

AYANTIKA SEN

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AREAS OF EXPERTISE

- Immune response to bacterial and viral infections
 - Chronic HCV and EBV infection induced tumors
 - microRNA and Exosome biology
 - Post-transplant Lymphoproliferative disorder
 - Estrogen receptor signaling
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EDUCATION

Oklahoma State University Center for Health Sciences (CHS), <i>Ph.D.</i> (Immunology)	August 2014 – August 2019
Vellore Institute of Technology, <i>M.S.</i> (Biomedical Genetics)	August 2012 – May 2014
SRM University, <i>B.Tech</i> (Genetic Engineering)	August 2007 – May 2011

TECHNICAL SKILLS

Molecular Biology	QPCR, nested PCR, Primer designing, DNA, RNA and protein isolation, purification and analyses from cells and tissues, Gene editing by siRNA, Transfection by Lipofectamine, Western Blotting, Exosome isolation
Cell-based Assays	Cell culture- adherent cell lines and primary immune cells, Isolation of immune cells from peripheral blood by Ficoll density gradient method, Cell cytotoxicity and viability assays, <i>in vitro</i> infection models, Gentamicin Protection Assay
Immunoassays	Flowcytometry, CyTOF, RNA in-situ hybridization, Fluorescent and chromogenic immunohistochemistry and immunocytochemistry, H&E staining, Fluorescent in-situ hybridization, ELISA
<i>In vivo</i> model	Mouse model of infection, Intraperitoneal, subcutaneous, and intravenous drug injections, Transurethral catheterization, Blood collection from tail-vein and by cardiac puncture, Cervical decapitation, Organ harvesting, Administering anesthesia, Mouse numbering scheme by toe clipping
Microscopy	Fluorescent and Confocal microscopy,
Computational	ImageJ, GraphPad Prism, MS Excel, FlowJo, R

MANAGEMENT / COMMUNICATION SKILLS

Team-work/ management	Actively collaborated with immunologists and material scientists to lead multi-disciplinary projects with minimal supervision
Project management	Ability to manage multiple projects simultaneously and meet project timelines, Independently design and execute experiments, Accurate record keeping and result documentation
Scientific mentorship	Supervised and mentored 17 research trainees
Written/Verbal communication	5 manuscripts and publications, 13 conference presentations
Leadership role	President of International Students' Organization of OSU-Tulsa (September 2015 – April 2017)

RELEVANT RESEARCH EXPERIENCE

STANFORD UNIVERSITY, *Postdoctoral Researcher* October 2020 – Present

Project Title: *Host microRNAs are differentially expressed in EBV+ solid-organ transplant recipients with the development of Post-transplant Lymphoproliferative Disorder*

- Collaborate with a team of researchers to quantitate the levels of microRNAs in tissue, plasma and exosomes by chip microarray and qPCR, analyzed data using GraphPad Prism

- Results of this study implicate the possibility of utilizing microRNAs to develop novel immunomodulatory therapeutics against EBV infection in transplant recipients

Project Title: *Immune responses to SARS-CoV-2 peptides in pediatric solid organ transplant recipients*

- Investigate the changes in immune cell profiles and cytokine responses in pediatric transplant recipients infected with SARS-CoV-2 (ongoing project)
- Independently formulated hypothesis, designed experiments and planned the study timeline
- Secured the Transplant and Tissue Engineering fellowship for this project (\$64,000/year)- granted by Stanford Children's Hospital

OKLAHOMA STATE UNIVERSITY CHS, Postdoctoral Research Associate

August 2019 – September 2020

Project Title: *Immunomodulatory effects of Diamond Nanoparticles in response to urinary tract infection*

- Image analysis using ImageJ, statistical data analysis using GraphPad Prism, data interpretation and manuscript preparation

Project Title: *Estrogen mediated epithelial protection on primary human hepatocytes and Huh-7 hepatoma cells against invasive Escherichia coli*

- Image analysis using ImageJ, statistical data analysis using GraphPad Prism, data interpretation and manuscript preparation

OKLAHOMA STATE UNIVERSITY CHS, Graduate Researcher Assistant

August 2014 - August 2019

Project Title: *Estrogen receptors differentially modulate innate immunity in the urinary tract in response to urinary tract infection (UTI)*

- Discovered the differential role of estrogen receptors in regulating host immunity against uropathogenic *E. coli*, findings indicate an immunomodulatory therapeutic role of estrogen receptor modulators
- Independently designed experiments involving *in vitro* and *in vivo* UTI models, molecular biology techniques, and fluorescence microscopy
- Published two original research papers, Communicated findings at national and international conferences
- Contributed to the overall scientific growth of the lab and mentored of 15 trainees over a span of three years.

