

# Rakesh Sharma

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## SUMMARY

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Multimodal AI researcher with a strong background in bioengineering, medical imaging, and healthcare product development. Passionate about building clinically deployable multimodal learning systems, with a focus on gastrointestinal disorders and post-surgical complication prediction through the integration of imaging, clinical, and structured data. Brings extensive industry experience in developing, validating, and deploying healthcare technologies within clinical workflows. First author of research on clinically-aware evaluation of medical vision-language models; inventor on three patent applications; peer reviewer for *Nature Communications*, the *Korean Journal of Radiology*, the *Journal of Imaging Informatics in Medicine*, ACM-BCB, and SIIM-CAIMI.

## RESEARCH IMPACT

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Citations    **108** total; **86** since 2021 (Google Scholar, July 21, 2026).  
Indices      h-index **4**    |    i10-index **3**.  
Output       4 journal articles (1 accepted); 4 peer-reviewed conference papers (2 accepted: AMIA 2026, MICCAI 2026); 5 manuscripts as preprints or under review; 10 conference abstracts.  
Patents       **3** patent applications (US / PCT); two assigned to industry employers.  
Review       Peer reviewer for **3** journals and **2** international conferences.

## EDUCATION

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2024 – present    PhD in **Bioengineering, University of Pennsylvania**                      (GPA: 4.0/4.0)  
                         *Advisors: Prof. Walter R. T. Witschey and Prof. Victoria M. Gershuni*  
                         Research: Multi-agent multi-modal systems; clinically-aware LLM-as-a-judge; post-operative outcome prediction.  
2008 – 2013       B.Tech and M.Tech in **Bioengineering, IIT (BHU) Varanasi**                      (GPA: 8.57/10)  
                         *Advisors: Prof. Neeraj Sharma and Prof. Nira Misra*  
                         Research: Digital signal processing; biomedical image analysis; biosensor fabrication.

## WORK EXPERIENCE

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**Data Scientist, Eli Lilly and Company, Bengaluru, India**                                              2020 – 2024

- Built and deployed end-to-end data science solutions across multiple product lines.
- Automated product research and development workflows to improve efficiency and scalability.
- Applied data science methodologies to support innovation in drug-delivery device design and evaluation.
- Developed imaging pipelines and algorithms for semi-automated and automated device failure analysis.
- Recipient of the Lilly Innovator Award in three consecutive years (2021–2023).

**CTO and Co-founder, Comofi Medtech Pvt Ltd, Bengaluru, India**                                              2017 – 2020

- Directed full-cycle development of a surgical robotic platform, including system architecture, integration, and validation.

- Developed advanced medical imaging algorithms for automated segmentation and deformable image registration.
- Led fundraising initiatives, authored grant proposals, and established manufacturing workflows during COVID-19 supply-chain disruptions.

**Scientist, Achira Labs Pvt Ltd, Bengaluru, India**

2015 – 2017

- Developed microfluidics-based in-vitro diagnostic platforms, including assay design and device integration.

**Engineer (CTO Office), Wipro Technologies, Bengaluru, India**

2013 – 2015

- Built computer vision-enabled solutions for financial products and automation pipelines.

## SKILLS

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| Programming      | Python, PyTorch, R, NumPy, SciPy, Pandas, Git                                                                            |
| Medical imaging  | CT/MRI processing, segmentation, registration, radiomics, SimpleITK, MONAI, nnU-Net, PyRadiomics                         |
| Machine learning | Deep learning, large language models, multi-agent AI, computer vision, vision-language models, transformer architectures |
| Workflow         | HPC (SLURM/LSF), data engineering, project management                                                                    |

