

# SAKSHAM SAKSENA

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## EDUCATION

**Vanderbilt University**, *BA in Molecular & Cellular Biology and Medicine, Health, & Society*  
**GPA: 4.00/4.00**; MCAT: 522/528 (99<sup>th</sup> percentile); National Merit Scholar; Ned McWherter Scholar  
**Houston High School**  
**GPA: 4.75/4.00**; ACT: 36/36; Summa Cum Laude Diploma

Nashville, TN  
May 2025  
Germantown, TN  
May 2021

## RESEARCH EXPERIENCE

### Hillyer Lab, Vanderbilt University

*Undergraduate Student Researcher*

Nashville, TN  
January 2022 - Present

- Investigate the effects of temperature and age on body size and cellular immunity of female *Anopheles gambiae*, the African malaria mosquito, by measuring abdomen, wing, & tibia sizes and hemocyte numbers & efficiency, respectively.
  - Discovered warmer temperatures decreased abdomen and tibia sizes, but did not alter wing size, and abdomen size changed with adult age in a non-linear fashion.
  - Propose and build algorithm for automated counting of hemocytes from microscope images to accelerate investigations.
- Key Skills:** *microscopy · imaging software (Fiji) · plating · bacterial incubation · nano-injecting · statistics (GraphPad Prism)*

### Gonzales Lab, Vanderbilt University

*Undergraduate Student Researcher*

Nashville, TN  
February 2024 – Present

- Investigating the effects of the recent rise in anti-LGBTQ+ legislature on the health and risk behaviors of LGBTQ+ adolescence.
  - Pursuing Honors thesis for Medicine, Health, and Science major.
- Key Skills:** *study design · statistics · literature review*

### Strahl Lab, University of North Carolina

*Undergraduate Student Researcher, NSF Summer Undergraduate Research Experience in Biological Mechanisms Fellow*

Chapel Hill, NC  
May 2023 - Present

- Investigate the role of the Ada2 protein within the SAGA protein complex in acetylating histones.
  - Evaluate binding patterns of Ada2 with histone tails via *in vitro* peptide pull-down and western blot and *in silico* docking.
  - Develop PyMol plugin, Seq2PTM, to automatically generate peptide with post-translational modifications to aid *in silico* exploration.
- Key Skills:** *protein extractions · peptide pull-down · western blot · PCR · gel electrophoresis · plating · bacterial transformation · study design*

### Giles Lab, University of Tennessee Chattanooga

*Undergraduate Student Researcher, NSF Interdisciplinary Computational Biology REU Fellow*

Chattanooga, TN  
May 2022 – November 2023

- Examined the genomic context and phylogenetic distributions of fatty acid handling machinery in Gram-negative bacteria.
  - Developed phylogenetic trees for six key proteins in fatty acid acquisition and utilization via 4 different methods, using both amino acid and nucleic acids and the Mr. Bayes and RAxML algorithms, which suggest a more ancestral origin of the multiple homolog phenomena seen for two of the six proteins.
  - Utilized bioinformatic tools to generate protein models of bacterial fatty acid transporter and explore docking with fatty acids, which suggest similar preferences for fatty acids and the cruciality of the role of homologs.
- Key Skills:** *study design · NCBI tools · Python · R (language) · SWISS Model · Alpha Fold · Pymol · AutoDock Tools · AutoDock Vina*

### Universal Screening for Cancer, Stroke from Atrial Fibrillation, & COVID-19 Related Thrombophilia

*Independent Research Project*

Memphis, TN  
January 2020 – January 2024

- Developed methodology for universal screening of cancer and certain cardiovascular diseases via detection of pathogenic precursors – Circulating Tumor Cell Cluster (CTCCs) & Microthrombi, respectively.
  - Demonstrated ultrasound differentiation of pathogenic precursor yeast surrogates from normal blood cell surrogates.
  - Improved accuracy of differentiation via implementation of a Computational Neural Network.
- Key Skills:** *study design · microscopy · medical ultrasound · Python · Arduino C++ · machine learning*

### Open Avenues Foundation (In Partnership with CRISPR Therapeutics)

*Student Intern Consultant, Computational Molecular Biology*

Somerville, MA  
November – December 2022

- Conducted literature review of LNP studies.
  - Proposed study to screen different LNP formulations.
- Key Skills:** *PubMed queries · literature review · study design*

