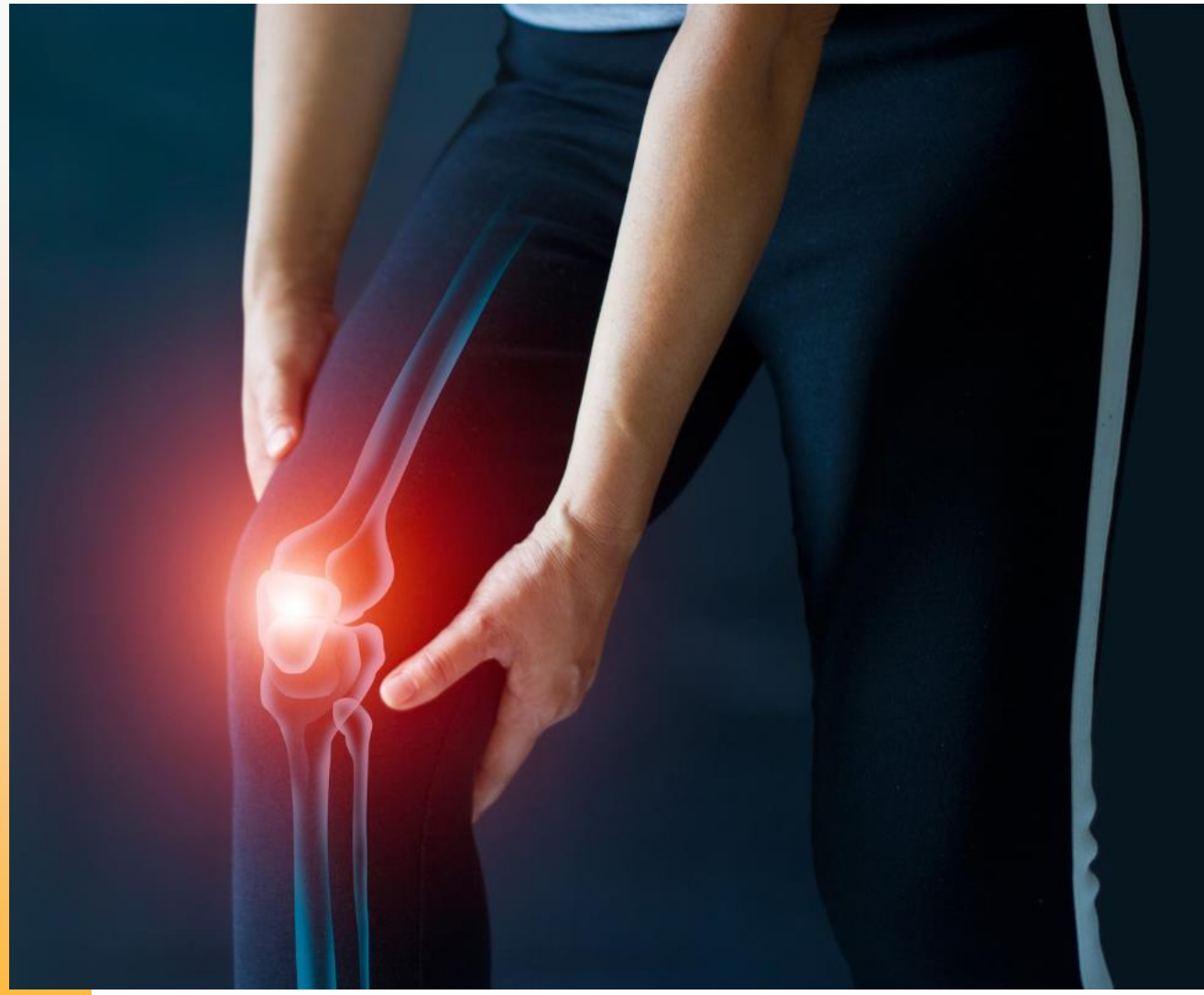
ARTHRITIS TALKS

Preventing arthritis and other autoimmune diseases



March 5, 2025

Presenters

Dr. Siân Bevan
Chief Science Officer
Arthritis Society Canada
(Moderator)

