

Shanay H. Desai

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EDUCATION

University of Pennsylvania – Perelman School of Medicine

Ph.D. in Pharmacology and Translational Therapeutics (GPA: 4.0/4.0)

Aug. 2025 – Present

Philadelphia, PA

Vanderbilt University – College of Arts and Sciences

B.A. in Neuroscience, B.A. in Drug Discovery and Biotechnology (GPA: 3.9/4.0)

Aug. 2021 – May 2025

Nashville, TN

Mississippi School for Mathematics and Science

High School Diploma | Honors in Research & Highest Honors in Biology (GPA: 4.0/4.0)

Aug. 2019 – May 2021

Columbus, MS

RESEARCH EXPERIENCES

Graduate Research Scientist

Aug. 2025 – Present

University of Pennsylvania, Center for Cellular Immunotherapies

Philadelphia, PA

- Engineered pseudotyped lentiviral vectors (VSV-G, VSV-Gmut+aCD7, BaEV) to optimize in vivo CAR-T delivery and T cell targeting, incorporating both integrating and transient transgenes for controlled expression
- Designed and conducted proof-of-concept studies in primary human T cells, demonstrating transient CAR19 and activator molecule expression (Zap70, FYN, LCK, CD28 mutants) to promote proliferative advantage of transduced T cells
- Applied flow cytometry-based titration and phenotyping (BFP/GFP reporters, CD25, CD69, CD134) to characterize transduction kinetics, T cell activation, and expansion across multiple donors
- Investigated novel immunization strategies by leveraging SARS-CoV-2 spike-reactive T cell populations to enhance in vivo transduction efficiency, using both peptide stimulation and humanized/murine surrogate vaccine platforms

Undergraduate Research Scientist, Advisor: Michael King, PhD

Dec. 2021 – May 2025

Vanderbilt University, Department of Biomedical Engineering

Nashville, TN

- Investigating glioblastoma multiforme (GBM) drug resistance by leveraging mechanobiology principles to enhance apoptosis
- Analyzed activation mechanisms of mechanosensitive ion channel Piezo1 in brain cancer cells to identify therapeutic targets
- Designed and optimized 2+ treatment regimens to increase GBM cell death, developing 3+ immunological assays to evaluate apoptosis and mitochondrial depolarization; implemented high-throughput methods to identify synergistic drug interactions
- Utilized flow cytometry and cone-plate viscometers to study pro-apoptotic protease inhibition and role in apoptosis signaling
- Led protocol development and revisions for publications, creating 4-panel infographics to visually represent GBM cell pathway mechanisms; spearheaded university collaboration with neurosurgeons to apply treatments to primary GBM tumors

Undergraduate Research Scientist, Advisor: Henning Stockman, PhD

May 2024 – Aug. 2024

Eli Lilly and Company, Biotechnology Discovery Research (BioTDR) Group

Indianapolis, IN

- Developing brain-derived neurotrophic factor (BDNF) mimetics to enhance neuroprotection and cross the blood-brain barrier
- Independently created/validated 3+ cell-based assays and automated 1 signal transduction assay in neuroblastoma cell lines
- Engineered VHH antibodies fused with BDNF to improve blood-brain barrier penetrance and stability; collaborated on structure-activity relationship (SAR) analyses and optimization of antibody-protein interactions with protein chemists
- Utilized fluorescence resonance energy transfer (FRET) and surface plasmon resonance (SPR) to assess stability of BDNF-VHH fusion in CHO-K1-NFAT-*bla* cell lines; gave Lilly a final recommendation on molecule prioritization for *in vivo* testing

Undergraduate Research Scientist, Advisor: Daniel Heller, PhD

May 2023 – Aug. 2023

Memorial Sloan Kettering Cancer Center, Department of Nanomedicine

New York, NY

- Exploring mechanisms of drug resistance in lung adenocarcinoma via *NRF2-KEAP1* axis and its role in ferroptosis cell death
- Designed and optimized lipid peroxidation and intracellular ROS cell-based assays; created chromatin immunoprecipitation (ChIP)-qPCR protocols to investigate NRF2 binding and transcriptional regulation of KEAP1 in lung cancer cell lines
- Studied transcription factors driving phospholipase A2 (PLA2) enzyme upregulation under ferroptotic cell death; analyzed PLA2 activity following *NRF2* activator and inhibitor treatments; identified therapeutic targets to induce ferroptosis
- Applied flow cytometry, PCR, and immunoblotting to identify molecular targets of ferroptosis and assess *NRF2* dynamics

