

**University of California, San Francisco**  
**CURRICULUM VITAE**

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**Position:** Professor of Clinical Medicine, Step 1  
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School of Medicine  
University of California, San Francisco

Associate Director, Clinical and Translational Medicine  
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**EDUCATION**

1993 - 1997	North Carolina State University	B.S. Chemical Engineering, summa cum laude
1997 - 2001	Johns Hopkins University	M.D.
2001 - 2004	Johns Hopkins Hospital	Internship and Residency, Internal Medicine
2004 - 2007	University of California, San Francisco	Clinical Fellowship, Rheumatology
2005 - 2006	University of California, San Francisco	Certificate, Advanced Training in Clinical Research
2007 - 2008	University of California, San Francisco	M.A.S., Clinical Research
2017 - 2017	UCSF-Coro Faculty Leadership Collaborative	Graduate

**LICENSES, CERTIFICATION**

2004	Medical Board of California Physician and Surgeon License, Certificate #A86647
2014	Diplomate in Internal Medicine, American Board of Internal Medicine (initially obtained 2004)
2017	Diplomate in Rheumatology, American Board of Internal Medicine (initially obtained 2007)

**PRINCIPAL POSITIONS HELD**

2004 - 2007	Clinical Fellow	University of California, San Francisco	Department of Medicine, Division of Rheumatology
2007 - 2013	Assistant Adjunct Professor	University of California, San Francisco	Department of Medicine, Division of Rheumatology
2013 - 2017	Assistant Professor in Residence	University of California, San Francisco	Department of Medicine, Division of Rheumatology
2016 - present	Associate Director, Clinical and Translational Medicine, Clinical Trials Group	University of California, San Francisco	Immune Tolerance Network
2017 - 2021	Associate Professor of Clinical Medicine	University of California, San Francisco	Department of Medicine, Division of Rheumatology
2021-present	Professor of Clinical Medicine	University of California, San Francisco	Department of Medicine, Division of Rheumatology

**OTHER POSITIONS HELD CONCURRENTLY**

2010 - present	Director, UCSF Vasculitis Clinic	University of California, San Francisco	Department of Medicine, Division of Rheumatology
2012 - present	Affiliate Member	University of California, San Francisco	Institute for Human Genetics

**HONORS AND AWARDS**

1997	John T. Caldwell Alumni Scholar (from 1993-1997)	North Carolina State University
1997	Fellow, North Carolina Fellows Program (from 1993-1997)	North Carolina State University
1997	Barry M. Goldwater Scholar (from 1995-1997)	Barry Goldwater Scholarship and Excellence in Education Foundation
1997	Valedictorian	North Carolina State University
2006	Epstein Endowment for Clinical Trials Research and Education Award Recipient	University of California, San Francisco

2006	Scholarship recipient, "Genetic Analysis of Complex Human Diseases" course	Duke Center for Human Genetics
2007	Distinguished Fellow Award	American College of Rheumatology
2011	Ephraim Engleman Award for Excellence in Arthritis Research	University of California, San Francisco
2014	Irene Perstein Award	University of California, San Francisco
2020	Ira M. Goldstein Award for Outstanding Teaching in Rheumatology	University of California, San Francisco

### **KEYWORDS/AREAS OF INTEREST**

Genetic epidemiology, genomics, epigenetics, next-generation sequencing, RNA-sequencing, systemic vasculitis, systemic lupus erythematosus, immune tolerance, clinical trials

## **CLINICAL ACTIVITIES**

### **CLINICAL ACTIVITIES SUMMARY**

Director, UCSF Vasculitis Clinic and Attending, UCSF Rheumatology Faculty Practice: In December 2010, I created the UCSF Vasculitis Clinic, a subspecialty referral clinic for patients with systemic vasculitis in the western United States. I see patients in this clinic 1-2 half days/week, and provide both longitudinal care as well as consultations for patients with vasculitis. I manage a wide spectrum of vasculitic diseases in this clinic, including the ANCA-associated vasculitis, Takayasu arteritis, polyarteritis nodosa, giant cell arteritis, IgA vasculitis, essential mixed cryoglobulinemia, and Behcet disease. I manage the longitudinal care of over 100 patients with vasculitis each year. I also mentored Dr. Sarah Goglin in the clinical care of patients with vasculitis, and she has joined me in caring for patients at this clinic. This clinic also serves as a teaching clinic for rheumatology fellows, who can rotate through this clinic during their second year of fellowship. Patients in the clinic participate in my own clinical studies as well as studies sponsored by the Vasculitis Clinical Research Consortium. In addition, in my continuity clinic, I care for patients with other autoimmune diseases, including rheumatoid arthritis, systemic lupus erythematosus, and spondyloarthritis. Lastly, I precept UCSF rheumatology fellows in their continuity clinic when requested to discuss the care of their patients with systemic vasculitis.

Attending, UCSF Inpatient Rheumatology Consult Service: Since 2007, I have attended on the inpatient rheumatology consult service at the UCSF Medical Center Moffitt-Long Hospital for 1 month each year. My activities as the consult attending include evaluating admitted patients for new diagnoses of autoimmune diseases and managing potentially life-threatening complications of autoimmune diseases, such as alveolar hemorrhage, rapidly progressive glomerulonephritis, and cerebral vasculitis. I supervise the rheumatology fellows, medical residents, and medical students that rotate on this service.

### **CLINICAL SERVICES**

2007 - present	Attending, UCSF Inpatient Rheumatology Consult service	1 month per year
2007 - present	Attending, UCSF Rheumatology Faculty Practice	1-2 half days/week

2010 - present Attending and Director, UCSF Vasculitis Clinic 1-2 half days/week

## PROFESSIONAL ACTIVITIES

### MEMBERSHIPS

2005 - present Member, American College of Rheumatology

### SERVICE TO PROFESSIONAL ORGANIZATIONS

2017 - present American College of Rheumatology Vasculitis Guidelines Committee Chair/Core Team Leader

2017 - 2019 American College of Rheumatology CARE (Continuing Assessment Review Evaluation) Development Group Content Expert: Vasculitis

2019 - present American College of Rheumatology Annual Meeting Planning Committee Abstract Reviewer (Vasculitis – Non-ANCA-Associated and Related Disorders)

2019 - 2019 American College of Rheumatology Annual Meeting Planning Committee Abstract Session Moderator (Vasculitis--Non-ANCA-associated and Related Disorders I: Miscellaneous Disorders)

### SERVICE TO PROFESSIONAL PUBLICATIONS

2007 - present *ad hoc* reviewer: Arthritis and Rheumatology, Arthritis Care and Research

2013 - 2016 Advisory Editor, Arthritis and Rheumatology

### INVITED PRESENTATIONS - INTERNATIONAL

2021 ACR Convergence 2020 Highlights in China Shanghai, China Invited speaker  
"State of the Art: Treatment of ANCA-associated Vasculitis"

2021 Turkish Rheumatology Congress (Turkish League Against Rheumatology) Invited speaker  
"Treatment of ANCA-associated Vasculitis in 2021"

**INVITED PRESENTATIONS - NATIONAL**

2008	Oklahoma Medical Research Foundation Lupus Genetics Conference: "Refining genetic associations in SLE according to specific subphenotypes"	Speaker
2010	Vasculitis Foundation Symposium: "Microscopic polyangiitis"	Panel member
2010	Vasculitis Foundation Symposium: "Building a Team: Patient-Physician Communication"	Speaker
2011	American College of Rheumatology Annual Meeting: "Lupus nephritis susceptibility markers in PDGFRFA-GSX2, SLC5A11, ID4, and HAS2-SNTB1 regions identified from a meta-analysis of genome-wide association studies of women with systemic lupus erythematosus"	Abstract presenter
2012	UCSF Rheumatology Board Review and Clinical Update: "Meet the Professor: Vasculitis" (2010-2012)	Speaker
2013-present	UCSF Rheumatology Board Review and Clinical Update: "Board Review: Vasculitis" (2013-2014, 2016, 2018, 2020)	Speaker
2015	American College of Rheumatology Annual Meeting: "Using exome sequencing to identify novel genetic associations with granulomatosis with polyangiitis susceptibility"	Abstract presenter
2017	Vasculitis Foundation Symposium: "The Role of Genetics in Vasculitis"	Speaker
2017	American College of Rheumatology Annual Meeting: "Clinical Conundrums in ANCA-associated Vasculitis" (Review Course)	Speaker
2018	American College of Rheumatology Annual Meeting: "CARE Maintenance of Certification Session: Vasculitis"	Speaker
2019	The 19th International Vasculitis & ANCA Workshop: "Role of the Microbiome in Vasculitis"	Session moderator; summarizing speaker
2019	University of Oklahoma William K. Ishmael Lectureship "Update on Vasculitis"	Speaker
2019	American College of Rheumatology Annual Meeting: "Meet the Professor: Giant Cell Arteritis in 2019: Diagnosis & Management"	Speaker
2019	American College of Rheumatology Annual Meeting: "Clinical Application of the ACR/VF Guidelines for the Management of Granulomatosis with Polyangiitis and Microscopic Polyangiitis"	Speaker

