Benaroya Research Institute
Virginia Mason Franciscan Health

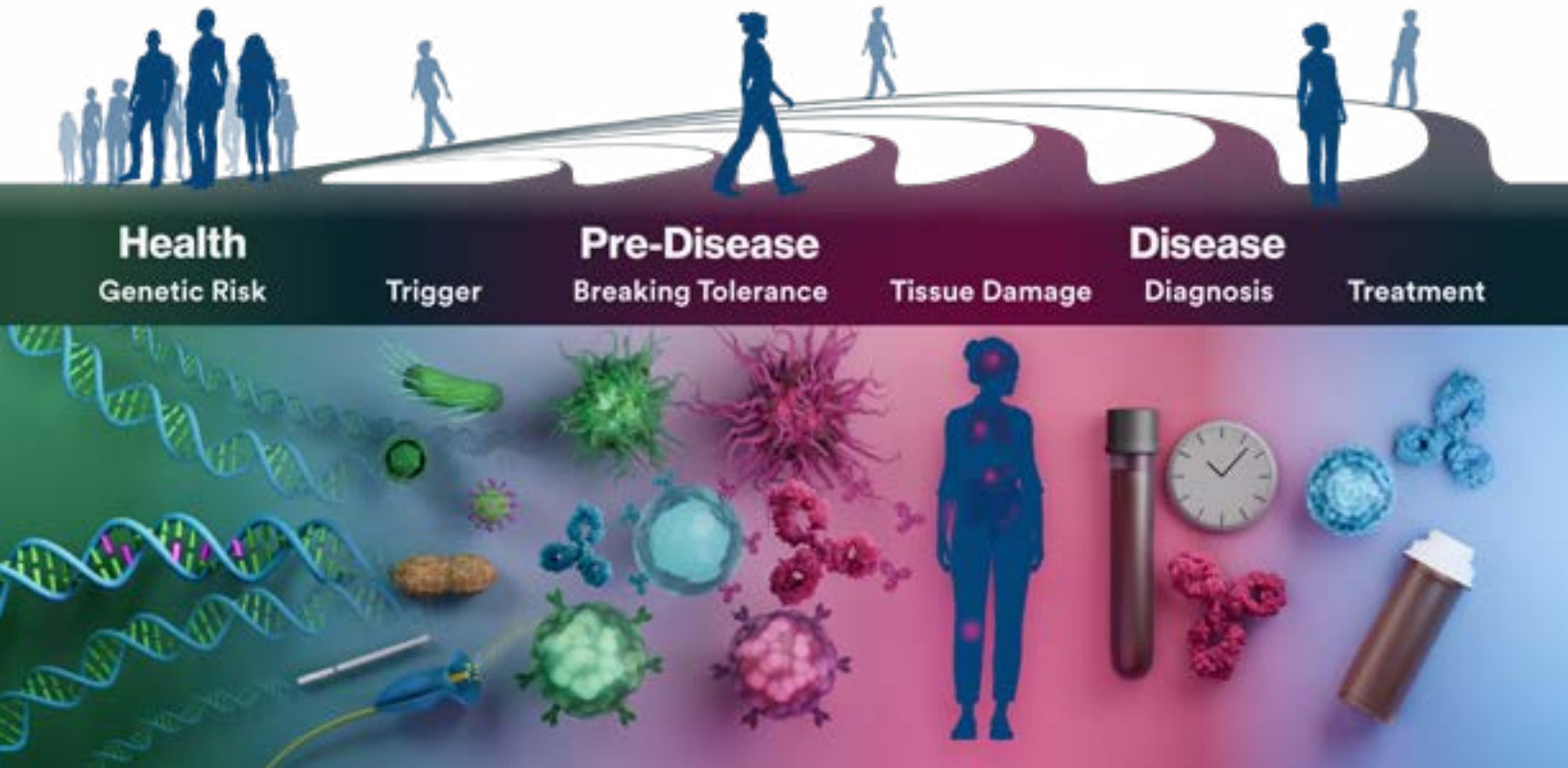
Cross-Autoimmunity Prevention Symposium

March 25-26, 2026

Bringing together researchers, clinicians, and people living with autoimmune disease to advance strategies for the prediction and prevention of autoimmunity

Funded by The Leona M. and Harry B. Helmsley Charitable Trust

Planning committee: Jane Buckner, MD, Carla Greenbaum, MD, and Cate Speake, PhD



thritis dermatomyositis autoimmune hemolytic anemia transverse myelitis
toimmune autonomic ganglionopathy autoimmune lymphoproliferative
ndrome juvenile myositis alopecia areata Guillain-Barré syndrome
ehcet's disease **ulcerative colitis** palindromic rheumatism autoimmune
olyglandular syndrome type 3 undifferentiated connective tissue disease
toimmune myelopathy thrombotic thrombocytopenic purpura Addison's
sease eosinophilic granulomatosis with polyangiitis sympathetic ophthalmia
quired hemophilia multifocal motor neuropathy autoimmune inner ear
sease Vogt-Koyanagi-Harada disease **type 1 diabetes** giant cell arteritis
anulomatosis with polyangiitis autoimmune pancreatitis autoimmune
patitis acute disseminated encephalomyelitis autoimmune polyglandular
ndrome type 2 Cogan's syndrome dermatitis herpetiformis polymyositis
roxysmal cold hemoglobinuria bullous pemphigoid rheumatic fever
yasthenia gravis chronic inflammatory demyelinating polyneuropathy reactive
thritis narcolepsy primary biliary cholangitis scleroderma autoimmune
phoritis immune thrombocytopenic purpura **multiple sclerosis** Takayasu's
teritis immune thrombocytopenic purpura autoimmune orchitis adult-onset
ill's disease antisynthetase syndrome sarcoidosis Sjögren's syndrome
toimmune retinopathy psoriasis Susac syndrome mixed connective
sue disease pemphigus Graves' disease IgA vasculitis stiff-person
ndrome Evans syndrome **lupus** polymyalgia rheumatica non-radiographic
ial spondyloarthritis pernicious anemia Raynaud's disease pyoderma
ngrenosum paroxysmal nocturnal hemoglobinuria IgG4-related sclerosing
sease antiphospholipid syndrome PANDAS syndrome IgA nephropathy
toimmune pulmonary alveolar proteinosis autoimmune diabetes insipidus
ergies cold agglutinin disease **rheumatoid arthritis** eosinophilic fasciitis
ti-MAG peripheral neuropathy neuromyelitis optica axonal and neuronal
uropathy Lambert-Eaton myasthenic syndrome autoimmune myocarditis
toimmune polyglandular syndrome type 1 relapsing polychondritis asthma
toimmune angioedema **Crohn's disease** eosinophilic granulomatosis with
lyangiitis ankylosing spondylitis paraneoplastic cerebellar degeneration anti-
BM disease autoimmune encephalitis celiac disease Hashimoto's
sease microscopic polyangiitis polyarteritis nodosa immune-mediated
crotizing myopathy juvenile idiopathic arthritis dermatomyositis autoimmune

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Virginia Mason Franciscan Health

Table of Contents

Program: Day One

7:30-8:15 a.m.	**Lobby: breakfast**
8:30-9 a.m.	**Auditorium: welcome**

Session one: prediction

9-9:15 a.m.	**Break: go to small groups**
9:15-10 a.m.	**Small group discussion** • Are there approaches to identify predictors in one disease that could be applied to others? • Are "standardized" approaches to validate predictive measures desirable/feasible? • Markers for a. Time-dependent progression b. Identification of active disease
10-10:15 a.m.	**Small group synthesis**
10:15-10:30 a.m.	**Break: go to auditorium**
10:30 a.m.-12 p.m.	**Auditorium: small group presentations and discussion**
12-1:15 p.m.	**1 North: lunch**

Session two: identifying populations for prevention

1:15-1:30 p.m.	**Auditorium: session two introduction**
1:30-1:45 p.m.	**Break: go to small groups**
1:45-2:30 p.m.	**Small group discussion** • What terminology should be used to describe risk? • Perceptions (how important and risk/benefit) of health care providers, planners, health systems, those with disease, and regulators regarding: a. Finding people at risk in different populations b. Intervention: How much risk over what time period?
2:30-2:45 p.m.	**Small group synthesis**
2:45-3 p.m.	**Break: go to auditorium**
3-4:15 p.m.	**Auditorium: small group presentations and discussion**
4:30-5:30 p.m.	**1 North: reception with BRI faculty**
6 p.m.	**Dinner** (Monsoon: 615 19th Ave. E, Seattle, WA 98112)

Program: Day Two

7:30-8:15 a.m.	**Lobby: breakfast**

Session three: trial designs

8:30-8:45 a.m.	**Auditorium: session three introduction**
8:45-9 a.m.	**Break: go to small groups**
9-9:45 a.m.	**Small group discussion** • How did entry/outcome criteria impact outcome of trial? • What types of trial designs are informative and what is essential info needed to do them? • How to address heterogeneity within disease?
9:45-10 a.m.	**Small group synthesis**
10-10:15 a.m.	**Break: go to auditorium**
10:15-11:30 a.m.	**Auditorium: small group presentations and discussion**
11:30-11:45 a.m.	**National Institutes of Health Office of Autoimmune Disease Research Update** Victoria Shanmugam, MBBS Director, Office of Autoimmune Disease Research National Institutes of Health
11:45 a.m.-1 p.m.	**1 North: lunch**

Session four: identifying synergies

1-1:15 p.m.	**Auditorium: session four introduction**
1:15-1:30 p.m.	**Break: go to small groups**
1:30-2:15 p.m.	**Small group discussion** • Is cross-autoimmunity screening feasible/desirable? • Is testing similar interventions and mechanisms of response cross-autoimmunity feasible/desirable? • Is cross-autoimmunity messaging feasible/desirable? • What other activities could benefit these diseases?
2:15-2:30 p.m.	**Small group synthesis**
2:30-2:45 p.m.	**Break: go to auditorium**
2:45-3:30 p.m.	**Auditorium: small group presentations and discussion**
3:45-5 p.m.	**Auditorium: next steps**
5:45 p.m.	**Dinner** (Tavolàta: 501 E Pike St., Seattle, WA 98122)

