

Curriculum Vitæ
Dr. Pranav Kumar Mishra

Post-Doctoral Research Fellow
Departments of Surgery and Orthopedic Surgery
Rush University

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Education

2020 **MBBS**, Kasturba Medical College, Manipal, India
2013 **BA in Biology**, Washington University in St. Louis, USA
2009 **EMT-B**, College of DuPage, USA

Professional Appointments

2021 – Present **Post-Doctoral Research Fellow**
Laboratory of Anna Spagnoli, Department of Orthopedic Surgery
Laboratory of Alfonso Torquati, Department of Surgery
Laboratory of Susan Chubinskaya, Department of Pediatrics (2021-2022)
Rush University, USA

2021 – 2021 **Junior Resident - Non-Academic**
Department of Surgical Oncology
Kasturba Medical College, Manipal
Manipal Academy of Higher Education, India

Awards and Honors

2022 **1st Place - Elevator Speech Finalists' Competition - Rush**
Judges Award. Exploring novel hormones in the Bone-Fat-Insulin metabolism interface.
Presented at the 2022 Rush University Trainee Research Day

- 2022 **3rd Place - Elevator Speech Finalists' Competition - Rush**
People's Choice Award. Exploring novel hormones in the Bone-Fat-Insulin metabolism interface. Presented at the 2022 Rush University Trainee Research Day
- 2020 **3rd Place Oral Presentation – AAPI**
A deductive approach to modeling the spread of COVID-19. Presented at American Association of Physicians of Indian Origins Virtual Summit 2020
- 2013 – 2018 **First Class Honors at Kasturba Medical College, Manipal**
Medicine (with Psychiatry), Surgery (with Orthopedics), Pediatrics, Pathology, Microbiology, Pharmacology, Physiology, and Biochemistry
- 2016 **1st Place Oral Presentation - AFMC**
Invasive Rhabdomyosarcoma of the Nasopharynx and Cranium in a 21-year-old male. Presented at Illuminati, Armed Forces Medical College, Pune, India.

Fellowships

- 2021 – Present **Rush Public Voices Fellowship**
Full scholarship for the 40-member Rush cohort to the Op-Ed Project.
The program provides instruction and mentorship towards publishing op-ed articles with the media
- 2009 – 2009 **Summer Undergraduate Research Fellowship**
PI: Igor Efimov, Department of Biomedical Engineering, Washington University in St. Louis
Funding: Howard Hughes Medical Institute and Imaging Sciences Pathways training grant
Amount: \$ 3750

Postgraduate Training

Research

- 2021 – Present **Project 1: Determine the mechanisms regulating the bone-fat-glucose interface**
 PIs: Alfonso Torquati, MD, MSCI (Surgery); Anna Spagnoli, MD (Orthopedic Surgery, Pediatrics).
 Role: **Project lead**
 Understand the role of sclerostin to metabolic, endocrine, and musculoskeletal health through a comparison between obese and non-obese individuals.
 Creation of a biorepository and experimentation with gastrointestinal, adipose, and blood samples from Roux-en-Y gastric bypass patients and non-obese cadavers.
 Clinical research coordination: recruitment and monitoring of patients in the study.
 Clinical and research database creation and maintenance
- 2021 – Present **Project 2: Role of IL-36RA in osteoarthritis and post-traumatic osteoarthritis**
 PI: Anna Spagnoli, MD (Orthopedic Surgery, Pediatrics).
 Role: **Project lead**
 Determine the role of IL-36RA in mitigating factors of osteoarthritis (OA) and post-traumatic osteoarthritis (PTOA).
 Examining the augmentation of molecular and histological characteristics of impacted articular cartilage with IL-36RA.
 Primary chondrocyte culture studies with RT-qPCR and Western Blot endpoints
- 2022 – Present **Project 3: Using next-generation transcriptomics to study Prrx1 in growth plate cartilage**
 PI: Anna Spagnoli, MD (Orthopedic Surgery, Pediatrics).
 Role: Project member
 Assisted the project lead, Sai Meka, PhD in the tissue harvest and processing for a single-cell RNA sequencing experiment.
 Developed an *in silico* workbench leveraging *Nvidia CUDA*, *docker*, *python*, *R*.
 A reproducible-research environment was created using *datalad*, *quarto*, *mamba (conda)*
- 2021 – 2022 **Project 4: Human cartilage tissue repository**
 PI: Susan Chubinskaya, PhD (Pediatrics)
 Role: **Project lead**
 Intake and processing donated human cadaver specimens into the tissue repository.
 Dissection of en-bloc human legs for knee and ankle joints experiments, including articular cartilage, synovium, and synovial fluid.
 Grading degenerative morphological changes (DMC) to human articular cartilage.
 Multivariate and machine-learning models for clinical factors leading to DMC.
 National collaborations with tissue repository specimens.

