RUSH

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The Mary and John Bent Professor of Cardiovascular and Thoracic Surgery

Advancement of Medicine

In 2024, the Bent endowment funds were deployed to strengthen our clinical trials and research programs as well as our translational research efforts in lung cancer research. In September 2024, **Jian Zhou, PhD**, was recruited from University of Illinois to lead a program in microfluidics to identify and characterize circulating tumor cells. His recruitment strengthens our program in early detection and improved prognosis in lung cancer. **Carlos Bechara, MD, DFSVS**, joined the Department of Cardiovascular and Thoracic Surgery as chief of vascular surgery in January 2025. He is recognized internationally as an innovator in complex aortic surgery and physician modified endograft repair. The Rush Thoracic Surgery Research Group established a visiting clinical research scholar program and graduated its first two scholars, **Arsalan Khan, MD**, and **Minha Ansari**. The group has produced over 20 original clinical research publications over the past year.

Clinical Research

Visiting clinical scholars, surgical residents and medical students — under the direction and supervision of **Christopher W. Seder, MD**, the Arthur E Diggs, MD, and L. Penfield Faber, MD, Professor of Surgical Sciences — have performed several clinical outcomes studies exploring the impact of physiologic, imaging-based, and social factors on non-small cell lung cancer, or NSCLC, prognosis and recovery.

Our expertise has also been recognized through invited authorship of high-impact review articles, a selection of which are mentioned below. Our team regularly contributes editorial commentaries on emerging debates in thoracic oncology, reflecting our commitment to shaping the evolving discourse around NSCLC and esophageal cancer management. We are currently extending our body composition-, social vulnerability index- and systemic immune-inflammatory index-based methodologies to patients undergoing esophagectomy, with prospective data collection underway.

With Dr. Bechara's recruitment, the Bent endowment is funding to build out clinical research analyst support for an aortic database and linkage to the Vascular Quality Initiative database to aid in outcomes research spearheaded by **Sungho Lim, MD**, who joined in April 2025.

Translational Research

Lung cancer remains the leading cause of cancer-related mortality worldwide, largely due to late-stage diagnosis and limited tools for early detection. Despite advances in screening, current methods still suffer from high false-positive rates, overdiagnosis and limited sensitivity. Moreover, existing risk stratification models often fail to capture the full spectrum of recurrence risk, particularly in patients with early-stage disease. Compounding these challenges is the lack of robust, predictive preclinical models that accurately mimic the complexity of lung cancer and its tumor microenvironment, hindering the development and testing of novel therapies. These gaps underscore the urgent need for innovative approaches in screening, risk assessment and translational research to improve outcomes for lung cancer patients.

To address these challenges, Dr. Zhou's team is advancing two major research tracks in close collaboration with healthcare providers, utilizing microfluidic technology and 3D patient-derived organoids. These two approaches aim to improve our understanding of tumor biology, enhance the predictive accuracy of preclinical testing and support the development of personalized therapeutic strategies.

Meanwhile, the lab of Jeffrey Borgia, PhD, is dedicated to uncovering molecular and clinical drivers of recurrence in early-stage NSCLC. His lab recently received s $50,000 grant from Swim Across America for a project that aims to describe the biomarkers associated with recurrence. These efforts aim to establish a clinically meaningful panel of recurrence-associated markers to inform future diagnostic tools. Additionally, we are collaborating with our basic science and molecular biology colleagues to develop a blood-based method to improve early detection of lung cancer, for which a $50,000 grant application is currently under review by The Women's Board of Rush University Medical Center.

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Select Presentations

- Reduced Thoracic Adipose Volume Is Associated with Occult Nodal Disease In Females With NSCLC. Khan AA*, Shah SK*, Alex GC, Liptay MJ, Seder CW, Geissen NM. Presented at 71st Annual Southern Thoracic Surgical Association Meeting. November 2024. Austin, TX.
- Social Vulnerability Index is Associated with Major Morbidity After VATS Lung Resection. Shah SK*, Khan AA*, Basu S, Alex GC, Karush JM, Geissen NM, Liptay MJ, Seder CW. 36th Annual General Thoracic Surgery Club (GTSC) Meeting. March 2024. Palm Springs, CA.

Publication Highlights — Abbreviated

- Shah SK, Krishnan V, Khan AA, Fass L, Chaudhry T, Seder CW, Geissen NM, Liptay MJ, Alex GC. Women are Underrepresented in Non-small Cell Lung Cancer Clinical Trials: A Systematic Review. *Ann Surg Oncol*. 2024 Jul 10. doi: 10.1245/s10434-024-15720-z. Epub ahead of print. PMID: 38987373.
- Shah SK, Kim S, Khan AA, Krishnan V, Lally AM, Shah PN, Alex GC, Seder CW, Liptay MJ, Geissen NM. Examination of Firefighting as an Occupational Exposure Criteria for Lung Cancer Screening. Lung. 2024 Oct;202(5):649-655. doi: 10.1007/s00408-024-00736-9. Epub 2024 Aug 20. Erratum in: Lung. 2024 Oct;202(5):657. doi: 10.1007/s00408-024-00747-6. PMID: 39164595.
- Khan AA*, Shah SK*, Naeem W, Basu S, Alex GC, Geissen NM, Liptay MJ, Seder CW. Postoperative Sarcopenia and Association with Recurrence in Resected Early-Stage Non-Small Cell Cancer. Journal of the American College of Surgeons ():10.1097/XCS.0000000000001360, February 18, 2025. | DOI: 10.1097/XCS.0000000000001360

The Year Ahead: 2025 and Beyond

In 2025 we are focused on expanding our clinical research and trials in both heart and vascular and thoracic surgery. Our clinical research programs in thoracic and vascular surgery have attracted three general surgery residents to continue our productive investigations using Rush and national databases to answer timely clinical questions. The Zhou and Borgia labs continue to use cuttingedge basic science techniques married with our tumor bank and clinical databases to discover new ways to diagnose and identify cancer in its earliest stages. The Bent endowment has been essential to this past years accomplishments and those of the future.

With Gratitude

Thank you to the Bent family for supporting our Department of Cardiovascular and Thoracic Surgery research and educational efforts throughout the years. Without your support, much of this would not have come to fruition.