Small Groups

Day One: Session One — Prediction

Group A
Location: 4 South
Mod.: Cate Speake
Souwelimatou Amadou Amani
Bill Barry
Diane Kamen
Sun-Ho Lee
Kulveer Mankia
Alexandra Schwab
Anne Hocking

Group B
Location: Poll
Mod.: Carla Greenbaum
Kevin Deane
Jonas Halfvarson
Andrew Koval
Sharon Roman
Victoria Shanmugam
Helen Tremlett
Elizabeth Wethington
Sheila Scheiding

Group C
Location: 3 East
Mod.: Jane Buckner
Peter Achenbach
Jean-Frederic Colombel
Philip L. De Jager
N'Dea Johnson
David Karp
Samuel S. Wu
Rachael Ryner

Group D
Location: Robbins
Mod.: Judith James
Marie Falahee
Anne Koralova
Naila Makhani
Kimber Simmons
Sidney Smith
Ali Shojaie
Diane Wherrett
Olivia Doyle

Day One: Session Two — Populations

Group A
Location: Lobby
Mod.: Cate Speake
Peter Achenbach
Marie Falahee
Judith James
Sharon Roman
Helen Tremlett
Samuel S. Wu
Sheila Scheiding

Group B
Location: 3 South
Mod.: Carla Greenbaum
Jean-Frederic Colombel
N'Dea Johnson
Naila Makhani
Kulveer Mankia
Ali Shojaie
Souwelimatou Amadou Amani
Olivia Doyle

Group C
Location: 3 East
Mod.: Jane Buckner
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Anne Koralova
Andrew Koval
Sun-Ho Lee
Alexandra Schwab
Kimber Simmons
Sidney Smith
Anne Hocking

Group D
Location: Robbins
Mod.: Diane Wherrett
Bill Barry
Philip L. De Jager
Kevin Deane
Jonas Halfvarson
David Karp
Victoria Shanmugam
Elizabeth Wethington
Rachael Ryner

Small Groups

Day Two: Session Three — Trials

Group A
Location: 3 South
Mod.: Cate Speake
Kevin Deane
Jonas Halfvarson
N'Dea Johnson
Andrew Koval
Victoria Shanmugam
Kimber Simmons
Olivia Doyle

Group B
Location: Poll
Mod.: Carla Greenbaum
Bill Barry
Philip L. De Jager
Marie Falahee
Diane Kamen
Anne Koralova
Sun-Ho Lee
Sharon Roman
Rachael Ryner

Group C
Location: 3 East
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Sheila Scheiding

Group D
Location: Robbins
Mod.: Diane Wherrett
Jean-Frederic Colombel
David Karp
Naila Makhani
Kulveer Mankia
Sidney Smith
Samuel S. Wu
Anne Hocking

Day Two: Session Four — Synergies

Group A
Location: Poll
Mod.: Diane Kamen
Souwelimatou Amadou Amani
Marie Falahee
Andrew Koval
Sun-Ho Lee
Helen Tremlett
Elizabeth Wethington
Diane Wherrett
Sheila Scheiding

Group B
Location: Robbins
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Group D
Location: 4 South
Mod.: Cate Speake
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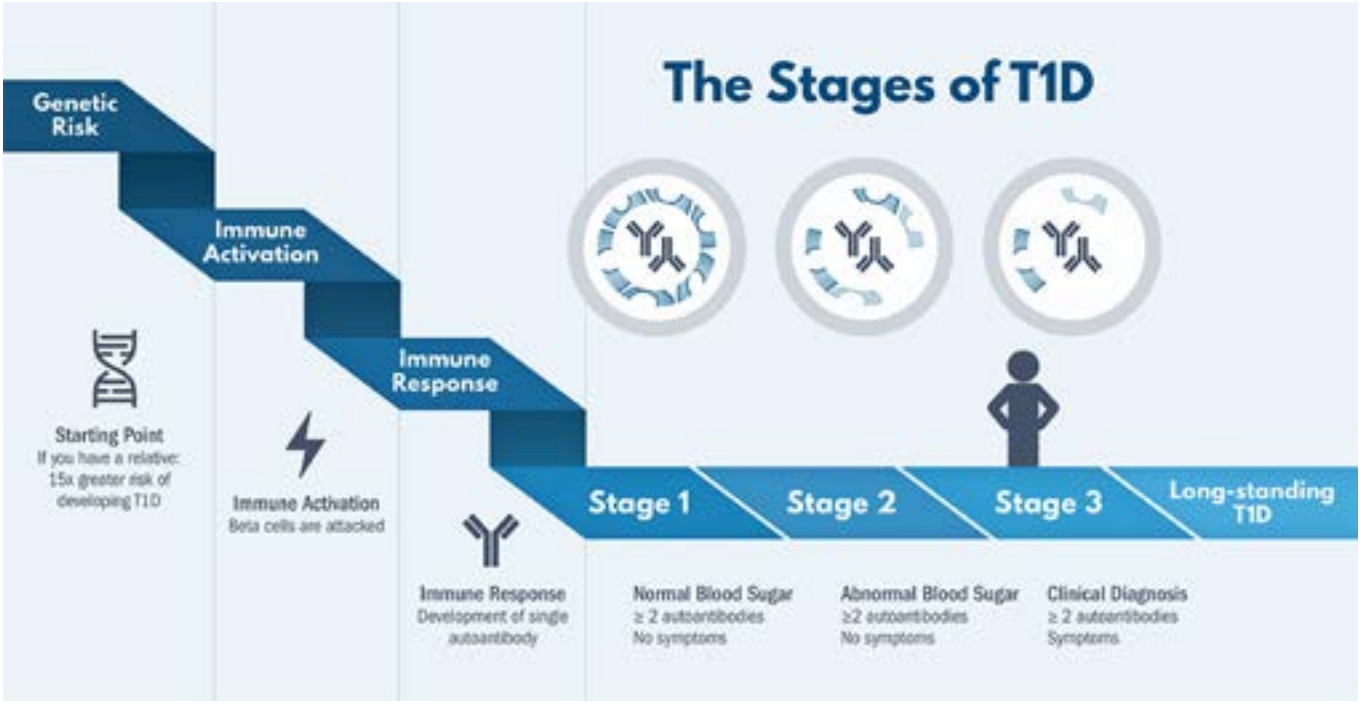
Alexandra Schwab
Ali Shojaie
Rachael Ryner

Type 1 Diabetes
Multiple Sclerosis
Rheumatoid Arthritis
Inflammatory Bowel Disease
Systemic Lupus Erythematosus
Biostatistician
Patient
NIH or Program Officer

Disease Progression

Type 1 Diabetes

Type 1 diabetes (T1D) results when the immune system attacks and destroys the beta cells in the pancreas, which produce insulin. When there is not enough insulin, blood sugar becomes dysregulated (dysglycemia) and rises and symptoms develop, such as excessive thirst, excessive urination and weight loss. T1D requires lifelong insulin and blood sugar monitoring. Individuals with two or more T1D-specific autoantibodies will inevitably develop symptomatic disease. T1D affects about 8.5 million people worldwide, about 20% of them being 19 years or younger.

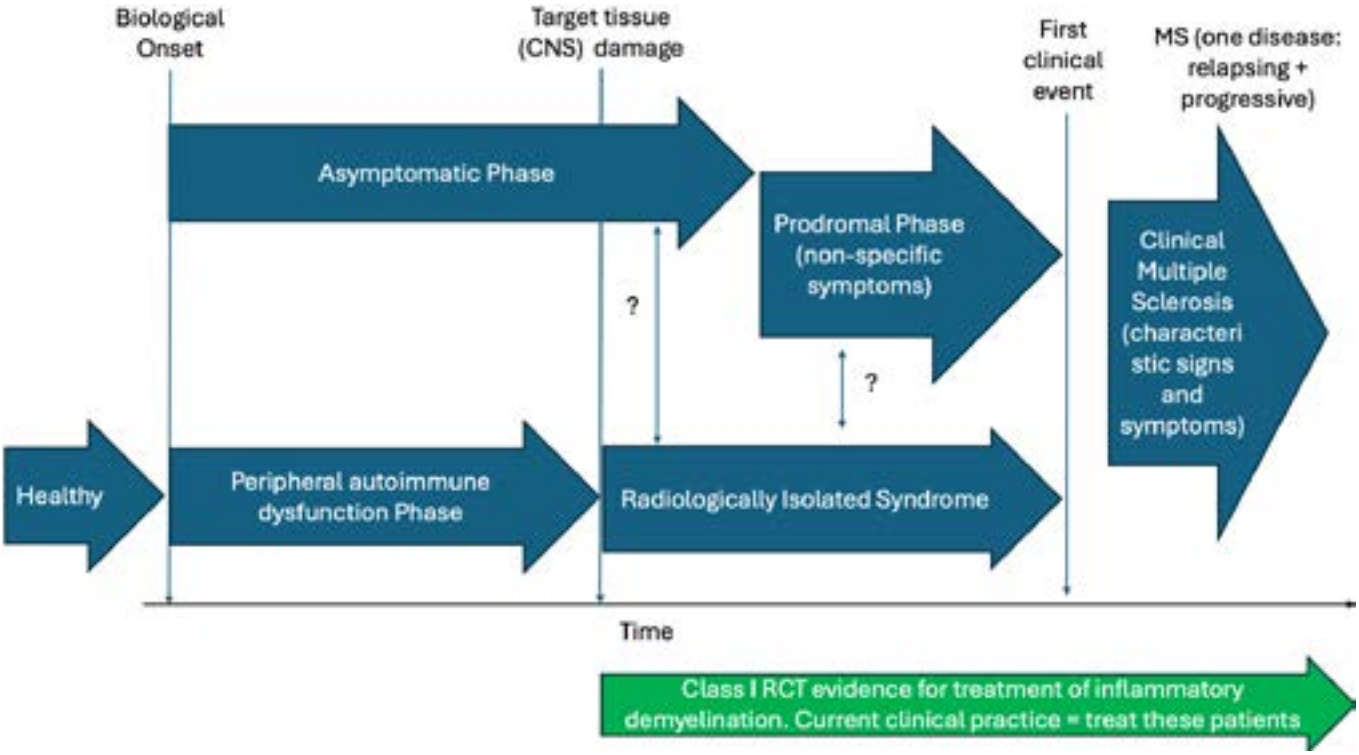


T1D starts with a genetic predisposition, meaning there are certain genes that put you at higher risk. Everyone who develops T1D has these genes, including people with no family history of T1D. In stage one, individuals test positive for two or more diabetes-related autoantibodies. The immune system has started attacking insulin-making beta cells. Blood sugar levels remain normal and no symptoms are present. In stage two, individuals have two or more diabetes-related autoantibodies, but now blood sugar levels have become abnormal. This is due to an increased loss of beta cells. Still, there are often no symptoms. In stage three, T1D symptoms are present due to significant beta cell loss. Some people are diagnosed with T1D when they are hospitalized with diabetic ketoacidosis, a serious and potentially life-threatening condition.

