NOMINEE – ESPR COUNCIL

BIOGRAPHICAL SKETCH

Position: Assistant Professor, Pediatrics

Name: Shaon Sengupta

Education:
2006 MBBS All India Institute of Medical Sciences, India (Medicine and Surgery)
2008 MPH Johns Hopkins Bloomberg School of Public Health (Epidemiology and Statistics)

House Staff & Fellowship Training:
2005-2006 Rotating Internship, All India Institute of Medical Sciences, India
2008-2011 Resident, Women and Children's Hospital of Buffalo, SUNY, Buffalo
2011-2014 Clinical Fellow, Neonatal-Perinatal Medicine, Children's Hospital of Philadelphia
2013-2014 Postdoctoral Fellow, Division of Neonatology, Children's Hospital of Philadelphia
2014-2015 Postdoctoral Fellow, Institute of Translational Medicine and Therapeutics (ITMAT), University of Pennsylvania

Faculty Positions:
2018-present Assistant Professor of Pediatrics, University of Pennsylvania School of Medicine

Current Position:
Assistant Professor, Pediatrics, University of Pennsylvania *(tenure track)*

Society Memberships:
International:
2013-2014 Society of Free Radical Biology and Medicine (Member)
2013-Present Society of Research on Biological Rhythms (Member)
2020-Present Society of Pediatric Research (Member)
National:
2008-Present: American Academy of Pediatrics (Member)
2008-Present: Neonatal Resuscitation Program (Member)
2011-Present: American Board of Pediatrics (Member)
2012-Present: American Thoracic Society (Member)
2015-Present: American Association of Immunologists (Member)
2018-Present: American Physiological Society (Member)

Local:
2018-present Chronobiology and Sleep Institute (Participating Faculty)
2021-present: Penn-CHOP Lung Biology Institute
2021-present: Participating faculty, Institute of Regenerative Medicine

Research Interests:
1. Epidemiological studies investigating health outcomes in neonates: During my graduate school (Master of Public Health) training and pediatric residency, I worked on epidemiological datasets and was involved in preparing systematic reviews funded by the Cystic Fibrosis Foundation at the Johns Hopkins Evidence based Practice Center. During pediatric residency, I undertook a county-wide study of all hospital born

neonates and we were amongst the first to report an increase in respiratory morbidity and need for NICU admission in early term babies (37-38 weeks). Finally, I collaborate with a virology group from WashU in identifying unique mechanisms that influence the pathogenesis of RSV disease in children and neonates. Thus, I have a solid understanding and skill set for biostatistics and epidemiology, which is useful as I continue to close the gap from bench to bedside in translational chronobiology.

1. **Sengupta S**, Carrion V, Shelton J, Wynn RJ, Ryan RM, Singhal K, Lakshminrusimha S. Adverse neonatal outcomes associated with early-term birth. JAMA Pediatr 167(11): 1053-1059, 2013. PMID: 24080985.
2. Flume PA, Mogayzel PJ Jr, Bujan J, Downs A, Finder J, Goss C, Gutierrez H, Hazle L, Kuhn R, Lester L, Marshall B, Quittell L, Robinson KA, Rosenblatt R, Sabadosa K, Vender RL, White TB, Willey-Courand DB, Saldanha I, Oyegunle M, Shankar MB, Mckoy N, **Sengupta S**, Odelola OA, Waybright S. Clinical practice guidelines for pulmonary therapies committee. Cystic fibrosis pulmonary guidelines: treatment of pulmonary exacerbations. Am J Respir Crit Care Med 180(9):802-808, 2009. PMID:19729669
3. Mukhopadhyay S, **Sengupta S,** Puopolo K. Challenges and opportunities for antibiotic stewardship among preterm infants. Arch Dis Child Fetal Neonatal Ed 104(3):F327-F332, 2019. PMCID: PMC6491257.
4. Sun Y, Felt S, Jozwik A, Paras A, Habib MI, Anderson L, Feemster K, Cárdenas AM, Hartert T, **Sengupta S,** Chiu C, Lopez, CB. Detection of defective viral genomes in nasal secretions predicts RSV disease severity in children and adults. Nat Microbiol. 2021 May;6(5):672-681. doi: 10.1038/s41564-021-00882-3. Epub 2021 Apr 1. PubMed PMID: 33795879; NIHMSID:NIHMS1691560.

