

MANISHA AGARWAL

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EDUCATION

PH.D. CANDIDATE IN PHARMACOLOGY (SEPTEMBER 2019 TO PRESENT), WAYNE STATE UNIVERSITY 2019 | MI, USA

Advisor: Dr. Michael Petriello

Dissertation Title: Loss of Flavin containing Monooxygenases 3 (FMO3) protects mice from hepatic Oxidative Stress Induced by Dioxin-like polychlorinated biphenyls (PCB) toxicity

MASTERS IN BIOPROCESS TECHNOLOGY, UNIVERSITY OF MUMBAI

2004 | INDIA

Advisor: Dr. Arvind M. Lali and Dr. A. R. Juvekar

Dissertation Title: Purification and Evaluation of Biological activities of Lactoferrin

BACHELOR'S IN PHARMACY, PUNE UNIVERSITY

2002 | INDIA

Advisor: Prof. Shantanu Kale

Title: Extraction and Characterization of Fatty Acids of *Balanitis Aegyptica* of Family Balanitaceae

PATENTS

Lali Arvind Mallinath, **Agarwal Manisha Rameshchand**, Kale Sandeep Bhaskar. **Process for Separation and Purification of bioactive lactoferrin, apo-lactoferrin, and lactoperoxidase.** March 2007, Indian patent application no.504/mum/2004, http://www.tmpsearchers.com/patdb/details/10092/patents_2007

PUBLICATIONS

<https://scholar.google.com/citations?user=cTJPb1wAAAAJ&hl=en>

Roy B, Yang Z, Pan G, Roth K, **Agarwal M**, Sharma R, Petriello MC, Palaniyandi SS (2022). Exposure to the Dioxin-like Pollutant PCB 126 Afflicts Coronary Endothelial Cells via Increasing 4-Hydroxy-2 Nonenal: A Role for Aldehyde Dehydrogenase 2. *Toxics*. 10(6):328.

K Roth, Z Yang, **M Agarwal**, W Liu, Z Peng, Z Long, J Birbeck, J Westrick, W Liu, & MC Petriello (2021). Exposure to a mixture of legacy, alternative, and replacement per- and polyfluoroalkyl substances (PFAS) results in sex-dependent modulation of cholesterol metabolism and liver injury. *Environment International*, 157, 106843. <https://doi.org/10.1016/j.envint.2021.106843>

Z Yang, K Roth, **M Agarwal**, W Liu, MC Petriello (2021). The Transcription Factors CREBH, PPAR α , and FOXO1 as Critical Hepatic Mediators of Diet-Induced Metabolic Dysregulation: Transcription factors and metabolic diseases. *The Journal of Nutritional Biochemistry*, 108633

M Agarwal, M Goheen, S Jia, S Ling, ES White, KK Kim (2020). Type I Collagen Signaling Regulates Opposing Fibrotic Pathways through $\alpha 2\beta 1$ Integrin. *American Journal of Respiratory Cell and Molecular Biology* 63 (5), 613-622

J Yang, **M Agarwal**, S Ling, S Teitz-Tennenbaum, RL Zemans, JJ Osterholzer, TH Sisson, KK Kim (2020). Diverse injury pathways induce alveolar epithelial cell CCL2/12, which promotes lung fibrosis. *American journal of respiratory cell and molecular biology* 62 (5), 622-632

CJ Miller, M Runge-Morris, AE Cassidy-Bushrow, JK Straughen, TM Dittrich, TR Baker, MC Petriello, G Mor, DM Ruden, BF O'Leary, S Teimoori, CM Tummala, S Heldman, **M Agarwal**, K Roth, Z Yang, BB Baker (2020). A Review

of Volatile Organic Compound Contamination in Post-Industrial Urban Centers: Reproductive Health Implications Using a Detroit Lens. *International Journal of Environmental Research and Public Health* 17 (23), 8755

L Sun, EM Hult, TT Cornell, KK Kim, TP Shanley, CA Wilke, **M Agarwal**, SJ Gurczynski, BB Moore, MK Dahmer (2019). Loss of myeloid-specific protein phosphatase 2A enhances lung injury and fibrosis, resulting in IL-10-dependent sensitization of epithelial cell apoptosis. *American Journal of Physiology-Lung Cellular and Molecular Physiology* 316 (6), L1035-L1048