Type 1 Diabetes TrialNet. https://www.trialnet.org.

Multiple Sclerosis

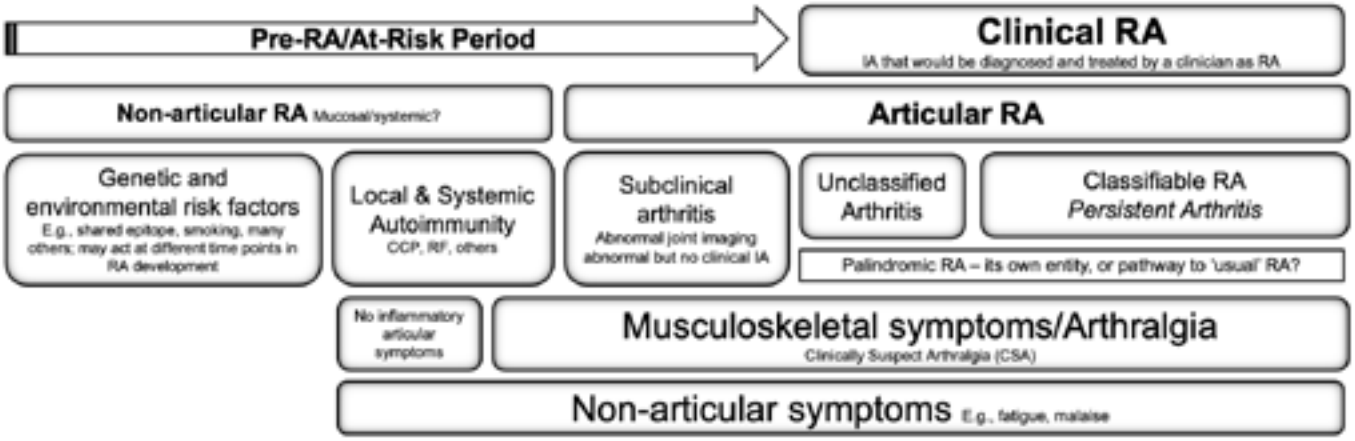
Multiple sclerosis (MS) is an autoimmune disease in which the body's immune system attacks myelin, the fatty sheath that surrounds and protects the nerve fibers in the central nervous system. Signs and symptoms of MS include numbness, fatigue, dizziness, paralysis and loss of vision. For some individuals, MS is progressive, with symptoms getting worse over time. Other people have relapsing-remitting MS, which means they have periods where their symptoms get worse and then improve. MS affects about 1.8 million people worldwide and is most common in young adults and females.



The development of MS generally begins with an asymptomatic phase, where autoimmune dysfunction begins in the periphery. This advances to central nervous system tissue damage, from which white matter lesions may be detected and patients are then classified with radiologically isolated syndrome (RIS). This suggests a prodromal phase, with about 50% of patients going on to develop MS. Current clinical practice begins to treat these RIS and prodromal patients for inflammatory demyelination. After the first clinical event, patients are classified with clinical MS and treatment continues for inflammatory demyelination.

Rheumatoid Arthritis

In rheumatoid arthritis (RA), the immune system mistakenly attacks the synovium, the membrane that lines the joints, which causes fluid buildup and results in inflammation and pain in the joints. Most people with RA experience intermittent periods of intense disease activity punctuated by periods of fewer symptoms or even remission. Over time, RA damages cartilage, bones and ligaments, and can lead to deformity of the joints and loss of mobility. RA can also affect the skin, eyes, lungs, heart and blood vessels. RA affects about 18 million people worldwide. 70% of those living with RA are female and 55% are over the age of 55.



The Natural History of Rheumatoid Arthritis.

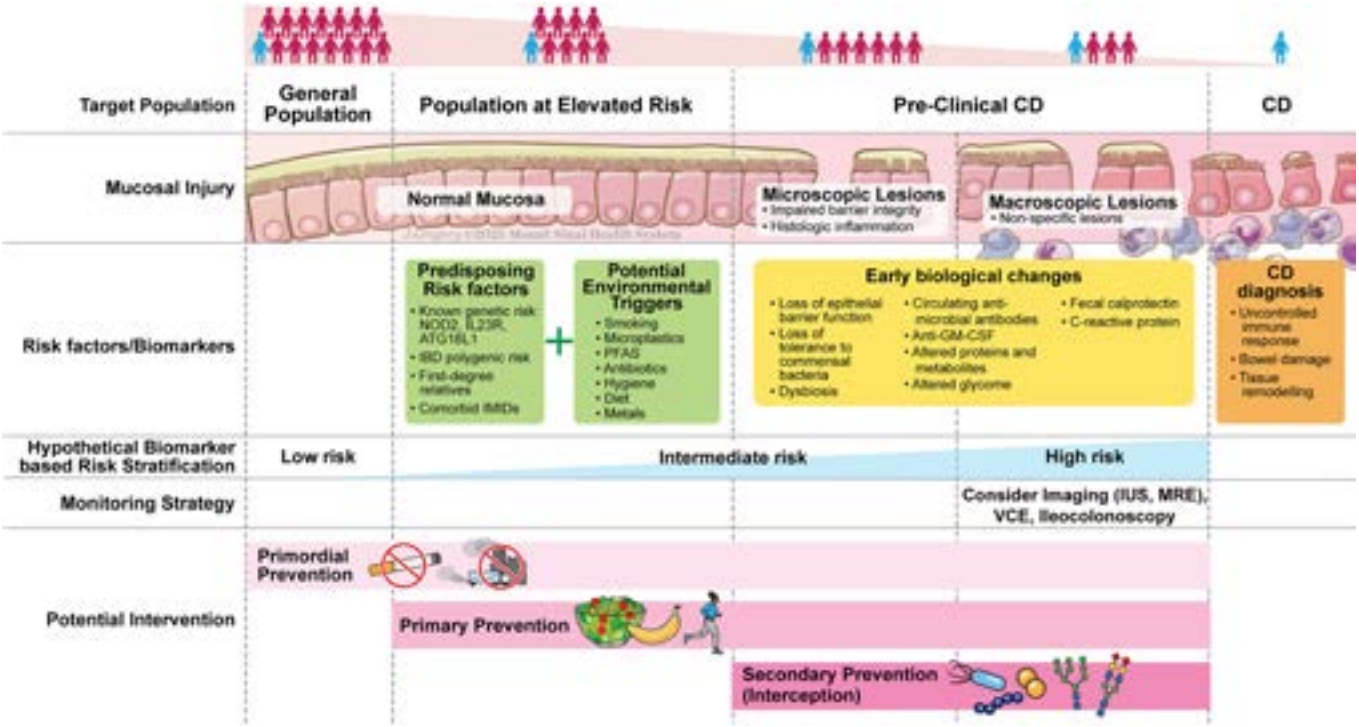
Abbreviations/definitions: CCP=cyclic citrullinated peptide antibody; Clinical RA=presence on physical examination of >=1 swollen joint consistent with synovitis; RA=rheumatoid arthritis; RF=rheumatoid factor.

The natural history of RA starts with an at-risk, pre-RA period that advances to clinical RA, with the presence of at least one swollen joint consistent with synovitis (inflammation of the synovial membrane lining joints). Genetic and environmental factors can put you at higher risk at different time points in RA development. Along with non-articular RA (musculoskeletal inflammation and/or pain in tissues outside of the joint), these factors can underlie the pre-RA period, suggesting a development of local and systemic autoimmunity with or without symptoms. The factors of clinical RA then develop from this period, including articular RA which can be further subdivided into subclinical arthritis, unclassified arthritis, palindromic RA (recurring arthritis flares), and classifiable RA (persistent arthritis). Musculoskeletal symptoms and arthralgia are more common during this period.

O'Neil et al. **Rheumatoid Arthritis: The Continuum of Disease and Strategies for Prediction, Early Intervention, and Prevention.** J Rheumatol. 2024 Apr 1;51(4):337-349.

Inflammatory Bowel Disease

Inflammatory Bowel Diseases (IBDs) are disorders that cause chronic inflammation, pain and bleeding in the digestive tract. Crohn's disease (CD) and ulcerative colitis (UC) are the most common forms of IBD. Both occur when the immune system mistakenly attacks the gut and can cause abdominal pain, constipation and diarrhea. CD most commonly occurs in the lining of the last part of the small intestine or the beginning of the large intestine. UC causes inflammation and ulcers in the large intestine and affects the mucosa, the innermost layer of the intestinal lining. IBD affects about 3 million people in the United States.