2019	American College of Rheumatology Annual Meeting: "Clinical Application of the ACR/VF Guidelines for the Management of Takayasu Arteritis, Giant Cell Arteritis, and Polyarteritis Nodosa"	Speaker
2020	American College of Rheumatology Annual Meeting: "State of the Art: Treatment of ANCA-Associated Vasculitis in 2020"	Speaker
2021	University of Minnesota, Minneapolis, Rheumatology Citywide Research Conference	Invited speaker
2021	University of Minnesota, Minneapolis, Center for Women in Medicine and Science, Distinguished Women in Medicine and Science Visiting Scholar	Invited speaker

### **INVITED PRESENTATIONS - REGIONAL AND OTHER INVITED PRESENTATIONS (Selected)**

2006	UCSF Rheumatology Retreat, San Francisco, CA	Invited speaker
2008	Actemra Genetics Meeting, San Francisco, CA	Invited speaker
2008	Vasculitis Foundation, Northern California Chapter	Invited speaker
2008	University of Nebraska Medical Center, Omaha, NE	Invited speaker
2009	UCSF Institute of Human Genetics seminar, San Francisco, CA	Invited speaker
2010	University of Rochester, Rochester, NY	Medical Grand Rounds speaker
2010	Baylor College of Medicine, Houston, TX	Invited speaker
2012	Stanford Hospital and Clinics, Stanford, CA	Rheumatology Grand Rounds speaker
2012	San Francisco General Hospital, San Francisco, CA	Medical Grand Rounds speaker
2015	Vasculitis Foundation Patient and Family Conference, Stanford Hospital and Clinics, Stanford, CA	Invited speaker
2016	University of California, San Francisco, San Francisco, CA	Medical Grand Rounds speaker
2016	California Rheumatology Alliance Medical and Scientific Meeting, San Francisco, CA	Invited speaker
2017	Northwestern University Vasculitis Update, Chicago, IL	Invited speaker
2018	UCSF PREMIER Symposium	Invited speaker

2018	University of California, San Francisco-Fresno, Fresno, CA	ENgage Visiting Lecture speaker
2018	University of California, San Francisco-Fresno, Fresno, CA	Medical Grand Rounds speaker
2020	San Francisco Veterans Affairs Medical Center, San Francisco, CA	Medical Grand Rounds speaker
2021	University of California, San Francisco, San Francisco, CA	Rheumatology CPC presenter

### **CONTINUING EDUCATION AND PROFESSIONAL DEVELOPMENT ACTIVITIES**

2005-present UCSF Rheumatology Board Review (2005-2007, 2010-2017, 2018, 2020)

### **GOVERNMENT AND OTHER PROFESSIONAL SERVICE**

2010 - present	Vasculitis Foundation	Medical Consultant
2012 - present	Vasculitis Foundation	<i>ad hoc</i> Scientific Reviewer
2019 - 2020	Congressionally Directed Medical Research Programs	Scientific Reviewer
2021	U.S. Food and Drug Administration	Invited <i>ad hoc</i> member, Arthritis Advisory Committee

### **UNIVERSITY AND PUBLIC SERVICE**

#### **SERVICE ACTIVITIES SUMMARY**

UCSF Division of Rheumatology: Starting in 2019, I began coordinating the UCSF Rheumatology Grand Rounds Series with Dr. R. Krishna Chaganti. We identify, invite, and arrange speaker activities for both regional and national presenters participating in this monthly series. Topics covered in recent sessions include the role of the microbiome in the development of autoimmune disease, the treatment of auto-inflammatory diseases, quality improvement initiatives, and critical literature reviews.

For the UCSF Rheumatology Fellow Program, I provide teaching and mentoring for the rheumatology fellows. My teaching activities are primarily focused on educating trainees (fellows, residents, medical students, and visiting scholars) about the diagnosis, treatment, and management of systemic vasculitis in the core didactic series. I also interview candidates for the fellowship program, serve as a mentor for clinical case presentations and fellows' journal clubs, and provide career and research guidance.

Past service activities for the UCSF Division of Rheumatology have included planning the annual rheumatology retreat (2 years) and serving on the strategic planning committee.

University of California, San Francisco general academic community: Since 2018, I have served on the committee to select the Irene Perstein Award recipient. The Irene Perstein Award provides support to outstanding, junior woman scientists newly recruited to UCSF to

further advance women in research. In addition, I am a permanent reviewer and co-chair of the Clinical Sciences 1 review section of the Resource and Allocation Program, an intramural research program funding opportunities at UCSF. Lastly, I provide didactic lectures regarding the diagnosis, treatment, and management of vasculitis to other UCSF Departments and Divisions (e.g., Ophthalmology, Emergency Medicine, Allergy/Immunology) and field inquiries regarding vasculitis management from the general medical community.

### **UCSF CAMPUSWIDE**

2019 - present	Resource Allocation Program	Expert/Scientific Reviewer (Clinical Sciences-1); co-chair (starting 2021)
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### **SCHOOL OF MEDICINE**

2018 - present	UCSF Irene Perstein Award selection committee
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### **DEPARTMENTAL SERVICE**

2007 - present	Division of Rheumatology	Fellowship Candidate Interviewer
2012 - 2014	Division of Rheumatology	Strategic Planning Committee
2014 - 2016	Division of Rheumatology	Annual Retreat Planning Chair
2019 - present	Division of Rheumatology	Rheumatology Grand Rounds coordinator

### **COMMUNITY AND PUBLIC SERVICE**

2006 - 2011	Covenant Food Pantry, San Francisco, CA	Volunteer
2014 - 2014	The Cooking Channel. Interviewed and filmed for 2 episodes of "The Freshman Class" reality television program which aired Spring 2014.	Vasculitis Consultant
2019 - present	San Francisco Marin Food Bank	Volunteer, Driver (Pantry@Home)

## **CONTRIBUTIONS TO DIVERSITY**

### **CONTRIBUTIONS TO DIVERSITY**

The benefits of a diverse and inclusive community cannot be overemphasized. By empowering all the members our community, we develop a resilience and innovation. I am proud to support diversity and inclusion at UCSF in the following ways:

One group I am particularly honored to strengthen are women academic investigators. As a woman conducting translational and clinical research, I am aware of the challenges women face to succeed in academic research. Thus, I support the research and increase the visibility of women junior faculty by helping select the Irene Perstein Award recipient each year. This award provides unrestricted funding to the recipient to facilitate the development of their



independent research program. Recent recipients have been from smaller departments (e.g., Department of Family & Community Medicine) or departments where traditionally women are under-represented (e.g., Department of Surgery, Department of Otolaryngology).

As the core team leader for the American College of Rheumatology/Vasculitis Foundation Vasculitis Guidelines Committee, I had the opportunity to select the voting panel and expert panel members, as well as recommend individuals for the literature review team. I took this opportunity to nominate young faculty from diverse backgrounds to promote their exposure on the national level and increase the number and diversity vasculitis physicians in this country.

One of the glaring limitations of genomics research studies is that all too often, large studies focus only on individuals of European descent. It is critical that well-powered genomic studies are conducted across multiple racial/ethnic groups so that all individuals can potentially benefit from the insights gained by these studies. To help accomplish this, I help mentor the work of Cristina Lanata, a junior faculty member whose research focuses on identifying genomic risk factors of systemic lupus erythematosus in non-European populations. As an example, I helped her design and analyze one of the largest of genetic association studies of lupus nephritis in non-European populations.

As an interviewer for the UCSF Rheumatology Fellowship program, I also endeavor to broaden the diversity of the rheumatology workforce by supporting the applications of under-represented minorities to our fellowship program.

Lastly, I am undergoing training to become a Diversity, Equity, and Inclusion Champion at UCSF. This training will be completed in October 2021.

My goal with these efforts is to provide impactful support to under-represented groups in our community to acknowledge and amplify their voice.

## **TEACHING AND MENTORING**

### **TEACHING SUMMARY**

Since my area of clinical expertise is systemic vasculitis, I present core lectures discussing the diagnosis and management of systemic vasculitis for rheumatology fellows, medicine residents, and medical students in the UCSF Rheumatology Didactic Series and Internal Medicine noon conference series each year. In addition, I have provided didactic sessions discussing vasculitis for other departments/divisions at UCSF and other academic institutions in the local area (e.g., Stanford Hospital and Clinics). I also serve as the discussant for vasculitis cases presented at UCSF internal medicine conferences, such as the weekly "Morbidity and Mortality" conference. I am consultant for community rheumatologists, pulmonologists, and nephrologists and provide assistance in the management of their patients with vasculitis. To assist medical student teaching, I co-authored the Vasculitis Internet Learning Module and the Vasculitis Small Group Study cases for the Infection, Immunity, and Inflammation UCSF medical school course (2013-2016). I also have provided instruction in general rheumatology for the UCSF Internal Medicine Rheumatology Intern "Half-Day" each year as well as to other UCSF Departments and Divisions. Given my rigorous training in clinical and translational research methods, I also act as an informal mentor for rheumatology fellows and provide guidance regarding study design and biostatistical analysis. Lastly, since my appointment as a faculty member in July 2007, I have taught fellows and residents in both

the inpatient consult and outpatient rheumatology ambulatory care services. In 2020, I was selected to receive the Ira Goldstein Teaching Award by the UCSF rheumatology fellows.