KK Kim, MR Dotson, **M Agarwal**, J Yang, PB Bradley, N Subbotina, JJ Osterholzer, TH Sisson (2018). Efferocytosis of apoptotic alveolar epithelial cells is sufficient to initiate lung fibrosis. *Cell death & disease* 9 (11), 1-12

S Jia, **M Agarwal**, J Yang, JC Horowitz, ES White, KK Kim (2018). Discoidin domain receptor 2 signaling regulates fibroblast apoptosis through PDK1/Akt. *American journal of respiratory cell and molecular biology* 59 (3), 295-305

E Cipolla, AJ Fisher, H Gu, EA Mickler, **M Agarwal**, CA Wilke, KK Kim, Bethany B Moore, R Vittal (2017). IL-17A deficiency mitigates bleomycin-induced complement activation during lung fibrosis. *The FASEB Journal* 31 (12), 5543-5556

AK Wheaton, **M Agarwal**, S Jia, KK Kim (2017). Lung epithelial cell focal adhesion kinase signaling inhibits lung injury and fibrosis. *American Journal of Physiology-Lung Cellular and Molecular Physiology* 312 (5), L722-L730

AK Wheaton, M Velikoff, **M Agarwal**, TT Loo, JC Horowitz, TH Sisson, KK Kim (2016). The vitronectin RGD motif regulates TGF- β -induced alveolar epithelial cell apoptosis. *American Journal of Physiology-Lung Cellular and Molecular Physiology* 310 (11), L1206-L1217

J Yang, M Velikoff, **M Agarwal**, S Disayabutr, PJ Wolters, KK Kim (2015). Overexpression of inhibitor of DNA-binding 2 attenuates pulmonary fibrosis through regulation of c-Abl and Twist. *The American journal of pathology* 185 (4), 1001-1011

KR Kleaveland, M Velikoff, J Yang, **M Agarwal**, RA Rippe, BB Moore, KK Kim (2014). Fibrocytes are not an essential source of type I collagen during lung fibrosis. *The Journal of Immunology* 193 (10), 5229-5239

M Agarwal, C He, J Siddiqui, JT Wei, JA Macoska (2013). CCL11 (eotaxin-1): A new diagnostic serum marker for prostate cancer. *The Prostate* 73 (6), 573-581

ORAL AND POSTER PRESENTATION

M. Agarwal, K. Roth, Z. Yang, R. Sharma, K. Maddipati, K. Gurdziel, J. Westrick, and M. Petriello (March 2023). Polychlorinated Biphenyl 126 (PCB 126)-induced Oxidative Stress can be Attenuated in Mouse Liver by Loss of Flavin Containing Monooxygenase-3 (FMO3). 62nd Annual SOT meeting at Nashville, TN; Poster presentation.

M Agarwal, MC Petriello (January 2023). Mice are protected against oxidative stress caused by Polychlorinated Biphenyl (PCB) by loss of Flavin Containing Monooxygenase 3 (FMO3). 26th Annual Chuan-Pu Lee Endowed GSRPD selected for podium talk.

M Agarwal, MC Petriello (October 2022). Polychlorinated Biphenyl 126 (PCB 126)-induced Oxidative Stress in Liver is protected by the loss of Flavin Containing Monooxygenase-3 (FMO3). Michigan Regional Chapter of the Society of Toxicology presented a poster.

M Agarwal, MC Petriello (January 2022). Loss of Flavin Containing Monooxygenase 3 (FMO3) protects Mice Against Dioxin-like Polychlorinated Biphenyl (PCB)-induced Inflammation. 25th Annual GSRPD symposium presented a 3-minute oral poster style

M Agarwal, MC Petriello (June 2021). Loss of Flavin Containing Monooxygenase 3 (FMO3) protects Mice Against Dioxin-like Polychlorinated Biphenyl (PCB)-induced Inflammation. 47th Michigan Pharmacology Colloquium selected for podium talk.