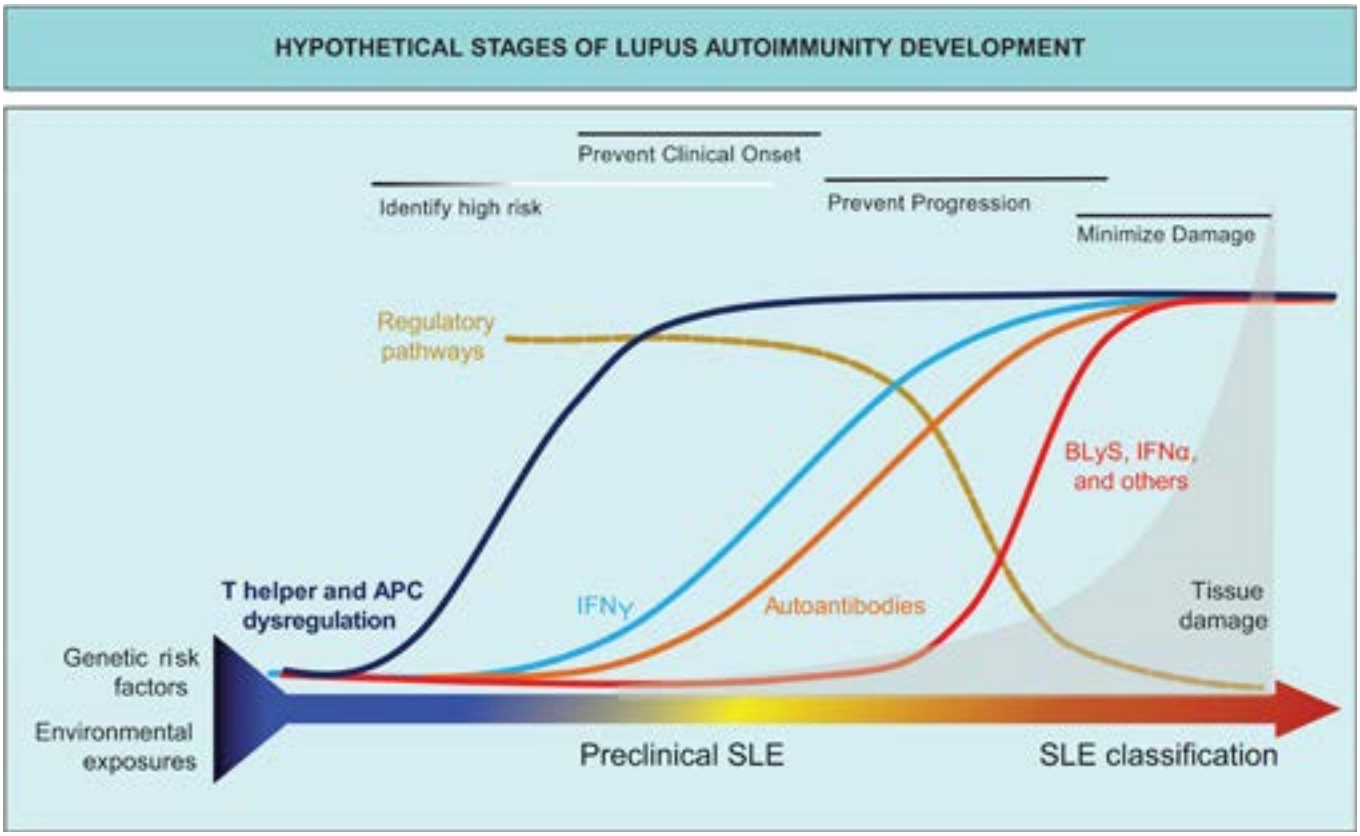


Conceptual stages in development of CD, with defining features and proposed management. Strategies for risk stratification, monitoring and intervention are hypothetical and require further evidence. Primordial prevention targets risk factor determinants in the general population; primary prevention aims to reduce disease initiation by intervening on individual risk factors; secondary prevention (interception) aims to prevent progression of disease in those with early biological changes.

Lee SH, Lopes EW, Khalili H, Croitoru K, Colombel JF, Peter I; 2025 PROMISE Workshop participants. **Prediction and Prevention of Inflammatory Bowel Disease: A Call to Action.** Gastroenterology. 2026 Feb;170(2):233-239.

Systemic Lupus Erythematosus

Systemic lupus erythematosus (SLE) is the most common form of lupus. SLE is a complex autoimmune disease caused by immune cells that attack healthy tissues, causing widespread inflammation and damage to organs such as the skin, joints, kidneys, brain and lungs. SLE can cause inflammation and low blood cell counts and results in skin rash, fatigue, joint pain, kidney disease, chest pain, headaches, confusion and bleeding problems. Symptoms often go through cycles of being very active and then relatively dormant. In intense and complex forms, lupus can cause significant disability and even death. Lupus affects about 5 million people worldwide, and 90% of people living with lupus are women.



Hypothesis model of preclinical SLE pathogenesis: Genetic predisposition affects apoptotic clearance, antigen presentation and lymphocyte responses, contributing to the appearance of autoreactive cells and dysregulation of T helper-type cytokines, providing further co-stimulatory signals for the expansion of autoreactive cells and potentiating the accrual of lupus-associated autoantibodies. Immune dysregulation results in tissue damage and further exposure to intracellular autoantigens, which result in hyperactivation of innate immune cells, leading to further dysregulation of soluble mediators that contribute to enhanced apoptosis and intracellular autoantigen exposure, perpetuating the cycle of autoimmunity.

Lu R, Munroe ME, Guthridge JM, et al. **Dysregulation of Innate and Adaptive Serum Mediators Precedes Systemic Lupus Erythematosus Classification and Improves Prognostic Accuracy of Autoantibodies.** J Autoimmun. 2016;74:182-93.

At-a-Glance Tables

Epidemiology

Disease	Incidence per Year (Varies Around the World)	Prevalence	Sex Ratio (M:F)	Percent With FDR	Age Onset Distribution (Years)
T1D	U.S. and Canada: 0.3% <20 years	U.S.: ~2 million World: 8.42 million	1:1 (adults: M > F)	10-15%	Median: 29 Peak: 10-14 ~50% diagnosed as adults
MS	U.S. and Canada: 0.01% (lower in pediatric population)	U.S.: nearly 1 million World: ~3 million	1:3	15-20%	Majority: ~20-50 Median: ~35
RA	U.S. and Europe: 0.23-0.4%	U.S.: 1.3-1.5 million Europe: ~2 million	1:2-3	Up to 10%	Females: 30-60 Males: >45
CD	0.1-0.2%	U.S.: 1 million Europe: 2.2 million	1:1	1-5%	Peak: 15-35
UC	0.2-0.3%	U.S.: 1.4 million Europe: 3 million	1:1	1-5%	Peak: 20-40
SLE	0.005-0.012% Black female: 0.016% Global: 0.005%	U.S.: 200,000-300,000 Global: 3.4 million	80-90% adult onset: 1:10 10-20% child onset: 1:6	1.6-3.9% (sibling relative risk: 23.7%)	Peak: ~15-44 Mean: 39.3 ± 16

Abbreviations: CD = Crohn's disease, FDR = first-degree relative, MS = multiple sclerosis, RA = rheumatoid arthritis, SLE = system lupus erythematosus, T1D = type 1 diabetes, UC = ulcerative colitis

Genetics

Disease	Genetic Contribution	Odds Ratio Highest Risk	Risk Among First-Degree Relatives (FDRs)	Predictive Value
T1D	40-50%	DR3/4: ~17	3-8% 25% with two FDRs	Associated with development of AABs, not with progression from multiple AABs to diagnosis
MS	~10% explained by genetics 48% explained by heritability	DR1501: 2.06	2-3%	Associated with clinical diagnosis for PPMS, RRMS and SPMS
RA	40-50%	HLA-DRB1: the shared epitope	3-5x higher risk (higher in Native Americans)	Associated with disease susceptibility, increased disease severity, and risk of developing extra-articular manifestations
CD	13.6% explained by genetics 78% explained by heritability	NOD2 (R702W, G908R, 1007fs) for Caucasians: heterozygous — 2-3, homo/compound heterozygous — 17-20	Not yet known	Not yet known
UC	7.5% of variance explained by genetics 57% explained by heritability	HLA class II (DRB1): ~1.5-2	Not yet known	Not yet known
SLE	~66% — 200+ GWAS loci	HLA B8-DR3 haplotype in Europeans: OR — 2.8	2-8%	Associated with AABs (e.g., ANA)

Abbreviations: AAB = autoantibody, ANA = anti-nuclear antibody, CD = Crohn's disease, FDR = first-degree relative, MS = multiple sclerosis, PPMS = primary progressive multiple sclerosis, RA = rheumatoid arthritis, RRMS = relapsing-remitting multiple sclerosis, SLE = system lupus erythematosus, SPMS = secondary progressive multiple sclerosis, T1D = type 1 diabetes, UC = ulcerative colitis

Biomarkers

Disease	Marker	Predictive Value	Validation/ Standardization	Robustness
T1D	AABs: GAD, IAA, IA2, ZnT8, ICA	>1 AAB: all develop clinical T1D 1 AAB: higher frequency of progression in children	Multiple assays — not all have been validated (e.g., dried blood spots)	+++++ Highly robust for multiple AABs regardless of first-degree relative
MS	GZMA	Not clear	Different assays including Olink	++
	MOG	Not clear	Not standardized	+
	Serum neurofilament light	~6-9 years pre-MS onset: predictive value unknown	Standardized	+
	Activated immune signature (PBMC RNA profile)	Not tested in prediction	Validation within one study External validation ongoing	++ (in progress)
	Epstein-Barr virus nuclear antigen (Anti-EBNA1)	OR 1.7	Yes	+++++
RA	Anti-CCP level	Very strong: <10% risk — low anti-CCP with minimal symptoms of RA; 50% risk — high anti-CCP with “inflammatory” symptoms	Yes — multiple separate cohorts	+++++
	Anti-CCP + RF	Very strong: equivalent to having high anti-CCP level	Yes — multiple cohorts Used as eligibility criteria in randomized controlled trials	+++++
CD	GEM integrated risk model (FC + LMR + fecal microbiome + demographics)	Top decile shows cumulative incidence of 8% at 5 years and 14% at 9 years among Crohn’s disease FDRs	Internal validation in test set of the GEM cohort Development and validation of a serum-based risk is underway	+
UC	Anti-integrin AAB: avβ6	Unknown	Validation in nested case-control (general population and FDRs), but no standardization	+