Dr. May Choi
Rheumatologist and Clinician Scientist
Calgary, Alberta

ARTHRITIS TALKS

Webinar tips

- Use the Q&A section to ask the presenters your questions. Some of the questions will be chosen for the live question period at the end of the webinar.
- Click on the Chat box to connect with other participants and the Arthritis Society's Canada's chat moderator.
- If you have further issues, email arthritistalks@arthritis.ca

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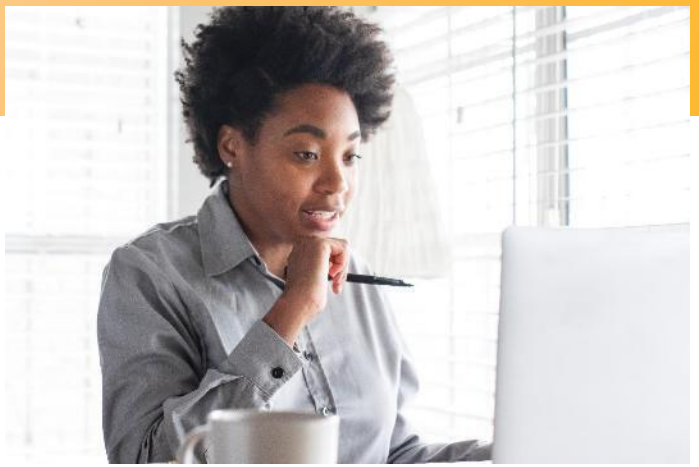
Signs and symptoms

Prevention



Q & A

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Q: Why is it important to diagnose arthritis and other autoimmune diseases early?

Autoimmune rheumatic diseases including those that can cause arthritis are *still* associated with high morbidity, disability, and mortality

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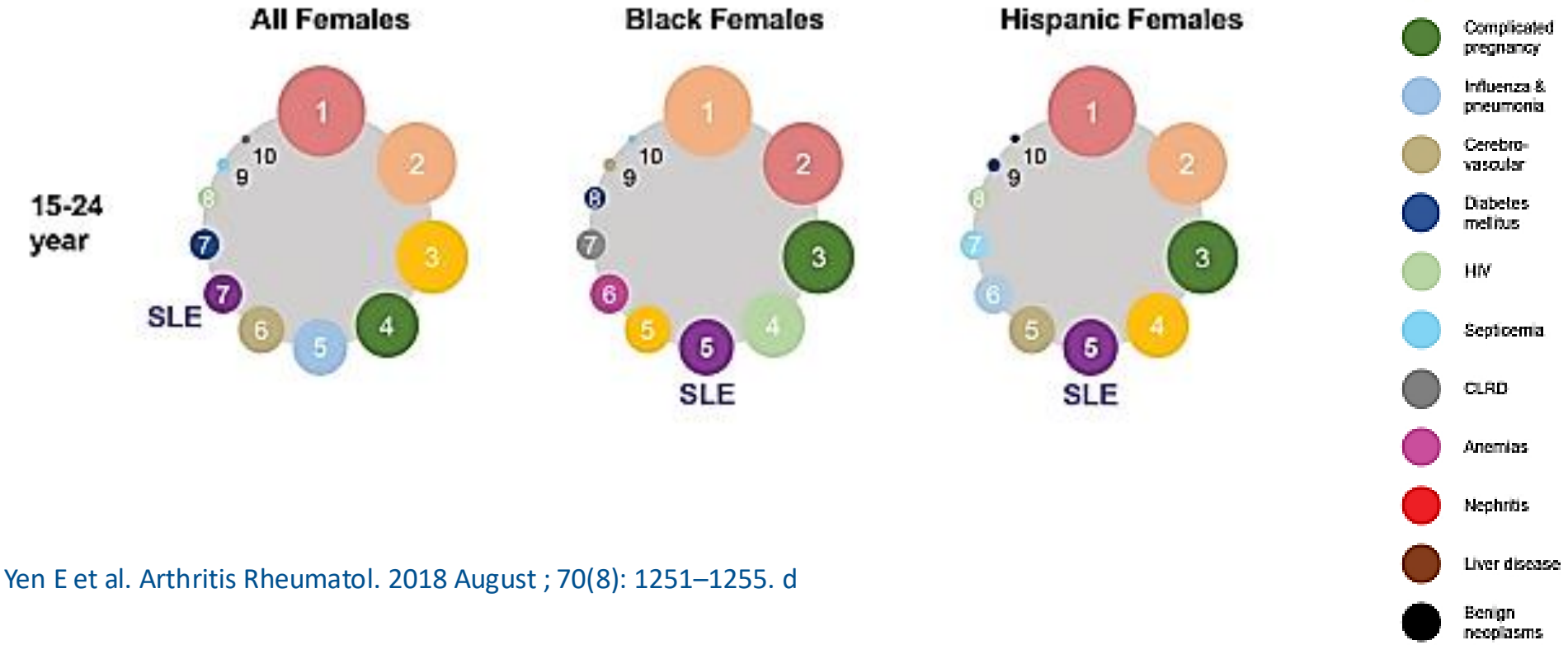
For example, lupus is a leading cause of death especially among young women