### Open Avenues Foundation (In Partnership with Dyno Therapeutics)

*Student Consultant, Computational Molecular Biology*

Cambridge, MA  
January – February and September – November 2022

- Developed a molecular cloning strategy for incorporation of sequences onto an AAV capsid gene with Golden Gate Assembly.
  - Built Python script to automatically identify necessary primers and insert sequences for insertion of sequences onto a plasmid.
  - Built a phylogenetic tree of different AAV serotypes and identified portions of AAV cap genes responsible for targeting the liver.
- Key Skills:** *Benchling · Python · NCBI Tools · UniProt · ClustalW · Clustal Omega*

### Zhou Lab, Vanderbilt University

*Undergraduate Student Researcher*

Nashville, TN  
October 2021 – April 2022

- Advanced a quadruple knockout study focusing on investigating the role of synaptogyrins and synaptophysins.
  - Worked to create a deep-learning program to automatically select and assess size of synaptic vesicles in cryo-electron tomograms.
- Key Skills:** *Linux · MATLAB*

## PUBLICATIONS

1. **Saksena, S. R.**, & Rajan, S. K. (2023). Proof of Principle study using *Saccharomyces cerevisiae* for Universal Screening Test for Cancer through Ultrasound based Size-Distinction of Circulating Tumor Cell Clusters. *Journal of Biosciences*, 49, 14. doi: 10.1007/s12038-023-00399-3
2. **Saksena, S. R.**, Forbes, K., Rajan, N.N., & Giles, D. K. (2023). Phylogenetic Investigation of Gammaproteobacteria Proteins involved in Exogenous Long-Chain Fatty Acid Acquisition and Assimilation. *Biochemistry and Biophysics Reports*, 35, 101504. doi: 10.1016/j.bbrep.2023.101504.
3. Barr, J.S., Estevez-Lao, T. Y., Khalif, M., **Saksena, S. R.**, Yarlagadda, S., Farrah, O., Shivere, Y., & Hillyer, J.F. (2023). Temperature and age, individually and interactively, shape the size, weight, and body composition of adult female mosquitoes. *Journal of Insect Physiology*, 148, 104525. doi: 10.1016/j.jinsphys.2023.104525.

## PRESENTATIONS (click for the presentation)

1. **Saksena, S. R.**, Barr, J., Hillyer, J. (2024, March). Warmer temperature and aging have complex and interactive effects on the number of sessile hemocytes in mosquitoes [Poster]. *Vanderbilt University Fall Undergraduate Research Fair*. Nashville, TN, USA.
2. **Saksena, S. R.**, Rajan, N.N., & Rajan, S.K. (2024, March). Pride Serve: Combating Rising Transphobia in Schools through Advocacy and Awareness. [Oral Presentation]. *Vanderbilt University LGBTQI Conference*. Nashville, TN, USA.
3. **Saksena, S. R.**, Barr, J., Hillyer, J. (2024, March). The body size, body composition, and cellular immune response of mosquitoes are shaped by the individual and interactive effects of warmer temperatures and aging. [Oral Presentation]. *85<sup>th</sup> Annual Meeting of the Association for Southeastern Biologists*. Chattanooga, TN, USA.
4. **Saksena, S. R.**, Forbes, K., Rajan, N.N., & Giles, D. K. (2023, November). Phylogenetic Investigation of Gammaproteobacteria Proteins involved in Exogenous Long-Chain Fatty Acid Acquisition and Assimilation. [Poster]. *Southeastern Medical Scientist Symposium*. Atlanta, GA, USA.
5. **Saksena, S. R.**, Madden, E., Cummins, C., Rostamian, H., Strahl, B. (2023, November). Investigating the Histone Binding Potential of the ZZ and SANT Domains of Ada2. [Poster]. *Vanderbilt University Fall Undergraduate Research Fair*. Nashville, TN, USA.
6. **Saksena, S. R.**, Madden, E., Cummins, C., Rostamian, H., Strahl, B. (2023, July). Investigating the Histone Binding Potential of the ZZ and SANT Domains of Ada2. [Poster]. *UNC Office of Graduate Education Poster Symposium*. Chapel Hill, NC, USA.
7. **Saksena, S. R.**, Barr, J., Hillyer, J. (2023, April). Temperature and Age Shape the Body Size of Mosquitoes and Impact How They Respond to Infection. [Power Point Slides]. *Vanderbilt University Spring Undergraduate Research Fair*. Nashville, TN, USA.
8. **Saksena, S. R.**, Giles, D. (2022, September). Phylogenetic Examination of Proteins Involved in Exogenous Fatty Acid Metabolism in Gram-Negative Bacteria. [Power Point Slides]. *Vanderbilt University Fall Undergraduate Research Fair*. Nashville, TN, USA.
9. **Saksena, S. R.**, Giles, D. (2022, August). Phylogenetic Investigation of Gammaproteobacteria Proteins involved in Exogenous Long-Chain Fatty Acid Acquisition and Assimilation. [Oral Presentation]. *University of Tennessee Chattanooga Fall Research Conference*. online.
10. Shivere, Y., **Saksena, S. R.**, Yarlagadda, S., Farah, O., Sanner, J. (2022, May). Warmer Temperatures and Older Ages Significantly Influence Abdomen, Wing, and Tibia Size of *Anopheles gambiae*. [Poster]. *BSCI 1512 Poster Symposium*. Nashville, TN, USA.
11. **Saksena, S. R.**, Rajan, S. K. (2021, September). Personalizing Risk Assessment of Atrial Fibrillation and COVID Thrombophilia using Noninvasive Ultrasound Detection of Microthrombi. [Power Point Slides]. *Vanderbilt University Fall Undergraduate Research Fair*. Nashville, TN, USA.
12. **Saksena, S. R.**, Rajan, S. K. (2021, April). Omnidetector: Universal Screening Test for Cancer, Stroke from Atrial Fibrillation, and COVID Thrombophilia. [Oral Presentation]. *National Junior Science & Humanities Symposium*. Online.
13. **Saksena, S. R.**, Rajan, S. K. (2021, March). Omnidetector: Universal Screening Test for Cancer, Stroke from Atrial Fibrillation, and COVID Thrombophilia. [Oral Presentation]. *Tennessee Junior Science & Humanities Symposium*. Online.
14. **Saksena, S.R.**, Rajan, S. K. (2020, October). Demonstration of Doppler Ultrasound Based Innovative Diagnostic Tool for Cancer. [Poster]. *Institute of Electrical & Electronics Engineers and MIT Undergraduate Research Technology Conference*. Online.