Biomarkers

Disease	Marker	Predictive Value	Validation/ Standardization	Robustness
SLE	Lupus-specific AABs: e.g., anti-dsDNA, anti-Sm	>1 AAB (more moderate to high): 30-40% develop SLE	Multiple retrospective and nested case-control	+++
	Elevated levels of select cytokines, chemokines, soluble receptors (e.g., IFN act/sig, BLyS, IP-10, SCF)	Lupus AAB + soluble mediator elevation: >60% risk	No large-scale population studies to assess specificity	

Abbreviations: AAB = autoantibody, CCP = cyclic citrullinated peptide, CD = Crohn's disease, dsDNA = double-stranded DNA, FC = fecal calprotectin, FDR = first-degree relative, GEM = genetic, environmental, microbial, GZMA = Granzyme A, LMR = lymphocyte-monocyte ratio, MOG = myelin oligodendrocyte glycoprotein, MS = multiple sclerosis, RA = rheumatoid arthritis, RF = rheumatoid factor, SLE = system lupus erythematosus, Sm = Smith, T1D = type 1 diabetes, UC = ulcerative colitis

Pre-Diagnosis: Signs and Symptoms of Disease

Disease	Signs	Symptoms	Predictive Value	Validation	Robustness
T1D	Low insulin secretion Increasing glucose	Symptomatic (but not severe) lows Intermittent hypoglycemia	Rate of progression by oral glucose tolerance in AAB-positive individuals	Yes (glycemia measurements)	+++++
MS	~15 years pre-MS onset: increased health care use, increased mental health/ psychiatric (ill-defined)	~5-10 years pre-MS onset: increased sensory, MSK symptoms ~2-5 years pre-MS onset: decreased cognitive performance, decreased pregnancies	Unknown	Consistent patterns across studies (not formally validated)	+++ (limited regions — North America and Europe)
	Trend of reduced thalamic volume (high-risk group)	Reduced vibration sensation in the great toe (high-risk group)	Unknown	Replication ongoing	
RA		New onset of non-specific MSK symptoms without joint swelling	5-50% depending on symptom type and levels of AABs; higher with AABs	Yes	+++++
	Inability to make fist	“Clinically suspect arthralgia” symptoms: prolonged morning stiffness and small joint pain	~10-20% progression rate in absence of AABs ~50% with AABs	Limited	++++
	Palindromic flares — swelling, redness of joints	Palindromic flares of pain	~33% develop RA	Yes	+++++
	Synovitis (undifferentiated arthritis)	Joint pains and stiffness	Variable: very likely to develop RA if anti-CCP positive	Yes	+++++

Pre-Diagnosis: Signs and Symptoms of Disease

Disease	Signs	Symptoms	Predictive Value	Validation	Robustness
RA	MSK ultrasound subclinical synovitis and/or erosions		Strong: imminent RA — PD signal + erosions = highly predictive	Yes — multiple cohorts	+++++
	MRI of joints and tendons		Strong: tenosynovitis of hand/ wrist tendon is strongest predictor	Yes — multiple cohorts	+++++
CD	FC as a marker of subclinical gut inflammation	Not yet explored in detail	6-8-fold higher risk with elevated FC >100µg./g. in FDR population	No	+
UC	FC as a marker of subclinical gut inflammation	Not yet explored in detail	3-fold higher risk with elevated FC >100µg./g. in FDR population	No	+
SLE	ANA, immune cytopenias (complement, lymphocytes, leukocytes, platelets), proteinuria	Photosensitivity rashes, oral ulcers, alopecia, fatigue, arthralgias, myalgias, fevers	Modest: some studies (not SMILE) showed association with probable SLE by CSQ predictive of transition	Retrospective and nested case-control No large-scale population studies to assess specificity	++

Abbreviations: AAB = autoantibody, ANA = anti-nuclear antibody, CCP = cyclic citrullinated peptide, CD = Crohn's disease, CSQ = connective tissue disease screening questionnaire, FC = fecal calprotectin, FDR = first-degree relative, MS = multiple sclerosis, MSK = musculoskeletal, PD = power Doppler, RA = rheumatoid arthritis, SLE = system lupus erythematosus, T1D = type 1 diabetes, UC = ulcerative colitis

Identification of At-Risk Individuals

Disease	Population	Test	Percent With Risk Markers	Validation (N Screened and Utility)	Robustness
T1D	General population at about age 5 (or ages 2, 6 ± 10)	AABs	~1% (>1 AAB, ASK) 0.3% (>1 AAB, FR1DA)	Yes	+++++
	General population at about age 5 (or ages 2, 6 ± 10)	HLA risk and GRS	1.2% cross-GRS threshold (GPPAD) 10% >2 AAB by age 6	Yes	+++++
		GRS2 >90th percentile	2.4% risk of T1D	No	?
	Family members	AABs	5% single AAB, 2.5% multiple AABs	Yes	+++++
MS	Healthy adults with MRIs for research studies	MRI — RIS diagnosis	0.1% (up to 0.2% for white matter lesions not necessarily meeting RIS criteria)	No	+
	Family members	MRI — RIS diagnosis	2.9%	No	+
	High-risk family members in top 25% of genetic and environment risk	GRS	20% in high genetic risk subgroup	No	+++
	General population	HLA DRB1*1501	10-30% (northern European)	No	+++
	General population (adults)	EBV+	90-95%	No	++
	Healthy siblings of people with MS	OCBs	19% (vs. 4% in controls)	No	+++
RA	Indigenous populations with high background rates of RA	AABs including anti-CCP (and other ACPAs) and RF	Up to 17%	Limited	++++
	FDRs	AABs including anti-CCP (and other ACPAs) and RF	4-6%	Yes	+++++

Identification of At-Risk Individuals

Disease	Population	Test	Percent With Risk Markers	Validation (N Screened and Utility)	Robustness
RA	General population (health fair or other screening) — MSK symptoms not required	AABs including anti-CCP (and other ACPAs) and RF	2-4%	Yes	+++++
	MSK symptoms drove initial evaluation, AAB+ (mainly anti-CCP)	Anti-CCP test and present with symptoms	100%	Yes — multiple independent cohorts	+++++
	Clinically suspect arthralgia	Anti-CCP	Variable rates of positivity (~20%)	Consensus — majority of data from single center	+++
	Palindromic rheumatism	Anti-CCP/RF	>50% are anti-CCP/RF+	Yes — multiple cohorts	+++++
	Undifferentiated arthritis	Anti-CCP/RF	>50% are anti-CCP/RF+	Yes — multiple cohorts	+++++
CD	FDR	Blood-based risk score + FC	20% of FDRs have FC > 100µg./g.	Not yet	+
	FDR	CD polygenic risk score	Top quartile has 2.3-fold higher risk of incidence among FDRs	Not yet	+
UC	FDRs of IBD	Anti-integrin AAB: avβ6	Unknown	Not yet	+
SLE	Nurses' Health Study (138 with SLE, 1,136 without)	SLE-weighted GRS, FDR, 8 lifestyle or environmental risk factors	Family history of SLE or RA: OR = 1.46 (p 0.03) SLE wGRS: OR = 1.27 (p $1.4x10^{-7}$)	No	AUC future SLE 0.75 (less for renal involvement)

Abbreviations: AAB = autoantibody, ACPA = anti-citrullinated protein antibody, CCP = cyclic citrullinated peptide, CD = Crohn's disease, FC = fecal calprotectin, FDR = first-degree relative, GRS = genetic risk score, IBD = inflammatory bowel disease, MS = multiple sclerosis, MSK = musculoskeletal, OCB = oligoclonal band, RA = rheumatoid arthritis, RF = rheumatoid factor, RIS = radiologically isolated syndrome, SLE = system lupus erythematosus, T1D = type 1 diabetes, UC = ulcerative colitis

Prevention Trials

Disease	Population	Therapy	Outcome Measure	N	Duration of Trial	Result/ Publication Date
T1D	Genetic risk	Avoid cow's milk (hydrolyzed casein formula)	Development AABs/stage 3	5156	15 years	Negative
		Avoid gluten	Development AABs	150	6 years	Negative
		Omega-3 fatty acids (pilot)	Development AABs	156	7 years	Negative
		Oral insulin (POINT)	Development AABs	1050	8 years	Negative
	Multiple AABs (normal glucose, stage 1)	Abatacept	Stage 2 or 3	212	10 years	Negative
		HCQ	Stage 2 or 3	275	4 years (stopped early for futility)	Negative (stopped futility)
		Oral insulin DPT-1	Stage 2 or 3	372	9 years	Negative (post-hoc subgroup+)
		Oral insulin TrialNet	Stage 2 or 3	560	10 years	Negative (subgroup+)
		Oral insulin (Fr1da insulin intervention study)	Stage 2 or 3	220	8.5 years	Negative
	Multiple AABs	Nasal insulin (DIPP — Finland) in children	Stage 3	264	14 years	Negative (stopped futility; 2008)
		GAD-Alum (DiAPREV-IT)	Stage 3	50	8 years	
	ICA	Nicotinamide	Stage 3	552		Negative (2004)
	Multiple AABs (abnormal glucose; stage 2)	Teplizumab	Stage 3	76	10 years	Positive (2 year median delay)
		Parenteral insulin DPT-1	Stage 3	339	8 years	Negative