Yen E et al. Arthritis Rheumatol. 2018 August ; 70(8): 1251–1255. d

Too little, too late:

Barriers to arthritis and autoimmune disease care

- Too little is known about what causes the diseases
  - Lack of effective prevention and therapeutic options
- Diagnosed and treated too late
  - Irreversible organ damage (advanced stage of disease)

We know that advanced disease is already present at the time of diagnosis

- ~30% of lupus – kidney disease at diagnosis
- ~50% of scleroderma – evidence of lung disease within 3 months of diagnosis
- ~30% of early rheumatoid arthritis – joint erosions less than one year of diagnosis

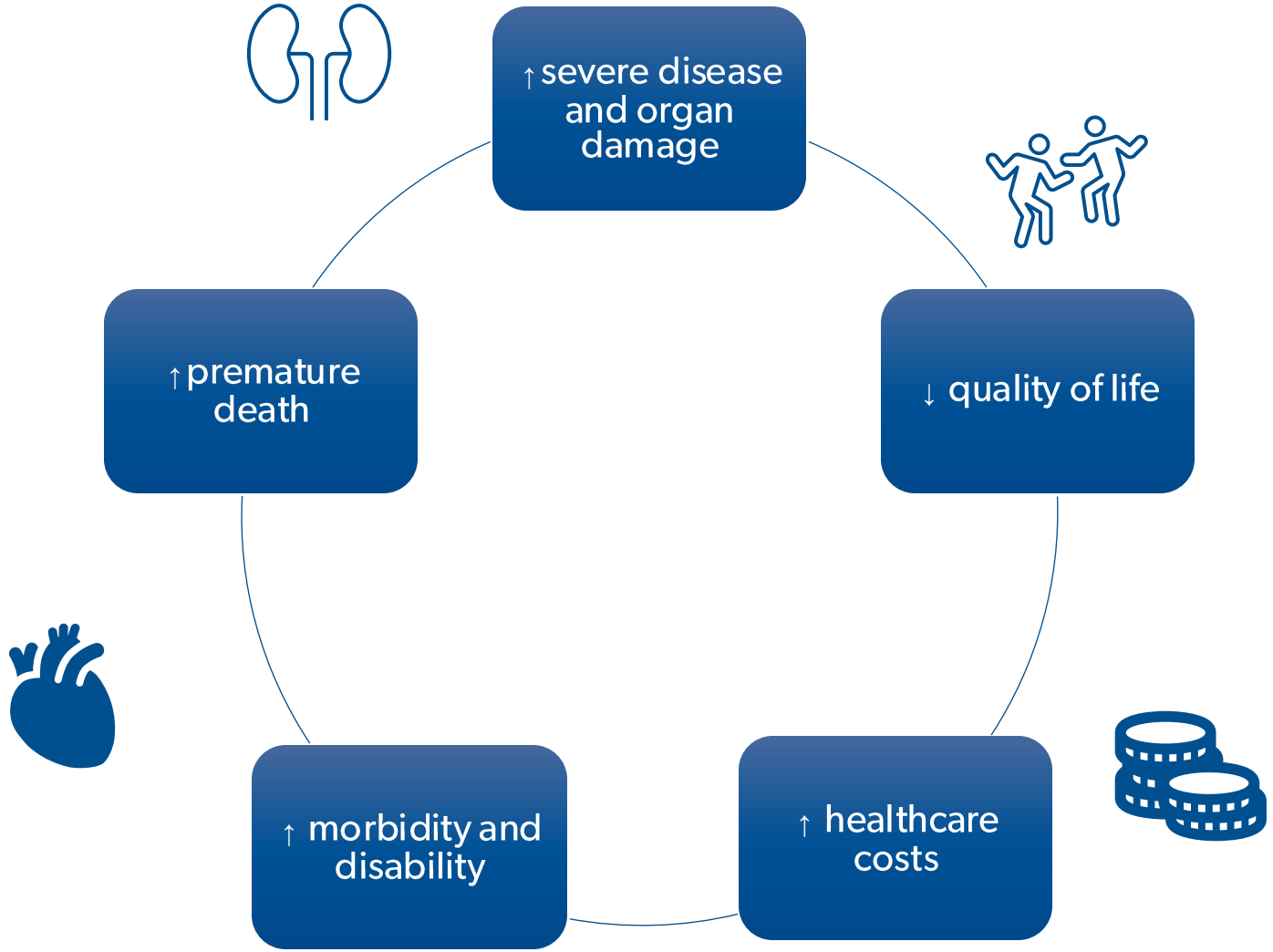
Sequalae of delayed diagnosis of autoimmune disease

Most patients report it **negatively impacts** their health

Increased **health care costs**

Leads to **condition worsening, job loss, and disability**

Unnecessary tests, inappropriate treatments, patient uncertainty and anxiety, multiple medical referrals



