Ummul AFIA Shammi

Contact

- **Building & Room:** Building NMRL & Room 110C
- **Address:** 820 S Wood St, Room W103 CSN, Chicago, IL 60612
- **Phone:** 573.529.4178
- **Email:** ushammi@uic.edu

Research Interests

- Pulmonary imaging; Hyperpolarized gas; Translational studies; Clinical MRI

Education and training

- **PhD:** Department of Biological Engineering, University of Missouri, Columbia, MO
- **Postdoctoral Fellowship:** Roy Blunt NextGen Precision Health Center, University of Missouri, Columbia, MO

Research Interests

My research focuses on pulmonary imaging, hyperpolarized gas imaging, rare lung diseases, and the characterization of cardiopulmonary function in a range of disorders. My educational and professional background is rooted in hyperpolarized xenon MRI and its clinical applications. I am passionate about conducting research that provides clinicians and researchers with deeper insights into early lung disease, its progression over time, and its response to treatment, ultimately providing direct clinical benefits to patients.

The primary aim of this lab is to develop and validate innovative MRI techniques to visualize and quantify regional lung structure-function relationships in lung diseases. Hyperpolarized ^{129}Xe MRI is particularly promising for this purpose, as it can act as a gaseous contrast agent. Due to its solubility in tissues, ^{129}Xe distributes within lung airspaces and dissolves in the parenchyma and blood within lung capillaries. This dissolution leads to shifts in its resonance frequency, enabling the separate detection of gas-phase, tissue-phase, and RBC-associated ^{129}Xe. This allows us to obtain comprehensive regional data on lung ventilation, diffusion, and perfusion in a single short breath hold.

Utilizing hyperpolarized ^{129}Xe gas MRI, I aim to uncover the pathophysiological mechanisms underlying rare lung diseases. The advantage of MRI, being free from ionizing radiation, makes it an ideal tool for generating biomarkers to assess treatment responses, especially in rare diseases with limited patient numbers. These findings have the potential to inform personalized clinical care, leading to improved patient outcomes.

Selected Publications

- **Shammi, U.A.,** Delgado, Gabriela M.C., Thomen, R., Troubleshooting and Quality Assurance in Hyperpolarized Xenon MRI: Tools for High-Quality Image Acquisition, Journal of Visualized Experiments. Aug 2023 (Link)
- **Shammi, U. A**., Flors-Blasco, L., Altes, T., Mugler III, J. P., Meyer, C., Mata, J., Qing, K., Miller, W., Seibert, M., Glascott, B., Siddiqui, A., Thomen, R., Quantifying regional pulmonary ventilation changes in hyperpolarized 3He MRI of asthma subjects following bronchodilator at three timepoints, Joint Annual Meeting ISMRM-ESMRMB & SMRT 31st Annual Meeting, 2022. (Link)
- Grace, M., **Shammi, U.A**., Oechtering, T.H., Chatbots for Literature Review and Research – Insights from a Panel Discussion at the Annual Meeting of the International Society of Magnetic Resonance in Medicine (ISMRM) 2023, J. Magn. Reson. Imaging, Jun 2023 (Link)
- **Shammi, U.A.**, Luan, Z., Xu, J., Hamid, A., Flors-Blasco, L., Cassani, J., Altes, T., Thomen, R., Doren, S.V., Improved visualization of free-running cardiac magnetic resonance by respiratory phase using principal component analysis. Research in Diagnostic and Interventional Imaging. Dec 2023 (Link)
- **Shammi, U. A.**, D'Alessandro, M. F., Altes, T., Hersman, F. W., Ruset, I. C., Mugler, J., Meyer, C., Mata, J., Qing, K., Thomen, R, Comparison of hyperpolarized ^{3}He and ^{129}Xe MR imaging in cystic fibrosis patients. Acad Radiol. 2021 Jan 21; S1076-6332(21)00013-1 [IF = **5.482**]. (Link)
- Delgado, G.G, **Shammi, U.A.**, Altes, T., Mugler III, J.P., Thomen, R., Quantification of Spatial Ventilation Defect Distribution in Hyperpolarized Gas MRI of Lungs Using A 3D Clustering Algorithm, ISMRM & ISMRT Annual Meeting & Exhibition, Jun 2023.
- **Shammi, U. A**., Flors-Blasco, L., Altes, T., Mugler III, J. P., Meyer, C., Mata, J., Qing, K., Miller, W., Seibert, M., Glascott, B., Siddiqui, A., Thomen, R., Quantifying regional pulmonary ventilation changes in hyperpolarized 3He MRI of asthma subjects following bronchodilator at three timepoints, Joint Annual Meeting ISMRM-ESMRMB & SMRT 31st Annual Meeting, 2022. (Link)
- Chao, S.K, **Shammi, U.A.**, Flors-Blasco, L., Altes, T., Mugler III, J. P., Meyer, C., Mata, J., Qing, K., Miller, W., Seibert, M., Glascott, B., Siddiqui, A., Thomen, R., Automatic lung segmentation for hyperpolarized gas MRI using transferred conditional generative adversarial network and 3D redundancy, Joint Annual Meeting ISMRM-ESMRMB & SMRT 31st Annual Meeting, 2022 (Link)
- **Shammi, U.A.**, Luan, Z., Xu, J., Hamid, A., Cassani, J., Altes, T., Thomen, R., Small and Large Respiratory Motions from Free-Running Cardiac Magnetic Resonance Corrected by Two Post-Processing Strategies (poster 2877), ISMRM and SMRT Annual Meeting & Exhibition May 2021. (Link)
- **Shammi, U. A.**, Thomen, R., Role of New Imaging Capabilities with MRI and CT in the Evaluation of Bronchiectasis. Curr Pulmonol Rep 8, 2019, pp. 166–176. DOI:10.1007/s13665-019-00240-z. (Link)