-layered microneedles for delivering VLP-based vaccines

PI: Neil Fanger, Virtici, Inc.

UNM PI: Pavan Muttill

Percent Effort: 4%

My role: To formulate and characterize novel microneedles for vaccine and adjuvant delivery in mouse models.

Total proposed budget: **\$50,000**

NIH/NCATS (UL1TR001449) 08/01/2020- 05/31/21

Development of a Smart-Inhaler to Improve Care for Asthma Patients

PI: Pavan Muttill

Percent Effort: NA

My role: The purpose of this study is to develop a smart inhaler that will improve patient compliance

Total proposed budget: **\$10,000**

Submitted/Pending Grants:

NIH/NIAID R21 (PA-20-195) 09/01/2021- 09/31/23

HPV vaccination using layered-microneedles

PI: Pavan Muttill

Percent Effort: 15%

My role: To formulate and characterize microneedles containing VLP-based vaccines against HPV and evaluate efficacy in preclinical animals

Total proposed budget: **\$416,625**

NIH/NIAID R21 (PA-20-195)

05/01/2021- 05/31/23

Oral soluble films for delivering anti-TB drugs

PI: Pavan Muttill

Percent Effort: 15%

My role: To formulate and characterize oral soluble films containing multiple drugs against tuberculosis and evaluate efficacy in preclinical animals

Total proposed budget: **\$416,625**

Completed Grant and Contract Funding:

NIH/NIAID SBIR (R44AI120260)

01/01/2020- 11/30/20

PI- Gregory Tobin, Biological Mimetics, Inc.

Development of an improved, low-cost polio vaccine (Ir-IPV)

PI- Pavan Muttill

My role- To stabilize a novel polio vaccine using spray-drying and freeze-drying for long-term storage at extreme conditions.

Total budget: **\$9,266**

National Research Foundation (Grant# 105830, South Africa)

06/15/2017- 06/30/19

Inhaled BCG vaccine for enhanced protection against tuberculosis

PI- Dr. Bernard Fourie (the University of Pretoria, Faculty of Health Sciences, South Africa)

My role- Co-PI- To formulate and characterize a temperature-stable BCG vaccine in a dry powder form that will be administered in guinea pigs as aerosols.

Total budget (direct): **\$48,000**

NCI Experimental Therapeutics (NExT) Program Chemical Biology Consortium (CBC)

04/01/2016- 08/31/19

Discovery and development of lactate dehydrogenase A (LDHA) inhibitors

PI- Dr. Larry Sklar

My role- Co-PI- To formulate drug delivery systems and explore different routes of administration for LDHA inhibitors to improve bioavailability in preclinical animal models

My effort: 10%

NIH/NIAID R15 (AREA: PA13-313)

02/01/2017- 07/31/18

Development of a multi-epitope bacteriophage VLPs vaccine to enhance protection against oral HPV infections in HIV patients

Percent effort- 5.0%

PI: Dr. Ebenezer Tumban (Michigan Technical University)

My role: Co-Investigator: To formulate heat-stable VLPs using spray freeze-drying

Total budget: **\$44,518**

American Cancer Society (IRG-14-187-19)

10/01/2016- 06/30/18

Aerosolized chemo- and immunotherapy against non-small cell lung cancer

My role- Principal Investigator- To evaluate a combination chemo-immunotherapy, when delivered by the pulmonary route, to treat lung cancer in preclinical animal models.

Total budget: **\$30,000**

Environmental Health Sciences Pilot Research Award

10/01/2017- 06/30/18

Exposure to environmental arsenic adversely impact immune response to the BCG vaccine

My role- Principal Investigator- To evaluate the immunosuppressive effect of arsenic exposure toward intradermally delivered BCG vaccine in mice.

Total budget: **\$7,300**

CTSC pilot grant 06/01/2017- 03/31/18

Protective efficacy of spray-dried HPV vaccine, Gardasil 9

My role- Principal Investigator- To evaluate the temperature stability of the commercially available HPV vaccine, Gardasil 9, after spray drying. The efficacy of the spray-dried vaccine will be evaluated in mice.

Total budget: **\$16,000**

UNM College of Pharmacy Research Pilot Project 01/01/2016- 06/30/17

Efficacy of 'needle-free' immunization with Virus-Like Particles against Staphylococcus aureus (SA) skin infection

My role- Principal Investigator- To formulate a microneedle containing heat stable VLPs against a mouse model of *Staphylococcus Aureus* skin infection

Total budget: **\$25,000**

Defense Threat Reduction Agency (DTRA) (CBM-VAXBT1) 11/01/2014- 12/31/15

Evaluation of novel subunit tularemia vaccines in rat and non-human primate aerosol infection models (Option period)

Percent Effort: 35%

PI: Terry Wu (UNM Department of Internal Medicine)

My role: Co-Investigator: Long-term thermostability of live *Listeria monocytogenes* dry powder vaccine and *in vivo* delivery by the pulmonary route

Total budget for Muttill's efforts: **\$258,365**

NIH/NIAID U19 (AI113187) 09/01/2014- 08/31/15

Epidemiology and Prevention Interdisciplinary Center for Sexually Transmitted Infections (EPIC-STI) (Center Director: Cosette M. Wheeler, Department of Pathology, UNM)

Project #2- *Discovery and Refinement of Preventive STI Vaccines Targeting Critical Epitopes of human papillomavirus (HPV) and chlamydia trachomatis* (CT) (PI: Bryce Chackerian, Molecular Genetics, and Microbiology, UNM)

Percent Effort: 5%

My role: Co-Investigator: To formulate a heat-stable VLPs vaccine

Nanostructured Active Therapeutic Vehicles Defense Threat Reduction Agency (NATV DTRA) 12/01/2014- 09/31/15

Development of a mesoporous silica nanoparticle-supported lipid bilayer platform for targeted, triggered, sustained, and systemic delivery of antibiotic

Project Director: Carlee Ashley and Jeffery Brinker (Sandia National Laboratories, Albuquerque, New Mexico)

Percent Effort: 25%

My role: Principal Investigator (sub-award): Spray drying nanoparticles (protocells) for increased stability during storage

Total budget: **\$100,000**

Defense Threat Reduction Agency (DTRA) (CBM-VAXBT1) 10/01/2012- 09/31/14

Evaluation of novel subunit tularemia vaccines in rat and non-human primate aerosol infection models (Base period)

PI: Terry Wu (UNM Department of Internal Medicine)

Percent Effort: 35%

My role: Co-Investigator: To formulate live *Listeria monocytogenes* into a dry powder vaccine by spray drying

Total budget for Muttill's efforts: **\$277,379**

Bill and Melinda Gates Grand Challenges Exploration (GCE) Phase I
(Grant No. OPP1061393) 05/01/2012- 10/31/14

Pulmonary BCG immunization for uniform protection against tuberculosis

Percent Effort: 17%

My role: Principal Investigator: To develop an inhaled vaccine against tuberculosis that will overcome the immunosuppressive effects of environmental mycobacteria exposure

Total budget: **\$100,000** (no indirect cost)

HSC Research and Allocation Committee (RAC) grant 09/01/2012- 06/01/13

Radio imaging-based animal model for targeted delivery of inhalable microparticles

Percent Effort: NA

My role: Principal Investigator: UNM Health Science Center (HSC) internal award designed to provide funding for developing preliminary data for extramural grants

Total budget: **\$15,000** (\$5,000 provided by the UNM COP)

HSC research equipment Funding FY12

My role: Principal Investigator: Funds were awarded to purchase a Malvern Dynamic Light Scattering (DLS) device to characterize nanoparticle size and charge