2. <u>Oxidative stress response and defense mechanisms in the body</u>: During my Neonatal-Perinatal medicine fellowship and early postdoctoral training, I worked on oxidative stress and neonatal lung injury. Our focus was on heme-oxygenase-1 (HO-1) and using a neonatal lung injury model, we discovered some fascinating mechanisms behind the cellular location of the enzyme with its anti-oxidant role in the cells and in the organism. Although our model was one of neonatal hyperoxia, we looked both at acute and long-term outcomes, equipping me with tools to study acute inflammation/injury as well as tissue remodeling and persistent damage later.

1. Namba F, Go H, Murphy JA, La P, Yang G**, Sengupta S**, Fernando AP, Yohannes M, Biswas C, Wehrli SL, Dennery PA. Expression level and subcellular localization of heme oxygenase-1 modulates its cytoprotective properties in response to lung injury: a mouse model. PLoS One 9(3):e90936, 2014. PMCID: PMC3944979.
2. Biswas C, Shah N, Muthu M, La P, Fernando AP, **Sengupta S**, Yang G, Dennery PA. Nuclear heme-oxygenase-1 (HO-1) modulates subcellular distribution and activation of Nrf2 impacting metabolic and anti-oxidant defenses. J Biol Chem. 289(39):26882-36894, 2014. PMID: 25107906. PMCID PMC4175329
3. Yang G, Wright CJ, Hinson, MD, Fernando AP, **Sengupta S**, Biswas C, La P, Dennery PA. Oxidative stress and inflammation modulate Rev-erbα signaling in the neonatal lung and affect circadian rhythmicity. Antioxid Redox Signal. 21(1):17-32, 2014. PMCID: PMC4048579.

<u>3. Circadian regulation of lung injury:</u> Early in my postdoctoral training, I led a study that integrated the metabolic effects of the circadian gene, Rev-erbα with its ability to protect cells from oxidative stress. As I moved towards more translational models to elucidate the role of circadian regulation in lung inflammation, I adapted a popular murine model of influenza A virus (IAV) infection towards my question on the circadian regulation of lung inflammation. Further, I have continued to not only elucidate the mechanistic basis of circadian regulation of lung injury, but also advocated for the need for this kind of science (at NIH and other workshops) and devised protocols that will be necessary for the rigorous study of immune cell populations in circadian biology.

1. **Sengupta S,** Yang G, O'Donnell JC, Hinson MD, McCormack SE, Falk MJ, La P, Robinson MB, Williams ML, Yohanne MT, Polyak E, Nakamaru-Ogiso E, Dennery PA. The circadian gene Rev-erbα improves cellular bioenergetics and provides preconditioning for protection against oxidative stress. Free Radic Biol Med. 2016 Apr; 93:177-89 PMID: 26855417 PMCID: <u>PMC4905744</u>

2. Haspel JA, Anafi R, Brown MK, Cermakian N, Depner C, Desplats P, Gelman AE, Haack M, Jelic S, Kim BS, Laposky AD, Lee YC, Mongodin E, Prather AA, Prendergast B, Reardon C, Shaw AC, **Sengupta S,** Szentirmai É, Thakkar M, Walker WE, Solt LA. Perfect timing: circadian rhythms, sleep and immunity- an NIH workshop summary. JCI Insight. 2020 Jan 16;5(1). pii: 131487. doi: 10.1172/jci.insight.131487. Review. PMID: 31941836
3. Issah, Y., Naik, A., Tang, S. Y., Forrest, K., Theken, K. N., **Sengupta, S.** Distinguishing Intrapulmonary Immune Cells from Intravascular Immune Cell Populations: The Intrajugular Approach. J Vis Exp. 2020 Sep 22;(163). doi: 10.3791/61590. PMID: 33006587.
4. **Sengupta S**, Ince L, Sartor F, Borrmann H, Zhuang X, Naik A, Curtis AM, McKeating JA. Clocks, Viruses, and Immunity: Lessons for the COVID-19 Pandemic. Biol Rhythms. 2021 Jan 22;748730420987669.doi: 10.1177/0748730420987669. PMID: 33480287
5. Issah Y, Naik A, Tang SY, Forrest K, Brooks TG, Lahens N, Theken KN, Sehgal A, Worthen GS, FitzGerald GA, **Sengupta S**. Loss of Circadian Protection in Adults Exposed to Hyperoxia as Neonates. Elife. 2021 Mar 2;10. doi: 10.7554/eLife.61241.PMID: 33650487; PMCID: PMC7924938.
6. **Sengupta S**, Tang SY, Devine JC, Anderson ST, Nayak S, Zhang SL, Valenzuela A, Fisher DG, Grant GR, López CB, FitzGerald GA. Circadian regulation of lung inflammation in influenza infection. Nat Comm. 2019 Sep 11;10(1):4107 PMID: 31511530. PMCID PMC6739310.