Clinical

2021 **Junior Resident (Non-Academic) – Surgical Oncology – KMC, Manipal**
Appointment with Dr. Naveen Kumar, Head of Department, Surgical Oncology.
Intra-operative: first or second assist in open cases. Second assist in lap / VATS. 9 major surgeries per week.
In-patient pre-operative and post-operative management with 15 patients on service.

Medical Experience

MBBS Internship

Role comparable to a US PGY-1 Transitional Year. Following the Final MBBS examinations, Indian doctors complete a “compulsory rotating internship”. Intern/house doctor in 11 departments, across primary, secondary, and tertiary care settings, treating patients speaking English, Hindi, and Kannada. Primary location: Kasturba Medical College, Manipal, KA, India

6 weeks **General Surgery**
Kasturba Medical College, Manipal: Direct responsibility for 10 in-patients on service, ER call, out-patient clinic services.
Intra-operative: first or second assist in open and laparoscopic general surgical cases.
Jackson Park Hospital, Chicago, IL (Abroad rotation, 4 weeks)

4 weeks **Orthopedic Surgery**
In-patient management on the spine service, directly responsible for 5-7 patients, trauma call, out-patient evaluation and follow-up.
Second assistant in spine cases. First assist in trauma. Supervised with traction pinning.

6 weeks **Emergency Medicine (2 weeks mandated + 4 weeks additional elective)**
Kasturba Medical College, Manipal: Level 1 trauma center. Lead physician for yellow and green zone. Assisted attendings with blue-zone critical, trauma, and ED-ICU patients.
Jackson Park Hospital, Chicago, IL (Abroad rotation, additional 4 weeks)

8 weeks **Community Medicine (Preventative and Social Medicine)**
Preventative and social medicine: community surveillance of HIV, leprosy, tuberculosis, complications from diabetes.
Dr. TMA Pai Rotary Hospital, Karkala, KA (Remote rural secondary care hospital): in-patient, out-patient, and emergency department duty for pediatric, OB/Gyn, and adult emergent patients.
Rural Primary Healthcare Centers (PHC) in Udupi District, KA: out-patient clinic, managing 5-10 adult patients per day in the capacity of a family medicine physician.

- 8 weeks **Obstetrics and Gynecology**
 In-patient/out-patient management of 5-15 patients directly in services, including high-risk pregnancy, fetal medicine, oncology. Intra-op first or second assistant.
 Labor Theater: conducted / assisted deliveries, monitored/augmented progress of labor.
 Manipal Artificial Reproductive Centre: evaluated for causes of infertility, assisted in management via ovulation induction, IUI, IVF.
- 10 weeks **Internal Medicine (6 weeks mandated + 4 weeks additional research)**
 In-patient management of 5-10 patients in ICU, step-down tele, and ward patients.
 Consult services and ER call duties.
 Out-patient adult clinic and university student clinic.
 COVID-19 research during non-clinical lockdown rotation.
- 4 weeks **Psychiatry**
 Streamwood Behavioral Healthcare System, Streamwood, IL, USA (Abroad rotation):
 In-patient child psychiatry, assisting attending with 15-20 acute patients.
 Coordinated pharmacology, behavioral, family, and DCFS care.
- 4 weeks **Pediatrics**
 In-patient management of 15-20 patients directly. PICU and Peds ER call duty.
 Out-patient evaluation, medication review, and vaccination.
- 2 weeks **Ear, Nose, Throat – Head and Neck Surgery**
 In-patient and intra-operative management for 5 patients, assisting residents.
 Outpatient clinic including diagnostic procedures EUM, VDL, audiometry.
- 2 weeks **Ophthalmology**
 In-patient and intra-operative management for 5 patients, assisting residents.
 Outpatient clinic, including assisting diagnostic and therapeutic procedures.
- 2 weeks **Anesthesiology**
 Assisting residents and attendings with intra-operative management.
 Critical care work for ventilator dependent ICU patients.