The total cost of the instrument: **\$60,926**

SCHOLARLY ACTIVITIES

ORIGINAL RESEARCH ARTICLES IN REFEREED JOURNALS

* denotes corresponding author

h-index-20

i10-index- 28

Total Citations- 1398

1. Pearce, E., Baca, J.T., Blewett, J.P., Femling, J., Hanson, D., Kraai, E., **Muttill, P.**, Wolf, B., Lauria, M., Braude, D., Campen, M. (2021) Aerosol Generation with Various Approaches to Oxygenation in Healthy Volunteers in the Emergency Department **Journal of the American College of Emergency Physicians Open**, In press
2. Rai, G., ...**Muttill, P.**, ...Maloney, D. J. (2020) Pyrazole-based lactate dehydrogenase (LDH) inhibitors with optimized cell activity and pharmacokinetic properties **Journal of Medicinal Chemistry (Impact factor- 6.26)** 63, 10984-11011 (**Impact factor- 6.20**)
3. Price, D., Kunda, N., Ellis, R., **Muttill, P.*** (2020) Design and optimization of a temperature-stable dry powder BCG vaccine **Pharmaceutical Research** 37(1), 1-14 (**Impact factor- 3.9**)
4. Zhai, L., Yadav, R., Kunda, N.K., Miller, E.K., Anderson, D., Bruckner, E., Basu, R., **Muttill, P.**, Tumban, T. (2019) Oral immunization with bacteriophage MS2-L2 VLPs protects against multiple HPV types associated with head & neck cancers and cervical cancer **Antiviral Research**, 166, 56-65 (**Impact factor- 4.9**)
5. Kunda, N. K.*, Peabody, J., Zhai, L., Price, D., Chackerian, B., Tumban, E., **Muttill, P.*** (2019) Evaluation of the thermal stability and the protective efficacy of liquid and the spray-dried HPV vaccine, Gardasil® 9 **Human Vaccines and Immunotherapeutics**, DOI: 10.1080/21645515.2019.1593727 (**Impact factor- 3.64**)
6. Zychowski, K.E., Wheeler, A., Sanchez, B., Harmon, M., Steadman, C.R., Herbert, G., Lucas S.N., Ali, A., Avasarala, S., Kunda, N.K., Paul, R., **Muttill, P.**, Cerrato, J.M., Bleske, B., Smirnova, O., Campen, M.J. (2019) Toxic effects of particulate matter derived from dust samples near the Dzhidinski ore processing mill, eastern Siberia, Russia **Cardiovascular Toxicology**, 1-11 (**Impact factor- 2.99**)
7. Kunda, N., Price, D., **Muttill, P.*** (2018) Respiratory tract deposition and distribution pattern of microparticles in mice using different pulmonary delivery techniques **Vaccines**, 6(3), 41

8. Zychowski, K.E., Kodali, V., Harmon, M., Tyler, C., Sanchez, B., Ordonez Suarez, Y., Herbert, G., Wheeler, A., Avasarala, S., Cerrato, J.M., Kunda, N.K., **Muttill, P.**, Shuey, C., Brearley, A., Ali, A., Lin, Y., Shoeb, M., Erdely, A., Campen, M.J. (2018) Respirable Uranyl-Vanadate Containing Particulate Matter Derived from a Legacy Uranium Mine Site Exhibits Potentiated Cardiopulmonary Toxicity **Toxicological Sciences**, kfy064 (**Impact factor- 4.08**)
9. Price, D., Stromberg, L. R., Kunda, N., & **Muttill, P. *** (2017) *In vivo* pulmonary delivery and magnetic-targeting of dry powder nano-in-microparticles **Molecular pharmaceuticals**, 14(12), 4741-4750 (**Impact factor- 4.44**)
10. Kunda, N., Hautmann, J., Marshik, P., Chand, R., **Muttill, P.*** (2017) A novel approach to study the plume characteristics from pMDIs using a high-speed infrared camera **International Journal of Pharmaceutics** 526(1), 41-49 (**Impact factor- 3.99**)
11. Peabody, J., **Muttill, P.**, Chackerian, B., Tumban, E. (2017) Characterization of a Spray-dried HPV L2-VLP Vaccine Stored for Multiple Years at Room Temperature. **Papillomavirus Research** 3, 116-120 (**Source normalized impact per paper- 1.96**)
12. Garcia-Contreras, L., Padilla-Carlin, D., Sung, J., VerBerkmoes, J., **Muttill, P.**, Elbert, K., Peloquin, C., Edwards, D., and Hickey, A. (2017) Pharmacokinetics of ethionamide delivered in spray-dried microparticles to the lungs of guinea pigs. **Journal of Pharmaceutical Sciences** 106 (1), 331-337 (**Impact factor- 2.71**)
13. Price, D., McBride, A. A., Anton, M., Kusewitt, D., Norenberg, J. P., Mackenzie, D. A., Thompson, A. A., **Muttill, P.*** (2016) Longitudinal assessment of lung cancer progression in mice using the sodium iodide symporter reporter gene and SPECT/CT imaging. **PLOS one** December 30; 11 (12); e0169107 (**Impact factor- 3.23**)
14. Price, D., Kusewitt, D. F., Lino, C.A., McBride, A. A., Wu, T. H., **Muttill, P.*** (2016) Oral tolerance to environmental mycobacteria interferes with intradermal, but not pulmonary, immunization against tuberculosis. **PLOS Pathogens** May 6;12 (5): e1005614 (**Impact factor: 7.56**)
15. Saboo, S., Tumban, E., Wafula, D., Peabody, J., Peabody, D. S., Chackerian, B., **Muttill, P.*** (2016). An optimized formulation of a thermostable spray-dried virus-like particles vaccine against human papillomavirus. **ACS Molecular Pharmaceutics** 13 (5), 1646-1655 (**Impact factor: 4.38**)
16. Kunda, N. K., Wafula, D., Tram, M., Wu, T., **Muttill, P.*** (2016). An ultra-stable live bacterial vaccine. **European Journal of Pharmaceutics and Biopharmaceutics** Epub- March 25 (**Impact factor: 4.25**)
17. Johnson, P.E., **Muttill, P.**, MacKenzie, D., Carnes, E., Pelowitz, J., Mara, N., Mook, B., Jett, S. Timmins, G.S., Brinker, J. (2015) Spray-dried multiscale nano-bio composites containing living cells. **ACS Nano** 9 (7), 6961-6977 (**Impact factor: 12.88**)
My role: Spray drying of lipid silica nanoparticles that encapsulated live *E. coli* that showed viable but not culturable state of the bacteria
18. Tumban, E., **Muttill, P.**, Escobar, C. A. A., Peabody, J., Wafula, D., Peabody, D. S., & Chackerian, B. (2015) Preclinical refinements of a broadly protective VLP-based HPV vaccine targeting the minor capsid protein, L2. **Vaccine** 29 (33) 3346- 3353 (**Impact factor: 3.62**)
My role: We spray-dried VLPs that demonstrated the integrity and immunogenicity of VLPs in animal models after reconstitution as well as heat stability of dry powder VLPs when stored at 37° C