## PUBLICATIONS

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### Journal Papers

- Aleixo, G., W.-T. Hwang, R. Sedhom, **Sharma, R.**, W. Jung, C. Xia, W. Witschey, and B. Ky (2026). “The Impact of Body Composition on Cardiac Function in Women with Early Breast Cancer Taking Cardiotoxic Chemotherapy”. In: *Breast Cancer Research* (Springer Nature). **Accepted**.
- Dang, X., H. Shih, **Sharma, R.**, D. T. Angwin-Kaerner, K. Lin, S. Kapur, N. R. Thyagarajapuram, G. H. Shi, and D. S. Collins (2024). “Clinical Investigation of Large Volume Subcutaneous Delivery up to 25 mL for Lean and Non-Lean Subjects”. In: *Pharmaceutical Research* 41.4, pp. 751–763.
- Montoya, G., J. V. Teli, C. Kadamus, K. Lin, K. Eddy, E. Curry, K. Blankenship, N. Anumba, **Sharma, R.**, and V. K. Sharma (2024). “Computational Modeling and Simulation of the Cerebrospinal Flow and Drug Delivery”. In: *Alzheimer’s & Dementia* 20, e094612.
- Sharma, R.**, G. Kapusetti, S. Y. Bhong, P. Roy, S. K. Singh, S. Singh, C. K. Balavigneswaran, K. K. Mahato, B. Ray, and P. Maiti (2017). “Osteoconductive Amine-Functionalized Graphene–Poly(methyl methacrylate) Bone Cement Composite with Controlled Exothermic Polymerization”. In: *Bioconjugate Chemistry* 28.9, pp. 2254–2265.

### Preprints and Manuscripts Under Review

- Beeche, C. A., H. Tavolinejad, Z. Li, Z. Fan, B. Zhao, H. Wei, L. Steger, **Sharma, R.**, L. Ni, S. Zaman, J. Duda, J. Gee, A. Verma, H. Sagreiya, S. M. Damrauer, M. G. Levin, D. Rader, A. Goldberg, J. A. Chirinos, and W. R. Witschey (2026). “Aortic Geometric Atlas: Centile-Based Reference Charts and Pathological Signatures Across the Adult Lifespan”. In: *medRxiv*. DOI: [10.64898/2026.06.25.26356450](https://doi.org/10.64898/2026.06.25.26356450).
- Golubovsky, J. L., **Sharma, R.**, E. Massaad, Y. Ghenbot, G. A. Crabill, J. D. Arena, S. Khalid, M. Mathur, A. Kiapour, W. C. Welch, B. Judy, A. S. Zhang, A. Khalsa, D. Casper, W. R. Witschey, V. M. Gershuni, A. K. Ozturk, and J. H. Shin (2026). *Automated Computed Tomography-Based Body Composition Analysis and Utility in Risk Stratification for Adult Spinal Deformity Correction — A Retrospective Cohort Analysis*. Manuscript under review.

- Gershuni, V., R. A. Damani, S. Vasisht, **Sharma, R.**, J. Rowe, C. Compher, J. Duda, H. Sagreiya, R. Kelz, H. Li, G. Tasian, S. Damrauer, G. D. Wu, and W. R. Witschey (2026). “Development of an Automated, Imaging-Based Preoperative Screening Model for Early Identification of Malnutrition in an Abdominal Surgery Cohort”. In: *medRxiv*. DOI: [10.64898/2026.06.08.26355187](https://doi.org/10.64898/2026.06.08.26355187).
- Beeche, C., J. Kim, H. Tavolinejad, B. Zhao, J. Dong, **Sharma, R.**, J. Duda, J. Gee, F. Dako, A. Verma, C. Morse, B. Hou, and W. R. Witschey (2026). “Generalizable CT Vision-Language Modeling for Population Health and Disease Risk”. In: *medRxiv*. DOI: [10.1101/2025.07.03.25330654](https://doi.org/10.1101/2025.07.03.25330654). Previously circulated as “A Pan-Organ Vision-Language Model for Generalizable 3D CT Representations”.
- Goyal, S., P. Bist, and **Sharma, R.** (2020). “Optimal Sample Pooling: An Efficient Tool Against SARS-CoV-2”. In: *medRxiv*.