### FORMAL TEACHING

Not UCSF	Academic Yr	Course No. & Title	Teaching Contribution	School	Class Size
	2006 - 2007	I3: Infection, Immunity, and Inflammation	Small Group Discussion Leader; one 3 hour session	Medicine	~20
	2007 - 2007	Biostat 212: Introduction to Statistical Computing in Research	Teaching Assistant; seven 4 hour sessions	Grad	29
	2007 - present	UCSF Rheumatology Didactic series	2-3 two hour lectures/year	Medicine	3-10
	2009 - 2016	I3: Infection, Immunity, and Inflammation	Small Group Discussion Leader; two 1 hour sessions/year	Medicine	10-20
	2012 - 2012	UCSF Cardiology Core Curriculum	1 lecture/year	Medicine	~10
X	2011 - 2012	Stanford Hospital and Clinics Rheumatology Core Curriculum	1 lecture/year	Medicine	~10
	2015 - present	UCSF Internal Medicine Core Curriculum: Vasculitis	1-2 lectures/year	Medicine	~30
	2015 - 2017	UCSF Department of Emergency Medicine Core Curriculum: Ask the Expert: Rheumatology	1 lecture/year	Medicine	~30
	2015 - present	UCSF Department of Medicine M & M conference	Case discussant; 1-2 cases/year	Medicine	~20
	2016 - 2017	UCSF Division of Pediatric Rheumatology Educational Conference	1 lecture/year	Medicine	~10

Not UCSF	Academic Yr	Course No. & Title	Teaching Contribution	School	Class Size
	2017 - present	UCSF Department of Pulmonary, Critical Care, Allergy and Sleep Medicine Allergy Core Lecture Series	1 lecture/year	Medicine	~10
	2018 - present	Pathogens and Host Defense	Small Group Discussion leader, one 2 hour session/year	Medicine	~20
	2018 - 2019	UCSF School of Medicine Bridges Foundations of Science	2 lectures/year	Medicine	
	2018 - present	UCSF Proctor Foundation	1 lecture/year	Medicine	~5-10
	2018 - present	UCSF Division of Nephrology Grand Rounds	Case/Literature Review discussant (1 session/year)	Medicine	15-20

### INFORMAL TEACHING

2007 - present Attending, Rheumatology inpatient consult service (1 month/yr)

2007 - present Attending, Rheumatology outpatient clinic (1-4 clinics/yr)

### PREDOCTORAL STUDENTS SUPERVISED OR MENTORED

Dates	Name	Program or School	Mentor Type	Role	Current Position
2015 - 2015	Milena Gonzalez	Arthritis Foundation Summer Student Intern	Project Mentor	Guided development of project and analysis of data	College student (Rensselaer Polytechnic Institute)

### POSTDOCTORAL FELLOWS AND RESIDENTS MENTORED

Dates	Name	Fellow	Mentor Role	Faculty Role	Current Position
2014 - 2015	Sarah Goglin	Rheumatology Fellow	Co-Mentor/Clinical Mentor	Clinical supervision of 1 clinic/week	Assistant Professor, UCSF

Dates	Name	Fellow	Mentor Role	Faculty Role	Current Position
2015 - 2017	Jessica Tsui	Pulmonary Fellow	Research Mentor, Career Mentor	Serving on multidisciplinary committee for research and career mentoring	Assistant Professor of Medicine, Oregon Health Sciences University

## RESEARCH AND CREATIVE ACTIVITIES

### RESEARCH AND CREATIVE ACTIVITIES SUMMARY

My current research activities focus on the following areas:

#### 1. Deciphering autoimmune diseases using integrative genomics

Genetic factors are recognized to contribute to the pathogenesis and prognosis of autoimmune and immune-mediated diseases such as systemic vasculitis and systemic lupus erythematosus (SLE). However, the identified genetic associations are modest, thus painting an incomplete picture of disease pathogenesis. As a consequence, current treatments are untargeted with substantial side effects and unable to cure disease.

My central goal is to examine how genomic factors—including genetic, epigenetic, transcriptional, and protein variation—independently and concurrently influence autoimmune and immune-mediated disease development and its manifestations. Understanding the interplay of these genomic factors facilitates the identification of immunologic pathways that contribute to disease pathogenesis and may be novel targets for more directed therapy.

Previous efforts in this area include leading genome-wide genetic and epigenetic association studies of SLE-related autoantibody production and lupus nephritis, as well as candidate gene and exome-wide sequencing studies in granulomatosis with polyangiitis. These studies have shown that genetic and epigenetic studies identify different biologic pathways that contribute to disease manifestations, and epigenetic variation contributes to the interferon signature observed in SLE.

Current efforts employ cutting-edge integrative analyses to concurrently analyze genetic variation with transcriptional variation (assessed via RNA-sequencing) to identify genomic profiles associated with cyclophosphamide response in lupus nephritis. Understanding molecular profiles associated with cyclophosphamide response will facilitate identification of those most likely to respond, and limit the toxicity associated with this potent immunosuppressive agent.

#### 2. Inducing tolerance to treat immune-mediated diseases

Starting in September 2016, I began serving as an Associate Director of Clinical and Translational Medicine for the Immune Tolerance Network (ITN). The ITN is an NIH-funded collaborative clinical trials consortium based, in part, at UCSF and investigates novel approaches to induce immune tolerance in allergy, autoimmune diseases, and solid organ transplantation. My primary role is to develop clinical trials utilizing innovative therapeutic

strategies to modulate the immune system, as well as mechanistic studies accompanying these trials to characterize the molecular, cellular, and serologic responses to therapy. As the clinical trial physician, am leading or developing the following clinical trials:

- ITN079AD ACTIVATE: Exposure to Vaginal Microbiome in C-section Infants at High-risk for Allergies – A Pilot Study: the goal of this study to assess how exposure to the vaginal microbiome in neonates delivered by Caesarean section alters allergic sensitization to food allergens and the development of immune responses at 12 months of age. This trial opened in March 2019.
- ITN080AI REBOOT: Efficacy of Belimumab and Rituximab Compared to Rituximab Alone for the Treatment of Primary Membranous Nephropathy--An Open-label Lead-in and Randomized, Placebo-controlled Trial: the goal of this Phase II study is to determine the efficacy of belimumab with rituximab at inducing a complete remission in patients with primary membranous nephropathy. This trial opened in December 2019.
- “ITN092AI CONTROL-RA: Combining a CD40L-Binding Protein with a TNF- $\alpha$  Inhibitor for the Treatment of Inadequately Controlled Rheumatoid Arthritis: the goal of this study is to determine if CD40L antagonism in conjunction with TNF- $\alpha$  inhibitor therapy improves clinical disease control in patients with moderately-to-highly active rheumatoid arthritis. This trial is currently in development

### 3. Clinical practice guideline development for systemic vasculitis

I am the core team leader for the American College of Rheumatology and Vasculitis Foundation's efforts to develop guidelines for the management of systemic vasculitis. Clinical management guidelines have never been developed by the ACR or VF for these diseases. I am leading the effort to develop guidelines using the GRADE approach (Grading of Recommendations Assessment, Development and Evaluation) for 7 different types of vasculitis: Takayasu arteritis, giant cell arteritis, polyarteritis nodosa, Kawasaki disease, granulomatosis with polyangiitis, microscopic polyangiitis, and eosinophilic granulomatosis with polyangiitis. This effort has been quite substantial--for example, the literature review screened 13,800 articles, with 1156 articles undergoing full review to be included in the evidence reports. Three guideline manuscripts and 5 systematic reviews have been published; an additional guideline manuscript and systematic review are under review.

### 4. Cohort studies in vasculitis

The Vasculitis Clinical Research Consortium (VCRC) is the largest network of vasculitis investigators in North America. As a clinical expert in vasculitis leading a dedicated Vasculitis Clinic, I am a member of this consortium. I recruit patients for the VCRC's genetic and other clinical studies. In addition, I created my own cohort of patients with ANCA associated vasculitis (VICTORe: Vasculitis Investigative Cohort for Translational Research) to facilitate genomic research studies of ANCA-associated vasculitis.

### RESEARCH AWARDS - CURRENT

1. UM1AI109565	Associate Director, Clinical and Translational Research	50 % effort	G. Nepom (PI)
NIH/NIAID		05/31/2014	01/31/2028
Immune Tolerance Network		\$ 26,500,000 direct/yr 1	

Immune Tolerance Network (ITN) investigates novel strategies for inducing immune tolerance as a treatment strategy for immune mediated diseases. The ITN aims to evaluate how cellular, genetic and immunologic mechanisms of immune-mediated diseases are altered in response to potentially tolerogenic therapy.

As an Associate Director of Clinical and Translational Research, I design, implement, and conduct the clinical trials and mechanistic studies of potentially toleragenic therapies for immune-mediated diseases.