19. McBride, A. A., Price, D. N., Lamoureux, L. R., Elmaoued, A. A., Vargas, J. M., Adolphi, N. L. and **Muttill, P.* (2013)** Preparation and Characterization of Novel Magnetic Nano-in-Microparticles for Site-Specific Pulmonary Drug Delivery. **ACS Molecular Pharmaceutics** 10 (10) 3574-3581 (**Impact factor: 4.38**)
20. McBride, A. A. and **Muttill, P.* (2013)** A pilot study targeting Nano-in-Microparticles (NIMs) in rat lungs *ex vivo*. **Respiratory Drug Delivery** (2) 423-428
21. Hautmann, J., Godoy, S. E., Marshik, P., Chand, R., McConville, J., Krishna, S., Krishna, S. and **Muttill, P.* (2013)** Effect of time between actuation on the dose variability for three metered dose inhalers. **Respiratory Drug Delivery** (2) 429-434
22. Garcia-Contreras, L., **Muttill, P.**, Fallon, J., Kabadi, M., Gerety, R., and A. Hickey (**2012**) Pharmacokinetics of Sequential Doses of Capreomycin Powder for Inhalation in Guinea Pigs. **Antimicrobial Agents and Chemotherapy** Feb 13, 56 (5)
23. McBride, A. A., Lamoureux, L. R., Price, D. N. and **Muttill, P.* (2012)** Novel preparation and characterization of magnetic nano-in-microparticle dry powders for directed drug delivery: an application to lung cancer. **Respiratory Drug Delivery** (3) 815-820
24. Wang, C., Garcia-Contreras, L., **Muttill, P.**, A. Hickey (**2012**) Isoxyl assays in plasma. **Journal of Pharmaceutical and Biomedical Analysis**. 60, 1-6
25. Sharma, R., Yadav, A. B., **Muttill, P.**, Kajal, H., and A. Misra (**2011**) Inhalable microparticles modify cytokine secretion by lung macrophages of infected mice. **Tuberculosis**. 91 (1), 107-110
26. **Muttill, P.**, Pulliam, B., Garcia-Contreras, L., Fallon, J., Wang, C., Hickey, A. J. and D. A. Edwards (**2010**) Pulmonary immunization of guinea pigs with diphtheria CRM-197 antigen as nanoparticle aggregate dry-powders enhance local and systemic immune responses. **AAPS journal**. 12 (4), 699-707
27. **Muttill, P.**, Prego, C., Garcia-Contreras, L., Pulliam, B., Fallon, J., Wang, C., Hickey, A. J., and D. A. Edwards (**2010**) Immunization of guinea pigs with novel Hepatitis B antigen as nanoparticle aggregate powders administered by the pulmonary route. **AAPS journal**. 12 (3), 330-337
28. Lu, D., Garcia-Contreras, L., **Muttill, P.**, Padilla, D., Xu, D., Liu, J., Braunstein, M., McMurray, D. N., A. J. Hickey (**2010**) Pulmonary immunization using antigen 85-B polymeric microparticles to boost tuberculosis immunity. **AAPS journal**. 12 (3), 338-347
29. Yadav, A. B., **Muttill, P.**, Singh, A. K., Verma, R. K., Mohan, M., Agrawal, A. K., Verma, A. S., Sinha, S. K., A. Misra (**2010**) Microparticles induce variable levels of activation in macrophages infected with *Mycobacterium tuberculosis*. **Tuberculosis**. 90 (3), 188-196
30. Garcia-Contreras, L., Sung, J. C., **Muttill, P.**, Padilla, D., Telko, M., VerBerkmoes, J. L., Elbert, K. J., Hickey, A. J. and D. Edwards (**2010**) Dry powder PA-824 aerosols for the treatment of tuberculosis in guinea pigs. **Antimicrobial Agents and Chemotherapy**. 54 (4), 1436-1442
31. Garcia-Contreras, L., **Muttill, P.**, Fallon, J. K., Kabadi, M., Gerety, R. and A. J. Hickey (**2010**) Preclinical Studies of Capreomycin Dry Powder Aerosols for the Treatment of Tuberculosis. **Respiratory Drug Delivery** (3) 843-846
32. Yadav, A. B., Sharma, R., **Muttill, P.**, Singh, A. K., Verma, R. K., Mohan, M., Patel, S. K., A. Misra (**2009**) Inhalable microparticles containing isoniazid and rifabutin target macrophages and "Stimulate the Phagocyte" to achieve high efficacy. **Indian Journal of Experimental Biology** 47 (06), 469-474

33. Wang, C., **Muttill, P.**, Lu, D., Beltran-Torres, A., Garcia-Contreras, L. and A. J. Hickey (2009) Screening for potential adjuvants administered by the pulmonary route for tuberculosis vaccines. **AAPS journal**. 11(1), 139-47
34. Garcia-Contreras, L., Wong, Y-L, **Muttill, P.**, Padilla, D., Sadoff, J., Derousse, J., Germishuizen, W. A., Goonesekera, S., Elbert, K., Bloom, B. R., Miller, R., Fourie, P. B., Hickey, A. J. and D. Edwards (2008) Immunization by a bacterial aerosol. **Proceedings of the National Academy of Science USA**. 105 (12), 4656-60
35. Garcia-Contreras, L., Wong, Y-L, **Muttill, P.**, Padilla-Carlin, D.J., DeRousse, J., Goonesekera, S., Elbert, K., Bloom, B. R., Hickey, A. J. D. A. Edwards (2008) A novel aerosol vaccine against tuberculosis. **Respiratory Drug Delivery** (3) 881-884
36. Kaur, J., **Muttill, P.**, Verma, R. K., Kumar, K., Yadav, A. B., Sharma, R., and A. Misra (2008) A hand-held apparatus for "nose-only" exposure of mice to inhalable microparticles as a dry powder inhalation targeting lung and airway macrophages. **European Journal of Pharmaceutical Sciences**. 34 (1), 56-65
37. **Muttill, P.**, Kaur, J., Kumar, K., Yadav, A. B., Sharma, R. and A. Misra (2007) Inhalable microparticles containing large payload of anti-tuberculosis drugs. **European Journal of Pharmaceutical Sciences**. 32 (2), 140-150
38. Sharma, R., **Muttill, P.**, Yadav, A. B., Rath, S. K., Bajpai, V. K., Mani, U., and A. Misra (2007) Uptake of inhalable microparticles affects defence responses of macrophages infected with Mycobacterium tuberculosis H37Ra. **Journal of Antimicrobial Chemotherapy**. 59, 499-506

REVIEWS/ EDITORIALS

Price[#], D., Kunda[#], N., & **Muttill, P.*** (2019) Challenges associated with the pulmonary delivery of therapeutic dry powders for preclinical testing **KONA powder and particle Journal** - # Equal contribution, 2019008 (**Impact factor- 1.68; selected as the 'Featured article for 2020'**)

Muttill, P.*, Price, D. N., McBride, A. A. (2011) Pulmonary immunization for TB with live cell-based vaccines: the importance of the delivery route. **Therapeutic Delivery** 2 (12), 1519-1522

Muttill, P., Wang, C., A. J. Hickey (2009) Inhaled drug delivery for tuberculosis therapy (*Expert review*). **Pharmaceutical research**. 26 (11), 2401-2416

EDITED BOOKS AND BOOK CHAPTERS

EDITED BOOK- Muttill. P. and Kunda, N.K. (2020) **Mucosal delivery of drugs and biologics in nanoparticles** Editor- **Pavan Muttill** and N. K Kunda, AAPS Advances in the Pharmaceutical Sciences Series, Springer Nature

Chavan, T., **Muttill. P.**, Kunda, N.K. (2020) "Introduction to nanomedicine in drug delivery" In **Mucosal delivery of drugs and biologics in nanoparticles** Editor- Pavan Muttill and N. K Kunda (pp. 3-26). AAPS Advances in the Pharmaceutical Sciences Series, Springer Nature

Price, D. N., & **Muttill. P.*** (2018) "Delivery of Therapeutics to the Lung" In **Lung Innate Immunity and Inflammation** Editor- Scott Alper and William J. Janssen (pp. 415-429). Humana Press, New York, NY.

McBride, A., Price, D., and **Muttill. P.*** (2017) "Preparation and Characterization of Magnetic Nano-in-Microparticles for pulmonary delivery" In **Cancer Nanotechnology: Methods and Protocols**. Editor- Reema Zeineldin. Springer Science and Business Media, LLC, New York;

p 99-108

McBride, A., Price, D., and **Muttill, P.* (2017)** "Pulmonary delivery of magnetically targeted Nano-in-Microparticles" In **Cancer Nanotechnology: Methods and Protocols**. Editor- Reema Zeineldin. Springer Science and Business Media, LLC, New York; p 369- 378

Price, D. N. and **Muttill, P.* (2016)** "Directed intervention for immunomodulation against tuberculosis." In: **Drug Delivery Systems for Tuberculosis Prevention and Treatment** in the Advances in Pharmaceutical Technology Series. Editor- Vladimir Torchilin. John Wiley and Sons, Ltd; Aug 25:346

Price, D. N., Kunda, N. K., McBride, A. and **Muttill, P.* (2016)** "Vaccine preparation: Past, present, and future." In: **Drug Delivery Systems for Tuberculosis Prevention and Treatment** in the Advances in Pharmaceutical Technology Series. Editor- Vladimir Torchilin. John Wiley and Sons, Ltd; Aug 25:69

RESEARCH ARTICLES SUBMITTED FOR PUBLICATION/ IN PREPARATION

1. Kunda, N., Saboo, S, Wafula, D., **Muttill, P.*** Visualization of the delivery of enteric-coated capsules into the small intestine of rats (in preparation)

SELECTED ABSTRACTS/ POSTERS (SINCE 2010)