PEER-REVIEWED PUBLICATIONS

- Ruiz, SB, Tylawsky, DE, Shah, JA, Saoi, ME, Cuevas, BC, **Desai, SH**, Ishiguro, AR, Cross, JH, Heller, DA (2025). Phospholipase PAFAH2 Mediates Ferroptosis Surveillance and Lipid Remodeling to Promote Resistance in KEAP1 Mutant Cancers. *ACS Chemical Biology*, 20(7), 1739–1755. doi/10.1021/acscchembio.5c00273
- Sarna, NS, **Desai, SH**, Kaufman, B, Hanna, A, King, MR (2023). Enhanced and sustained T cell activation in response to fluid shear stress. *Cell – iScience*, 27(6), 109999. doi.org/10.1016/j.isci.2024.109999

- Knoblauch, SV, **Desai, SH**, Dombroski, JA, Sarna, NS, Hope, JM, King, MR (2023). Chemical Activation and Mechanical Sensitization of Piezo1 Enhance TRAIL-Mediated Apoptosis in Glioblastoma Cells. *ACS Omega*, 8(19), 16975-16986. doi.org/10.1021/acsomega.3c00705
- **Desai, SH**, Spencer, DA (2024). *Relaying A Cancer Diagnosis: A Children's Activity Book About Cancer*. Nashville, TN, Independently published. ISBN: 979-8338608234 (Amazon Kindle Direct Publishing)
- **Desai, SH**, Nguyen, GE (2021). *A Beginner's Guide to Scientific Research: One Step Closer to Achieving Scientific Excellence*. Madison, MS, Independently published. ISBN: 979-8670581943 (Amazon Kindle Direct Publishing)

CONFERENCES & PRESENTATIONS

Oral Presentations

- Leadership Alliance National Symposium (LANS) Annual Meeting Hartford, CT (2023)
- Weill Cornell Gateways to the Laboratory Summer Symposium New York, NY (2023)
- Mississippi State University - Keynote Speaker (IDP: Undergraduate Research) Starkville, MS (2022)
- Aspirnaut™ Summer Minority Research Program at Vanderbilt University Nashville, TN (2021)

Poster Presentations

- Biomedical Engineering Society (BMES) Annual Meeting Seattle, WA (2023)
- Vanderbilt Undergraduate Research Fair (VURF) Nashville, TN (2023)
- TN Louis Stokes Alliance for Minority Participation (TLSAMP) Conference Nashville, TN (2023)
- Annual Biomedical Research Conference for Minoritized Scientists (ABRCMS) Anaheim, CA (2022)
- Nashville Nanoscience and Nanotechnology Forum Nashville, TN (2022)
- Biomedical Engineering Society (BMES) Annual Meeting San Antonio, TX (2022)
- International Science and Engineering Fair (ISEF) Annual Meeting Anaheim, CA (2021)
- University of Mississippi Science and Engineering Fair Oxford, MS (2021)
- Madison County School District City Hall Inventors Forum Madison, MS (2021)

INSTITUTIONAL HONORS & ACCOLADES

- University Fontaine Fellow, University of Pennsylvania Office of Provost Fontaine Society Mar. 2025
- Grand Prize Winner, Association of National Advertisers (ANA) Multicultural Excellence Award Dec. 2024
- 2nd Place, American Cancer Society Southeast Region Runner Up Event of the Year Nov. 2024
- Attendee, Harvard Integrated Life Sciences (HILS) PhD Preview Weekend Sept. 2024
- Inductee, Inaugural Vanderbilt Live, Learn, Lead (LLL) Leadership Development Academy Sept. 2024
- 1st Place, Weill Cornell-Sloan Kettering Abby Rockefeller Mauze Charitable Trust Scholarship Aug. 2023
- 3rd Place Best Poster Presentation, Vanderbilt Undergraduate Research Fair (VURF) Apr. 2023
- \$10,000 Peace Grant Recipient, Davis Projects for Peace Foundation Feb. 2023
- 2nd Place Best Final Presentation, SyBBURE Fall 2022 Symposium Dec. 2022
- 3rd Place Best Poster Presentation, Nashville Nanoscience and Nanotechnology Forum Nov. 2022
- Top Poster in Cancer Biology, Annual Biomedical Research Conf. for Minority Scientists (ABRCMS) Nov. 2022
- Roger Deromedi International Service-Learning Scholar, Global Education Office (GEO) Feb. 2022
- Poster Finalist in Cellular Immunology, International Science and Engineering Fair (ISEF) July 2021
- Autodesk Certified User, Certiport Pearson 3D-Modeling Education June 2021

