OTHER PARTICIPATING FACULTY PRIMARY RESEARCH MENTORS

Other Participating Faculty and Their Qualifications

Theme 1. Innate Immunity, Connective Tissue Biology, and Inflammation in Rheumatic Diseases.
Theme 1 Primary Mentor Faculty listed below are supplemented by 3 primary mentors and an EC member from Program Leadership (Firestein, Ginsberg, Terkeltaub, and Corr, respectively), by Dr. Kronenberg, and by Methodology & Resource Advisors and Mentors in Development, cited further below.

i. Adam Engler, PhD. UCSD. Musculoskeletal Tissue Bioengineering and Regeneration/Stem Cells, Stem Cells, Matrix Biology, Mechanobiology (ISI 9,987 citations, H-index 35). Dr. Engler's inter-disciplinary expertise combines engineering and biology, in areas including extracellular matrix (ECM), muscle, and stem cell biology. Recipient of an ***NIH New Innovator Award***, he has established the influence that mechanical properties can have on stem cells, including their differentiation into and function in connective tissues (e.g. muscle) and in disease. He also has developed next-generation "smart" materials to mimic ECM changes during disease to create new disease-in-a-dish models where the niche itself changes. In this program, he currently collaborates, with Drs. Ward and Firestein, on skeletal regeneration.

ii. Chris Glass, MD.,PhD. UCSD. Macrophages, Inflammation, TLR Signaling, Nuclear Receptors, "Omics" (ISI 59,403 citations, H-index 122). Based in UCSD Endocrinology, and the Howard Hughes Institute, Dr. Glass works on mechanisms by which sequence-specific transcription factors, co-activators and co-repressors regulate macrophage development and function. His major focus is defining genome-wide locations and functions of these proteins, using assays based on massively parallel DNA sequencing. He is combining these technologies with molecular, genetic, lipidomic and cell-based approaches. He brings insights into macrophage gene expression and function that are highly relevant to inflammatory diseases.

iii. Hal Hoffman, MD. UCSD. Autoinflammatory and Rare Pediatric Diseases (ISI 6,309 citations, H-index 32). Chief of the UCSD Division of Pediatric Immunology and Rheumatology, Dr. Hoffman discovered the molecular etiology of CAPS syndrome in his seminal work that cloned cryopyrin/NLRP3. His lab actively investigates functional genomics in autoinflammatory diseases, and actively collaborates and publishes with multiple T32 faculty. Dr. Hoffman's UCSD "Pediatric Hereditary Fever Clinic" is a substantial component of our clinical training experience, and a rich research cohort.

iv. Michael Karin, PhD. UCSD. Inflammation, Signal transduction (ISI 154,257 citations, H-index 201). Dr. Karin, a very highly cited inflammation biologist with a deep training record (including Dr. Guma of this T32), investigates stress signaling. He has made landmark discoveries on AP-1, NF-κB, STAT3 and other transcription factors, IκB kinases (IKKs), and the IL-6 cytokine family in disease. More recently, his lab elucidated the existence of immunosuppressive plasma cells. He continues to collaborate and publish actively with multiple T32 faculty.

v. Klaus Ley, PhD. LJI. Leukocyte trafficking and inflammatory and vascular diseases (ISI 37,050 citations, H-index 118). Dr. Ley is a world authority on myeloid cell biology, including adhesion and recruitment. He discovered that L-selectin is involved in leukocyte rolling in vivo, and developed true intravital microscopy for resolving three populations of vascular

macrophages in vivo. He has elucidated antigen presentation to CD4 T cells in the vessel wall, and the unique subset of CD4 T cells termed CCR5 Teffs. He collaborates on leukocyte trafficking with Dr. Ginsberg in the UCSD RAI Division.

vi. Eyal Raz, MD. UCSD. Innate and mucosal immunity, tolerance (ISI 17,271 citations, H-index 66). Dr. Raz studies host-environment interactions, including innate immunity, TLR signaling in response to CpG (leading to productive immunity enhancement strategies in pharma), and mucosal immunology. Recently, he discovered the role of ion channel TRPV1 signaling on inflammation. He has conducted seminal work on gut-immune system intersections in chronic inflammation, collaborating with Dr. Corr and other T32 faculty.

vii. Sam Ward, PT/PhD. UCSD. Articular translational biomechanics and tissue regeneration, and skeletal imaging (ISI 2,686 citations, H-index 27). Dr. Ward directs the Muscle Physiology laboratory, co-directs the Center for Musculoskeletal Research, and is Vice Chair of Research in Orthopedic Surgery. His expertise is in biomechanics, skeletal muscle physiology, and skeletal MR imaging. He works on musculoskeletal tissue regeneration, and modifying outcomes such as fibrosis, inflammation, atrophy, and biomechanical changes.

viii. Carl Ware, PhD. Sanford Burnham Prebys Medical Discovery Institute. Innate and adaptive immunity, TNF superfamily, signal transduction (ISI 26,682 citations, H-index 83). Dr. Ware has made seminal advances in TNF Superfamily biology, including discovery of LIGHT and other family cytokine members and receptors, and characterization of the integrated Lymphotoxin-$\alpha\beta$ and LIGHT and TNF cytokine-signaling circuit that regulates the development and homeostasis of the innate and adaptive immune systems. His work has led to novel therapeutics currently in clinical trials (LTβR-Fc decoy, baminercept; human anti-LIGHT mAb) for inflammatory diseases and cancer. Dr. Ware is Chair of the Scientific Advisory Board of the Arthritis National Research Foundation, which focuses on supporting outstanding early career PhD and MD investigators.