1. Binzet, G., Wiley, C., McChesney, D.A., McConville, J., **Muttill, P.**, Çelik, M., and Felton, L. Determining the design space of intermediate core microparticles obtained from spray-dried acrylic polymers for taste masking bitter drugs, American Association of Pharmaceutical Sciences annual conference, (Virtual), October 2020
2. Binzet, G., Wiley, C., McChesney, D.A., McConville, J., **Muttill, P.**, Çelik, M., and Felton, L. Preparation of Drug Containing Core Microparticles for Use in Taste Masking Applications, Controlled Release Society (CRS) conference (Virtual), June 2020
3. Kunda, N., Price, D., **Muttill, P.** Respiratory tract deposition and distribution pattern of microparticles in mice using different pulmonary delivery techniques, American Association of Pharmaceutical Sciences annual conference, Washington DC, November 2018
4. Miller, E.K., Kunda, N., Rossi, I., Price, D., and **Muttill, P.** Strategies to combat drug-resistant tuberculosis: inhalable microparticles encapsulating anti-tubercular antibiotics and efflux pump inhibitors. the UNM COP Research and Scholarship Day, Albuquerque, NM, April 2018 (**First place to Mr. Elliott- Pharm. D. student**)
5. Kunda, N., Joyner, J. A., Elmore, B. O., Hall, P. R., **Muttill, P.** A novel nanoparticulate formulation to enhance antibody titers after Virus-like particles (VLPs) vaccination, American Association of Pharmaceutical Sciences annual conference, San Diego, CA, November 2017
6. Miller, E.K., Kunda, N., and **Muttill, P.** Inhalation of Dry Powder Microparticles Encompassing Efflux Pump Inhibitors and Isoniazid in PLGA Nanoparticles American Association of Pharmaceutical Sciences, Rocky Mountain conference, Albuquerque, NM, September 21, 2017 (**First place to Mr. Elliott- Pharm. D. student**)
7. Miller, E.K., Kunda, N., Price, D., and **Muttill, P.** Efflux Pump Inhibitors in PLGA Nanoparticles as an Adjunct to Isoniazid. the UNM COP Research and Scholarship Day, Albuquerque, NM, April 2017 (**Second place to Mr. Elliott- Pharm. D. student**)
8. Price, D., Kunda, N., **Muttill, P.** Design and optimization of a temperature-stable dry powder BCG vaccine, American Association of Pharmaceutical Sciences annual conference, Denver, CO, November 2016

9. Kunda, N., Hautmann, J., Godoy, S., Marshik, P., Chand R., Krishna, S., **Muttill, P.** A high-speed infra-red camera to study plume characteristics from pMDIs, American Association of Pharmaceutical Sciences annual conference, Denver, CO, November 2016
10. Campen, M., Kunda, N., **Muttill, P.** et al. Cardiovascular effects from pulmonary exposure to metal-contaminated dusts from an abandoned uranium mine, Mountain West regional chapter of Society of Toxicology (34th annual meeting), Salt Lake City, UT, September 2016
11. Kunda, N., Wafula, D., Rae, C., Tram, M., Skoble, J., Leong, M., Wu, T., **Muttill, P.** A thermostable dry powder live vaccine against Francisella tularensis, American Association of Pharmaceutical Sciences annual conference, Orlando, FL, October 2015
12. Kunda, N., Price, D., McBride, A., **Muttill, P.** Chemotherapy and immunotherapy combination treatment against pulmonary TB, American Association of Pharmaceutical Sciences annual conference, Orlando, FL, October 2015
13. Kunda, N., Wafula, D., Tram, M., Skoble, J., Leong, M., Wu, T., **Muttill, P.** A thermostable dry powder live vaccine against tularemia, American Association of Pharmaceutical Sciences, Rocky Mountain Conference, Breckenridge, CO, September 23, 2015 (**Best poster award**)
14. Price, D., Kusewitt, D., Lino, C., Wu, T., **Muttill, P.** Inhaled dry powder BCG for uniform protection against tuberculosis in Environmental mycobacteria endemic regions, American Association of Pharmaceutical Sciences, Rocky Mountain Conference, Breckenridge, CO, September 23, 2015 (**Best poster award**)
15. McBride, A. A., **Muttill, P.**, Carnes, E., Ashley, C., Lipid bilayer nanoparticles for pulmonary delivery: A potential treatment strategy against tularemia, American Association of Pharmaceutical Sciences, Rocky Mountain Conference, Breckenridge, CO, September 23, 2015 (**Best poster award**)
16. Price, D., Kusewitt, D., Lino, C., Wu, T., **Muttill, P.** Inhaled dry powder BCG for uniform protection against tuberculosis in Environmental mycobacteria endemic regions, the UNM COP Research and Scholarship Day, Albuquerque, NM, September 2015 (**First place in the Graduate student research category**)
17. Martin, D., Thompson, T. A., Yamada, M., Timmins, G., **Muttill, P.** Optimizing highly lipophilic drug bioavailability by using nanoemulsions to create spray-dried amorphous dispersions, the UNM COP Research and Scholarship Day, Albuquerque, NM, September 2015 (**First place in the Pharm. D. student research category**)
18. Price, D., McBride, A. A., **Muttill, P.** Oral exposure to non-tuberculous Mycobacteria generates tolerance against other Mycobacteria including the BCG vaccine. Keystone Symposia: Host response in tuberculosis, NM, January 2015
19. McBride, A. A., Anton, M., Price, D., Norenberg, J. P., Mackenzie, D. A., Thompson, A. A., **Muttill, P.** Magnetic targeting of an inhalable nano-in-microparticle system and the development of an animal imaging model. National Cancer Institute (NCI) Principal investigators annual meeting, Shady Grove, MD, October 2014 (**outstanding poster award to A. McBride**)
20. McBride, A. A., Price, D., Norenberg, J. P., Mackenzie, D. A., Thompson, A. A., **Muttill, P.** A longitudinal, orthotopic murine imaging model using genetically modified A549 cells and SPECT/CT imaging, American Association of Cancer Research (AACR) annual conference, San Diego, CA, April 2014
21. Price, D., McBride, A. A., **Muttill, P.** Inhaled BCG immunization; A vaccination strategy to bypass interference by environmental mycobacteria and increase protective efficacy,

Keystone Symposia: Novel Therapeutic Approaches to tuberculosis, Keystone, CO. March 2014 (**Selected for Short Talk** by D. Price, graduate student)

22. McBride, A. A., Price, D., **Muttill, P.** Evaluation of an inhalable nano-in-microparticle drug delivery vehicle using a novel cancer imaging animal model, Gordon Research Conference (GRC) Cancer Nanotechnology Conference, Mount Snow, MT, July 2013
23. Price, D., McBride, A. A., Elmaoued, A., **Muttill, P.** Inhaled dry powder BCG for uniform protection against tuberculosis in environmental mycobacteria endemic regions. International Society of Aerosols in Medicine (ISAM), Chapel Hill North Carolina, April 2013
24. Price, D., McBride, A. A., Elmaoued, A., **Muttill, P.** Inhaled dry powder BCG for uniform protection against tuberculosis in environmental mycobacteria endemic regions, the UNM COP Research and Scholarship Day, Albuquerque, NM, April 2013 (**Second place in the Graduate student research category**)
25. Hautmann, J., Godoy, S., Marshik, P., Chand, R., McConville, J., Krishna, S., **Muttill, P.**, Effect of time between actuation on the dose variability for three metered-dose inhalers, the UNM COP Research and Scholarship Day, Albuquerque, NM, April 2013 (**First place in the Pharm. D. student research category**)
26. Price, P., McBride, A. A., Lamoureux, L., **Muttill, P.**, Pulmonary delivery as a method of enhancing efficacy and decreasing variability of the BCG vaccine against Tuberculosis, the UNM COP Research and Scholarship Day, Albuquerque, NM, April 2013 (**First place in the Graduate student research category**)
27. Weeda, E., McBride, A., MacKenzie, D., Norenberg, J., Thompson, T. A., **Muttill, P.**, Developing a ^{99m}TcO₄- Radioimaging-based In Vitro Model to Assess the Efficacy of a Lung Cancer Therapeutic Delivery System, the UNM COP Research and Scholarship Day, Albuquerque, NM, April 2012 (**First place in the Pharm. D. student research category**)
28. McBride, A. A., Lamoureux, L., Price, D., **Muttill, P.** Inhalable Magnetic Microparticles for Site-specific Delivery and Treatment of Lung Cancer. American Association of Pharmaceutical Scientists (AAPS), Washington DC, October 2011
29. McBride, A. A., Lamoureux, L., Price, D., Weeda, E., Timmins, G., Adolphi, N., **Muttill, P.** Inhalable magnetic nano aggregates for site-specific delivery and treatment of lung cancer, Gordon Research Conference (GRC) Cancer Nanotechnology Conference, Maine, July 2011
30. D. Weerskoon, D., Sawant, R., **Muttill, P.**, Garcia-Contreras, L., Braunstein, M., Torchilin, V., and Hickey, A. J. Targeting of alveolar macrophages for tuberculosis therapy: antimycobacterial activity of tat-micelles containing isoxyl in mycobacterium bovis infected THP-1 human macrophage-like cells. 18th Congress of International Society for Aerosols in Medicine (ISAM), Rotterdam, Netherlands, June 2011
31. Garcia-Contreras, L., **Muttill, P.**, Fallon, J., Kabadi, M., Gerety, R., Hickey, A. J. Preclinical studies of capreomycin dry-powder aerosols for the treatment of tuberculosis, 3rd Southeastern Mycobacteria Meeting, North Carolina, January 2010