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Too little, too late: Barriers to arthritis and autoimmune disease care

TOP RESEARCH PRIORITIES

- Too little is known a[illegible] diseases
  - Lack [illegible] therapeutic options
- Diagnosed and treated too late
  - Irreversible organ damage (advanced stage of disease)

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Q: What are the signs and symptoms you should watch for?

As an example…Systemic Lupus Erythematosus

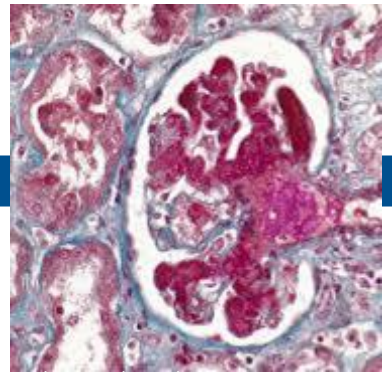
- Chronic systemic autoimmune rheumatic disease that can affect virtually **any organ**

Mayoclinic.com

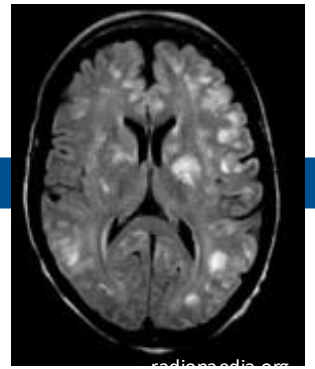
Skin

nejm.org

Joints



Kidneys



Nervous System

- Predominantly **young women** during reproductive years (9:1 female to male, average age at diagnosis is 31 years)
- More common and severe in **non-white race/ethnicities** (Indigenous, Asians, Hispanics, Blacks)