ix. Tony Yaksh, PhD. UCSD. Inflammatory pathophysiology of pain in arthritis (ISI 38,014 citations, H-index 97). Dr. Yaksh studies innate mechanisms of pain in inflammatory diseases, including the roles of lipid mediators in pain processing and the contribution of innate immunity. With Dr. Corr, and T32 trainee Sarah Woller, PhD, he demonstrated that TLR KO and spinal TLR4 blockers prevent transition from acute inflammation to chronic neuropathic-like pain, and defined regulators of spinal TLR4 trafficking in chronic pain states. These observations led to new spinal analgesics being developed in the pharma industry.

x. Monica Guma, MD.,PhD., UCSD. Inflammation biology, metabolomics. (ISI 2,628 citations, H-index 22). Dr. Guma studies mechanisms of chronic inflammation, and modulation by metabolic changes in cells, especially in RA and in synoviocytes. She is an expert in metabolomics and inflamamtion transcription factor signaling.

xi. Ru Liu-Bryan, PhD, UCSD. OA, Cartilage biology, inflammation, metabolism. (ISI 3,112 citations, H-index 27). Professor Liu-Bryan's expertise includes chondrocyte and macrophage biology, OA models, and intersections of metabolism with inflammation, including by the AMP Kinase pathway.

Theme 2. Adaptive Immunity in Rheumatic Diseases.
Theme 2's working group of Primary Mentor Faculty is listed below. Mentoring teams are supplemented by Drs. Bottini, Ginsberg, Ley, Raz, Ware as Primary Mentors (cited above from Program Leadership and/or Innate Immunity), and by the Methodology & Resource Advisors and Mentors in Development, cited further below.

i. Mitch Kronenberg, PhD. **LJI.** Antigen presentation, NK cells, mucosal immunity (ISI 36,167 citations, H-index 95). President and CEO of LJI, Fellow of AAAS, Dr. Kronenberg is in the top 0.5% cited of immunologists globally. He is a pioneer in antigen presentation and NKT cell biology, including studies in autoimmune diseases, and IBD. He developed a glycolipid to activate NKT cells, currently in clinical trials. With Nunzio Bottini, and T32 trainee Meng Zhao, he discovered that NKT cells are protective for arthritis in SKG mice via IFNgamma secretion, elucidating a feedback mechanism to attenuate reduced thymic selection.

ii. Yun-Cai Liu, PhD. **LJI.** Immunoproteasome, tolerance. (ISI 4,237 citations, H-index 47). The Liu lab works on regulation of lymphocyte function by protein ubiquitination, and implication of the ubiquitin system in abnormal immune responses. This includes molecular and cellular mechanisms of Th2, Th17, and Tfh differentiation, the development and function of Tregs, and T cell anergy induction. For example, Dr. Liu established that Cbl family of adaptor proteins acts as E3 ubiquitin ligases. He identified Cbl-b as essential in T cell tolerance induction and native suppression of development of arthritis. He also discovered that E3 ubiquitin ligase Itch is a critical regulator for Th2 cell development.

iii. Bjoern Peters, PhD. **LJI.** Antigen presentation, epitope targets, computational biology (ISI 7,818 citations, H-index 60). Dr. Peters is an authority in quantitative analysis approaches in adaptive immune responses, including cutting edge bioinformatic approaches and large scale data analyses. He is the bioinformatics lead for the Immune Epitope Database (IEDB) project, where he has developed many epitope prediction tools made freely available to the community.

Theme 3. Clinical, Epidemiologic, Genetic, and Translational Research in Rheumatic Diseases.
Theme 3 Primary Mentors include the faculty listed below. Mentoring teams are supplemented by Drs. Ix, LaCroix, and Terkeltaub from the Program Leadership group, and by the Methodology & Resource Advisors and Mentors in Development, cited further below.

i. Jane Burns, MD. **UCSD.** Kawasaki Disease (KD) (ISI 16,630 citations, H-index 59). Dr. Burns studies KD pathogenesis, epidemiology, genetics, and treatment. She directs the Kawasaki Disease Research Center at UCSD, an NIH K24 in this area, and NHLBI-supported biorepository that includes serum, plasma, urine, RNA, and DNA on KD patients and febrile control children, with detailed phenotypes including demographic, clinical, laboratory, and echocardiographic data. She has developed a web-based portal for data management and analysis that facilitates data sharing. She also is a KD trialist, starting with the seminal IV IgG and infliximab trials, and NIH phase III trial of anakinra for KD (with her former mentee Dr. Tremoulet).

ii. Christina Chambers, PhD. **UCSD.** Maternal and fetal health in rheumatic diseases (ISI 4,587 citations, H-index 33). Dr. Chambers is a maternal-fetal epidemiologist, who co-directs the Center for Maternal Health and Infant Development in UCSD Pediatrics. She has extensive experience in epidemiologic research on medication safety in pregnancy, including in rheumatic diseases. Since 1998, she has led several national longitudinal cohort studies involving

pregnant women with autoimmune diseases and their treatments.

iii. Wei Wang, PhD. UCSD. Computational genetics for rheumatic diseases (ISI 5,202 citations, H-index 40). Dr. Wang brings valued expertise as a computational biologist. He works on epigenomics in RA and gout, in large, funded projects as co-investigator or co-PI, with Drs. Firestein and Terkeltaub, respectively. He has particular expertise in "integrative omics". By integrating GWAS, transcriptome and methylome data from RA synoviocytes and gout PBMCs, he is identifying new potential drug targets and disease activity biomarkers.