Washington University Emergency Support Team (EST)

- 2009 – 2013 **Volunteer Emergency Medical Technician – Basic (EMT)**
 EST responds to all EMS calls directed to the Washington University emergency dispatch center as the primary BLS team and provides large event stand-by coverage.
 2800+ hours of experience, with 2100+ hours as a senior EMT.
- 2013 **Field Director (Chief Medic)**
 Responsible for the oversight of 57 EMTs, selection, training, quality assurance.
 Coordinated with Medical Director (Alan Glass, MD) and Clayton Fire Department.

- 2011 – 2012 **Assistant Field Director of New Medics**
 Conducted internal training of first years
 Coordinated with St. Louis Community College for EMT-B certification.
 Created “The Move-Up Guide” e-book containing 28 Standard Operating Protocols, 75 practical scenario questions, training advice, and mock call preparation.
- 2011 – 2012 **Disaster Committee Co-Head**
 Planned and executed annual mass-casualty disaster drills.
 Led meetings with university administration, police, and fire departments.
- 2010 – 2011 **Public Relations Committee**
 Improved awareness of common on-campus illnesses, when/how to call EST.
 Arranged First Aid/CPR classes for the St. Louis region.
- 2010 – 2012 **Webmaster**
 Helped develop and maintain est.wustl.edu using Drupal on an AMP stack.

US Clinical Experience

- Aug 2022 **Emergency Medicine Elective**
 Jackson Park Hospital and Medical Center; Chicago, IL, USA
- Jul 2022 **General Surgery Elective**
 Jackson Park Hospital and Medical Center; Chicago, IL, USA
- Feb-Mar 2022 **Child Psychiatry - In-patient**
 Streamwood Behavioral Healthcare System; Streamwood, IL, USA
- Jan 2017 **Neurosurgery Sub-Internship**
 Pritzker School of Medicine, University of Chicago; Chicago, IL, USA

Publications

Pre-print

- [1] **Mishra PK** and Mishra S. 2020. A deductive approach to modeling the spread of COVID-19. medRxiv:2020.03.26.20044651.

Oral Presentations

- [1] Esposito A, Wilson BM, Kluppel M, Meka SRK, **Mishra PK**, and Spagnoli A. 2022. CXCR4: A Key Axis in Mediating IGF-1 Signaling in Fracture Repair. Oral Presentation. Oral Presentation. ORS ISFR 3-Minute Research Pitch Competition.

- [2] Esposito A, Wilson BM, Kluppel M, Meka SRK, Suryadevara V, **Mishra PK**, Corbeels K, and Spagnoli A. 2022. Critical Role of IGF1/CXCR4 Signaling in Regulating HIF1 α and HIF2 α Expression in Fracture Repair. Podium Presentation at Spotlight Session. Podium Presentation at Spotlight Session. Orthopedic Research Society 2022 Annual Meeting. Tampa, Florida. URL: <https://www.ors.org/Transactions/68/243.pdf>.
- [3] **Mishra PK**, Katrien C, Wilson BM, Meka SRK, Esposito A, Vidyani S, Kluppel M, Torquati A, and Spagnoli A. 2022. Exploring novel hormones in the Bone-Fat-Insulin metabolism interface. Elevator Speech Finalists' Competition. Elevator Speech Finalists' Competition. Chicago, IL, USA.
- [4] **Mishra PK** and Mishra S. 2020. A deductive approach to modeling the spread of COVID-19. Oral Presentation. Oral Presentation. Chicago, IL.
- [5] **Mishra PK**, Shetty S, Mathew M, and Vijayan S. 2017. Surgical considerations for a case of recurring chondroblastic osteosarcoma. Oral Presentation. Oral Presentation. Orthopedics Clinical Pathological Conference. Manipal, KA, India.
- [6] **Mishra PK** and Singh R. 2017. A Tale of Two Cities – Invasive Rhabdomyosarcoma and International Comparison of Tertiary Center Management. Oral Presentation. Oral Presentation. Neurosurgery Grand Rounds, Pritzker School of Medicine, University of Chicago. Chicago, IL, USA.
- [7] **Mishra PK** and Singh R. 2016. Invasive Rhabdomyosarcoma of the Nasopharynx and Cranium in a 21-year-old male. Oral Presentation. Oral Presentation. Illuminati, Armed Forces Medical College. Pune, MA, India.
- [8] **Mishra P**, Lang D, and Efimov I. 2010. Induction of ventricular fibrillation: the compensatory role of proline-rich tyrosine kinase 2 in hypertrophic mice hearts. Poster Presentation. Poster Presentation. Fall Undergraduate Research Symposium. St. Louis. URL: <https://rgdoi.net/10.13140/RG.2.2.29649.81764>.
- [9] Jackson GP and **Mishra PK**. 2006. Interstellar transport using nuclear sails. Oral Presentation. Oral Presentation. New Trends in Astrodynamics and Applications III, Princeton University. Princeton, NJ, USA.

