

Stanford



Tushar Desai

Associate Professor of Medicine (Pulmonary and Critical Care)
Medicine - Pulmonary & Critical Care Medicine

CLINICAL OFFICES

- **Chest Clinic**

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Bio

BIO

Dr. Tushar Desai specializes in the treatment of general pulmonary and Interstitial Lung Diseases like Idiopathic Pulmonary Fibrosis (IPF). He has practiced pulmonary medicine since 2002.

Dr. Desai has a special interest in understanding the development and progression of diseases like IPF, Chronic Obstructive Pulmonary Disease (COPD), and lung adenocarcinoma, as well as in understanding how native lung stem cells function to repair the lung gas exchange surface after injury.

CLINICAL FOCUS

- Pulmonary Disease
- Interstitial Lung Diseases

ACADEMIC APPOINTMENTS

- Associate Professor, Medicine - Pulmonary & Critical Care Medicine
- Member, Bio-X
- Member, Institute for Stem Cell Biology and Regenerative Medicine
- Member, Maternal & Child Health Research Institute (MCHRI)
- Member, Stanford Cancer Institute

HONORS AND AWARDS

- Genome Editing to Correct Cystic Fibrosis Mutations in Airway Stem Cells, California Institute of Regenerative Medicine (CIRM) (2017-2019)
- Woods Family Endowed Faculty Scholar, Stanford Child Health Research Institute (2016-2021)
- In Situ Identification and Mapping of Alveolar Stem Cells at Single Cell Resolution in Human Lungs, NIH/NHLBI (2016-2017)
- A Genetic Dissection of Lung Adenoma Initiation and Progression, American Lung Association, Lung Cancer Discovery Award (2015-2017)
- Selective Aging of the Lungs: Using Conditional Klotho Deletion to Identify the Basis for Emphysema, Glenn Center for the Biology of Aging Seed Grant 2014 (2015-2017)
- Single Cell Profiling and in vivo Cellular Interrogation of Alveolar Stem Cells, NIH/NHLBI (2015-2016)

- In Situ Transcriptome Profiling in Histological Sections, Stanford Bio-X Interdisciplinary Initiatives Program 2014 (2014-2016)
- Interrogation of Individual Cells to Identify Progenitor Cells and Their Niches (U01), NIH/NHLBI (2014-2016)
- ITI Faculty Seed Grant 2014, Stanford Institute for Immunity, Transplantation, and Infection (2014-2015)
- Development and Maintenance of the Alveolar Type 1 Cell (K08), NIH/NHLBI (2008-2013)
- Fellowship in Pulmonary Research, Parker B. Francis Foundation (2006-2009)
- Retinoic Acid in Early Lung Morphogenesis, GlaxoSmithKline Pulmonary Fellowship Award (2002-2003)
- Robert Dawson Evans Fellow Excellence in Teaching Award, Boston University School of Medicine, Department of Internal Medicine (2000)
- House Officer Research Award, University of Michigan Hospitals, Department of Internal Medicine (1998)
- Worth F. Bloom M25 Prize, Tufts University School of Medicine (1995)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Member, Scientific Advisory Board, UK Regenerative Medicine Platform, Engineered Cell Environment Hub (2018 - present)
- Member, Scientific Advisory Committee, American Thoracic Society (ATS) (2015 - present)

PROFESSIONAL EDUCATION

- Fellowship: Boston University Pulmonary and Critical Care Fellowship (2002) MA
- Residency: University of Michigan Health System Internal Medicine Residency (1998) MI
- Internship: University of Michigan Health System Internal Medicine Residency (1996) MI
- Medical Education: Tufts University School of Medicine Office of the Registrar (1995) MA
- Board Certification: Pulmonary Disease, American Board of Internal Medicine (2001)
- BA, Amherst College , Psychology (1991)
- MD, MPH, Tufts University School of Medicine , Medicine, Public Health (1995)

PATENTS

- Tushar Desai, Pehr Harbury, Daniel Riordan. "United States Patent 62/475,090 Molecular profiling using proximity ligation- in situ hybridization", Leland Stanford Junior University, Mar 22, 2017

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

We attempt to deeply characterize the normal biology of the lung, in vivo and at single cell resolution, using powerful and precise genetic and genomic tools. We then apply our fundamental understanding of lung biology to investigate which specific processes have gone awry in particular lung diseases, using a combination of experimental models and analysis of primary human disease samples. Our belief is that dissecting the specific mechanisms of disease pathogenesis will enable the rational design of highly targeted therapies that have the potential to halt disease without conferring significant off-target toxicities.

CLINICAL TRIALS

- Detection of Integrin avb6 in Idiopathic Pulmonary Fibrosis Using PET/CT, Recruiting

Teaching

COURSES

2017-18

- Advanced Cell Biology: BIO 214, BIOC 224, MCP 221 (Win)

STANFORD ADVISEES

Postdoctoral Faculty Sponsor

Monica Nagendran

GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Cancer Biology (Phd Program)
- Medicine (Masters Program)
- Pulmonary & Critical Care Medicine (Fellowship Program)
- Stem Cell Biology and Regenerative Medicine (Phd Program)

