

## Asthma

**Gregg Duncan** (gaduncan@umd.edu): Research in the Duncan lab focuses on understanding the lung airway microenvironment and its role in pulmonary diseases such as cystic fibrosis (CF), chronic obstructive pulmonary disease (COPD), and asthma. Dr. Duncan uses biochemical, biophysical, engineering, and materials science approaches to understand airway microphysiology in health and disease with ultimate goal of engineering new and/or improved treatments. Project areas within the Duncan laboratory include: mucociliary clearance, virus-induced pulmonary exacerbations, and drug & gene therapeutics.

### Highlighted Publications:

1. Song D, Iverson E, Kaler L, Bader S, Scull MA, **Duncan GA**. "Modeling airway dysfunction in asthma using synthetic mucus biomaterials". *ACS Biomaterials Science & Engineering*. 7 (6), 2723–33, 2021.
2. Morgan LE#, Jaramillo AM#, Shenoy SK, Raclawska D, Emezienna NA, Richardson VL, Hara N, Harder AQ, El-Batal HM, Magin CM, Grove Villalon DE, **Duncan GA**, Hanes JS, Suk JS, Thornton DJ, Holguin F, Janssen WJ, Thelin WR, Evans CM. "Disulfide disruption reverses mucus dysfunction in allergic airway disease". *Nature Communications*. 12 (249), 2021.
3. Linssen RS, Chai G, Ma J, Kummarapurugu A, van Woensel JBM, Bem RA, Kaler L, **Duncan GA**, Zhou L, Rubin BK, Xu Q. "Neutrophil extracellular traps increase airway mucus viscoelasticity and impede particle transit through the mucus layer". *American Journal of Respiratory Cell and Molecular Biology*. 64 (1), 69-78, 2021.
4. Iverson E, Kaler L, Agostino EL, Song D, **Duncan GA**, Scull MA. "Leveraging 3D Model Systems to Understand Viral Interactions with the Respiratory Mucosa". *Viruses*. 12 (12), 1425, 2020.
5. Song D, Cahn D, **Duncan GA**. "Mucin biopolymers and their barrier function at airway surfaces". *Langmuir*, 36 (43), 12773–12783, 2020.

### Links:

Faculty webpage: <http://duncan.umd.edu>, <http://www.bioe.umd.edu/faculty/duncang>

PubMed publications:

<https://www.ncbi.nlm.nih.gov/myncbi/browse/collection/54250996/?sort=date&direction=ascending>

**Stella Hines** (Shines@som.umaryland.edu): Dr. Hines studies occupational & environmental lung disease with a particular focus on pulmonary physiology. She has a distinct interest in characterizing unique exposures in military populations, ranging from inhalational and systemic metal exposures, blast impact and other airborne hazards in relation to measures of pulmonary physiology, including respiratory impedance. She also studies the use of different forms of respiratory protection among healthcare workers as protection from occupational hazards, with goals of improving preparedness for emerging infectious disease threats and strengthening the healthcare workforce infrastructure

### Highlighted Publications:

1. **Hines, SE**, Barnes, AH, Brown, C, Gucer, P, Oliver, MS, Gaitens, JM, Condon, M, McDiarmid, M. Impulse Oscillometry Measurement of Distal Airways Obstruction in Depleted Uranium Exposed Gulf War Veterans. *American Journal of Industrial Medicine*. 2018;61:308-316.
2. **Hines, SE**, Brown, C, Oliver, M, Gucer, P, Frisch, M, Hogan, R, Roth, T, Chang, J, McDiarmid, M. User acceptance of reusable respirators in healthcare. *American Journal of Infection Control*. 2019;47:648-655.