Poster Presentations

- [1] **Mishra PK**, Meka SRK, Kluppel M, Parker M, Torquati A, and Spagnoli A. 2023. Development of a surgical biorepository to examine the Bone-Fat-Glucose Interface. Poster Presentation. Poster Presentation. TRD 2023. Chicago, IL, USA.
- [2] Corbeels K, Wilson BM, Meka SRK, Yu L, Esposito A, Suryadevara V, **Mishra PK**, Kluppel M, Torquati A, and Spagnoli A. 2022. Bariatric surgery: a critical crossroad in the bone/glucose metabolism interface. Poster Presentation. Poster Presentation. ASBMR 2022 Annual Meeting. Austin, TX.
- [3] Esposito A, Kluppel M, Meka SRK, Wilson BM, **Mishra PK**, and Spagnoli A. 2022. Critical Role of IGF1/CXCR4/VEGF α Axis in Fracture Repair. Poster Presentation. Poster Presentation. ASBMR 2022 Annual Meeting. Austin, TX.
- [4] Esposito A, Kluppel M, Meka SRK, Wilson BM, **Mishra PK**, and Spagnoli A. 2022. Critical Role of IGF1/CXCR4/VEGF α Axis in Fracture Repair. Poster Presentation. Poster Presentation. ORS ISFR 17th International Biennial Meeting. Edinburgh, UK.

- [5] Esposito A, Wilson BM, Kluppel M, Meka SRK, **Mishra PK**, Corbeels K, and Spagnoli A. 2021. Critical Role of IGF1/CXCR4/VEGF α Axis in Fracture Repair. Poster Presentation. Poster Presentation. RUSH Symposium. Chicago, IL.
- [6] Suryadevara V, Meka SRK, Kluppel M, **Mishra PK**, Corbeels K, Esposito A, Yu L, and Spagnoli A. 2021. HGC-curcumin nanoparticles for therapeutic intervention of osteoarthritis as seen by their regulation of chondrocyte biology. Poster Presentation. Poster Presentation. RUSH Symposium. Chicago, IL.

Software

- [1] **Mishra PK**. SinguLab. URL: github.com/pranavmishra90/SinguLab.
- [2] **Mishra PK**. SinguLab-templates. URL: github.com/SinguLab-Rush/SinguLab-templates.
- [3] **Mishra PK** and Balakrishnan P. 2021. PREPAREDx. Version v0.0.4. Manipal, KA, India. URL: github.com/pranavmishra90/preparedx-website.
- [4] **Mishra PK** and Mishra S. 2020. COVID-19 Dashboard.

Conference Activity

2022, 2023	Rush University Trainee Research Day
2021, 2022	Rush Research Symposium
2020	American Association of Physicians of Indian Origin (AAPI)
2016	Armed Forces Medical College (AFMC)
2014 – 2016	Indo-German Convention of Lindau Alumni (IGCLA)
2014, 2015	Chirurgia
2014, 2015	Manipal Conventus

Teaching Experience

St. Louis Community College - Forest Park

2010 – 2013	Adjunct Instructor - EMT-Basic Course Taught practical skills including ventilation, bleeding control, c-spine immobilization, extrication, cardiac arrest management, splinting. Evaluated students in trauma/medical mock calls, per NREMT and Missouri standards.
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Leadership Experiences

University Staff Council

2023 – Present

Committee Member

- Elected to the FY23 Term as a Post-Doctoral Research Fellow representative

Rush Postdoctoral Society

2021 – Present

Committee Member

- Coordinate seminars and workshops aimed at improving the postdoctoral experience at Rush University for over 60 members
- Integration with the Mentoring Programs Office which promotes placement of postdoctoral fellows and independent research
- Representative to the National Postdoctoral Association

Kasturba Medical College Student Council

2016 – 2017

Vice President of Administration

- Propositioned college administration for the first elected student council, with additional positions to advance student responsibilities and financial independence
- Elected to represent 1,000 medical students on issues primarily concerning academics, room & boarding, student safety, and overall medical school experience
- Advocated and negotiated for the student body in meetings with student interest groups, faculty heads, college/university administration, and local public officials
- Compiled student data and interviewed for national/international academic accreditation agencies

Committees representing Kasturba Medical College, Manipal (KMC):

- New York State Education Department
- National Assessment and Accreditation Council