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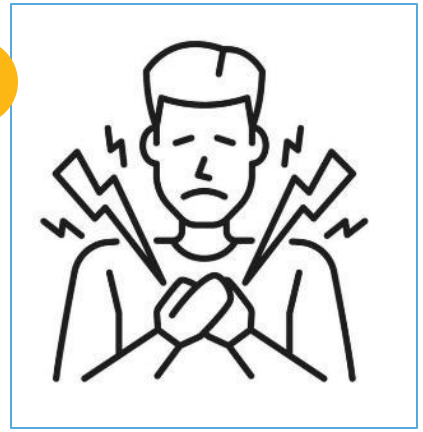
Q: How are arthritis and other autoimmune diseases diagnosed?

DELAY

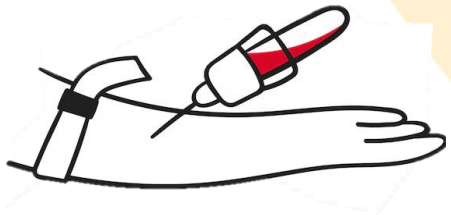
DELAY

1



Patient has symptoms and sees their family physician

2

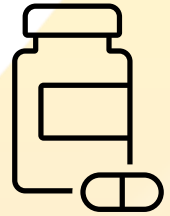


Patient goes for screening tests including blood tests and imaging

3

Patient is referred to rheumatologist

4



Treatment is initiated

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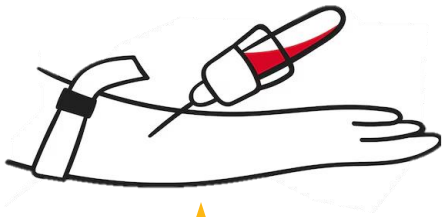
Autoantibodies are a hallmark of autoimmune diseases:

Biomarker tests that are currently used by clinicians to help make a diagnosis and prognosis of autoimmune disease



Autoantibodies

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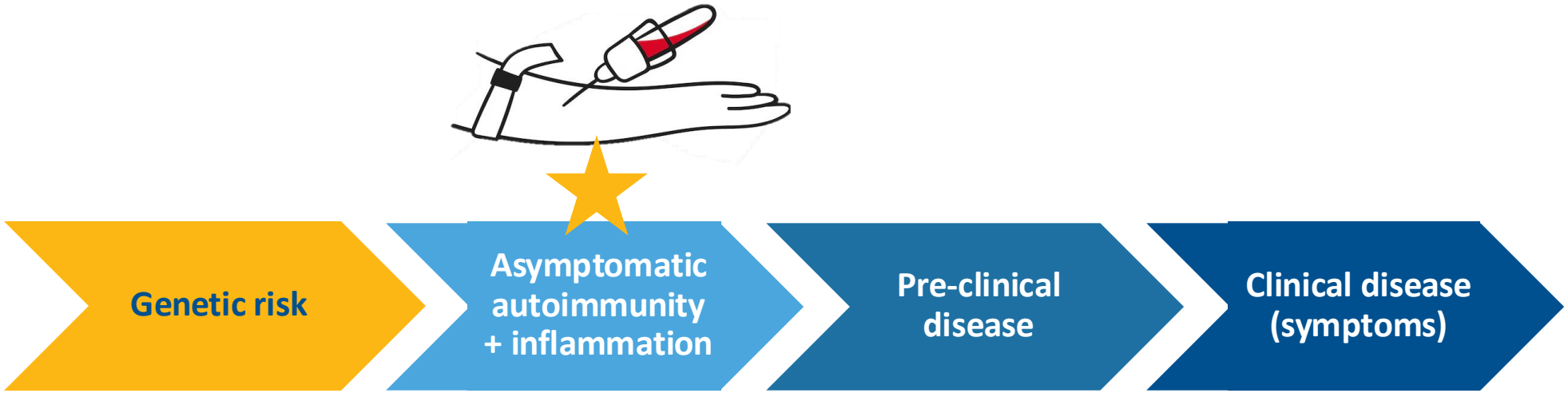
Shifting our mindset to disease prevention:
Biomarkers are detectable a decade prior to disease onset