## RESEARCH AWARDS - PAST

1. NIH Loan Repayment Program for Clinical Researchers	PI		Chung (PI)
NIH		07/01/2006	06/30/2008
Comprehensive analysis of the MHC contribution to autoantibody production in SLE		\$ 10,190 direct/yr 1	\$ 19,278 total
The goal of this study was to identify genetic variants within the major histocompatibility complex (MHC) associated with anti-dsDNA, anti-SSA, anti-SSB, anti-Sm, anti-RNP, and anticardiolipin autoantibody production among patients with systemic lupus erythematosus (SLE) using dense single nucleotide polymorphism genotyping followed by imputation in over 1,100 SLE cases.			
2. Physician Scientist Development Award	PI		Chung (PI)
American College of Rheumatology		07/01/2007	06/30/2010
Comprehensive analysis of the MHC contribution to autoantibody production in SLE		\$ 50,000 direct/yr 1	\$ 150,000 total
The goal of this study was to identify genetic variants within the major histocompatibility complex (MHC) associated with anti-dsDNA, anti-SSA, anti-SSB, anti-Sm, anti-RNP, and anticardiolipin autoantibody production among patients with systemic lupus erythematosus (SLE) using dense single nucleotide polymorphism genotyping followed by imputation in over 1,100 SLE cases.			
3. 8 KL2 TR000143-07	Clinical Research Scholar		Johnston (PI)
NCATS		09/30/2006	6/30/2016
Clinical and Translational Science Institute (CTSI)			\$ 3,540,391 total
The goal of the CTSI KL2 career development award is to increase the number and quality of clinical and translational investigators skilled at leading multidisciplinary research teams. My role is as a KL2 Scholar, for which I received salary support for 9 calendar months, plus research funds, each year for 4 years.			
4. Pilot Award for Junior Investigators in Clinical/Translational Sciences	PI		Chung (PI)

UCSF Resource Allocation Program	07/01/2011	06/30/2013
DNA methylation and disease activity in Wegener's granulomatosis	\$ 30,000 direct/yr 1	\$ 30,000 total

The major goal of this project is to identify changes in the methylation of DNA from peripheral blood cells associated with disease activity in granulomatosis with polyangiitis (Wegener's granulomatosis).

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5. Vasculitis Foundation Research Program Award	PI		Chung (PI)
Vasculitis Foundation		01/01/2012	12/31/2013
Exome sequencing in granulomatosis with polyangiitis		\$ 50,000 direct/yr 1	\$ 50,000 total

The major goal of this project is to sequence the exomes of up to 50 individuals with granulomatosis with polyangiitis in order to identify rare, novel protein-influencing genetic variants associated with disease susceptibility.

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6. 1K23AR063126	PI		Chung (PI)
NIAMS		07/01/2013	08/31/2016
Using genomics to elucidate the pathogenesis of granulomatosis with polyangiitis		\$ 100,000 direct/yr 1	\$ 500,000 total

The goal of this project is to identify genetic, epigenetic, and transcriptional factors associated with GPA disease susceptibility and activity using next generation sequencing and high-throughput methylation assessment.

I am the lead investigator on this project. I am responsible for the study design, generation of data, and data analysis, as well as manuscript preparation and publication.

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7. Funding Patient Cohorts Grant	PI		Chung (PI)
UCSF Department of Medicine		04/01/2013	04/01/2017
VICTORe: the Vasculitis Investigative Cohort for Translational Research		\$ 100,000 direct/yr 1	\$ 100,000 total

The goal of this study is to create and maintain a cohort of patients with vasculitis by longitudinally collecting biospecimens (cryopreserved peripheral blood mononuclear cells, serum, and DNA) as well as detailed clinical data including disease activity and manifestations.

I am the lead investigator for this cohort. I determine patient eligibility, collect the clinical data, and oversee sample utilization by other investigators.

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8. Irene Perstein Award	PI		Chung (PI)
UCSF School of Medicine		11/1/2014	10/31/2017
Genomic predictors of cyclophosphamide response		\$ 50,000 direct/yr 1	\$ 150,000 total

This award is provided by the UCSF School of Medicine to support a newly recruited early faculty woman clinician scientist. I am using this award to support a research project investigating the genetic, transcription, and proteomic factors that influence cyclophosphamide response when used to treat lupus nephritis.

I am the sole recipient of the award and the lead investigator for the project. I am responsible for the design and conduct of the study, its execution, data analysis, and manuscript publication.

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9. UCSF PREMIER RAP Pilot grant		Chung (PI)
UCSF PREMIER Center	7/2/2017	12/31/2018
Using integrative genomics to identify predictors of cyclophosphamide response	\$ 39,000 direct/yr 1	\$ 39,000 total

The goal of this study is to identify genetic and transcriptional profiles associated with response to cyclophosphamide for the treatment of lupus nephritis.

I am responsible for the study design, and oversee the generation of data and data analysis for this project.

## PEER REVIEWED PUBLICATIONS

- Hom G, Graham RR, Modrek B, Taylor KE, Ortmann W, Garnier S, Lee AT, **Chung SA**, Ferreira RC, Pant PV, Ballinger DG, Kosoy R, Demirci FY, Kamboh MI, Kao AH, Tian C, Gunnarsson I, Bengtsson AA, Rantapää-Dahlqvist S, Petri M, Manzi S, Seldin MF, Rönnblom L, Syvänen AC, Criswell LA, Gregersen PK, and Behrens TW. Association of systemic lupus erythematosus with C8orf13-BLK and ITGAM-ITGAX. *N Engl J Med* 2008; 358(9):900-9. Epub 2008 Jan 20. PMID: 18204098. Available at <http://www.nejm.org/doi/full/10.1056/NEJMoa0707865>.
- Taylor KE, Remmers EF, Lee AT, Wortmann WA, Plenge RM, Tian C, **Chung SA**, Nititham J, Hom G, Kao AH, Demirci FY, Kamboh MI, Petri M, Manzi S, Kastner DL, Seldin MF, Gregersen PK, Behrens TW, and Criswell LA. Specificity of the STAT4 genetic association for severe disease manifestations of systemic lupus erythematosus. *PLoS Genet* 2008; 4(5): e1000084. PMID: PMC2377340
- Liu K\* , Li QZ\*, Delgado-Vega AM\*, Abelson AK\*, Sánchez E\*, Kelly JA\*, Li L, Liu Y, Zhou H, Yan M, Ye Q, Liu S, Xie C, Zhou XJ, **Chung SA**, Pons-Estel B, Witte T, de Ramón E, Bae SC, Barizzone N, Sebastiani GD, Merrill JT, Gregersen PK, Gilkeson GG, Kimberly RP, Vyse TJ, Kim I, D'Alfonso S, Martin J, Harley JB, Criswell LA, Profile Study Group, Italian Collaborative Group, German Collaborative Group, Spanish Collaborative Group, Argentinian Collaborative Group, SLEGEM consortium, Wakeland EK, Alarcón-Riquelme ME, and Mohan C. Kallikrein genes are associated with lupus and glomerular basement membrane-specific antibody-induced nephritis in mice and humans. *J Clin Invest*. 2009; 119(4):911-23. PMID: PMC2662554  
\*co-lead authors
- Gateva V, Sandling JK, Hom G, Taylor KE, **Chung SA**, Sun X, Ortmann W, Kosoy R, Ferreira RC, Nordmark G, Gunnarsson I, Svenungsson E, Padyukov L, Sturfelt G, Jönsen A, Bengtsson AA, Rantapää-Dahlqvist S, Baechler EC, Brown EE, Alarcón GS, Edberg JC, Ramsey-Goldman R, McGwin G Jr, Reveille JD, Vilá LM, Kimberly RP, Manzi S, Petri MA, Lee A, Gregersen PK, Seldin MF, Rönnblom L, Criswell LA, Syvänen AC, Behrens TW, and Graham RR. A large-scale replication study identifies TNIP1, PRDM1, JAZF1,