Publications

PUBLICATIONS

- **An atlas of the aging lung mapped by single cell transcriptomics and deep tissue proteomics.** *Nature communications*
Angelidis, I., Simon, L. M., Fernandez, I. E., Strunz, M., Mayr, C. H., Greiffo, F. R., Tsitsiridis, G., Ansari, M., Graf, E., Strom, T., Nagendran, M., Desai, T., Eickelberg, et al
2019; 10 (1): 963
- **Single-cell Wnt signaling niches maintain stemness of alveolar type 2 cells.** *Science (New York, N.Y.)*
Nabhan, A., Brownfield, D. G., Harbury, P. B., Krasnow, M. A., Desai, T. J.
2018
- **Automated cell type classification in intact tissues by single-cell molecular profiling.** *eLife*
Nagendran, M., Riordan, D. P., Harbury, P. B., Desai, T. J.
2018; 7
- **Attenuated PDGF signaling drives alveolar and microvascular defects in neonatal chronic lung disease.** *EMBO molecular medicine*
Oak, P., Pritzke, T., Thiel, I., Koschlig, M., Mous, D. S., Windhorst, A., Jain, N., Eickelberg, O., Foerster, K., Schulze, A., Goepel, W., Reicherzer, T., Ehrhardt, et al
2017
- **Early Identification of Bronchopulmonary Dysplasia Using Novel Biomarkers by Proteomic Screening.** *American journal of respiratory and critical care medicine*
Förster, K., Sass, S., Ehrhardt, H., Mous, D. S., Rottier, R. J., Oak, P., Schulze, A., Flemmer, A. W., Gronbach, J., Hübener, C., Desai, T., Eickelberg, O., Theis, et al
2017
- **Trinucleotide repeat containing 6c (TNRC6c) is essential for microvascular maturation during distal airspace sacculation in the developing lung.** *Developmental biology*
Guo, H., Kazadaeva, Y., Ortega, F. E., Manjunath, N., Desai, T. J.
2017; 430 (1): 214–23
- **Hedgehog-driven myogenic tumors recapitulate skeletal muscle cellular heterogeneity** *EXPERIMENTAL CELL RESEARCH*
Hettmer, S., Lin, M. M., Tchessalova, D., Tortorici, S. J., Castiglioni, A., Desai, T., Mao, J., McMahon, A. P., Wagers, A. J.
2016; 340 (1): 43-52
- **Hedgehog-driven myogenic tumors recapitulate skeletal muscle cellular heterogeneity.** *Experimental cell research*
Hettmer, S., Lin, M. M., Tchessalova, D., Tortorici, S. J., Castiglioni, A., Desai, T., Mao, J., McMahon, A. P., Wagers, A. J.
2016; 340 (1): 43–52
- **Keeping it together: Pulmonary alveoli are maintained by a hierarchy of cellular programs.** *BioEssays*
Logan, C. Y., Desai, T. J.
2015; 37 (9): 1028-1037
- **Cellular mechanisms of alveolar pathology in childhood interstitial lung diseases: current insights from mouse genetics** *CURRENT OPINION IN PEDIATRICS*

- Kuo, C. S., Desai, T. J.
2015; 27 (3): 341-347
- **Reconstructing lineage hierarchies of the distal lung epithelium using single-cell RNA-seq.** *Nature*
Treutlein, B., Brownfield, D. G., Wu, A. R., Neff, N. F., Mantalas, G. L., Espinoza, F. H., Desai, T. J., Krasnow, M. A., Quake, S. R.
2014; 509 (7500): 371-375
 - **Alveolar progenitor and stem cells in lung development, renewal and cancer.** *Nature*
Desai, T. J., Brownfield, D. G., Krasnow, M. A.
2014; 507 (7491): 190-194
 - **Stem cells: Differentiated cells in a back-up role.** *Nature*
Desai, T. J., Krasnow, M. A.
2013; 503 (7475): 204-205
 - **Smooth muscle protein 22 alpha-mediated patchy deletion of Bmpr1a impairs cardiac contractility but protects against pulmonary vascular remodeling** *CIRCULATION RESEARCH*
El-Bizri, N., Wang, L., Merklinger, S. L., Guignabert, C., Desai, T., Urashima, T., Sheikh, A. Y., Knutsen, R. H., Mecham, R. P., Mishina, Y., Rabinovitch, M.
2008; 102 (3): 380-388
 - **In vitro and in vivo gene therapy vector evolution via multispecies interbreeding and retargeting of adeno-associated viruses** *J Virol*
Grimm D, Lee JS, Wang L, Desai T, Akache B, Storm TA, Kay MA
2008; 82 (12): 5887-5911
 - **Inhibition of Tgf beta signaling by endogenous retinoic acid is essential for primary lung bud induction** *DEVELOPMENT*
Chen, F., Desai, T. J., Qian, J., Niederreither, K., Lu, J., Cardoso, W. V.
2007; 134 (16): 2969-2979
 - **Distinct roles for retinoic acid receptors alpha and beta in early lung morphogenesis** *DEVELOPMENTAL BIOLOGY*
Desai, T. J., Chen, F., Lu, J. M., Qian, J., Niederreither, K., Dolle, P., Chambon, P., Cardoso, W. V.
2006; 291 (1): 12-24
 - **Retinoic acid selectively regulates Fgf10 expression and maintains cell identity in the prospective lung field of the developing foregut** *DEVELOPMENTAL BIOLOGY*
Desai, T. J., Malpel, S., Flentke, G. R., Smith, S. M., Cardoso, W. V.
2004; 273 (2): 402-415
 - **COPD: Clinical Manifestations, Diagnosis, and Treatment** *Baum's Textbook of Pulmonary Diseases (Eds: James D. Crapo, Jeffrey Glassroth, Joel Karlinsky, and Talmadge E. King Jr.)*
Desai TJ, Karlinsky, JB
2004; 7th ed
 - **Growth factors in lung development and disease: friends or foe?** *Respiratory research*
Desai, T. J., Cardoso, W. V.
2002; 3: 2-?
 - **Participation of urokinase-type plasminogen activator receptor in the clearance of fibrin from the lung** *AMERICAN JOURNAL OF PHYSIOLOGY-LUNG CELLULAR AND MOLECULAR PHYSIOLOGY*
Hattori, N., Sisson, T. H., Xu, Y., Desai, T. J., Simon, R. H.
1999; 277 (3): L573-L579