## CLINICAL EXPERIENCE

### Vanderbilt University Medical Center

Volunteer Emergency Room and Surgery Desk Guest Ambassador

Nashville, TN  
February 2023 – Present

- Provide comfort to patients by distributing pillows, blankets, food, and drinks to patients in the ER room.
- Guide and give directions to patients to their rooms
- Courier important patient documents between different areas of the medical center.

### Nashville Veterans Affairs Medical Center

Volunteer Guest Ambassador

Nashville, TN  
April 2023 – Present

- Drive patients between different areas of hospital by wheelchair and alleviate patient stress via conversation.
- Observe the inner workings of the hospital.

### Shadowing at Vanderbilt University Medical Center

Observational Student

Nashville, TN  
October 2022 – Present

- Shadow physicians in Hematology/Oncology, Cardiology, Gastroenterology, Neurology, and Plastic Surgery.
- Learn bedside manners and enhance knowledge of diseases and conditions.
- Observe procedures, such as cardiac catheterization and colonoscopy.

### Shadowing at Erlanger Health System

Observational Student

Chattanooga, TN  
March 2022 – August 2022

- Observed physicians in Hematology/Oncology.
- Attended Breast Cancer Tumor Boards and expanded knowledge of diseases and conditions.

### VUMC Malignant Heme Tumor Board Shadowing

Student Liaison, Observational Student

Nashville, TN  
September 2021 – April 2022

- Joined weekly Malignant Heme Tumor Boards to observe physician discussions about complex cases.
- Communicated updates regarding tumor board to other observational students.