Cytokines,
Chemokines,
Interferon signature

Autoantibodies

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Antibody Target	SLE Clinical Significance	Time to SLE Onset[1]
SSA/Ro60	• Subacute cutaneous SLE • Lymphopenia • Neonatal lupus • In pediatric SLE, milder disease (cutaneous, musculoskeletal) • Protective with SSB/La (less renal and neurologic disease)	Up to 8.1-9.4 years (mean 2.3-2.97 years)
SSB/La	• Subacute cutaneous SLE • Neonatal lupus • Leukopenia • Serositis • Protective with SSA/Ro60 (less renal and neurologic	Up to 7.0-8.1 years (mean 0.6-2.83 years)
Cardiolipin		ean 2.29 years)
dsDNA		s (mean 1.24-2.0 years)
U1-RNP	• Leukopenia • Neuropsychiatric SLE • Raynaud's • Musculoskeletal involvement • Lung involvement	Up to 7.2-7.5 years (mean 0.20-1.2 years)
Histone	• Drug-induced SLE • Neuropsychiatric SLE • Pathogenic	Up to 6.5 years (mean 1.9 years)
Sm (U2-U6 RNP)	• Part of classification criteria • Serositis • Lupus nephritis • Neuropsychiatric SLE	Up to 1.1-8.1 years (mean 0.47 years)

Autoantibodies have been reported OVER 9 YEARS prior to disease onset

Choi MY and Costenbader KH (2022) Front. Immunol. 13:890522.

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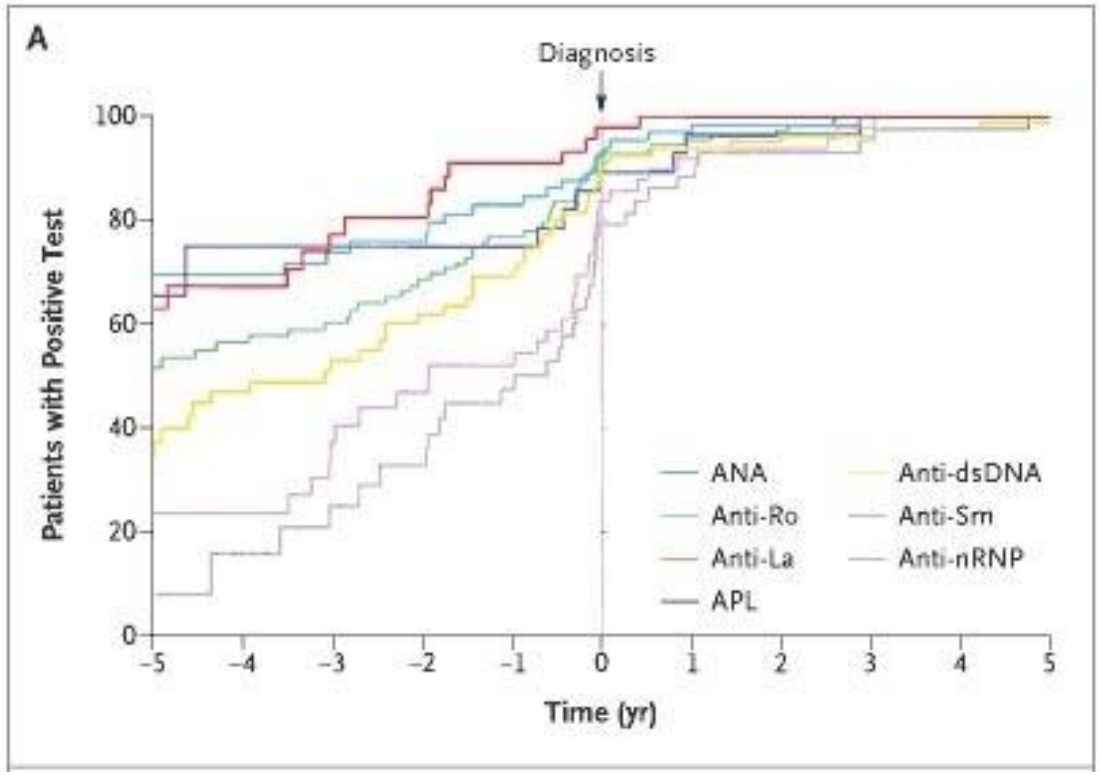