NATIONAL SCHOLARSHIP AWARDS

- NSF Graduate Research Fellowship Program (NSF-GRFP), National Science Foundation Apr. 2025
- Dennis Washington Leadership Graduate Scholar, Dennis & Phyllis Washington Foundation Feb. 2025
- Goldwater Scholar, Barry M. Goldwater Scholarship and Excellence in Education Foundation Mar. 2024
- United Health Foundation Scholar, Asian Pacific Islander American (APIA) Scholarship Feb. 2023
- Tennessee State Scholar, Louis Stokes Alliance for Minority Participation (TN-LSAMP) Jan. 2023
- Coca-Cola Scholar, The Coca-Cola Scholars Foundation (CCSF) May 2021
- Bill Gates Scholar, The Bill & Melinda Gates Foundation May 2021
- McDonald's Scholar, Asian Pacific Islander American (APIA) Scholarship May 2021
- Horatio Alger State Scholar, Horatio Alger Association (HAA) Foundation May 2021
- Elks Most Valuable Student Scholar, Elks National Foundation (ENF) Apr. 2021
- Burger King Scholar, Burger King® Foundation Feb. 2021

PROFESSIONAL EXPERIENCE

- Finance and Strategic Operations Consultant Dec. 2024 – May 2025

American Cancer Society (ACS) BrightEdge

Nashville, TN

- Conduct comprehensive evaluations of early-stage cancer startup applications; utilize a standardized scoring rubric to assess scientific merit, market potential, and alignment with ACS BrightEdge's impact investment strategy
- Manage deal flow and triage startup prospects using Airtable and internal management platforms, scoring opportunities and identifying high-potential ventures for further due diligence and mentorship; support ongoing startups via mentorship
- Participate in weekly investment review meetings, presenting analysis of promising startups and contributing to discussions on scientific breakthroughs, business models, and strategic fit for ACS BrightEdge's impact portfolio

Global Relay For Life Youth Director

Feb. 2023 – May 2025

American Cancer Society (ACS) & ACS Cancer Action Network (ACS CAN)

Chicago, IL

- Appointed as North America's sole youth liaison between the Society and its 35+ partner countries by connecting participants to Global Relay For Life events; serve on ACS Global Consortium to expand and implement international youth Relay events
- Serve as lead congressional liaison between ACS CAN and Congressman Mark Green's office in the state of Tennessee; attend 3 state/2 national lobby days (Washington, DC) and meet directly with politicians to advocate for cancer funding allocations
- Provide strategic direction for the 230+ ACS collegiate campus movement and supervise 5+ workgroups to act as the voice for the campus market in all national ACS discussions; organize a workgroup for annual Top Performing Campus Summit
- Facilitate national strategy execution of entire youth engagement and revenue strategy with accountability for a \$10M income; developed partnership with Canadian Cancer Society (CCS) to increase cross-border collaboration and fundraising

Boys Cabin Counselor & Tennis Instructor

May 2021 – Aug. 2021

Camp Taconic

Hinsdale, MA

- Supervised welfare of 12 campers; created 15 detailed medical allergy plans, performed mental health checkups weekly, and instructed medication/bed-making practices daily; facilitated personalized wellness activities and provided emotional support
- Coached intermural tennis to 450+ male and female campers (ages 8-15); conducted 10+ drills to target skill sets, coordinated 2 camp-wide tennis tournaments, evaluated 400 campers to assess skill level with performance evaluations
- Designed and led a week-long leadership workshop for senior campers, focusing on teamwork, conflict resolution, and personal development; received positive feedback from 95% of participants, leading to the adoption in future programming
- Learned flexible collaboration and team-work skills to facilitate camper-camper and administrative conversations

Assistive Technology Specialist

May 2019 – Aug. 2019

Mississippi Department of Rehabilitation Services

Madison, MS

- Founded online program to interview, train, and certify 4,400+ MS-based caretakers; provided 300+ new job titles for employment around Mississippi; collaborated with Project START to optimize 10 audible devices for disabled children
- Created 50+ architect floor plans and specifications for disabled individuals' home modifications; performed 80 follow-up evaluations with clients and architects after project completions; submitted 20 detailed final reports to MDRS Director
- Designed and distributed a comprehensive assistive technology resource guide, detailing device recommendations and usage instructions, which helped 1,000+ individuals with disabilities access tailored tools and secure state-funded support services