Prevention Trials

Disease	Population	Therapy	Outcome Measure	N	Duration of Trial	Result/ Publication Date
MS (early treatment — not truly prevention)	RIS	Dimethyl fumarate 240mg. BID	Time to first clinical demyelinating event	87	96 weeks	Positive
		Teriflunomide 14mg. QD	Time to first clinical demyelinating event	89	96 weeks (optional additional year if no symptoms)	Positive
		Ocrelizumab	Time to new MRI activity or first clinical demyelinating event	Planned 100	n/a	Terminated after 2 years for insufficient recruitment
	CIS	Glatiramer acetate	Time to CDMS	481	up to 36 months	Positive
		IFN β-1b 250 µg. SC every other day	Time to CDMS	468	24 months	Positive
		IFN β-1a 30 µg. IM weekly	Time to CDMS	383	36 months (stopped early)	Positive
		IFN β-1a 22 µg. SC weekly	Time to CDMS	309	24 months	Positive
		Minocycline 100 mg. PO BID	Diagnosis of MS (McDonald 2005)	142	24 months	Positive at 6 months, negative at 24 months
	CIS and vitamin D <100 nmol./L. with ≥2 MRI lesions or OCB+	Cholecalciferol 100,000 IU Q2 weeks	Clinical relapse or new MRI activity	316	24 months	Positive

Abbreviations: AAB = autoantibody, CCP = cyclic citrullinated peptide, CD = Crohn's disease, CDMS = clinically definite multiple sclerosis, CIS = clinically isolated syndrome, CLE = cutaneous lupus erythematosus, FC = fecal calprotectin, FDR = first-degree relative, GEM = genetic, environmental, microbial, HCQ = hydroxychloroquine, IA = inflammatory arthritis, MS = multiple sclerosis, MTX = methotrexate, OCB = oligoclonal band, RA = rheumatoid arthritis, RF = rheumatoid factor, RIS = radiologically isolated syndrome, SLE = system lupus erythematosus, T&H = tasty and healthy, T1D = type 1 diabetes, UC = ulcerative colitis

Prevention Trials

Disease	Population	Therapy	Outcome Measure	N	Duration of Trial	Result/ Publication Date
RA	Arthralgia, RF and/or CCP+, positive shared epitope	Dexamethasone 100mg. x2 doses vs. placebo	IA	83 (20% developed IA)	26 months (median)	No reduction in rate of IA; lower levels of AABs (2010)
	Arthralgia, RF and CCP+	Rituximab 1000mg. x1 (plus single-dose steroid) vs. placebo	IA	81 (37% developed IA)	29 months (median)	No reduction in IA; modest RA delay (2019)
	Arthralgia, MRI joint inflammation, ~30% RF+ or CCP+	MTX 25mg. orally x1 year (plus single-dose steroid) vs. placebo (plus single-dose steroid)	IA meeting 2010 RA criteria x2 time points 2 weeks apart	236 (19% developed IA)	12 months treatment 24 months primary endpoint	No difference at 24 months; improved rates at 12 months (2022)
	Arthralgia, MRI joint inflammation, high CCP or CCP+/RF+	Abatacept 125mg. SQ x6 months vs. placebo	MRI inflammation at 18 months; incidence IA at 18 months	98 (46% developed IA)	6 months treatment 18 months primary endpoint	Reduced joint inflammation and rate of IA at 18 months (2024)
	Arthralgia, high CCP or CCP+/RF+	Abatacept 125mg. SQ x12 months vs. placebo	IA in ≥3 joints or RA by 2010 criteria	213 (31% developed IA)	12 month treatment 24 month primary endpoint	Reduced rate of IA/RA at 24 months (2024)
	CCP ≥ 2x upper limit normal (arthralgia not required)	HCQ 200-400mg. x12 months vs. placebo	IA meeting 2010 RA criteria	144 (31% developed IA)	12 month treatment 36 month primary endpoint	No difference RA rate (2025)

Prevention Trials

Disease	Population	Therapy	Outcome Measure	N	Duration of Trial	Result/ Publication Date
RA	Prespecified analyses of vitamin D/ Omega-3 for cancer and CVD risk reduction	Vitamin D 2000 IU and/or Omega-3 2g. x5 years	Combined outcome of RA, PMR, psoriasis, other (by chart review)	25,871 (n=128 — 0.5% developed RA)	5 and 7-year endpoints	Reduced RA in vitamin D arm at 5 years and Omega-3 arm at 7 years (2022, 2024)
CD	FDR with increased FC	Vedolizumab	Onset of CD	100-200	2 years	Trial planning stage (HALT-CD)
	FDR of patients with CD with increased FC or GEM risk score	T&H diet (no pro-inflammatory components)	Reduction of risk biomarkers (FC)	42	16 weeks	Week 8 median FC was 45µg./g. (33–54) in T&H arm vs. habitual — 112µg./g. (56–215; p = 0.047)
SLE	"Incomplete SLE"	HCQ (placebo-controlled randomized trial)	Accumulation of additional classification criteria	180	24 months	Negative
	CLE	HCQ vs. topical steroids (pragmatic observational)	Classification as SLE	286	7 years	Positive

Abbreviations: AAB = autoantibody, CCP = cyclic citrullinated peptide, CD = Crohn's disease, CDMS = clinically definite multiple sclerosis, CIS = clinically isolated syndrome, CLE = cutaneous lupus erythematosus, FC = fecal calprotectin, FDR = first-degree relative, GEM = genetic, environmental, microbial, HCQ = hydroxychloroquine, IA = inflammatory arthritis, MS = multiple sclerosis, MTX = methotrexate, OCB = oligoclonal band, RA = rheumatoid arthritis, RF = rheumatoid factor, RIS = radiologically isolated syndrome, SLE = system lupus erythematosus, T&H = tasty and healthy, T1D = type 1 diabetes, UC = ulcerative colitis

Symposium Attendees

Symposium Attendees

Type 1 Diabetes

Dr. med. Peter Achenbach

Deputy Director, Institute of Diabetes Research
Helmholtz Munich
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Dr. Achenbach leads clinical research to define the pathogenesis, early detection and prevention of type 1 diabetes (T1D), advancing immune-based strategies to identify and intervene in disease before clinical onset. Through leadership of large-scale screening and primary prevention studies in genetically at-risk children and his role in international standardization and research consortia, he is helping build the evidence and infrastructure needed to predict and intercept T1D.

Program Officer

Inflammatory Bowel Disease

Souwelimatou Amadou Amani, PhD

Associate Program Officer, Crohn's Disease
The Leona M. and Harry B. Helmsley Charitable Trust
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Dr. Amadou Amani advances Crohn's disease research by supporting a grants portfolio focused on defining disease drivers and accelerating strategies to prevent onset, recurrence and progression. With a background in microbiology, immunology and translational therapeutics, she brings expertise in immune-mediated disease mechanisms and preclinical development to efforts aimed at predicting risk and intercepting inflammatory bowel disease before irreversible damage occurs.

Biostatistician

Bill Barry, PhD

Principal Statistical Research Scientist and Autoimmunity Group Leader
Rho
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Dr. Barry leads statistical strategy for complex clinical trials in autoimmunity, advancing rigorous and efficient evaluation of therapies designed to prevent, delay or modify immune-mediated disease. As principal investigator of the NIAID-funded Autoimmune Diseases Statistical and Clinical Coordinating Center, he supports adaptive, biomarker-driven and translational trial designs that strengthen therapeutic targeting and early-intervention approaches across national research networks.

Rheumatoid Arthritis

Jane Buckner, MD

President
Benaroya Research Institute
jbuckner@benaroyaresearch.org

Dr. Buckner is a rheumatologist and translational immunologist whose work integrates genetics, human immunology and clinical investigation to define the mechanisms driving autoimmune diseases and advance antigen-specific immune therapies. Through leadership of large-scale research infrastructure, including national clinical trial networks and an extensive biorepository, she has accelerated efforts to predict, prevent and intercept rheumatoid arthritis, type 1 diabetes, multiple sclerosis and other autoimmune conditions before irreversible tissue damage occurs.

Symposium Attendees

Inflammatory Bowel Disease

Jean-Frederic Colombel, MD

Director, Susan and Leonard Feinstein Inflammatory Bowel Disease Clinical Center
Icahn School of Medicine at Mount Sinai
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Dr. Colombel is an international leader in inflammatory bowel disease (IBD) whose research has advanced understanding of IBD pathophysiology and reshaped clinical strategies for earlier intervention and disease control. Through decades of collaborative, multicenter investigation and more than 1,200 peer-reviewed publications, he has helped define mechanisms of immune dysregulation that inform precision medicine and prevention-oriented approaches in Crohn's disease and ulcerative colitis.

Multiple Sclerosis

Philip L. De Jager, MD, PhD

Chief, Division of Neuroimmunology
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Dr. De Jager is a neuroimmunologist whose research integrates human immunology, molecular genomics and computational modeling to define how immune responses shape trajectories of aging and neurodegenerative disease. Focusing on multiple sclerosis and Alzheimer's disease, he translates these insights into therapeutic targets and immune-modulating strategies aimed at the prevention of immune-driven brain degeneration.

Rheumatoid Arthritis

Kevin Deane, MD, PhD

Professor of Medicine, Rheumatology
University of Colorado Anschutz
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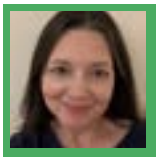
Dr. Deane is a rheumatologist whose research defines the immunologic and clinical features of "pre-RA," the at-risk phase before the first swollen joint, with the goal of enabling prediction and prevention of rheumatoid arthritis. Through leadership of the NIH-sponsored StopRA trial and international risk stratification initiatives, he is building evidence-based strategies to identify high-risk individuals and intervene before persistent autoimmune disease is established.