## Conference Proceedings and Oral Presentations

- Sharma, R.**, C. Beeche, J. Dong, R. Zhuang, H. Qu, R. Zhang, V. Gangaram, P. Goswami, J. Xin, J. Ballard, A. Goldberg, H. Sagreiya, Q. Long, T. Chen, and W. Witschey (2026). “DISCERN: A Clinical Impact-Aware Framework for Radiology Report Comparison”. In: *AMIA Annual Symposium*. **Accepted for oral presentation**. Preprint: *medRxiv*, DOI: [10.64898/2026.05.26.26353612](https://doi.org/10.64898/2026.05.26.26353612).
- Zhang, R., J. Dong, J. Xin, J. Ballard, C. Beeche, **Sharma, R.**, X. Zhao, N. Konz, Q. Long, W. Witschey, and T. Chen (2026). “CURA: Calibrated Uncertainty with Retrieval and Agents for Trustworthy Multimodal Medical Decision Support”. In: *Medical Image Computing and Computer Assisted Intervention (MICCAI)*. **Accepted**.
- Chen, H., R. Shukla, R. Wu, S. Yang, D. Duong-Tran, D. M. H. Nguyen, M. Niepert, C. Beeche, J. Gee, J. Duda, **Sharma, R.**, C. Davatzikos, W. Witschey, B. Hou, and L. Shen (2025). “Adapting Vision-Language Models for 3D CT/MRI Understanding on PMBB via Slice Selection and Explanation Analysis”. In: *Proceedings of the IEEE/CVF International Conference on Computer Vision (ICCV) Workshops*, pp. 2273–2282.
- Sharma, R.**, S. Vasisht, G. M. Vargas, R. Damani, J. Duda, J. C. Gee, C. M. Vollmer, W. Witschey, and V. Gershuni (2025). *Automated CT-Based Volumetric Body Composition Analysis Predicts Post-Operative Complications Following Pancreaticoduodenectomy: A Retrospective Study*. CLINICCAI (MICCAI). Oral Presentation.
- Lee, K., **Sharma, R.**, E. Bouche, C. Quy, V. Gershuni, and W. Witschey (2025). *Body Composition Analysis of Weight Loss Induced by GLP1 Receptor Agonists*. Korean College of Radiologists Annual Meeting. Oral Presentation.
- Vasisht, S., **Sharma, R.**, G. M. Vargas, R. Damani, J. C. Gee, W. Witschey, C. M. Vollmer, and V. M. Gershuni (2025). *Muscle Quality on Preoperative Imaging is Associated with Postoperative Pancreatic Fistula Risk*. American College of Surgeons Annual Meeting. Oral Presentation.
- Pai, J., M. Azad, B. Goyal, R. Nair, **Sharma, R.**, and D. Dendukuri (2019). “A Point-of-Care Immunoassay Platform for Thyroid Function Based on Hydrogel Sensors Embedded Inside a Microfluidic Device”. In: *23rd International Conference on Miniaturized Systems for Chemistry and Life Sciences (MicroTAS)*. CBMS, pp. 102–103.

## Poster Presentations

- Aleixo, G., W.-T. Hwang, R. Sedhom, **Sharma, R.**, W. Jung, C. Xia, W. Witschey, and B. Ky (2026). *The Impact of Body Composition on Cardiac Function in Women with Early Breast Cancer Taking Cardiotoxic Chemotherapy*. ASCO Annual Meeting. Abstract 12021; *Journal of Clinical Oncology* 44.16\_suppl.
- Lee, S., **Sharma, R.**, W. R. Witschey, M. S. Altieri, D. A. Mankoff, V. Gershuni, and D. A. Hashimoto (2026). *Automated Pipeline for Analysis of Paraesophageal Hernias*. Digestive Disease Week (DDW). Abstract 1280; *Gastrointestinal Endoscopy* 103.5, pp. S2698–S2699.
- Lee, S. A., **Sharma, R.**, W. R. Witschey, M. S. Altieri, V. M. Gershuni, D. A. Mankoff, and D. A.

Hashimoto (2026). *Automated ML Pipeline for Analysis of Paraesophageal Hernias*. Association for Clinical and Translational Science (ACTS) Annual Meeting. Abstract 78; *Journal of Clinical and Translational Science*.