LEADERSHIP INVOLVEMENT

Co-President

Aug 2021 – Jan. 2025

Relay For Life of Vanderbilt

Nashville, TN

- Managed the largest student-led, volunteer-driven philanthropy at Vanderbilt, overseeing an annual \$25,000 budget, 10 exec members, and 70+ students; re-structured the organization to improve operational efficiency, delegation, and accountability
- Increased minority participation by 30% and student membership by 60+ new members; implemented a new club structure with support systems for students with cancer diagnoses; organized the bag-lighting Luminaria ceremony with 500+ attendees
- Worked cross-functionally with entire org to raise \$90,000+ for the American Cancer Society, securing \$30,000 through corporate sponsorships and peer-to-peer donations; launched volunteer initiatives at Hope Lodges to support cancer patients
- Led strategy execution discussions with National Relay For Life Director to create fundraising toolkits for top campus events

Vice President, Scholar Advisory Board

Oct. 2021 – May 2025

Elks National Foundation

Chicago, IL

- Implement national strategy and strengthen relationships amongst Scholars, National Elks Foundation, and local lodges
- Coordinate and execute leadership service retreat for yearly selected Top 20 National Elks MVS scholars in Chicago
- Created an Undergraduate Fellowship Guide for Elks Scholars, providing resources and mentorship on fellowship applications
- Serve as 1 of 15 campus liaisons nationwide to implement annual Vanderbilt service project; oversee \$2,500 budget to create 60+ care packages and donate 200+ toys to Vanderbilt-Cancer Ingram Center & Monroe Jr. Children's Hospital
- Attended undergraduate leadership retreats in Seattle, Tampa, and Chicago; constructed community gardens at Seattle Jubilee Women's Center, sorted 200+ vegetable crates at Immanuel Community Services, and organized 600+ clothing pieces

Undergraduate Student Fellow & Community Event Leader, Advisor: Jon Ehrman, PhD
SyBBURE Searle Undergraduate Research & Design Program

Jan. 2022 – May 2025
Nashville, TN

- Vanderbilt's only scientific fellowship that provides a \$50,000 grant to select students to fund lab work & conference travel
- Engage in 10+ research-based workshops to support team building; attended 20+ weekly small group meetings to discuss research updates/progress; spearhead 15+ weekly hang-out gatherings to foster organization's community & engagement
- Attend 30+ hours of technical training for engineering tools & machinery; received \$500 award/semester for buying lab supplies and antibodies; received \$2,500 prestigious Travel Conference Award to present research at national conferences
- Serve as secondary research mentor to 5 underclassmen, engage in weekly subgroup meetings to discuss research updates
- Conducted weekly lab cleanings with staff & attended 5+ meetings with director to brainstorm new makerspace options

CREATIVE EXPERIENCE

Featured Actor & Brand Ambassador, McDonald's Corporation
Asian & Pacific American (APA) Scholarship Fund Campaign

Aug. 2024 – Jan. 2025
Los Angeles, CA

- Featured in 15-second and 30-second commercials aired on TV and digital platforms, including YouTube Shorts and Instagram campaigns, with a target audience of 1.3+ million viewers across domestic and international Asian cable channels
- Shared my personal story as a first-generation, low-income neuroscience student at Vanderbilt University, promoting a \$3 million scholarship fund that has empowered over 7,000 AANHPI students to achieve their academic goals
- Collaborated with a production team of 20+ industry professionals to create an authentic and impactful on-screen performance

SKILLS

- **Research Techniques:** Mammalian cell and tissue culture, blood biopsy, primary leukocyte and cancer cell isolation, flow cytometry, immunological and cell viability assays, immunoblotting, light/fluorescence microscopy, magnetic cell separation (T cells & circulating tumor cells), RNA sequencing, RNA isolation, cone-and-plate viscometers, plasmid construction, transfection, ChIP-qPCR, liquid chromatography, surface plasmon resonance (SPR), FLIPR High-Throughput Screening
- **Data Analysis:** MATLAB, RStudio, GraphPad Prism, FlowJo, ImageJ, WordPress, Microsoft Suite, POS Management
- **Computer-Aided Design:** Autodesk Inventor, AutoCAD, Autodesk Fusion, OnShape
- **Languages:** English (native), Gujarati (native), Spanish (intermediate), Sanskrit (beginner)