INVITED LECTURES/TALKS

2021

1. Pulmonary delivery of a tuberculosis vaccine: can altering the route of immunization resurrect an age-old vaccine?, *Inhalation Drug Delivery Virtual Summit, Pharma ED Resource Inc.*, (Virtual), March 23-24, 2021

2020

1. Vaccination strategy in the COVID-19 era: the formulation and characterization of microneedles containing VLP-based vaccines, *American Association of Pharmaceutical Scientists- Rocky Mountain Discussion group (AAPS-RMDG) annual meeting*, (Virtual) hosted by the University of Utah, Salt Lake City, November 2020
2. A comparison of two-fluid and three-fluid nozzles for spray drying, with a case study on an inhaled antibiotic, *3rd Inhalation and Respiratory Drug Delivery USA Congress*, San Diego, September 2020 (**Conference chairperson**)
3. Pulmonary evaluation of immunotherapeutic agents in an immunocompetent, orthotopic mouse model of lung cancer, *Cancer Biology and Immunotherapy Conference*, Savannah, Georgia March 30, 2020 (postponed)

2019

4. Formulation and device differences between animals and humans: Challenges for inhaled TB research, *5th Inhaled therapies for tuberculosis and other infectious diseases*, University of Groningen, Netherlands, August 28, 2019
5. The poor translational success of aerosols: different mechanisms of preclinical delivery devices and clinically irrelevant animal models, *Inhalation Drug Delivery Summit, Pharma ED Resource Inc.*, Boston, USA, May 28, 2019
6. The poor translational success of inhalation drug products; the wide chasm between preclinical and clinical testing, *2nd Inhalation and Respiratory Drug Delivery USA Congress*, San Diego, March 18th, 2019
7. Challenges in preclinical inhalation delivery and how to improve translational success, *Food and Drug Department, University of Parma*, Italy, March 27th, 2019

2018

8. Formulation and preclinical efficacy of temperature stable nano-particulate vaccines, Institute of Nano Science and Technology, Mohali, Punjab, India, October 30, 2018
9. Pulmonary delivery of nanoparticles for treating lung cancer, *NANOBIOTECK 2018*, 3rd annual conference, New Delhi, India, October 24-27, 2018
10. Environmental toxicants affect vaccine efficacy: Is there a value in altering the route of immunization, *Molecular, and Biomedical Sciences seminar series*, College of Pharmacy, University of Montana, April 27, 2018
11. Temperature-stable vaccines for pulmonary delivery: Can we kill two birds with one stone, *1st Inhalation and Respiratory Drug Delivery USA Congress*, San Diego, March 13th, 2018

2017

12. Design and optimization of a temperature-stable BCG vaccine for pulmonary delivery, *2017 4th Inhaled therapies for tuberculosis and other infectious diseases*, Durham, North Carolina, USA, October 16, 2017

2016

13. Thermostable vaccine formulation towards achieving global vaccine accessibility, *2016 American Association of Pharmaceutical Scientists- Rocky Mountain Discussion group (AAPS-RMDG) annual meeting*, Roseman University of Health Sciences, Las Vegas, Nevada, August 5-6 2016

2015

14. Combination therapy against pulmonary tuberculosis, UNM Infectious Disease, and Immunity Program (IDIP) Works in Progress series, November 4, 2015, UNM
15. Combined chemotherapy and immunotherapy against pulmonary tuberculosis, 3rd International inhaled therapies for tuberculosis, University of Parma, Italy, October 15, 2015
16. Longitudinal assessment of lung cancer progression in mice using SPECT/CT imaging, 3D Cryo-Imaging Quantitative Autoradiography (CIQA) Anesthesiology Pain Laboratory Mini-Symposium, July 28th, 2015, UNM
17. Needle-free delivery of thermostable biologics, UNM Comprehensive Cancer Center-Los Alamos National Laboratory- Sandia National Laboratory Annual Research Retreat, June 26th, 2015, UNM
18. The quest for better drugs and vaccines: inspiration from nature, Center for Biomedical Engineering Seminar Series, March 18th, 2015, UNM
19. Biomimicry: Immunization against diseases inspired by nature, University of New Mexico lightning lounge talk series, February 5th, 2015 (**First Prize** among UNM faculty)

2014

20. Novel vaccination Strategy inspired by nature, STC.UNM Technology Social, October 9th, 2014, UNM
21. Formulation and delivery approaches to improve drug and vaccine efficacy, New opportunities seminar series, Center for Molecular Discovery, August 29, 2014, UNM
22. Effective immunity with pulmonary BCG/immune checkpoint inhibitor administration, UNM Cancer Center retreat, February 13th, 2014, UNM
23. Needle-free drug and vaccine delivery for treating cancer and infectious diseases, Pharmacy Department, Birla Institute of Technology and Sciences Pilani, Rajasthan, India January 9th

2013

24. Inhaled vaccination strategies against tuberculosis: overcoming the immunosuppressive effect of environmental mycobacteria, 2nd International inhaled therapies for tuberculosis, Tokyo, Japan, October 3, 2013
25. Toxicological considerations in nanoparticle/microparticle delivery to the lung, Mountain West Society of Toxicology (MWSOT), Albuquerque, New Mexico September 19th, 2013

2012

26. Dry powder inhaled drugs and vaccines, May 29th, 2012, Lovelace Respiratory Research Institute (LRRI), Albuquerque, NM
27. A novel needle-free approach for vaccine and drug delivery, Integrating Nanotechnology with Cell Biology and Neuroscience (INCBN) Integrative Graduate Education and Research Traineeship (IGERT) Seminar series, October 22nd, 2012, UNM
28. Lung as a novel delivery route for drugs and vaccines, Department of Biochemistry and Molecular Biology seminar series, October 15th, 2012, UNM
29. Drug and vaccine delivery to the lung, UNM College of Pharmacy Alumni and friends meeting, October 5th, 2012, UNM
30. Pulmonary drug and vaccine delivery, Nanoscience and Microsystems (NSMS) Academic Program Review, October 4th, 2012

31. Targeting drug and vaccines using nanoparticles, UNM Department of Neuroscience seminar series, September 27th, 2012, UNM
32. Aerosol Drug Delivery for Lung Cancer, UNM Cancer Center retreat: Cancer Biology and Biotechnology Program, November 27th, 2012, UNM

Prior to 2012

33. Dry powder drug and vaccine delivery by the pulmonary route, Integrating Nanotechnology with Cell Biology and Neuroscience (INCBN) Integrative Graduate Education and Research Traineeship (IGERT) Seminar series, April 27th, 2011, UNM
34. Inhaled dry powder for chemotherapy and vaccination, Central Drug Research Institute (CDRI), Lucknow, India, January 4th, 2011
35. Dry powder inhaled therapy for infectious diseases, Lovelace Respiratory Research Institute (LRRI), September 15th, 2010, Albuquerque, NM
36. Drug and vaccine delivery to the lung, UNM HSC Biomedical Sciences Graduate Program Student Retreat, September 20th, 2011, NM
37. Dry powder aerosolized chemotherapy, UNM Cancer Center retreat, December 11th, 2010, UNM
38. Dry powder inhaled therapy for tuberculosis, Mini TB symposia, November 22nd, HSC UNM
39. Targeted delivery of inhalable microparticles for pulmonary tuberculosis, School of Pharmacy seminar series, University of North Carolina, March 21st, 2007
40. Inhalable microparticles containing anti-tubercular drugs alter macrophage cytokine secretion in mice infected with TB, Tata Memorial Center, Advanced Center for Treatment, Research and Education in Cancer (ACTREC), Mumbai, India, September 22nd, 2005

INTELLECTUAL PROPERTY

Issued patent (**2019**) Vaccination, compositions, methods of making, and methods of use (U.S. Patent Application No.: 15/311,298)

Provisional Patents filed/ IP disclosed

Disclosed twelve inventions including three provisional patents and two patent applications.