- UHRF1BP1 and IL10 as risk loci for systemic lupus erythematosus. *Nat Genet.* 2009 Nov;41(11):1228-33. PMID: PMC2925843
5. Barcellos LF, May SL, Ramsay PP, Quach HL, Lane JA, Nititham J, Noble JA, Taylor KE, Quach DL, **Chung SA**, Kelly JA, Moser KL, Behrens TW, Seldin MF, Thomson G, Harley JB, Gaffney PM, and Criswell LA. High-density SNP screening of the major histocompatibility complex in systemic lupus erythematosus demonstrates strong evidence for independent susceptibility regions. *PLoS Genet.* 2009 Oct; 5(10):e1000696. PMID: PMC2758598
  6. **Chung SA**, Tian C, Taylor KE, Lee AT, Ortmann WA, Hom G, Graham RR, Nititham J, Kelly JA, Morrissey H, Wu H, Yin H, Alarcón-Riquelme ME, Tsao BP, Harley JB, Gaffney PM, Moser KL, Manzi S, Petri M, Gregersen PK, Langefeld CD, Behrens TW, Seldin MF, and Criswell LA. European population substructure is associated with mucocutaneous manifestations and autoantibody production in systemic lupus erythematosus. *Arthritis Rheum* 2009; 60(8):2448-2456. PMID: PMC2739103
  7. Richman IB, **Chung SA**, Taylor KE, Tian C, Nititham J, Rutman S, Petri M, Manzi SM, Gregersen PK, Seldin MF, and Criswell LA. European population substructure predicts disease phenotype among North Americans of European descent with systemic lupus erythematosus. *Genes Immun* 2010; 11(6):515-21. PMID: PMC3234215
  8. Taylor KE, **Chung SA**, Graham RR, Ortmann WA, Lee AT, Langefeld CD, Jacob CO, Kamboh MI, Alarcón-Riquelme ME, Tsao BP, Moser KL, Gaffney PM, Harley JB, Petri M, Manzi S, Gregersen PK, Behrens TW, and Criswell LA. Risk alleles for systemic lupus erythematosus in a large case-control collection and associations with clinical subphenotypes. *PLoS Genet* 2011; 7(2): e1001311. PMID: PMC3040652
  9. **Chung SA**, Taylor KE, Graham RR, Nititham J, Lee AT, Ortmann WA, Jacob CO, Alarcón-Riquelme ME, Tsao BP, Harley JB, Gaffney PM, Moser KL, SLEGEN, Petri M, Demirci FY, Kamboh MI, Manzi S, Gregersen PK, Langefeld CD, Behrens TW, and Criswell LA. Differential genetic associations for systemic lupus erythematosus based on anti-dsDNA autoantibody production. *PLoS Genet* 2011; 7(3): e1001323. PMID: PMC3048371
  10. Ramos PS, Criswell LA, Moser KL, Comeau ME, Williams AH, Pajewski NM, **Chung SA**, Graham RR, Zidovetzki R, Kelly JA, Kaufman KM, Jacob CO, Vyse TJ, Tsao BP, Kimberly RP, Gaffney PM, Alarcón-Riquelme ME, Harley JB, Langefeld CD; for The International Consortium on the Genetics of Systemic Erythematosus (SLEGEN). A comprehensive analysis of shared loci between systemic lupus erythematosus (SLE) and sixteen autoimmune diseases reveals limited genetic overlap. *PLoS Genet* 2011; 7(12):e1002406. PMID: PMC3234215
  11. Richman IB, Taylor KE, **Chung SA**, Trupin L, Petri M, Yelin E, Graham RR, Lee A, Behrens TW, Gregersen PK, Seldin MF, and Criswell LA. European genetic ancestry is associated with a decreased risk of lupus nephritis. *Arthritis Rheum* 2012; 64(10):3374-82. PMID: PMC3425721
  12. **Chung SA**, Xie G, Roshandel D, Sherva R, Edberg JC, Kravitz M, Dellaripa PF, Hoffman GS, Seo P, Specks U, Spiera RF, St.Clair EW, Stone JH, Plenge RM, Siminovitch KA, Merkel PA, and Monach PA. Meta-analysis in granulomatosis with polyangiitis reveals shared susceptibility loci with rheumatoid arthritis. *Arthritis Rheum* 2012; 64(10):3463-71. PMID: PMC3425721

13. Manjarrez-Orduño N, Marasco E, **Chung SA**, Katz MS, Kiridly JF, Simpfendorfer KR, Freudenberg J, Ballard DH, Nashi E, Hopkins TJ, Cunnigham Graham DS, Lee AT, Coenen MJ, Franke B, Swinkels DW, Graham RR, Kimberly RP, Gaffney PM, Vyse TJ, Behrens TW, Criswell LA, Diamond B, and Gregersen PK. CSK regulatory polymorphism is associated with systemic lupus erythematosus and influences B-cell signaling and activation. *Nat Genet* 2012; 44(11):1227-30. PMID: PMC3715052
14. Namjou B, Kim-Howard X, Sun C, Adler A, **Chung SA**, Kaufman KM, Kelly JA, Glenn SB, Guthridge JM, Scofield RH, Kimberly RP, Brown EE, Alarcón GS, Edberg JC, Kim J-H, Choi J, Ramsey-Goldman R, Petri MA, Reveille JD, Vilá LM, Boackle SA, Freedman BI, Tsao BP, Langefeld CD, Vyse TJ, Jacob CO, Pons-Estel B, on behalf of the Argentine Collaborative Group, Niewold TB, Sivils KLM, Merrill JT, Anaya J-M, Gilkeson GS, Gaffney PM, Bae S-C, Alarcón-Riquelme ME on behalf of the BIOLUPUS and GENLES networks, Harley JB, Criswell LA, James JA, Nath SK. PTPN22 association in systemic lupus erythematosus (SLE) with respect to individual ancestry and clinical sub-phenotypes. *PLoS One* 2013; 8(8):e69404. PMID: PMC3737240
15. Morris DL, Fernando MMA\*, Taylor KE\*, **Chung SA**, Nititham J, Alarcón-Riquelme ME, Barcellos LF, Behrens TW, Cotsapas C, Gaffney PM, Graham RR, Pons-Estel BA, Gregersen PD, Harley JB, Hauser SL, Hom G, Langefeld CD, Noble JA, Rioux JD, Seldin MF, SLEGEN, Vyse TJ, Criswell LA. MHC associations with clinical and autoantibody manifestations in European SLE. *Genes Immun* 2014 Mar 6. doi: 10.1038/gene.2014.6. [Epub ahead of print] PMID: 24598797  
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16. **Chung SA**, Brown EE, Williams AH, Ramos PS, Berthier CC, Bhangale T, Alarcon-Riquelme ME, Behrens TW, Criswell LA, Graham DC, Demirci FY, Edberg JC, Gaffney PM, Harley JB, Jacob CO, Kamboh MI, Kelly JA, Manzi S, Moser-Sivils KL, Russell LP, Petri M, Tsao BP, Vyse TJ, Zidovetzki R, Kretzler M, Kimberly RP, Freedman BI, Graham RR, Langefeld CD, for the International Consortium for Systemic Lupus Erythematosus Genetics (SLEGEN). Lupus Nephritis Susceptibility Loci in Women with Systemic Lupus Erythematosus. *J Am Soc Nephrol* 2014; 25(12):2859-70. PMID: PMC4243339
17. **Chung SA**, Nititham J, Elboudwarej E, Quach HL, Taylor KE, Barcellos LF, Criswell LA. Genome-wide assessment of differential methylation associated with autoantibody production in systemic lupus erythematosus. *PLoS One* 2015;10(7):e0129813. PMID: PMC4508022
18. Mok A, Solomon O, Nayak RR, Coit P, Quach HL, Nititham J, Sawalha AH, Barcellos LF, Criswell LA, **Chung SA**. Genome-wide profiling identifies associations between lupus nephritis and differential methylation of genes regulating tissue hypoxia and type 1 interferon responses. *Lupus Sci Med*. 2016; 3(1):e000183. PMID: 28074145. PMID: PMC5174796
19. 19. Merkel PA, Xie G, Monach PA, Ji X, Ciavatta DJ, Byun J, Pinder BD, Zhao A, Zhang J, Qian D, Ripke S, Pagnoux C, Carette S, **Chung SA**, Cuthbertson D, Davis, Jr. JC, Dellaripa PF, Forbess L, Gewurz-Singer O, Hoffman GS, Khalidi N, Koenig C, Langford CA, Mahr AD, McAlear C, Moreland L, Seo P, Specks U, Spiera RF, Sreih A, St. Clair EW, Stone JH, Ytterberg SR, Elder JT, Qu J, Ochi T, Hirano N, Edberg JC, Falk RJ, Amos CI, Siminovitch KA, for the Vasculitis Clinical Research Consortium. Identification of functional and expression polymorphisms associated with risk for anti-neutrophil cytoplasmic autoantibody-associated vasculitis. *Arthritis Rheumatol*. 2017; 69(5):1054-1066. doi: 10.1002/art.40034. PMID: PMC5434905

