Gene Regulation and Cytokine Biology in Neurodegeneration and Neuroinflammation

Position Description:
The laboratory of Dr. Han-Yu Shih at the National Institutes of Health (NIH) in Bethesda, MD is seeking a motivated and talented postdoctoral researcher to join our multidisciplinary team. Our lab focuses on understanding the mechanisms that precisely regulate gene expression in neuroinflammation and neurodegeneration, with a particular interest in cytokine-mediated CNS inflammation. We use cutting-edge genomic approaches to address three fundamental questions:

1. How do cytokines drive the progression of neurodegenerative and neuroinflammatory diseases in the CNS?
2. How do innate lymphoid cells (ILCs) integrate neuronal signals to support immune adaptation in tissues?
3. How do the microbiome and microbial metabolites regulate lymphocyte differentiation and function during aging-related disorders?

The successful candidate will use "omic" approaches to investigate immunoregulation and identify potential therapeutic targets. You will have the opportunity to lead and co-lead projects, design experiments for generating high-dimensional data (single cell transcriptomes and epigenomes, spatial transcriptomes, TCR/BCR repertoires), and work closely with collaborators and lab members. Additionally, you will receive hands-on training in bioinformatics and have opportunities to mentor postbacs or summer students. will be available based on interest. Salary is commensurate with research experience and accomplishments.

Selected publications:
1. Morrison TA, Vigee J, Tovar KA, Talley TA, Mujal AM, Kono M, Philips R, Nagashima H, Brooks SR, Dada H, Rozich I, Hudspeth K, Lau CM, Yao C, Sciumè G, Sun HW, Bonifacino JS, Kanno Y, Dustin ML, Randazzo D, Proia RL, Sun JC, Shih HY, O'Shea JJ. **Selective requirement of glycosphingolipid synthesis for natural killer and cytotoxic T cells.** *Cell.* 2025 PMID: 40306279
2. Liu C, Nagashima H, Fernando N, Bass V, Gopalakrishnan J, Signorella S, Montgomery W, Lim AI, Harrison O, Reich L, Yao C, Sun HW, Brooks SR, Jiang K, Nagarajan V, Zhao Y, Jung S, Phillips R, Mikami Y, Lareau CA, Kanno Y, Jankovic D, Aryee MJ, Pękowska A, Belkaid Y, O'Shea J, Shih HY. **Differential Requirement of 3D Genomic Organization for the *Mdm1-Il22-Ifng* Locus Regulation in Adaptive Versus Innate Responses.** *Immunity.* 2024 PMID: 38697116
3. Fernando N, Gopalakrishnan J, Behensky A, Reich L, Liu C, Bass V, Bono M, Montgomery W, De Pace R, Mattapallil M, Nagarajan V, Brooks S, Maric D, Caspi RR, McGavern DB, Shih HY. **Single-cell multiomic analysis reveals the involvement of Type I interferon-responsive CD8+ T cells in amyloid beta-associated memory loss.** *bioRxiv.* 2023 https://doi.org/10.1101/2023.03.18.533293
4. Sciumè G, Mikami Y, Jankovic D, Nagashima H, Villarino AV, Morrison T, Yao C, Signorella S, Sun HW, Brooks SR, Fang D, Sartorelli V, Nakayamada S, Hirahara K, Zitti B, Davis FP, Kanno Y, O'Shea JJ, Shih HY. **Rapid enhancer landscape remodeling and transcription factor repurposing enable high magnitude gene induction upon acute activation of NK cells.** *Immunity.* 2020 PMID: 33010223
5. Shih HY, Sciumè G, Mikami Y, Guo L, Sun HW, Brooks S, Urban J, Davis F, Kanno Y, O'Shea JJ. **Developmental acquisition of regulomes underlies innate lymphoid cell functionality.** *Cell.* 2016 PMID: 27156451

Qualifications:
We are seeking highly motivated candidates who meet the following requirements:

- Hold a Ph.D. or M.D./Ph.D. in immunology, neuroscience, genetics, molecular biology, biochemistry, computational biology or a related field, awarded within the last three years;
- Have first authorship on at least one peer-reviewed publication;
- Possess self-motivation and a strong desire to develop and learn cutting-edge technologies and genomic data analysis;
- Preferred experience in animal experiments or iPSC/organoid culture;
- Ability to work collaboratively within a highly cohesive group is important.

If you meet these qualifications and are excited about joining a dynamic team working to uncover the mechanisms of cytokine regulation and CNS inflammation using state-of-the-art genomic approaches, we encourage you to apply for this postdoctoral position.

To Apply:
Interested candidates please send a cover letter, curriculum vitae, and contact information of three references to: NEI Shih Lab han-yu.shih@nih.gov

Lab website:
https://www.nei.nih.gov/research/research-labs-and-branches/neuro-immune-regulome-unit

The NIH is dedicated to building a diverse community in its training and employment programs.