## MAJOR AWARDS AND HONORS

<b>The John T. &amp; Lizzie Allen Upper-class McGill Award</b> (Vanderbilt Awards for Leadership Excellence) <i>Award &amp; Scholarship honoring an upper-class student for academic accomplishment and leadership in creating open dialogue about complex and controversial issues</i>	<i>April 2024</i>
<b>Accolade: The Chancellor's Diversity Award Finalist</b> (Vanderbilt Awards for Leadership Excellence) <i>Finalist (Top 3) for Award given to a rising senior whose academics and extracurriculars have contributed to the diversification of the Vanderbilt student body</i>	<i>April 2024</i>
<b>Susan Jung Award Finalist</b> (Vanderbilt Awards for Leadership Excellence) <i>Finalist (Top 3) for Award recognizing an Asian American student for outstanding commitment and passion to Vanderbilt through cultural or political education</i>	<i>April 2024</i>
<b>Dean's List</b> <i>Five semester honoree of Vanderbilt University recognition to students who have achieved a 3.500 or higher semester GPA</i>	<i>August 2021 – December 2023</i>
<b>Travel Award</b> for Southeastern Medical Scientist Symposium <i>Monetary support to attend research conference awarded based on quality of student research</i>	<i>October 2023</i>
<b>Funding from NSF</b> for SURE in Biological Mechanisms <i>Monetary support and stipend to conduct summer research at University of North Carolina awarded based on past experiences and passion for research</i>	<i>February 2023</i>
<b>Funding from NSF</b> for Interdisciplinary Computational Biology REU <i>Monetary support and stipend to conduct summer research at University of Tennessee Chattanooga awarded based on past experiences and passion for research</i>	<i>March 2022</i>
<b>1<sup>st</sup> Place in Oral Presentation</b> at Tennessee Junior Science & Humanities Symposium <i>Award &amp; Scholarship recognizing quality and presentation of student research</i>	<i>March 2021</i>
<b>Regeneron National Science Talent Search Top 300 Scholar</b> <i>Premier Nationwide Research Honor awarded to High School Seniors for stellar student research</i>	<i>January 2021</i>

## ADDITIONAL EMPLOYMENT

<b>Housing and Residential Experience</b> , Vanderbilt University <i>Resident Advisor, Nicholas S. Zeppos College &amp; Rotschild College (Centennial Area)</i>	<i>Nashville, TN August 2022 – Present</i>
<ul style="list-style-type: none"><li>Plan and host events for residents on my floor to promote inclusivity, diversity, and resident well-being.</li><li>Build a floor community through engagement with around 90 residents in a one-on-one and group manner.</li><li>Surveil my dorm building and resolve student crises as they arise.</li><li>Served as representative for the Student Staff Advisory Board to address staff concerns &amp; organize events for resident advisors.</li></ul> <p><b>Key Skills:</b> Conflict Resolution · Event Planning · Emotional &amp; Career Counseling · Building Surveillance</p>	
<b>Tutor Me</b> <i>Independent Tutor</i>	<i>Los Angeles, CA January 2022 – May 2022</i>
<ul style="list-style-type: none"><li>Enrich the knowledge of 24 high school &amp; college students in math &amp; science by reviewing concepts &amp; answering questions.</li><li>Manage working hours while maintaining course load.</li></ul> <p><b>Key Skills:</b> Teaching · Motivation of Students</p>	

## LEADERSHIP AND CLUB MEMBERSHIP

<b>Vanderbilt Student Government</b> , Academic Affairs Committee <i>Co-Chair (April 2023 – Present), Committee Member (September 2021 – Present)</i>	<i>September 2021 - Present</i>
<ul style="list-style-type: none"><li>Lead one of the largest Student Government committees and distribute task to committee members.</li><li>Pioneer establishment of a Syllabus Repository to improve transparency for course content and structure.</li><li>Advocate for removal of Vanderbilt Zoom Ban for classes and for the establishment of a textbook fund for low-income students.</li><li>Envision the institution of a guidance module for providing resources and advice to empower students for academic success.</li><li>Guide the organization and distribution of the GAP fund to assist students applying for graduate and professional schools.</li><li>Coordinate with administrators to provide student feedback and envision the future of Vanderbilt's liberal arts core and Immersion program.</li></ul>	
<b>Vanderbilt Association for South Asian Cuisine</b> <i>Co-President and Founder (October 2022 – Present)</i>	<i>October 2022 – Present</i>
<ul style="list-style-type: none"><li>Celebrate diversity of South Asian culture through appreciation of cuisine from different regions of South Asia.</li><li>Program and emcee monthly dinner events.</li><li>Establish social media presence of the club on Instagram.</li></ul>	
<b>Association of Biology Students</b> <i>Co-President (April 2024 – Present), Publicity Chair (October 2022 – April 2024)</i>	<i>September 2021 – Present</i>
<ul style="list-style-type: none"><li>Design graphics and posters for publicity of club events.</li><li>Manage social media presence of the club on Instagram.</li></ul>	
<b>Eta Sigma Phi</b> <i>Hyparchos/Vice President (March 2024 – Present), Grammateus/Secretary (September 2023 – March 2024)</i>	<i>January 2022 – Present</i>
<ul style="list-style-type: none"><li>Celebrate the language, culture, and mythology of Ancient Rome and Greece by hosting club events.</li><li>Coordinate club events and detail minutes of board meetings.</li></ul>	
<b>Vanderbilt Premedical Society</b> <i>Public Relations Co-Chair (April 2023 – Present)</i>	<i>August 2021 – Present</i>
<ul style="list-style-type: none"><li>Compose and distribute weekly newsletters to all members.</li><li>Build a new website for the organization.</li><li>Manage social media presence of the club on Instagram.</li></ul>	