M Agarwal, MC Petriello (March 2021). Meat-based diets and Pollutants increase the risk of cardiovascular disease. 2021 Graduate Research Symposium (GRS) presented a 3-minute thesis style

M Agarwal, S Aher, S Kale (2001). Extraction and Characterization of Fatty Acids of Balanitis Aegyptica of Family Balanitaceae. International Pharmacy Conferences

PUBLISHED CONFERENCE PAPERS

J Yang, **M Agarwal**, KK Kim (2019). CCL2/12 from Injured Alveolar Epithelial Cells Initiated and Promoted Progressive Pulmonary Fibrosis. C64. PULMONARY FIBROSIS MODELS AND MECHANISTIC INSIGHTS, A5397-A5397

R Vittal, **M Agarwal**, C Wilke, E Cipolla, KK Kim, VN Lama, BB Moore (2019). Decay-Accelerating Factor 1 Gene Silencing Exacerbates Alveolar Injury and Fibrotic Responses in Mice. A101. TRANSLATIONAL STUDIES IN ILD, IPF, AND SARCOIDOSIS, A2413-A2413

S Jia, JC Horowitz, **M Agarwal**, KK Kim (2017). Type I Collagen Signaling Through Ddr2 Receptor Regulates Fibroblast Apoptosis Through Akt. C78. FIBROSIS: MEDIATORS AND MODULATORS, A6440-A6440

AK Wheaton, M Velikoff, **M Agarwal**, KK Kim (2016). TGF- β Induces Alveolar Epithelial Cell Apoptosis Through Activation of A FADD/Caspase 8 Pathway. C72. EPITHELIAL BIOLOGY, A5890-A5890

S Jia, JC Horowitz, T Loo, **M Agarwal**, KK Kim (2016). Type I Collagen Signaling Regulates Fibroblast Activation, Proliferation, And Apoptosis. A74. MATRIX: DRIVERS AND TARGETS, A2432-A2432

AK Wheaton, M Velikoff, **M Agarwal**, TH Sisson, KK Kim (2015). C109 MATRIX MANIA: THE COMPLEX WEBS WE WEAVE?: Extracellular Matrix Regulates Alveolar Epithelial Cell Apoptosis. American Journal of Respiratory and Critical Care Medicine 191, 1

J Yang, M Velikoff, K Kleaveland, **M Agarwal**, KK Kim (2014). Overexpression Of Id2 Transcription Factor Promotes Alveolar Epithelial Cell Proliferation and Attenuates Bleomycin-Induced Pulmonary Fibrosis. A107. THE LUNG'S SILVER LINING: AIRWAY AND ALVEOLAR EPITHELIAL BIOLOGY, A2372-A2372

K Kleaveland, M Velikoff, **M Agarwal**, J Yang, K Kim (2014). B97 A SCAR IS BORN: NEW INSIGHTS IN LUNG FIBROGENESIS: Fibrocytes Are Not an Essential Source of Type I Collagen During Lung Fibrosis. American Journal of Respiratory and Critical Care Medicine 189, 1

J Yang, M Velikoff, K Kleaveland, **M Agarwal**, KK Kim (2014). A107 THE LUNG'S SILVER LINING: AIRWAY AND ALVEOLAR EPITHELIAL BIOLOGY: Overexpression of Id2 Transcription Factor Promotes Alveolar Epithelial Cell Proliferation and Attenuates Bleomycin-Induced Pulmonary Fibrosis. American Journal of Respiratory and Critical Care Medicine 189, 1

S Ashley, R Domingo-Gonzalez, C Wilke, **M Agarwal**, AM Levine, B Moore (2013). Surfactant protein A regulation of host defense post-bone marrow transplantation (P2158). The Journal of Immunology 190 (1 Supplement), 69.17-69.17

TEACHING/ TRAINING EXPERIENCE

Peer-reviewed a manuscript for the International Journal of Molecular Sciences – MDPI on January 9th, 2023. Manuscript ID: ijms-2163373 Title: Sirolimus and magnesium on primary human coronary endothelial cells: an in vitro study. Authors: Giorgia Fedele, Sara Castiglioni, Jeanette A. M. Maier *, Laura Locatelli

Judge for the Annual Biomedical Career Advancement Program (BCAP) Research Symposium on August 12, 2022

Currently volunteering as a mentor for kids in Detroit public school-aged 8-18 with Center for Success (CFS) center4success.org

Helped trained several clinical fellows and lab technicians with mouse colony maintenance, genotyping, primary cell isolation from mouse tissues, IP, oral gavage, oropharyngeal aspiration, aseptic cell culture techniques, and lab-specific experimental procedures and techniques during my work at the University of Michigan.