Teaching Interests:
2012-Present Teaching Pediatric Residents on NICU rotation re: "Care of Extremely Low Birth Weight (ELBW) Neonate". 3-4 times/academic year, Children's Hospital of Philadelphia.
2014-Present Bedside Instructor, medical students, residents, and fellows while on clinical service, Children's Hospital of Philadelphia and Hospital of the University of Pennsylvania.
2014-present: NRP instructor and instructor mentor for Hospital based providers, Children's Hospital of Philadelphia.
2018-Present "Circadian regulation of lung inflammation in Influenza". University of Pennsylvania Chronobiology Program.
2018-present Faculty, Chronobiology and Sleep Institute, University of Pennsylvania.
2020-present Faculty Co-Organizer, weekly Neonatology Research seminar series, Children's Hospital of Philadelphia.
2021-present Participating Faculty, Lung Biology Institute, University of Pennsylvania
2022-present Participating Faculty, Pharmacology graduate group, CAMB (Microbiology, Virology and Parasitology), University of Pennsylvania. Teaching faculty for CAMB605 course.

Statement of Interest:
I am an Assistant Professor (*tenure track*) at the University of Pennsylvania and a physician (neonatologist) scientist with a long-standing interest in lung health. The two areas of investigation in my lab are: (1) determining the mechanisms of the circadian regulation of lung inflammation, injury and repair/regeneration, and (2) effect of early life exposures on the development (or maldevelopment) and function of pulmonary circadian networks in adulthood. We use epidemiological resources to inform our mechanistic work using translational animal models. While most of our work involves viral infections, the mechanisms of circadian driven immune responses are conserved across different species of pathogens and hosts.

How will you enhance/promote awareness of diversity, equity, and inclusion in ESPR activities:

As a woman physician scientist, I am committed towards mentoring and supporting diversity in my lab and beyond. As a young faculty member, I have mentored 2 postdoctoral researchers, 6 pre-graduate trainees and 4 undergraduate students. Majority of my trainees were women and 25% were from underrepresented minorities. I am also a participating faculty member in Microbiology, Virology and Parasitology as well as Pharmacology graduate groups. In both of those forums, I continue to foster diversity and contribute to the training and development of candidates from under-represented groups. I encourage my lab group to participate in bias training and take advantage of the DEI initiatives undertaken by CHOP's research institute and the University of Pennsylvania. My overall philosophy towards promoting diversity through mentorship has included efforts towards developing a shared model with my mentee, be intentional about the training plans and allow for flexibility in a manner that supports accountability but also allows me to adjust learning

plans based on the unique life-circumstances and experiences of my mentees. I have also been deliberate about the kind of culture I promote in my lab. We have open dialogue regarding this issue and how it affects our day-to-day work. In particular, I have focused on “microaggressions” and how they affect minorities as well as in which way we can transform from sensitive colleagues and embarrassed bystanders to empowered allies. This allows underrepresented groups to feel validated but can also provide insights and tools of allyship to others. I am also optimistic that my efforts to find shared values with each of my mentees will promote a similar level of curiosity and desire among my mentees. Discovering common values within encourages a spirit of inclusion and collaboration in the group.

Finally, the role of the circadian clock that I study targets many important facets of basic physiology and as such should be broadly relevant to different parts of the world. It is highly relevant to our knowledge of emerging pathogens. I expect that this line of research will be very attractive to trainees, particularly those from underrepresented groups.