3. **Hines, SE**, Brown, C, Oliver, M, Gucer, P, Frisch, M, Hogan, R, Roth, T, Chang, J, McDiarmid, M. Cleaning and Disinfection Perceptions and Use Practices Among Elastomeric Respirator Users in Healthcare. *Workplace Health and Safety*, 2020;68(12):572-582.
4. Glick, DR, Brown, CH, Li, L, Weiler-Lisowski, B, Gaitens, JM, McDiarmid, M, **Hines, SE**. Longitudinal Evaluation of Lung Function in Gulf War I Veterans Exposed to Depleted Uranium. *Journal of Occupational and Environmental Medicine*, 2020;62:1059-1062.
5. Dement J, Cloeren M, Ringen K, Quinn, P, Chen A, Cranford K, Haas S, **Hines SE**. COPD Risk among Older Construction Workers – Updated Analyses 2020. *American Journal of Industrial Medicine*. 2021; Mar 16; doi: 10.1002/ajim.23244.

Links:

Med School faculty page: <https://www.medschool.umaryland.edu/profiles/Hines-Stella/>

PubMed publications: <https://www.ncbi.nlm.nih.gov/myncbi/stella.hines.1/bibliography/public/>

**Achsah Keegan** ([akeegan@som.umaryland.edu](mailto:akeegan@som.umaryland.edu)): Dr. Keegan's laboratory focuses on IL-4 and IL-13 signaling in the context of Th2 type inflammation and asthma with a recent focus on macrophage reprogramming. The laboratory has utilized advanced flow cytometry and cell sorting, genetically engineered mice, and mouse models of allergic asthma to make several key findings including (i) characterization of the role of the IRS2 and STAT6 pathways in protecting cells from apoptosis, (ii) identification of residues within the IL-4R $\alpha$  required for signal transduction, (iii) elucidation of the effect of allergy-associated polymorphisms in the IL-4R $\alpha$  on IL-4-induced signaling, (iv) characterization of the complex roles of IL-4R $\alpha$ , STAT6, and IRS2 in allergic inflammation *in vivo*; (v) how IL-4 promotes the alternative activation of macrophages (M2) and the formation of multinucleated giant cells (MNG) by a STAT6-dependent mechanism; and (vi) how semaphorin 4A and Plexin B1 downregulates allergic airway inflammation.

Highlighted Publications:

1. Nkyimbeng-Takwi, E.H., Shanks, K., Smith, E.P., Iyer, A., Lipsky, M.M., DeTolla, L.J., Kikutani, H., Keegan, A.D., Chapoval, S.P. (2012). Neuroimmune semaphorin 4A downregulates the severity of allergic response. *Mucosal Immunology*. 5:409-419. PMID: 22472774
2. Dorsey, N.J., Chapoval, S.P., Smith E. P., Skupsky, J., Scott, D.W., and Keegan, A.D. 2013. STAT6 controls the number of regulatory T cells in vivo thereby regulating allergic lung inflammation. *J. Immunol*. 191(4):1517-28. NIHMS490589
3. Shanks, K., Nkyimbeng-Takwi, E.H., Smith, E.P., Lipsky, M.M., DeTolla, L.J., Keegan, A.D., Chapoval, S.P. (2013). Neuroimmune semaphorin 4D is necessary for optimal lung allergic inflammation. *Molecular Immunology*. 56:480-487. PMID: 23911404
4. Zhang ZQ, Wang J, Hoy Z, Keegan A, Bhagwat S, Gigliotti F, Wright TW. Neither classical nor alternative macrophage activation is required for Pneumocystis clearance during immune reconstitution inflammatory syndrome. *Infection and immunity*. 2015; 83(12):4594-603. PMID: 26371121
5. Dasgupta P, Dorsey NJ, Li J, Qi X, Smith EP, Yamaji-Kegan K, Keegan AD. The adaptor protein insulin receptor substrate 2 inhibits alternative macrophage activation and allergic lung inflammation. *Science signaling*. 2016; 9(433):ra63. PMID: 27330190
6. Keegan AD, Shirey KA, Bagdure D, Blanco J, Viscardi RM, Vogel SN. Enhanced allergic responsiveness after early childhood infection with respiratory viruses: Are long-lived alternatively activated macrophages the missing link? *Pathogens and disease*. 2016; 74(5). PMID: 27178560

Links:

Med School faculty page: <http://www.medschool.umaryland.edu/profiles/Keegan-Achsah/>

PubMed publications:

<http://www.ncbi.nlm.nih.gov/sites/myncbi/achsah.keegan.1/bibliography/41138906/public/?sort=date&direction=ascending>