20. Tsui JL, Estrada OA, Deng Z, Wang KM, Law CS, Elicker BM, Jones KD, Dell SD, Gudmundsson G, Hansdottir S, Helfgott SM, Volpi S, Gattorno M, Waterfield MR, Chan AY, **Chung SA**, Ley B, Shum AK. Analysis of pulmonary features and treatment approaches in the COPA syndrome. *ERJ Open Res.* 2018 Apr; 4(2). PMID: 29977900. PMCID: PMC6019741
21. Lanata CM, Nititham J, Taylor KE, **Chung SA**, Torgerson DG, Seldin MF, Pons-Estel BA, Tusié-Luna T, Tsao BP, Morand EF, Alarcón-Riquelme ME, Criswell LA. Genetic contributions to lupus nephritis in a multi-ethnic cohort of systemic lupus erythematosus patients. *PLoS One.* 2018; 13(6):e0199003. PMID: 29953444. PMCID: PMC6023154
22. Lanata CM, **Chung SA**, Criswell LA. DNA methylation 101: what is important to know about DNA methylation and its role in SLE risk and disease heterogeneity. *Lupus Sci Med.* 2018; 5(1):e000285. PMID: 30094041. PMCID: PMC6069928
23. Minter DJ, Geha RM, Boslett BA, **Chung SA**, Ramani B, Manesh R. The Right Frame. *J Hosp Med.* 2019; 14(4):246-250. PMID: 30933677
24. Lanata CM, Paranjpe I, Nititham J, Taylor KE, Gianfrancesco M, Paranjpe M, Andrews S, **Chung SA**, Rhead B, Barcellos LF, Trupin L, Katz P, Dall'Era M, Yazdany J, Sirota M, Criswell LA. A phenotypic and genomics approach in a multi-ethnic cohort to subtype systemic lupus erythematosus. *Nat Commun.* 2019; 10(1):3902. PMID: 31467281. PMCID: PMC6715644
25. Schnappauf O, Sampaio Moura N, Aksentijevich I, Stoffels M, Ombrello AK, Hoffmann P, Barron K, Remmers EF, Hershfield M, Kelly SJ, Cuthbertson D, Carette S, **Chung SA**, Forbess L, Khalidi NA, Koenig CL, Langford CA, McAlear CA, Monach PA, Moreland L, Pagnoux C, Seo P, Springer JM, Sreih AG, Warrington KJ, Ytterberg SR, Kastner DL, Grayson PC, Merkel PA. Sequence-based screening of patients with idiopathic polyarteritis nodosa, granulomatosis with polyangiitis, and microscopic polyangiitis for deleterious genetic variants in ADA2. *Arthritis Rheumatol.* 2020 Oct 06. doi: 10.1002/art.41549. PMID: 33021335
26. Doubelt I, Cuthbertson D, Carette S, **Chung SA**, Forbess LJ, Khalidi NA, Koenig CL, Langford C, McAlear CA, Moreland LW, Monach PA, Seo P, Specks U, Spiera RF, Springer JM, Sreih AG, Warrington KJ, Merkel PA, Pagnoux C. Clinical Manifestations and Long-Term Outcomes of Eosinophilic Granulomatosis With Polyangiitis in North America. *ACR Open Rheumatol.* 2021 Jun;3(6):404-412. doi: 10.1002/acr2.11263. Epub 2021 May 25. PMID: 34032390. PMCID: PMC8207688.
27. Halabi C, Williams EK, Morshed RA, Caffarelli M, Anastasiou C, Tihan T, Cooke D, Abba AA, Dowd CF, Shah V, **Chung S**, Richie MB. Neurological manifestations of polyarteritis nodosa: a tour of the neuroaxis by case series. *BMC Neurol.* 2021 May 21;21(1):205. doi: 10.1186/s12883-021-02228-2. PMID: 34020612. PMCID: PMC8138997.
28. Springer JM, Kalot MA, Husainat NM, Byram KW, Dua AB, James KE, Chang Lin Y, Turgunbaev M, Villa-Forte A, Abril A, Langford CA, Maz M, **Chung SA**, Mustafa RA. Eosinophilic Granulomatosis with Polyangiitis: A Systematic Review and Meta-Analysis of Test Accuracy and Benefits and Harms of Common Treatments. *ACR Open Rheumatol.* 2021 Jan 29. *ACR Open Rheumatol* 2021 Jan 29. doi: 10.1002/acr2.11194. PMID: 33512787. PMCID: PMC7882521.
29. Lin YC, Kalot MA, Husainat NM, Byram K, Dua AB, James KE, Springer JM, Turgunbaev M, Villa-Forte A, Abril A, Langford C, Maz M, **Chung SA**, Mustafa RA. Polyarteritis Nodosa: A

Systematic Review of Test Accuracy and Benefits and Harms of Common Treatments. *ACR Open Rheumatol.* 2021 Jan 29. doi: 10.1002/acr2.11189. PMID: 33512781. PMCID: PMC7882539.

30. Dua AB, Kalot MA, Husainat NM, Byram K, Springer JM, James KE, Chang Lin Y, Turgunbaev M, Villa-Forte A, Abril A, Langford CA, Maz M, **Chung SA**, Mustafa RA. Takayasu Arteritis: a Systematic Review and Meta-Analysis of Test Accuracy and Benefits and Harms of Common Treatments. *ACR Open Rheumatol.* 2021 Jan 29. doi: 10.1002/acr2.11186. PMID: 33512784. PMCID: PMC7882531.
31. Springer JM, Kalot MA, Husainat NM, Byram KW, Dua AB, James KE, Chang Lin Y, Turgunbaev M, Villa-Forte A, Abril A, Langford C, Maz M, **Chung SA**, Mustafa RA. Granulomatosis With Polyangiitis and Microscopic Polyangiitis: A Systematic Review and Meta-Analysis of Benefits and Harms of Common Treatments. *ACR Open Rheumatol.* 2021 Mar;3(3):196-205. doi: 10.1002/acr2.11230. PMID: 33590973. PMCID: PMC7966881.
32. Dua AB, Husainat NM, Kalot MA, Byram K, Springer JM, James KE, Chang Lin Y, Turgunbaev M, Villa-Forte A, Abril A, Langford C, Maz M, **Chung SA**, Mustafa RA. Giant Cell Arteritis: A Systematic Review and Meta-Analysis of Test Accuracy and Benefits and Harms of Common Treatments. *ACR Open Rheumatol.* 2021 Apr 2. doi: 10.1002/acr2.11226. PMID: 33811481.
33. **Chung SA\***, Langford CA\*, Maz M, Abril A, Gorelik M, Guyatt G, Archer AM, Conn DL, Full KA, Grayson PC, Ibarra MF, Imundo LF, Kim S, Merkel PA, Rhee RL, Seo P, Stone JH, Sule S, Sundel RP, Vitobaldi OI, Warner A, Byram K, Dua AB, Husainat N, James KE, Kalot MA, Lin YC, Springer JM, Turgunbaev M, Villa-Forte A, Turner AS, Mustafa RA. 2021 American College of Rheumatology/Vasculitis Foundation Guideline for the Management of Antineutrophil Cytoplasmic Antibody-Associated Vasculitis. *Arthritis Rheumatol.* 2021 Jul 8;. doi: 10.1002/art.41773. [Epub ahead of print] PubMed PMID: 34235894.  
\* co-lead authors
34. **Chung SA\***, Gorelik M,\* Langford CA, Maz M, Abril A, Guyatt G, Archer AM, Conn DL, Full KA, Grayson PC, Ibarra MF, Imundo LF, Kim S, Merkel PA, Rhee RL, Seo P, Stone JH, Sule S, Sundel RP, Vitobaldi OI, Warner A, Byram K, Dua AB, Husainat N, James KE, Kalot M, Lin YC, Springer JM, Turgunbaev M, Villa-Forte A, Turner AS, Mustafa RA. 2021 American College of Rheumatology/Vasculitis Foundation Guideline for the Management of Polyarteritis Nodosa. *Arthritis Care Res (Hoboken).* 2021 Jul 8; doi: 10.1002/acr.24633. [Epub ahead of print] PMID: 34235889.  
\* co-lead authors
35. Maz M\*, **Chung SA\***, Abril A\*, Langford CA, Gorelik M, Guyatt G, Archer AM, Conn DL, Full KA, Grayson PC, Ibarra MF, Imundo LF, Kim S, Merkel PA, Rhee RL, Seo P, Stone JH, Sule S, Sundel RP, Vitobaldi OI, Warner A, Byram K, Dua AB, Husainat N, James KE, Kalot MA, Lin YC, Springer JM, Turgunbaev M, Villa-Forte A, Turner AS, Mustafa RA. 2021 American College of Rheumatology/Vasculitis Foundation Guideline for the Management of Giant Cell Arteritis and Takayasu Arteritis. *Arthritis Rheumatol.* 2021 Jul 8;. doi: 10.1002/art.41774. [Epub ahead of print] PMID: 34235884.  
\* co-lead authors
36. **Chung SA\***, Gorelik M\*, Langford CA, Maz M, Abril A, Guyatt G, Archer AM, Conn DL, Full KA, Grayson PC, Ibarra MF, Imundo LF, Kim S, Merkel PA, Rhee RL, Seo P, Stone JH,

Sule S, Sundel RP, Vitobaldi OI, Warner A, Byram K, Dua AB, Husainat N, James KE, Kalot M, Lin YC, Springer JM, Turgunbaev M, Villa-Forte A, Turner AS, Mustafa RA. 2021 American College of Rheumatology/Vasculitis Foundation Guideline for the Management of Polyarteritis Nodosa. *Arthritis Rheumatol*. 2021 Jul 8;. doi: 10.1002/art.41776. [Epub ahead of print] PMID: 34235883.

\* co-lead authors

37. **Chung SA\***, Langford CA\*, Maz M, Abril A, Gorelik M, Guyatt G, Archer AM, Conn DL, Full KA, Grayson PC, Ibarra MF, Imundo LF, Kim S, Merkel PA, Rhee RL, Seo P, Stone JH, Sule S, Sundel RP, Vitobaldi OI, Warner A, Byram K, Dua AB, Husainat N, James KE, Kalot MA, Lin YC, Springer JM, Turgunbaev M, Villa-Forte A, Turner AS, Mustafa RA. 2021 American College of Rheumatology/Vasculitis Foundation Guideline for the Management of Antineutrophil Cytoplasmic Antibody-Associated Vasculitis. *Arthritis Care Res (Hoboken)*. 2021 Jul 8;. doi: 10.1002/acr.24634. [Epub ahead of print] PMID: 34235880.