Goswami, P., **Sharma, R.**, H. Sagreiya, C. E. Kahn Jr., and W. R. Witschey (2026). *Enhancing Attending-to-Resident Feedback by Using LLMs Fine-Tuned to “Understand” Clinical Significance: A Proof of Concept*. SIIM Annual Meeting. Poster.

Aleixo, G., L. Paruzzo, **Sharma, R.**, W. Witschey, M. Ruella, D. Landsburg, S. Barta, J. Svoboda, S. Schuster, E. Chong, P. Munshi, S. Susanibar, and S. Dwivedy Nasta (2025). *Trends in Muscle and Fat Metrics and Their Association with Outcomes Following CAR T-Cell Therapy in Older Adults with Non-Hodgkin Lymphoma*. ASH Annual Meeting. Abstract 3553; *Blood* 146.Supplement 1, p. 3553.

Damani, R., **Sharma, R.**, S. Vasisht, G. M. Vargas, J. Duda, G. Wu, J. C. Gee, W. Witschey, and V. Gershuni (2025). *Volumetric Body Composition Analysis on Preoperative CT Scans Improves Risk Prediction in Colorectal Surgery Patients*. RSNA Annual Meeting. Poster.

Zaki, R., **Sharma, R.**, P. Goswami, H. Yang, J. C. Gee, C. E. Kahn, J. B. Kneeland, A. Borthakur, and W. Witschey (2025). *Enhancing Diagnostic Concordance and Quality Assurance Through Automated MRI and Arthroscopy Report Comparison Using Large Language Models*. RSNA Annual Meeting. Poster.

## Patent Applications

Desai, H., M. Kawiecki, **Sharma, R.**, A. Tiwari, and J. Venderley (Mar. 2023). *WO2023044089A1 – Methods and Apparatuses for Detecting Anomalies When Filling a Container with Fluid*. US Patent App. PCT/US2022/043937. Patent.

Gururaj, K. B., S. Kalme, S. K. Raghunath, and **Sharma, R.** (Jan. 2022). *System for Renal Puncturing Assistance*. US Patent App. 17/294,009. Patent.

**Sharma, R.** and M. Madhusudhanan (Dec. 2015). *Image Processing Method of Enabling Financial Transaction and an Image Processing System Thereof*. US Patent App. 14/459,428. Patent.

## PEER REVIEW AND PROFESSIONAL SERVICE

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- 2026 – Reviewer (official), *Journal of Imaging Informatics in Medicine* (JIIM), Springer.
- 2026 – Reviewer, *ACM Conference on Bioinformatics, Computational Biology, and Health Informatics* (ACM-BCB 2026).
- 2026 – Reviewer, *SIIM Conference on Machine Intelligence in Medical Imaging* (SIIM-CAIMI 2026).
- 2025 – Student Reviewer, *Nature Communications*, Springer Nature.
- 2025 – Student Reviewer, *Korean Journal of Radiology*.

## PROFESSIONAL MEMBERSHIPS

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|---------|------------------------------------------------------------------------------|
| Member  | MICCAI Society — Medical Image Computing and Computer Assisted Intervention. |
| Trainee | SIIM — Society for Imaging Informatics in Medicine (member-in-training).     |
| Trainee | RSNA — Radiological Society of North America (member-in-training).           |
| Trainee | AMIA — American Medical Informatics Association (member-in-training).        |

## AWARDS AND HONOURS

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| 2023 | <b>Lilly Innovator Award</b> (Individual and Team), Lilly Research Laboratories. |
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| 2022 | <b>Lilly Innovator Award</b> , Lilly Research Laboratories.                   |
| 2021 | <b>Lilly Innovator Award</b> , Lilly Research Laboratories.                   |
| 2014 | <b>Top 6 coders</b> , company-wide hackathon among ~150,000 Wipro employees.  |
| 2013 | <b>2nd Rank</b> , integrated B.Tech–M.Tech programme, IIT (BHU) Varanasi.     |
| 2008 | <b>Top 1.56%</b> , among ~320,000 candidates, IIT Joint Entrance Examination. |