Project Title: *Immunomodulatory therapeutic effects of Diamond Nanoparticles in response to urinary tract infection*

- Identified the immunogenic and therapeutic effects of diamond nanoparticles in response to UTI
- Regularly collaborated with a team of material science engineers as part of this cross-disciplinary project

Project Title: *Altered cytokine expression in Hepatitis C virus-related pathologies*

- Studied the changes in cytokine expression in human liver tissue sections of normal, HCV infected and HCV-induced hepatocellular carcinoma patients by immunohistochemical analysis

INTERNATIONAL JOURNAL OF IMMUNOLOGY, Scientific Reviewer

May 2020 – Present

PUBLICATIONS / MANUSCRIPTS

- **Sen A.,** Enriquez J., Rao M., *et. al.* (2022) Host microRNAs are differentially expressed in EBV+ solid-organ transplant recipients with the development of Post-transplant Lymphoproliferative Disorder (Submitted to American Journal of Transplantation)
- **Sen A.,** Kaul A., Kaul R. (2020) Estrogen receptors in human bladder cells regulate innate cytokine responses to differentially modulate uropathogenic *E. coli* colonization. *Immunobiology.* 2021 Jan;226(1):152020. doi: 10.1016/j.imbio.2020.152020. Epub 2020 Nov 4. PMID: 33246308.
- **Sen A.,** Iyer J., Boddu S., Kaul A., & Kaul R. (2019). Estrogen receptor alpha differentially modulates host immunity in the bladder and kidney in response to urinary tract infection. *Am J Clin Exp Urol.* 2019 Jun 15;7(3):110-122. PMID: 31317051; PMCID: PMC6627544.

- Sundaramoorthy, R., Srinivasan, V., Gujar, J., **Sen, A.**, Sekar, N., Abilash, VG., (2014). Clinical, Cytogenetic and CYP1A1 exon-1 Gene Mutation Analysis of Beedi Workers in Vellore Region, Tamil Nadu. *Asian Pac J Cancer Prev.* 2013;14(12):7555-60. doi: 10.7314/apjcp.2013.14.12.7555. PMID: 24460333.
 - **Sen A.**, Okda B., Kaul A., Kaul R. Immunomodulatory effects of Diamond Nanoparticles in response to Urinary Tract Infection. (Submitted to Immunobiology)
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CONFERENCE PRESENTATIONS:

Selected Oral Presentation:

- **A Sen**, S Boddu, S Raj, R Synar, J K Iyer, A Kaul, R Kaul. Estrogen Receptor Alpha Antagonist Differentially Modulates Tumor Necrosis Factor alpha production in Bladder versus Kidney affecting Urinary Tract Infection disease outcome. **OSU-CHS Annual Research Day, 2018 (Best oral presentation award)**
- **A Sen**, J K Iyer, A Dickey, A Kaul, C McDonald, R Kaul. Distinct role of Estrogen Receptor α agonist and antagonist on urinary tract infection outcome in bladder versus kidney. **Federation Of Clinical Immunology Society conference, 2017**
- **A Sen**, J K Iyer, A Dickey, A Kaul, C McDonald, R Kaul. Differential role of Estrogen Receptor α agonist and antagonist on urinary tract infection outcome in bladder and kidney. **OSU-CHS Annual Research Day, 2017 (Best oral presentation award)**
- **A Sen**, J K Iyer, A Dickey, C McDonald, Z Zaaza, A Kaul, R Kaul. Estrogen receptor alpha antagonist treatment affects bacterial clearance in bladder and kidneys of mice with experimental urinary tract infection. **OSU-CHS Annual Research Day, 2016 (Best oral presentation award)**

Selected Poster Presentation:

- **A Sen**, S Boddu, J K Iyer, A Kaul, R Kaul. Estrogen Receptor Alpha agonist and antagonist differentially modulate host immunity during Urinary Tract Infection. **5th European Congress of Immunology, Amsterdam, 2018**
- **A Sen**, S Boddu, S Raj, R Synar, J K Iyer, A Kaul, R Kaul. Estrogen Receptor Alpha Antagonist Mediates Therapeutic Benefit against Urinary Tract Infection by Boosting TNF α Production in Bladder. **Federation of Clinical Immunology Society conference, San Francisco, 2018**
- **A Sen**, J K Iyer, A Dickey, A Kaul, R Kaul. Selective Estrogen Receptor Modulators differentially regulate Urinary Tract Infection outcome in the bladder and kidney. **Cells vs. Pathogens Intrinsic Defenses and counter-defenses Keystone conference, Monterey, 2018**

Invited Talk:

- **“How does estrogen modulate our immune systems to protect us from Urinary Tract Infections?”** presented at OSU Women’s Faculty Council Award Ceremony, Stillwater, April 17, 2018
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AWARDS / FELLOWSHIPS

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| 1. Transplant and tissue engineering fellowship,
Transplant and Tissue Engineering Center of Excellence
leadership group, Lucile Packard Children’s Hospital (\$64,000/year) | July 2021 |
| 2. Outstanding Biomedical Sciences Ph.D. Graduate Student award | May 2019 |
| 3. Third prize in 3-Minute Thesis (3MT) competition at OSU-CHS (\$250) | October 2018 |
| 4. Research Award, OSU Women’s Faculty Council (\$750) | April 2018 |
| 5. Travel Award, Federation Of Clinical Immunology Society (\$750) | June 2017 |

Other Relevant Information: Currently have a valid U.S. work authorization