\* co-lead authors

38. Maz M\*, **Chung SA\***, Abril A\*, Langford CA, Gorelik M, Guyatt G, Archer AM, Conn DL, Full KA, Grayson PC, Ibarra MF, Imundo LF, Kim S, Merkel PA, Rhee RL, Seo P, Stone JH, Sule S, Sundel RP, Vitobaldi OI, Warner A, Byram K, Dua AB, Husainat N, James KE, Kalot MA, Lin YC, Springer JM, Turgunbaev M, Villa-Forte A, Turner AS, Mustafa RA. 2021 American College of Rheumatology/Vasculitis Foundation Guideline for the Management of Giant Cell Arteritis and Takayasu Arteritis. *Arthritis Care Res (Hoboken)*. 2021 Jul 8;. doi: 10.1002/acr.24632. [Epub ahead of print] PMID: 34235871.

\* co-lead authors

39. James KE, Kalot MA, Husainat NM, Dua AB, Byram K, Springer JM, Lin YC, Turgunbaev M, Villa-Forte A, Gorelik M, Abril A, Langford C, Maz M, **Chung SA**, Mustafa RA. Kawasaki Disease: A Systematic Review and Meta-Analysis of Benefits and Harms of Common Treatments. *ACR Open Rheumatol*. 2021 Jul 27. doi: 10.1002/acr2.11308. Epub ahead of print. PMID: 34313406.

## REVIEW ARTICLES

1. **Chung SA**, and Criswell LA. PTPN22: its role in SLE and autoimmunity. *Autoimmunity* 2007; 40(8):582-90. PMID: PMC2875134
2. **Chung SA**, and Seo P. Advances in the use of biologic agents for the treatment of systemic vasculitis. *Curr Opin Rheumatol* 2009; 21(1):3-9. PMID: PMC2921590
3. **Chung SA**, and Seo P. Microscopic polyangiitis. *Rheum Dis Clin North Am* 2010; 36(3):545-558. PMID: PMC2917831
4. Kriseman YL, Lee H, **Chung S**, and Josephson SA. A 67-year-old man with headaches, gait changes, and altered mental status. *Neurohospitalist*. 2013; 3(4):221-7. PMID: PMC3810831
5. Goglin S, and **Chung SA**. Current treatment of cryoglobulinemic vasculitis. *Curr Treat Options in Rheum* 2016; doi 10.1007/s40674-016-0048-5.
6. **Chung SA**, and Shum AK. Rare Variants, Autoimmune Disease, and Arthritis. *Curr Opin Rheumatol* 2016; 28(4):346–351.
7. Mandal J, and **Chung SA**. Primary Angiitis of the Central Nervous System. *Rheum Dis Clin N Am* 2017; 43(4):503-518.

## BOOKS AND CHAPTERS

1. **Chung SA**, Hsiao EC, and Klag MJ. "Hypertensive Urgency and Emergency." In The Osler Medical Handbook, 1<sup>st</sup> Edition. J Piccini and K Nilsson, Editors. Mosby: Philadelphia, Pennsylvania (2003).
2. **Chung SA** and Sack KE. "Imitators of Vasculitis." In Vasculitis, 3<sup>rd</sup> Edition. GV Ball and SL Bridges, Editors. Oxford University Press: Oxford, New York (2014).
3. Monach P and **Chung SA**. "ANCA-associated Vasculitis." In Kelley & Firestein's Textbook of Rheumatology, 10th edition. GS Firestein, RC Budd, SE Gabriel, IB McInnes, and JR O'Dell, Editors. Elsevier: Philadelphia, Pennsylvania (2017).
4. Lanata CM, Criswell LA, **Chung SA**. "Genetics & Genetic Testing in Rheumatology." In Current Diagnosis & Treatment: Rheumatology, 4<sup>th</sup> Edition. JH Stone, Editor. McGraw Hill: New York, New York (2021).

## SIGNIFICANT PUBLICATIONS

1. **Chung SA**, Taylor KE, Graham RR, Nititham J, Lee AT, Ortmann WA, Jacob CO, Alarcón-Riquelme ME, Tsao BP, Harley JB, Gaffney PM, Moser KL, SLEGEN, Petri M, Demirci FY, Kamboh MI, Manzi S, Gregersen PK, Langefeld CD, Behrens TW, and Criswell LA. Differential genetic associations for systemic lupus erythematosus based on anti-dsDNA autoantibody production. *PLoS Genet* 2011; 7(3): e1001323.PMCID: PMC3048371.

This genome-wide association study utilized single nucleotide polymorphism data from the 2 largest genome-wide association studies in systemic lupus erythematosus published at the time to identify genetic factors associated with anti-dsDNA autoantibody production. I found that genetic associations were stronger for anti-dsDNA autoantibody production than SLE itself, suggesting that many SLE susceptibility loci could be viewed as autoantibody propensity loci. This study was one of the largest studies to examine the genetic underpinnings of clinical heterogeneity in SLE. I designed the study, conducted the statistical analysis, and wrote the manuscript.

2. **Chung SA**, Xie G, Roshandel D, Sherva R, Edberg JC, Kravitz M, Dellaripa PF, Hoffman GS, Seo P, Specks U, Spiera RF, St.Clair EW, Stone JH, Plenge RM, Siminovitch KA, Merkel PA, Monach PA. Meta-analysis in granulomatosis with polyangiitis reveals shared susceptibility loci with rheumatoid arthritis. *Arthritis Rheum* 2012; 64(10):3463-71. PMCID:PMC3425721.

The goal of this study was to examine the association of previously identified autoimmune disease susceptibility loci with granulomatosis with polyangiitis (GPA), and to determine whether the genetic susceptibility profiles of other autoimmune diseases were associated with GPA. This study showed that a genetic risk score based on rheumatoid arthritis susceptibility genes was associated with the risk of GPA, indicating that GPA and rheumatoid arthritis may arise from a similar genetic predisposition. When published, this study was the largest genetic study of GPA to date. I designed and conducted the statistical analysis, and wrote the manuscript.

3. **Chung SA**, Brown EE, Williams AH, Ramos PS, Berthier CC, Bhangale T, Alarcon-Riquelme ME, Behrens TW, Criswell LA, Graham DC, Demirci FY, Edberg JC, Gaffney PM, Harley JB, Jacob CO, Kamboh MI, Kelly JA, Manzi S, Moser-Sivils KL, Russell LP, Petri M, Tsao BP, Vyse TJ, Zidovetzki R, Kretzler M, Kimberly RP, Freedman BI, Graham RR, Langefeld CD, for the International Consortium for Systemic Lupus Erythematosus Genetics (SLEGEN). Lupus Nephritis Susceptibility Loci in Women with Systemic Lupus Erythematosus. *J Am Soc Nephrol* 2014; 25(12):2859-70. PMID: PMC4243339.

This study was the first large scale genome-wide association study investigating lupus nephritis. Genetic data was meta-analyzed across three cohorts of patients to identify genetic variants contributing to the risk of lupus nephritis among women with systemic lupus erythematosus. Unlike other autoimmune manifestations, the strongest evidence for association was observed outside of the major histocompatibility complex and included markers localized to PDGFRA/GSX2 and SLC5A11. This study also contributed to the understanding of the genetic contribution to clinical heterogeneity in SLE. I conceived the hypothesis, oversaw and guided the statistical analysis, and co-wrote the manuscript.

4. **Chung SA**, Nititham J, Elboudwarej E, Quach HL, Taylor KE, Barcellos LF, Criswell LA. Genome-wide assessment of differential DNA methylation associated with autoantibody production in systemic lupus erythematosus. *PLoS One* 2015;10(7):e0129813. PMID: PMC4508022.

This study was the first to examine the association between DNA methylation and lupus-related autoantibody production in a genome-wide fashion. Using a discovery and replication study design, significant associations were identified and replicated between 16 CpG sites in 11 genes and lupus-related autoantibodies. The associated CpG sites were hypomethylated in autoantibody positive compared to autoantibody negative cases, and represented multiple biologic pathways that were not implicated in genetic association studies. This study showed that epigenetic mechanisms may also contribute to the clinical heterogeneity of autoimmune diseases. I conceived the hypothesis, designed the study, supervised the data analysis, and wrote the manuscript.

5. Mok A, Solomon O, Nayak RR, Coit P, Quach HL, Nititham J, Sawalha AH, Barcellos LF, Criswell LA, **Chung SA**. Genome-wide profiling identifies associations between lupus nephritis and differential methylation of genes regulating tissue hypoxia and type 1 interferon responses. *Lupus Sci Med*. 2016; 3(1):e000183. PMID: 28074145. PMID: PMC5174796.

The goal of this study was to identify differentially methylated CpG sites associated with nephritis among women with systemic lupus erythematosus. Associations for four sites in HIF3A, IFI44 and PRR4 were replicated in an independent data set. Notably, these associations were not driven by genetic variation within or around the differentially methylated regions. Similar to the DNA methylation in lupus-related autoantibody study discussed above, this study showed that differential DNA methylation may contribute to the clinical heterogeneity observed in systemic lupus erythematosus. I conceived the hypothesis, designed the study, supervised the data analysis, and wrote the manuscript.