- | | |
|-------------|---|
| 2019 | Multi-layered microneedle delivery platform and methods |
| 2018 | Nanobiocomposite compositions and methods |
| 2016 | Virus-Like particles encapsulated in nanoparticles on a microneedle. <i>Status-</i> Provisional patent filed |
| 2015 | Spray drying protocells to increase its shelf-life. <i>Status-</i> Provisional patent filed |
| 2013 | Systems and method for accurate and simultaneous measurement of temperature, velocity, and geometry of a spray plume actuated from pressurized metered-dose inhalers (pMDI) using a high-speed infrared camera <i>Status-</i> Marketing |
| 2007 | Inhalable biodegradable microparticles for target-specific drug delivery in tuberculosis and a process thereof (US Patent 20050084455) |

PROFESSIONAL RECOGNITION, HONORS, ETC.

- | | |
|------|--|
| 2020 | NIH reviewer (ad hoc), Advancing vaccine science to improve tuberculosis treatment outcomes for people living with or without HIV (SEP- ZAI1-JBS-A-J1) |
| 2020 | NIH reviewer (ad hoc), Development of Appropriate Pediatric Formulations and Pediatric Drug Delivery Systems (SEP- ZRG1 ETTN-G 50) |

2019	NIH reviewer (ad hoc), Research Education Program (R25) applications
2018	NIH reviewer (ad hoc), Gene and drug delivery systems study section
2018	NIH reviewer (ad hoc), Pediatric formulation and drug delivery systems (SEP)
2017	NIH reviewer (ad hoc), Vaccine against microbial disease study section
2017-18	Chair, American Association of Pharmaceutical Scientists, Rocky Mountain Discussion Group
2017	American Foundation for Pharmaceutical Education (AFPE) – To mentor a Pharm. D. student to pursue research in my laboratory
2016	1 st Year Pharm. D. Faculty Appreciation Award (College of Pharmacy)
2015	Graduate Student Teacher Appreciation Award (College of Pharmacy)
2015	Nominated by the 1 st year Pharm. D. students -Faculty Appreciation Award (College of Pharmacy)
2015	American Foundation for Pharmaceutical Education (AFPE) – To mentor a Pharm. D. student to pursue research in my laboratory
2013	UNM Cancer Center nominated applicant, The V Foundation for Cancer Research Grant
2013	UNM Cancer Center nominated applicant, Phi Beta Psi Sorority Cancer Grant
2012	Bill & Melinda Gates Foundation Grand Challenges Exploration (GCE) Phase I grant
2009	Outstanding Post-doctoral award for contributions in Mentoring, Service, and Leadership at The University of North Carolina
2006 - 2009	Post-Doctoral Fellowship funded by Bill and Melinda Gates Foundation
2002 – 2006	Ph.D. - New Millennium Indian Technology Leadership Initiative (NMITLI), an Academic-Industry Partnership- Govt. of India

PROFESSIONAL MEMBERSHIPS

2007 - present	American Association of Pharmaceutical Scientists
2011 - present	American Association of Colleges of Pharmacy

TEACHING/EDUCATION

MENTORING

Post-doctoral mentoring

1. Denis Wafula, Ph.D., 08/01/13 – 10/15/14
Title of project: To formulate live *Listeria monocytogenes* into a dry powder vaccine by spray drying
Funding- DTRA (CBM-VAXBT1) (base period)
Current position- Postdoctoral fellow at Dr. J. Dinman's Laboratory (University of Maryland)
2. Amber McBride, Ph.D., September 2014- September 2015
Title of project: Spray drying nanoparticles (protocells) for increased stability
Funding- DTRA (NATV)
Current position- Postdoctoral researcher at Sandia National Laboratories, Albuquerque, NM
3. Nitesh Kunda, Ph.D., February 2015 – August 2018
Title of project: Multiple projects
Funding- DTRA (CBM-VAXBT1) (2015)
Salary release and COP Pilot project (2016)
4. Dominique Price, Ph.D., February 2016 – current

Title of project: Multiple projects
Funding- Salary release (2016)

Graduate student mentoring (as advisor)

Graduated Ph.D. student:

Irene Rossi, Exchange graduate student, Food and drug department, University of Parma, Italy, (February 2018- August 2018)

Title of Project: Inhalable dry powders for pulmonary vaccination; Major supervisor- Prof. Ruggero Bettini

Dominique Price, UNM Biomedical Sciences Graduate Program (BSGP), (January 2011 January 2016)

Title of Project: Uniform protection against tuberculosis by pulmonary immunization with BCG. External support- Bill and Melinda Gates Foundation (2012-2014)

UNM Infectious Diseases and Inflammation Program (IDIP)- NIH T32 pre-doctoral fellowship (2014, 2015)

Travel award from NIAID for attending the 2014 Keystone Conference (Novel therapeutics approaches to tuberculosis)

Amber McBride, Ph.D. UNM Nanoscience and Microsystems Engineering (NSMSE), (December 2010- August 2014)

Title of Project: Magnetic targeting of inhalable Nano-in-microparticles and the development of an orthotopic tumor imaging mice model.

External support- INCBN-IGERT NSF fellowship (2011-2012)

UNM Cancer Nanotech Training Center (CNTC) fellowship (2013-2014)

Other students mentoring

BSGP Rotation Students:

2011 Mario Aragon (BSGP)
2016 Muskan Floren (BSGP)

Undergraduate students

2010 Allen Feng (Mechanical Engineering, University of Alberta)
2010-2011 Robert Rush (UNM)
2011-2012 Loreen Lamoureux (UNM Biochemistry)
2012-2013 Alaa Elmaoued (UNM NSMSE)
2013 Vanessa Duran (UNM Biology)
2014 Rajaun Ellis (UNM Undergraduate Pipeline Network (UPN) Program)
2014- Current Meilinn Tram (UNM, McNair Scholar)
2016 Laura Stephens (UNM Undergraduate Pipeline Network (UPN) Program)
2016 Genica Chow (NSF Research Education for Undergraduates (REU))
2019 David A McChesney (UNM Biology)
2019 Amelia Beirle (PREP student)

Professional Pharm D students

2011 Erin Weeda (1st year, COP Summer Research Fellow)
2012 Julia Hautmann (2nd year, COP Summer Research Fellow)
2013 Avni Patel (2nd year)
2014 David P. Martin (2nd year, COP Summer Research Fellow)
2015 David P. Martin (3rd year, American Foundation of Pharmaceutical Education)
External support- One-year research and stipend support (2014-2015)
2016 David P. Martin (4th year, Rotation)
2017 Elliott Miller (2nd year)

2018 Neha Parmar (1st year)
2019 Kwon Daeyong

Masters students

2014 Abhinav Kurumaddali (BITS, Pilani, India)
2014 Sugandha Saboo (BITS, Pilani, India)
2017 Elliott Miller (Pharm D/MS program, UNM)
2019-2021 Amelia Bierle (MS, Public Policy, UNM)