## **Vanderbilt University Research Journal**

October 2021 – Present

*Natural Sciences Reviewer (October 2022-Present), Liaison Committee (October 2021 – May 2022)*

- Review submitted Natural Sciences paper for publication in the research journal.
- Forged partnerships with campus organizations to advance engagement with the journal.

## **Vanderbilt Alliance on Disability and Condition**

August 2021 – May 2023

*Chair for Disability and Healthcare (September 2022 - May 2023)*

- Advocated for people with disabilities and other conditions.
- Forged partnerships with other clubs and organizations focused on disabilities.
- Organized and hosted club events.

**Also Involved in:** American Chemical Society, Vanderbilt Student Physician Scientists, & South Asian Cultural Exchange.

## **COMMUNITY SERVICE**

### **Pride Serve**

Germantown and Nashville, TN

*Co-President and Founder (February 2023 – Present), Volunteer (February 2023 – Present)*

February 2023 – Present

- Lead community service initiative aiming to better lives of LGBTQ+ youth.
- Raise awareness of LGBTQ+ identities, history, and issues via website and social media presence, garnering over 27,000 cumulative views and reaching over 4,500 unique individuals over 85+ posts.
- Advocate for LGBTQ+ rights, including a campaign to reverse a policy in a local school district that promotes deadnaming trans students, which has received over 600 co-signatories.

### **Vanderbilt Student Volunteers for Science**

Nashville, TN

*Outreach Committee Co-chair (January 2024-Present), Outreach Committee Member (January 2023-Present), Student Volunteer (February 2022 – Present)*

February 2022 – Present

- Lead outreach efforts to promote scientific learning in after school events for grade school students.
- Maintain the VSVS Lab by organizing and updating lesson kits and cleaning the lab.
- Train volunteer teams and assist in administering and receiving lesson kits from them.
- As a team leader, communicate important reminders and updates with team members and coordinate lessons & timings with class teachers.
- As a student volunteer, demonstrate science lessons and experiments at Middle Schools.

### **STEM Speaks**

Nashville, TN

*Secretary (September 2023 – Present), Student Volunteer (September 2023 – Present)*

September 2023 - Present

- Develop teaching plans and forge partnerships with other clubs and service organizations.
- Manage website for the club.
- Teach effective scientific communication to high schoolers and lead activities to help instill main ideas in the students.

### **Next Steps at Vanderbilt**

Nashville, TN

*Student Ambassador (January 2023 – April 2023)*

January 2023 – April 2023

- Assist students with intellectual disabilities.
- Plan workouts and guide students through them.
- Enhance social interaction of students through lunch conversations.

### **Vanderbilt Students for Underserved Pre-Health Scholars**

Nashville, TN

*Volunteer Mentor (January 2023 – April 2023)*

January 2023 – April 2023

- Mentor high-school students from underprivileged backgrounds interested in the health care field.
- Tutor students in topics from their science and math courses.

### **R Bootcamp, University of Tennessee Chattanooga**

Chattanooga, TN

*Volunteer Teaching Assistant (June 2022)*

June 2022

- Served at an R (programming language) bootcamp for inner city Chattanooga high schoolers.
- Assisted students in coding practice.
- Mentor students working on their final coding project.

### **Other Community Service:**

- Volunteered to teach health lessons to 3<sup>rd</sup> graders at Kirkpatrick Enhanced Option Elementary School.
- Volunteered at various school and college events, such as “The Dances of South Asia” cultural showcase.
- Created a YouTube video series to educate the community regarding COVID-19.
- Tutored students in various subjects, including AP Calculus BC.
- Volunteered at library to manage the Summer Reading Program, film and edit promotional videos, and sanitize children’s books.

## **ADDITIONAL SKILLS**

### **Computational Skills**

*Intermediate in Python · Benchling · Adobe Suite | Beginner in R · Linux · MATLAB · HTML*

### **Language Skills**

*Bilingual in Hindi | Intermediate in Latin | Beginner in Ancient Greek*