RESEARCH EXPERIENCE

University of Michigan Medical School **July 2013- July 2019 | Michigan, USA**

Research Lab Specialist Associate, Dept. of Internal Medicine Pulmonary & Critical Care

- Project: Cytokine release during EMT with a focus on TGF signaling, Transcriptional regulation of epithelial cells' plasticity during fibrosis, and defining the capacity of epithelial-derived cells to contribute to fibrosis.

University of Michigan Medical School **July 2012- July 2013 | Michigan, USA**

Research Technician Lead, Pediatrics critical care

- Project 1: Stem cell Transplant/ Bone marrow transplant (BMT) alters the epithelial cells and results in epigenetic and miRNA dysregulation of Alveolar Macrophages (AMs), impairing host defense against bacterial pathogens.
- Project 2: Surfactant Protein A Regulates Scavenger Receptor A Expression and Clearance of Apoptotic Alveolar Macrophages

University of Michigan Medical School **Jan 2010- June 2012 | Michigan, USA**

Senior Research Technician, Department of Urology

- Project 1: Chemokine Prostate Cancer Biomarkers (EDRN/NCI)
- Project 2: Validation of Potential anti-EGFR Compounds
- Project 3: Role of Prostatic Fibrosis in BPH/LUTs Development and symptomology (NIDDK/NIH)

Innovative Research Inc. / Molecular Innovations Inc. **2008-2009 | Michigan, USA**

Research Technician

- Development of Fibrinogen ELISA Kit.
- Purification of Therapeutic Proteins and Large Scale Production of Antibodies.
- Hybridoma Technology- screening and subcloning of hybridoma cells. Expansion and large-scale production of monoclonal cells.

Advance Biochemical Limited/ Advanced Enzyme Technologies Ltd **2004-05 | India**

Research Associate

- Purification and Scale-up of Industrial Enzymes
- Worked on studies of enzyme kinetics (temperature and pH) and stabilization (polymer type, polymer concentration, pH, and temperature).
- Operated and maintained lab instruments, interpreted, and documented QC/QA data for publication, ISO 9001 audits, and customer interaction.

HIGHLIGHTS

- Extensive expertise in immunoassay kit development, purification and production of therapeutic proteins, enzymes, and antibodies (both poly and monoclonal), genotyping and validation of potential drugs by using a variety of biological systems and approaches including:
 - Biochemistry, molecular biology, immunological and analytical techniques
 - In vitro cell culture and In-vivo animal models (mouse)
- https://www.researchgate.net/profile/Manisha_Agarwal7
- <https://www.linkedin.com/in/manisha-agarwal-62715514/>

TECHNICAL EXPERIENCE

- Protein Biochemistry: ELISA, western blot, immunoblot, immunoprecipitation, CHIP assay.
- Cell & Molecular Biology: Cell proliferation and apoptotic assays, bacterial and mammalian expression systems, RNA & DNA isolation & purification, mini and midi preps, and qPCR analysis.
- Immunohistochemistry: OCT blocks, PFA fixing, preparing tissue slides on HISTO-Cryostat, slicing tissue on HISTO-microtome.
- Microscopy: Bright field, differential interference contrast (DIC), and wide-field fluorescence (350, 488, 543 nm) microscopy
- Animal Handling: Oropharyngeal Aspiration, IT, IP, Oral Gavage, Bronchoalveolar lavage (BAL), mice Intubations, Mice breeding, and colony maintenance.
- Analytical Techniques: Chromatography (Ion-exchange, affinity, GC, AKTA purification systems with UNICORN software), Spectroscopy (Mass), qPCR, Flow Cytometry, and Flow Jo analysis.
- Immunological Techniques: Raising polyclonal antibodies, hybridoma technology, quantitative and qualitative analysis of antigens and antibodies (Immunoelectrophoresis, immunodiffusion, ELISA).
- Enzyme kinetics studies