Rheumatoid Arthritis

Marie Falahee, PhD

Lecturer, Behavioral Rheumatology, Department of Inflammation and Aging
University of Birmingham
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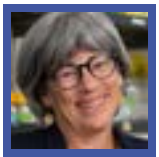
Dr. Falahee is a research scientist whose research integrates patient preferences into the design of prevention and treatment strategies for immune-mediated inflammatory diseases, with a focus on rheumatoid arthritis. Through leadership in international risk stratification efforts and prevention task forces, she advances patient-informed approaches that strengthen early identification, shared decision-making, and preventive intervention in autoimmunity.

Symposium Attendees



Type 1 Diabetes

Carla Greenbaum, MD

Member, Center for Interventional Immunology
Benaroya Research Institute
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Dr. Greenbaum is a clinical investigator focused on altering the course of type 1 diabetes (T1D) by defining disease mechanisms and testing immune-targeted interventions to preserve beta cell function. Through leadership in T1D TrialNet and extensive experience in clinical trials, she advances strategies to predict disease progression, identify at-risk individuals, evaluate biomarkers of disease and response to therapy, and intervene early to prevent or delay T1D.

Inflammatory Bowel Disease

Jonas Halfvarson, MD, PhD

Professor, Gastroenterology
Örebro University
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Dr. Halfvarson is a gastroenterologist whose research defines the genetic and immunologic mechanisms driving inflammatory bowel disease (IBD) with a focus on biomarker discovery in the preclinical disease phase. By advancing research in the preclinical phase of IBD, he is enabling earlier detection, refined risk stratification, and precision prevention strategies aimed at intercepting immune-mediated gut inflammation before irreversible damage occurs.

System Lupus Erythematosus

Judith James, MD, PhD

Executive Vice President and Chief Medical Officer
Oklahoma Medical Research Foundation
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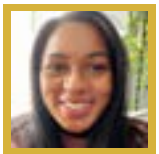
Dr. James is a physician-scientist whose research defines the origins and early pathogenesis of lupus, Sjögren's disease and related systemic autoimmune disorders, with foundational contributions to understanding autoantibody evolution and humoral epitope spreading. Through leadership of major NIH-funded collaborative networks, she advances strategies to identify autoimmune disease in its earliest stages, clarify genetic and environmental risk, and improve prevention and care — particularly for Indigenous and rural populations.



Patient

Inflammatory Bowel Disease

N'Dea Johnson

Pre-Award Manager
Crohn's and Colitis Foundation
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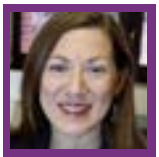
N'Dea brings lived experience with Crohn's disease to her work advancing research and patient-centered initiatives in inflammatory bowel disease. Drawing on her background in psychology and nutrition sciences, she is committed to improving understanding of disease drivers, addressing disparities, and supporting efforts to prevent complications and improve long-term outcomes for people at risk for or living with immune-mediated gut disease.

Symposium Attendees



System Lupus Erythematosus

Diane Kamen, MD

Professor of Medicine, Division of Rheumatology
Medical University of South Carolina
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Dr. Kamen is a rheumatologist whose research seeks to define the causes of lupus and translate those insights into safe, effective therapies that halt disease progression. Through NIH-funded observational cohorts and interventional clinical trials, she investigates environmental triggers, addresses health disparities and advances strategies for earlier identification and targeted intervention in systemic autoimmunity.

System Lupus Erythematosus

David Karp, MD, PhD

Chief, Rheumatic Diseases Division
UT Southwestern Medical Center
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Dr. Karp is a physician-scientist whose research defines how genetic and environmental factors drive autoimmune diseases such as rheumatoid arthritis and lupus. He leads efforts to identify biomarkers that predict disease development in at-risk individuals and directs NIH-supported prevention trials designed to intercept lupus before clinical onset.

Program Officer

Type 1 Diabetes

Anne Koralova, PhD

Program Officer, Type 1 Diabetes
The Leona M. and Harry B. Helmsley Charitable Trust
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Dr. Koralova advances primary prevention strategies in type 1 diabetes (T1D) through stewardship of a research portfolio focused on identifying risk, intercepting early autoimmunity, and stopping disease before clinical onset. With experience spanning translational science, therapeutics strategy and biotechnology, she supports initiatives that accelerate prediction, prevention and durable immune intervention in T1D.

Biostatistician

Andrew Koval, PhD

Biostatistician, Bioinformatics Group
Benaroya Research Institute
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Dr. Koval applies biostatistical approaches to experimental and early-phase trial design and analysis to improve disease prediction, risk stratification and prevention strategies in autoimmune disease.

Symposium Attendees

Inflammatory Bowel Disease

Sun-Ho Lee, MD

Assistant Professor
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Dr. Lee is a clinician-scientist whose translational research defines the preclinical phase of inflammatory bowel disease, with a focus on Crohn's disease. Integrating host genetics, the gut microbiome, antimicrobial immune responses, and barrier function through advanced bioinformatics and machine learning, he is developing precision models to predict risk, stratify patients, and identify modifiable triggers that enable earlier intervention and prevention in immune-mediated gut disease.

Multiple Sclerosis

Naila Makhani, MD, MPH

Director, Pediatric Multiple Sclerosis Program
Yale University
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Dr. Makhani is a physician-scientist whose research focuses on the earliest stages of multiple sclerosis, including a longitudinal study of children with radiologically isolated syndrome. By defining early radiologic and immunologic markers of risk, she is advancing strategies to predict disease onset and enable timely intervention to prevent or delay immune-mediated neurologic injury.

Rheumatoid Arthritis

Kulveer Mankia, BMBCh, DM

Professor of Rheumatology
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Dr. Mankia is a rheumatologist whose research centers on early and preclinical rheumatoid arthritis, integrating translational science, imaging, and proof-of-concept clinical trials to enable disease interception. Through leadership of prevention clinics, national trials, and international risk stratification initiatives, he is advancing strategies to identify high-risk individuals and intervene before persistent inflammatory arthritis becomes established.

Patient

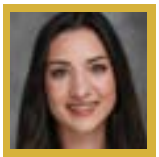
Multiple Sclerosis

Sharon Roman

Patient Partner, Pharmacoepidemiology in Multiple Sclerosis Research Group
The University of British Columbia
slhroman@gmail.com

Sharon is a patient partner in multiple sclerosis research who brings lived experience to pharmacoepidemiology, prevention and brain health initiatives. Through advisory and editorial leadership roles across national and international platforms, she supports efforts to improve early intervention and long-term outcomes in immune-mediated neurologic disease.

Symposium Attendees



Patient

System Lupus Erythematosus

Alexandra Schwab, MD

Rheumatology Fellow Physician
Duke University
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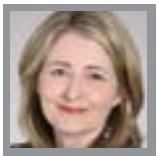
Dr. Schwab is a rheumatology fellow with clinical interests in general rheumatology. She brings lived experience to her work in autoimmune and inflammatory disease with diverse patient populations.



NIH

Victoria Shanmugam, MBBS

Director, Office of Autoimmune Disease Research
National Institutes of Health
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Dr. Shanmugam is a rheumatologist and physician-scientist who leads national efforts to advance autoimmune disease research, strengthening coordination and innovation across the National Institutes of Health. Her work spans systemic autoimmunity, immune–microbiome interactions, and translational science, advancing strategies to define disease mechanisms, improve risk assessment, and accelerate prevention-focused research in autoimmune conditions.

Biostatistician

Ali Shojaie, PhD

Interim Chair, Department of Biostatistics
University of Washington
ashojaie@uw.edu

Dr. Shojaie is a biostatistician whose research integrates statistical machine learning and network analysis to address complex biological questions, including those central to immune-mediated disease. Through leadership in large-scale data science initiatives and analytic cores, he advances computational frameworks that strengthen biomarker discovery, risk modeling and early detection strategies in complex disorders.

Type 1 Diabetes

Kimber Simmons, MD

Associate Professor of Pediatrics
University of Colorado Anschutz
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Dr. Simmons is a pediatric endocrinologist whose work focuses on early-stage type 1 diabetes (T1D) and clinical immunotherapy, advancing strategies to delay or prevent symptomatic disease. Through leadership of prevention and new-onset trials and real-world implementation of immune-modulating therapies such as teplizumab, she is strengthening pathways for early intervention and disease interception in T1D.

Symposium Attendees

Patient

Type 1 Diabetes

Sidney Smith, RN

Nurse Instructor, Barbara Davis Center for Diabetes
University of Colorado Anschutz
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Sidney is a certified diabetes care and education specialist who supports children and families navigating type 1 diabetes (T1D) with a focus on early-stage disease and prevention. She brings lived experience to her work in support of these families and is passionate about education, screening advocacy, and administration of immune-modifying therapy for stage two T1D.

Type 1 Diabetes

Cate Speake, PhD

Director, Center for Interventional Immunology
Benaroya Research Institute
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Dr. Speake is an immunologist who translates immunological laboratory-based findings to early stage and mechanistic clinical studies aimed at defining the drivers of type 1 diabetes (T1D) and other immune-mediated diseases. Through leadership of experimental medicine trials, biorepository infrastructure, and national immunology consortia, she advances biomarker discovery, risk stratification and reproducible strategies to predict and intercept T1D before and after clinical onset.

Multiple Sclerosis

Helen Tremlett, PhD

Professor, Division of Neurology
The University of British Columbia
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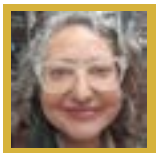
Dr. Tremlett is a neuroepidemiologist whose research defines the prodromal phase of multiple sclerosis and the factors that shape disease risk, progression and treatment response. Through large-scale, multidisciplinary studies spanning pharmacoepidemiology, genetics and the gut microbiome, she advances strategies for therapeutic intervention, refined risk assessment, and improved long-term outcomes in immune-mediated neurologic disease.