*Graduate Committee on Studies (COS) (*indicates primary advisor)*

1. Amber A. McBride UNM NSMSE (Dr. Pavan Muttill*, College of Pharmacy) graduated in 2014
2. Brett Manifold-Wheeler UNM BSGP (Dr. Pamela Hall*, College of Pharmacy) graduated 2015
3. Dominique N. Price UNM BSGP (Dr. Pavan Muttill*, College of Pharmacy) graduated in January 2016
4. Paul Durfee UNM Biomedical Engineering (Drs. Jeff Brinker*, Chemical, and Biological Engineering) graduated 2016
5. Leisha Armijo UNM (NSMSE) (Dr. Marek Osinski*, Center for High Technology Materials, Electrical and Computer Engineering)
6. Anh-Dung Le- UNM (NSMSE) (Dr. Jason McConville*, College of Pharmacy)
7. Jason Joyner UNM BSGP (Dr. Pamela Hall*, College of Pharmacy)
8. Tamara Young UNM BSGP (Dr. Matthew Campen*, College of Pharmacy)
9. Sudha Ananthakrishnan UNM (NSMSE) (Dr. Jason McConville*, College of Pharmacy)
10. Shailja Jakhar UNM BSGP (Dr. Harshini Mukundan, Los Alamos National Laboratory)

TEACHING/ INSTRUCTIONS

2021	Spring PHRM 810, Fundamentals of Pharmacokinetics and dosage forms, 3 credit hours
2021	Spring PHRM 802, Physical Pharmacy and Biopharmaceutics, 3 credit hours
2020	Fall PHRM 824, Dosage forms, 3 credit hours, IOR*
2020	Spring PHRM 810, Fundamentals of Pharmacokinetics and dosage forms, 3 credit hours
2020	Spring PHRM 802, Physical Pharmacy and Biopharmaceutics, 3 credit hours
2019	Fall PHRM 824, Dosage forms, 3 credit hours, IOR*
2019	Spring PHRM 810, Fundamentals of Pharmacokinetics and dosage forms, 3 credit hours
2018	Fall PHRM 802, Physical Pharmacy and Biopharmaceutics, 3 credit hours
2018	Fall PHRM 824, Dosage forms, 3 credit hours, IOR*
2018	Spring PHRM 810, Fundamentals of Pharmacokinetics and dosage forms, 3 credit hours
2017	Fall PHRM 802, Physical Pharmacy and Biopharmaceutics, 3 credit hours
2017	Fall PHRM 824, Dosage forms, 3 credit hours, IOR*
2016	Fall PHRM 701, Pharmaceutics I, 3 credit hours
2016	Spring PHRM 702, Pharmaceutics II, 3 credit hours, IOR*
2015	Fall PHRM 701, Pharmaceutics I, 3 credit hours
2015	Spring PHRM 702, Pharmaceutics II, 3 credit hours, IOR*
2014	Fall PHRM 701, Pharmaceutics I, 3 credit hours
2014	Spring PHRM 702, Pharmaceutics II, 3 credit hours, IOR*

2014	Spring PHRM 598, Pharmaceutical drug product development, Graduate course
2013	Fall PHRM 701, Pharmaceutics I, 3 credit hours
2013	Spring PHRM 702, Pharmaceutics II, 3 credit hours, IOR*
2012	Fall PHRM 701, Pharmaceutics I, 3 credit hours
2012	Spring PHRM 702, Pharmaceutics II, 3 credit hours, IOR*
2011	Fall PHRM 701, Pharmaceutics I, 3 credit hours
2011	Spring PHRM 702, Pharmaceutics II, 3 credit hours
2010	Fall PHRM 701, Pharmaceutics I, 3 credit hours
2010	Spring PHRM 702, Pharmaceutics II, 3 credit hours

*IOR- Instructor of Record- Role- Coordinating instructor schedules, syllabus development, submission of study materials, exam questions by all instructors on time, grade compilation at the end of the semester.

LECTURE DETAILS

2021	Spring PHRM 802, 4 lecture hours, exams, office hours** Spring PHRM 810, 6 lecture hours, exams, office hours**
2020	Spring PHRM 802, 4 lecture hours, exams, office hours* Spring PHRM 810, 6 lecture hours, exams, office hours** Fall PHRM 824, 16 lecture hours, exams, office hours** Fall PHRM 105, 1 lecture hours, exams
2019	Fall PHRM 824, 16 lecture hours, exams, office hours* Spring PHRM 810, 6 lecture hours, exams, office hours*
2018	Fall PHRM 802, 4 lecture hours, exams, office hours* Fall PHRM 824, 16 lecture hours, exams, office hours* Spring PHRM 810, 6 lecture hours, exams, office hours*
2017	Fall PHRM 802, 5 lecture hours, exams, office hours* Fall PHRM 824, 14 lecture hours, exams, office hours*
2016	PHRM 701, Pharmaceutics I, 9 lectures, exams, office hours* PHRM 702, Pharmaceutics II, 14 lectures, exams, office hours*
2015	PHRM 701, Pharmaceutics I, 9 lectures, exams, office hours* PHRM 702, Pharmaceutics II, 14 lectures, exams, office hours*
2014	PHRM 701, Pharmaceutics I, 9 lectures, exams, office hours* PHRM 702, Pharmaceutics II, 13 lectures, exams, office hours* Spring PHRM 598, Pharmaceutical drug product development, Graduate course, 4 lectures two hours each, exams BIOM/NSMS 581, Colloidal Nanocrystals lecture, Guest lecture
2013	PHRM 701, Pharmaceutics I, 9 lectures, exams, office hours* PHRM 702, Pharmaceutics II, 13 lectures, exams, office hours* BIOM/NSMS 581, Colloidal Nanocrystals lecture, Guest lecture
2012	PHRM 701, Pharmaceutics I, 9 lectures, exams, office hours* PHRM 702, Pharmaceutics II, 11 lectures, exams, office hours* BIOM/NSMS 581, Colloidal Nanocrystals lecture, Guest lecture
2011	PHRM 701, Pharmaceutics I, 9 lectures, exams, office hours* PHRM 702, Pharmaceutics II, 11 lectures, exams, office hours*

2010 PHRM 701, Pharmaceutics I, 6 lectures, exams, office hours*
PHRM 702, Pharmaceutics II, 4 lectures, exams, office hours*

*Office hours to meet students on an as-needed basis

** Virtual office hours

PROFESSIONAL SERVICE

NATIONAL

2020 Ad hoc grant reviewer, NIH, Advancing vaccine science to improve tuberculosis treatment outcomes for people living with or without HIV (SEP)

2020 Ad hoc grant reviewer, NIH, Pediatric formulation and drug delivery systems (SEP)

2019 Ad hoc grant reviewer, NIH- Research training and career development (R25 education grant mechanism)

2018 Ad hoc grant reviewer, NIH- Gene and drug delivery (GDD) Study Section
Ad hoc grant reviewer, NIH- Pediatric formulation and drug delivery systems SEP Study Section

2017 Chair, American Association of Pharmaceutical Sciences (AAPS), Rocky Mountain Discussion Group

2017 Ad hoc grant reviewer, NIH/NIAID 'Vaccines Against Microbial Diseases' Study Section (VMD)

2016 Chair-elect, American Association of Pharmaceutical Sciences (AAPS), Rocky Mountain Discussion Group

2016 Poster Judge, 3rd conference American Association of Pharmaceutical Sciences (AAPS), Rocky Mountain Discussion Group, August 6th, Roseman University of Health Sciences, Las Vegas, Nevada

2015 – present Steering Committee Member, American Association of Pharmaceutical Sciences (AAPS), Rocky Mountain Discussion Group

2015 Poster Judge, 33rd Mountain West regional chapter of the Society of Toxicology, September 24th, Breckenridge, CO

2015 – present Expert reviewer for American Foundation for Pharmaceutical Education (AFPE) Gateway Scholar Program

2013 Second international inhaled therapies for tuberculosis, Session- Biological payloads for inhaled TB therapy, Tokyo, Japan, October 3, 2013, Rapporteur

2009 Organizing Committee member, Optimization of Inhaled Tuberculosis Therapy, An international conference focused on treating tuberculosis by delivering drugs and vaccines by the pulmonary route, New Delhi, India November 3-5th 2009

Journal Reviewer:

Environmental Health Perspective
Expert Review of Medical Devices
Vaccines
Journal of Aerosol Medicine and Pulmonary Drug Delivery
Advanced Drug Delivery Reviews
Acta Biomaterialia
ACS Biomaterials Science and Engineering
Pharmaceutics (MDPI)
AAPS PharmSciTech

Antimicrobial Agents and Chemotherapy
Drug Discovery Today
KONA Powder and Particle journal
Nanomedicine
Advanced Healthcare Materials
Human Vaccines and Immunotherapeutics
Drug Delivery and Translational Research
Langmuir
Nature Communications
Journal of Controlled Release (Elsevier)
PLOS ONE
Current Pharmaceutical Design (Elsevier)
Chemical Engineering Research and Design
International Journal of Pharmaceutics (Elsevier)
ACS Molecular Pharmaceutics
European Journal of Pharmaceutics and Biopharmaceutics (Elsevier)
Journal of Aerosol Medicine and Pulmonary Drug Delivery
Vaccine (Elsevier)
Drug Development and Industrial Pharmacy (Informa Healthcare)
Toxicology in-vitro (Elsevier)
Pharmaceutical Patent Analyst (Future Science)
Lung (Springer)
Colloids and Surfaces B: Biointerfaces (Elsevier)

LOCAL (UNM HSC)

2020	Biomedical Sciences Graduate Program (BSGP) Steering Committee Member (COP faculty representative) BSGP Qualifying Exam Committee Member (May)
2019	Biomedical Sciences Graduate Program (BSGP) Steering Committee Member (COP faculty representative) Search Committee for a BSGP director
2018	BSGP Qualifying Exam Committee Member (May) BSGP Steering Committee Member (COP faculty representative)
2017	BSGP Qualifying Exam Committee Member (January) BSGP Steering Committee Member (COP faculty representative) BSGP Individual Development Plan (IDP) Committee Member
2016	BSGP Qualifying Exam Committee Member (January, Committee Chair) BSGP Qualifying Exam Committee Member (May) BSGP Steering Committee Member (COP faculty representative) Presented the "Overview of Pharmaceutical Sciences Research Programs" to the 2015 cohort of BSGP graduate students Oral presentation Judge, BSGP Student Research Day BSGP Individual Development Plan (IDP) Committee Member
2015	BSGP Qualifying Exam Committee Member (January, Committee Chair) BSGP Qualifying Exam Committee Member (May) BSGP Steering Committee Member (COP faculty representative) Presented the "Overview of Pharmaceutical Sciences Research Programs" to the 2015 cohort of BSGP graduate students, September 14 th Poster Judge, BSGP Student Research Day, February 27 th

- 2014 BSGP Admissions Committee (for incoming students)
BSGP Steering Committee Member (COP faculty representative)
BSGP Qualifying Exam Committee Member (January)
BSGP Qualifying Exam Committee Member (May; three committees)
Judge, oral and poster presentation BSGP Student Research Day,
February 28th, 2014
Poster Judge, UNM McNair's Program Student Research Day, March 27th
- 2013 BSGP Qualifying Exam Committee Member (May)
- 2012 BSGP Qualifying Exam Committee Member (May; two committees)
- Roles- BSGP Qualifying Exam Committee- To evaluate students on their presentation and proposal on a recently published paper. The role of the committee chair is to lead the committee and make a decision at the end of the student presentation.
Poster Judge, Student Research Day- To judge the best student poster based on the research presented, and their ability to answer questions

COLLEGE OF PHARMACY

- 2020 Search Committee for a Lecturer position
- 2019 College of Pharmacy Admissions Committee, **Chair**
Search Committee for a Full/Assistant Professor position
- 2018 Remediation Taskforce, College of Pharmacy
College of Pharmacy Admissions Committee, **Chair**
Faculty Awards Ad Hoc Committee, Member
- 2017 Active Learning Taskforce Committee, Member
College of Pharmacy Admissions Committee, **Chair**
Faculty Awards Ad-Hoc Committee, Member
- 2016 Internal Advisory Committee member- UNM Metals exposure and Toxicity assessment in the Southwest (METALS) Program
College of Pharmacy Admissions Committee, **Chair**
Faculty Awards Ad Hoc Committee, Member
Active Learning Task Force Committee, Member
- 2015 College of Pharmacy Admissions Committee, Member
- 2014 Research and Scholarship Committee, Member
Honor Council Committee, Member
Search Committee (User Support Analyst, COP)
Reviewer, COP Summer Research Fellowship
Reviewer, COP Research and Scholarship Committee (January)
Reviewer, COP Research and Scholarship Committee (August)
Judge, COP Outstanding Staff Award
- 2013 Research and Scholarship Committee, Member
Reviewer, COP Summer Research Fellowship
Reviewer, COP Research and Scholarship Committee (June)
COP Website Committee, Member
- 2012 Research and Scholarship Committee, Member
E-value portfolio mentoring of P1 students (10)

- 2011 Judge, COP Outstanding Staff Award
Research and Scholarship Committee, Member
E-value portfolio mentoring of P1 students (10 students in April and December)
Search Committee (teaching faculty in Pathophysiology)
- Roles- COP Admissions Committee- Interview prospective pharmacy students, read their application, and assign points. Meet and discuss with other committee members to select the best students.
Research and Scholarship Committee- Solicit and review COP research pilot proposal applications twice a year. Solicit and review COP summer research fellowship (SRF) for pharmacy students once a year.
E-value portfolio mentoring- To evaluate the written evaluations and activity documentation for pharmacy students and give constructive feedback.

DEPARTMENT OF PHARMACEUTICAL SCIENCES

- 2019/2020 Search Committee (faculty in the Department of Pharmaceutical Sciences at the Full/Associate Professor and Assistant Professor level)
- 2016 Search Committee (faculty in the Department of Pharmaceutical Sciences at the Assistant/Associate level)
- 2014 Pharmaceutical Sciences Seminar Series, Hosted guest speaker- Dr. Sunil Krishnan, Professor, MD Anderson Cancer Center, TX (April 14th)
- 2012 Search Committee (Administrative Assistant III, Department of Pharmaceutical Sciences)
- 2011 Search Committee (faculty in the Department of Pharmaceutical Sciences at the Assistant/Associate level)
Pharmaceutical Sciences Seminar Series, Hosted guest speaker- Dr. Chinnaswamy Jagannath, Professor, Department of Pathology and Laboratory Medicine, The University of Texas Health Sciences Center, Texas.
- 2010 Search Committee (faculty in the Department of Pharmaceutical Sciences at the Assistant/Associate level)
Roles- Hosting outside speaker- Pick up from the airport, develop an itinerary for the days of the visit.
Search Committee for faculty- Evaluate all the applications, assign numbers based on the evaluation matrix, interview the selected candidates and submit the final report to the faculty search committee chair

PROFESSIONAL DEVELOPMENT

- 2012 Participated in real-time grant writing workshop conducted by Dr. Laurie Hudson (UNM, COP) - Mentor- Dr. Pamela Hall
- 2011 Attended a workshop on nanoparticle characterization, Nanotechnology Characterization Laboratory (NCL) Lessons learned workshop, NCI Alliance for Nanotechnology in Cancer, Rockville, MD, (June 2011)
- 2010 Participated in the real-time grant writing workshop conducted by Dr. Laurie Hudson (UNM, COP) - Mentor- Dr. Graham Timmins

RESEARCH DISSEMINATION TO COMMUNITY

2015

Graduate student Dominique Price highlighted on the HSC news

<http://hscnews.unm.edu/file?id=524dc4097241c852e801ff41&fid=564f83de5e8eef20c93e6276>

Inventions highlighted by the Intellectual office (STC.UNM)

<https://stc.unm.edu/pavan-muttill-ph-d/>

2014

Targeted drug delivery into the lung using an external magnet (Daily Lobo, UNM's newsletter)

http://issuu.com/conceptionssw/docs/nm_daily_lobo_09_25/1

2012

Bill and Melinda Gates Foundation Grand Challenges Exploration (GCE) Phase I award

<http://gcgh.grandchallenges.org/grant/pulmonary-bcg-immunization-uniform-protection-against-tb>

<http://hscnews.unm.edu/news/college-of-pharmacy-to-study-improved-tb-vaccine>