6. **Chung SA\***, Langford CA\*, Maz M, Abril A, Gorelik M, Guyatt G, Archer AM, Conn DL, Full KA, Grayson PC, Ibarra MF, Imundo LF, Kim S, Merkel PA, Rhee RL, Seo P, Stone JH, Sule S, Sundel RP, Vitobaldi OI, Warner A, Byram K, Dua AB, Husainat N, James KE, Kalot MA, Lin YC, Springer JM, Turgunbaev M, Villa-Forte A, Turner AS, Mustafa RA. 2021 American College of Rheumatology/Vasculitis Foundation Guideline for the Management of Antineutrophil Cytoplasmic Antibody-Associated Vasculitis. *Arthritis Rheumatol.* 2021 Jul 8;. doi: 10.1002/art.41773. [Epub ahead of print] PubMed PMID: 34235894.

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The American College of Rheumatology and Vasculitis Foundation are developing management and treatment guidelines for seven different types of vasculitis: giant cell arteritis, Takayasu arteritis, polyarteritis nodosa, Kawasaki disease, granulomatosis with polyangiitis, microscopic polyangiitis, and eosinophilic granulomatosis with polyangiitis. As the principal investigator/core team leader for this project, I determined the scope of the project, guided the development of the clinical questions that directed the literature review, reviewed the evidence reports generated by the literature review, led the voting panel meetings that generated the recommendations, and have drafted the manuscripts presenting the recommendations. From this effort, three guideline manuscripts and 6 systemic reviews have been published. One additional manuscript (guideline for the management of Kawasaki disease) is under review. I am a lead author each of the guideline manuscript and am a contributing author for each of the systematic reviews arising from this effort.

#### **CONFERENCE ABSTRACTS (Selected)**

1. **Chung SA**, Edwards TL, Parsa A, Lum R, Taylor K, Seldin MF, Ritchie MD, and Criswell LA. Novel associations between angiotensinogen and ACE polymorphisms and SLE risk: results of a family-based analysis. *Arthritis Rheum* 2006; 54(9) (supplement): S290.
2. **Chung SA**, Pawlikowska L, Chu C, Oksenberg JR, Kwok P-Y, and Criswell LA. Investigating CD45 as a SLE susceptibility gene. *Arthritis Rheum* 2007; 56(9) (supplement): S838.
3. **Chung SA**, Taylor KE, Graham RR, Hom G, Ortmann WA, Lee AT, Seldin MF, Petri M, Manzi S, Gregersen PK, Behrens TW, and Criswell LA. Refining genome-wide association results for SLE according to anti-dsDNA autoantibody production. *Arthritis Rheum* 2008; 58(9) (supplement): S344.
4. **Chung SA**, Taylor KE, May SL, Ramsay PP, Quach HL, Lane JA, Nititham J, Noble JA, Quach DL, Kelly JA, Moser KL, Behrens TW, Seldin MF, Harley JB, Gaffney PM, Barcellos LF, and Criswell LA. Multiple independent major histocompatibility complex associations with nephritis and autoantibody production in systemic lupus erythematosus. *Arthritis Rheum* 2010; 62(10) (supplement): S210. Also presented at the 2010 Annual Meeting of the American Society for Human Genetics.
5. **Chung SA**, Taylor KE, Quach HL, Barcellos LF, and Criswell LA. Differential DNA methylation associated with anti-dsDNA autoantibody production in systemic lupus erythematosus. *Arthritis Rheum* 2011; 63(10) (supplement): S252. Also presented at the 2011 Annual Meeting of the American Society for Human Genetics.
6. **Chung SA\***, Brown EE\*, Williams AH, Bhangale T, Ramos P, Ziegler J, Freedman BI, Kimberly RP, Vyse TJ, Gregersen PK, Jacob CO, Alarcon-Riquelme ME, Tsao BP, Harley



JB, Behrens TW, Petri M, Demirci FY, Kamboh MI, Manzi S, Criswell LA, SLEGEN, Moser KL, Gaffney PM, Graham RR, and Langefeld CD. Lupus nephritis susceptibility markers in PDGFRFA-GSX2, SLC5A11, ID4, and HAS2-SNTB1 regions identified from a meta-analysis of genome-wide association studies of women with systemic lupus erythematosus. *Arthritis Rheum* 2011; 63(10) (supplement): S967.

\* co-lead authors

7. **Chung SA**, Nititham J, Elboudwarej E, Quach HL, Taylor KE, Barcellos LF, Criswell LA. Differential methylation of interferon-related genes is associated with anti-dsDNA autoantibody production in systemic lupus erythematosus. *Arthritis Rheum* 2013; 65(10) (supplement): S689.
8. Lanata C, Nayak R, Nititham J, Taylor K, Barcellos LF, **Chung SA**, Criswell LA. Residential Proximity to Highways, DNA Methylation and Systemic Lupus Erythematosus. *Arthritis Rheumatol.* 2015; 67 (suppl 10). <http://acrabstracts.org/abstract/residential-proximity-to-highways-dna-methylation-and-systemic-lupus-erythematosus/>. Accessed May 26, 2016.
9. Nayak R, **Chung SA**, Nititham J, Criswell LA. Differential DNA Methylation Associated with Lupus Nephritis Shows Enrichment in Genes Involved in Regulation of TH2 Differentiation and Renal Development. *Arthritis Rheumatol.* 2015; 67 (suppl 10). <http://acrabstracts.org/abstract/differential-dna-methylation-associated-with-lupus-nephritis-shows-enrichment-in-genes-involved-in-regulation-of-th2-differentiation-and-renal-development/>. Accessed May 26, 2016.
10. Mak ACY, Tang PLF, Xie G, Kwok PY, Monach PA, Carette S, Cuthbertson D, Hoffman GS, Khalidi NA, Koenig CL, Langford CA, McAlear CA, Moreland LW, Pagnoux C, Seo P, Specks U, Sreih AG, Ytterberg SR, Merkel PA, Siminovitch KA, **Chung SA**. Using exome sequencing to identify novel genetic associations with granulomatosis with polyangiitis susceptibility. *Arthritis Rheum* 2015; 67 (suppl 10). <http://acrabstracts.org/abstract/using-exome-sequencing-to-identify-novel-genetic-associations-with-granulomatosis-with-polyangiitis-susceptibility/>. Accessed November 19, 2015.
11. Schnappauf O, Stoffels M, Aksentijevich I, Kastner DL, Grayson PC, Cuthbertson D, Carette S, **Chung SA**, Forbess LJ, Khalidi NA, Koenig CL, Langford C, McAlear CA, Monach PA, Moreland LW, Pagnoux C, Seo P, Springer J, Sreih AG, Warrington KJ, Ytterberg SR, Merkel PA. Screening of Patients with Adult-Onset Idiopathic Polyarteritis Nodosa for Deficiency of Adenosine Deaminase 2. [abstract]. *Arthritis Rheumatol.* 2018; 70 (suppl 10). <https://acrabstracts.org/abstract/screening-of-patients-with-adult-onset-idiopathic-polyarteritis-nodosa-for-deficiency-of-adenosine-deaminase-2/>. Accessed October 16, 2018.
12. Ganesh R, Rychkov D, **Chung SA**, Sirota M. Leveraging Transcriptomics to Profile Response to Euro-Lupus Treatment Regimen Among Systemic Lupus Erythematosus Patients. American Medical Informatics Association Annual Meeting, 2019.
13. Lanata C, Nititham J, Taylor K, **Chung S**, Trupin L, Katz P, Dall'Era M, Yazdany J, Sirota M, Barcellos L, Criswell L. Longitudinal Blood DNA Methylation in a Multi-ethnic Cohort of SLE Patients [abstract]. *Arthritis Rheumatol.* 2020; 72 (suppl 10). <https://acrabstracts.org/abstract/longitudinal-blood-dna-methylation-in-a-multi-ethnic-cohort-of-sle-patients/>. Accessed August 2, 2021.
14. Solomon O, Lanata C, Adams C, Nititham J, Taylor K, **Chung S**, Pons-Estel B, Tusié-Luna T, Tsao B, Morand E, Alarcón-Riquelme M, Barcellos L, Criswell L. Local Genetic

Ancestry Associations with Clinical Features of Systemic Lupus Erythematosus [abstract]. *Arthritis Rheumatol.* 2020; 72 (suppl 10). <https://acrabstracts.org/abstract/local-genetic-ancestry-associations-with-clinical-features-of-systemic-lupus-erythematosus/>. Accessed August 2, 2021.

## **OTHER CREATIVE ACTIVITIES**

1. Co-author of the Rheumatology Primer for Department of Neurology Resident Curriculum handbook (4th edition). Contributed sections discussing systemic vasculitis, Behcet's Disease, and common autoantibodies used in the evaluation of rheumatic diseases.
2. Co-author of the Vasculitis Internet Learning Module and the Vasculitis Small Group Study cases for the Infection, Immunity, and Inflammation UCSF medical school course (2013-2017)
3. Clinical Trial Physician leading the clinical trial protocol "ITN079AD ACTIVATE: Exposure to Vaginal Microbiome in C-section Infants", [Clinicaltrials.gov NCT03567707](https://clinicaltrials.gov/ct2/show/study/NCT03567707).
4. Clinical Trial Physician leading the clinical trial protocol "ITN080AI REBOOT: Efficacy of Belimumab and Rituximab Compared to Rituximab Alone for the Treatment of Primary Membranous Nephropathy--An Open-label Lead-in and Randomized, Placebo-controlled Trial", [Clinicaltrials.gov NCT03949855](https://clinicaltrials.gov/ct2/show/study/NCT03949855).