Committees representing KMC medical students:

- Dean's Committee
- Executive Committee
- Judicial Committee
- First Year Orientation
- Second Year Orientation
- Cultural Committee
- Mess Committee
- Hostel Committee
- Indo-German Convention of Lindau Alumni
- International Quiz for Medical Undergraduates

Cutting Edge Surgical Society at Kasturba Medical College, Manipal

- 2017 **General Secretary**
- Set society schedule
 - Coordinated with surgical faculty on providing guest lectures and student opportunities
 - College administration liaison
- 2014 – 2016 **Webmaster**
- Developed and maintained cuttingedgemanipal.com
- 2014 – 2017 **Core Committee Member**
- Instructed student peers in basic surgical skills including knots, suturing, lumbar puncture, catheterization, ophthalmoscopy, otoscopy
- 2014, 2015 **Organizer of the Chirurgia surgical conference**

Research Experience

- 2021 **Dr. Jayaraj MB, Kasturba Medical College, Manipal; Manipal, KA, India**
Department of Emergency Medicine
Impact of mHealth pre-hospital communication in improving decision making in the Emergency Department
Pilot testing my personally developed software, PREPAREDx, as an end-to-end communication and workflow solution that improves emergency care outcomes
- 2020 **Dr. Chandrakanth Are, University of Nebraska, Omaha, NE, USA**
Department of Surgery
Analyzing the impact of geopolitical events on non-US citizen internationally trained physicians in the NRMP match
Cross-correlation studies of international medical graduate placement with overall US immigration data
- 2020 **Dr. Shekhar Mishra, Science Diplomacy and Innovation Management, Naperville, IL, USA**
Deductive, observational modeling of COVID-19s initial exponential expansion through Phase 1 developed nations Forecasting COVID-19s spread through Phase 2 major emerging nations

- 2016 **Dr. Suma Nair, Kasturba Medical College, Manipal; Manipal, KA, India**
 Department of Community Medicine
 Rural community survey analyzing impacts of economic and social determinants of health in the Udupi region.
 Assessing empathy in medical students using the Jefferson Scale of Empathy Student Version. Data collection and statistical analysis
- 2010 **Dr. Igor Efimov Lab, Washington University in St. Louis; St. Louis, MO, USA**
 Department of Biomedical Engineering
 Effects of PYK2 protein in Ventricular Fibrillation
 Simultaneous optical mapping of voltage and calcium channels of mice, rabbit, and human hearts, paced into ventricular fibrillation
- 2006, 2007 **Dr. Gerald Jackson, Hbar Technologies, LLC; West Chicago, IL, USA**
 Research Assistant
 3D modeling and simulation for an antimatter-sail propelled satellite (2006)
 Research on automobile pollution and alternative energy storage units (2007)

Patents and Trademarks

Trademarks (India)

- 4979064 Balakrishnan P, **Mishra, PK**. PREPAREDx. 2021;(Class 42).
 4979063 Balakrishnan P, **Mishra, PK**. PREPAREDx. 2021;(Class 9).

Licensures and Certifications

Licenses

- 2020 – Present **Registered Medical Practitioner**, Karnataka, India
 2018 – 2020 **Provisional Registration Certificate** - Karnataka, India
 2009 – 2013 **EMT-Basic License** - Illinois and Missouri

Certifications

- 2021 – 2024 **Biomedical Research** - CITI Program
 2020 – 2022 **Advanced Cardiac Life Support** - American Heart Association
 2020 – 2022 **Basic Life Support** - American Heart Association
 2018 – Present **Basic Neonatal Resuscitation Program** - Indian Academy of Pediatrics

2009 – 2012 **EMT-Basic** - National Registry of Emergency Medical Technicians

External Funding Sources

- 2021 – 2022 **DNA damage and cellular senescence in osteoarthritis pathophysiology**
NIH: R01 AG044034/AG/NIA
Awardee: **Richard F Loeser**, Principle Investigator, Department of Medicine, University of North Carolina, Chapel Hill
Sub-contract: Susan Chubinskaya, Department of Pediatrics, Rush University
Role: Pranav Mishra, post-doctoral research fellow. Performed human tissue procurement, morphological assessment, and processing
- 2009 – 2009 **Summer Undergraduate Research Fellowship**
Awardee: **Pranav K. Mishra**, undergraduate student
PI: Igor Efimov, Department of Biomedical Engineering, Washington University in St. Louis
Funding: Howard Hughes Medical Institute and Imaging Sciences Pathways training grant
Amount: \$ 3750