Patient

Rheumatoid Arthritis

Elizabeth Wethington

Patient Advocate, Autoimmune Disease Prevention Center
University of Colorado Anschutz
wethingtone@njhealth.org

Elizabeth is a patient advocate supporting the Autoimmune Disease Prevention Center's vision to make prevention of autoimmune disease a routine part of health care. She brings lived experience to her work in support of the educational activities, research and clinical care that will advance the prevention of autoimmune disease.

Symposium Attendees

Type 1 Diabetes

Diane Wherrett, MD

Professor of Pediatrics
University of Toronto
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Dr. Wherrett is a pediatric endocrinologist whose research centers on delaying and preventing type 1 diabetes (T1D) through early identification of at-risk children and immune-based intervention. Through leadership in T1D TrialNet and national population screening initiatives, she advances strategies to assess risk, implement screening programs, and intercept T1D before clinical progression.

Biostatistician

Samuel S. Wu, PhD

Professor and Deputy Director, Health Informatics Institute
University of South Florida
samuel.wu@epi.usf.edu

Dr. Wu is a biostatistician and informatics leader whose work integrates advanced statistical methods, genomics and clinical data science to strengthen the scientific foundation of prevention-focused research. His work advances rigorous study design, risk modeling and translational analytics that accelerate prediction and prevention strategies in autoimmune disease and other complex disorders.

References

Scan to view references or visit
bri-news.short.gy/CAPSreferences

References

Overview Reading

Moscovitz K, Bhavsar D, Tremlett H. Interventional studies targeting the prodromal or preclinical phase of immune-mediated disease to benefit patient outcomes: a scoping review. J Autoimmun. 2026;159:103526.

Type 1 Diabetes

Bingley PJ, Wherrett DK, Shultz A, Rafkin LE, Atkinson MA, Greenbaum CJ. Type 1 Diabetes TrialNet: A Multifaceted Approach to Bringing Disease-Modifying Therapy to Clinical Use in Type 1 Diabetes. Diabetes Care. 2018 Apr;41(4):653-661.

Bonifacio E, Ziegler AG. Type 1 diabetes risk factors, risk prediction and presymptomatic detection: Evidence and guidance for screening. Diabetes Obes Metab. 2025;27 Suppl 6(Suppl 6):28-39.

Insel RA, Dunne JL, Atkinson MA, Chiang JL, Dabelea D, Gottlieb PA, et al. Staging presymptomatic type 1 diabetes: a scientific statement of JDRF, the Endocrine Society, and the American Diabetes Association. Diabetes Care. 2015 Oct;38(10):1964-74.

Phillip M, Achenbach P, Addala A, Albanese-O'Neill A, Battelino T, Bell KJ, et al. Consensus Guidance for Monitoring Individuals With Islet Autoantibody-Positive Pre-Stage 3 Type 1 Diabetes. Diabetes Care. 2024 Aug 1;47(8):1276-1298.

Vercauteren J, consortium EF. Harmonising terminology for type 1 diabetes: the EDENT1FI lexicon initiative. Lancet Diabetes Endocrinol. 2025;13(11):905-7.

Multiple Sclerosis

Laitinen AW, Tozlu C, Roostaei T, Diallo F, Onomichi K, Son J, et al. A Prospective Study of Individuals at Risk of Multiple Sclerosis Informs the Design of Primary Prevention Studies. Annals of Clinical and Translational Neurology. 2026.

Makhani N, Tremlett H. The multiple sclerosis prodrome. Nat Rev Neurol. 2021;17(8):515-21.

Marrie RA, Allegretta M, Barcellos LF, Bebo B, Calabresi PA, Correale J, et al. From the prodromal stage of multiple sclerosis to disease prevention. Nat Rev Neurol. 2022;18(9):559-72.

Tremlett H, Munger KL, Makhani N. The Multiple Sclerosis Prodrome: Evidence to Action. Front Neurol. 2021;12:761408.

Xia Z, Steele SU, Bakshi A, Clarkson SR, White CC, Schindler MK, et al. Assessment of Early Evidence of Multiple Sclerosis in a Prospective Study of Asymptomatic High-Risk Family Members. JAMA Neurol. 2017;74(3):293-300.

Xia Z, White CC, Owen EK, Von Korff A, Clarkson SR, McCabe CA, et al. Genes and Environment in Multiple Sclerosis project: A platform to investigate multiple sclerosis risk. Ann Neurol. 2016;79(2):178-89.

Rheumatoid Arthritis

Deane KD, Holers VM, Emery P, Mankia K, El-Gabalawy H, Sparks JA, et al. Therapeutic interception in individuals at risk of rheumatoid arthritis to prevent clinically impactful disease. Ann Rheum Dis. 2025;84(1):14-28.

Duquenne L, Hensor EM, Wilson M, Garcia-Montoya L, Nam JL, Wu J, et al. Predicting Inflammatory Arthritis in At-Risk Persons: Development of Scores for Risk Stratification. Ann Intern Med. 2023;176(8):1027-36.

Gerlag DM, Raza K, van Baarsen LG, Brouwer E, Buckley CD, Burmester GR, et al. EULAR recommendations for terminology and research in individuals at risk of rheumatoid arthritis: report from the Study Group for Risk Factors for Rheumatoid Arthritis. Ann Rheum Dis. 2012;71(5):638-41.

References

Mankia K, Siddle HJ, Kerschbaumer A, Alpizar Rodriguez D, Catrina AI, Cañete JD, et al. **EULAR points to consider for conducting clinical trials and observational studies in individuals at risk of rheumatoid arthritis.** Ann Rheum Dis. 2021;80(10):1286-98.

van Steenbergen HW, Cope AP, van der Helm-van Mil AHM. **Rheumatoid arthritis prevention in arthralgia: fantasy or reality?** Nat Rev Rheumatol. 2023;19(12):767-77.

van Steenbergen HW, Doornkamp F, Alivernini S, Backlund J, Codreanu C, Cohen SB, et al. **EULAR/American College of Rheumatology Risk Stratification Criteria for Development of Rheumatoid Arthritis in the Risk Stage of Arthralgia.** Arthritis Rheumatol. 2025.

Crohn's Disease and Ulcerative Colitis

Lee S-H, Turpin W, Espin-Garcia O, Xu W, Croitoru K, Lee S-H, et al. **Development and Validation of an Integrative Risk Score for Future Risk of Crohn's Disease in Healthy First-Degree Relatives: A Multicenter Prospective Cohort Study.** Gastroenterology. 2025;168(1):150-3.e4.

Lee S-H, Lopes EW, Khalili H, Croitoru K, Colombel J-F, Peter I, et al. **Prediction and Prevention of Inflammatory Bowel Disease: A Call to Action.** Gastroenterology. 2026;170(2):233-9.

Torres J, Moss A. **Introduction to the IBD Journal Supplement: "Prevention of IBD: Forecasting and Forestalling Inflammatory Bowel Disease Onset".** Inflammatory Bowel Diseases. 2025;31(Supplement_2):S1-S2.

Turner D, Kenigsberg S, Focht G, Turpin W, Ledder O, Griffiths AM, et al. **Preclinical stages of Crohn's disease defined by faecal calprotectin in asymptomatic first-degree relatives: screening framework for prevention trials.** Gut. 2026.

Systemic Lupus Erythematosus

Choi MY, Costenbader KH. **Understanding the Concept of Pre-Clinical Autoimmunity: Prediction and Prevention of Systemic Lupus Erythematosus: Identifying Risk Factors and Developing Strategies Against Disease Development.** Front Immunol. 2022;13:890522.

James JA. 133 - **Preclinical features of lupus.** In: Hochberg MC, Silman AJ, Smolen JS, Weinblatt ME, Weisman MH, editors. Rheumatology (Sixth Edition). Philadelphia: Mosby; 2015. p. 1026-31.

Olsen NJ, Liao D, James JA, Guthridge JM, Arriens C, Kamen D, et al. **A Randomized, Placebo-Controlled Trial of Hydroxychloroquine in Incomplete Lupus.** Arthritis Rheumatol. 2025.

Slight-Webb S, Bourn RL, Holers VM, James JA. **Shared and unique immune alterations in pre-clinical autoimmunity.** Curr Opin Immunol. 2019;61:60-8.

Biostatistics

Adaptive Designs for Clinical Trials. E20 Draft Version. Accessed 3/3/2026. https://www.fda.gov/media/78495/download. Silver Spring (MD).

The Adaptive Platform Trials Coalition. **Adaptive platform trials: definition, design, conduct and reporting considerations.** Nat Rev Drug Discov 18, 797–807 (2019).

Bhatt DL, Mehta C. **Adaptive Designs for Clinical Trials.** N Engl J Med. 2016;375(1):65-74.

Califf RM. **Biomarker definitions and their applications.** Exp Biol Med (Maywood). 2018 Feb;243(3):213-221.

FDA-NIH Biomarker Working Group. **BEST (Biomarkers, EndpointS, and other Tools).** Accessed 3/3/2025. https://www.ncbi.nlm.nih.gov/books/NBK326791/. Silver Spring (MD).

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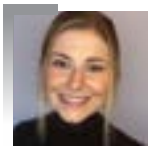

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About BRI

Progress against one immune system disease is progress against them all

At BRI, we study the immune system and the many diseases that impact it — including autoimmune diseases, allergies, asthma and cancer. Our research aims to build a deep understanding of how the immune system works in both health and disease, uncovering how disorders begin and how to rebalance the immune system back to health.

As a nonprofit institute within Virginia Mason Franciscan Health, we work closely with doctors and patients to accelerate the path from innovative lab discoveries to life-changing care.

OUR MISSION	Advance the science to predict, prevent, reverse and cure diseases of the immune system
OUR VISION	A healthy immune system for everyone
OUR VALUES	Persistent inquiry; innovation and agility; constant collaboration; integrity and respect

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