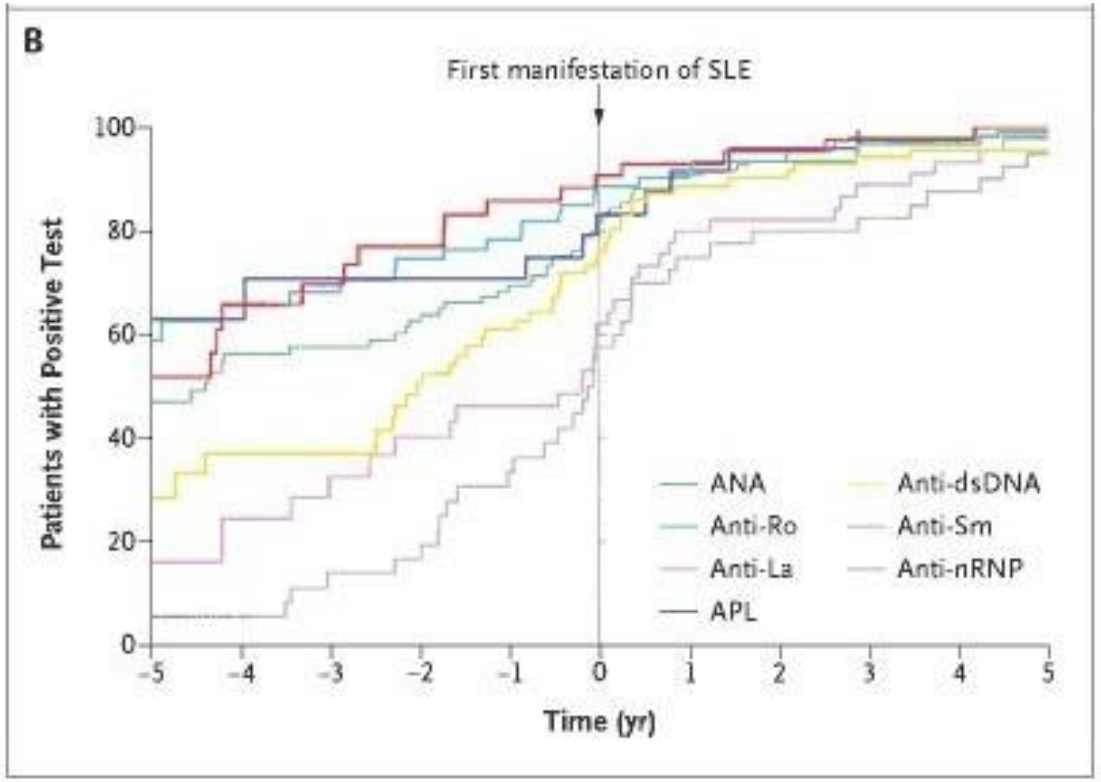

Arbuckle et al. N Engl J Med 2003; 349:1526-1533

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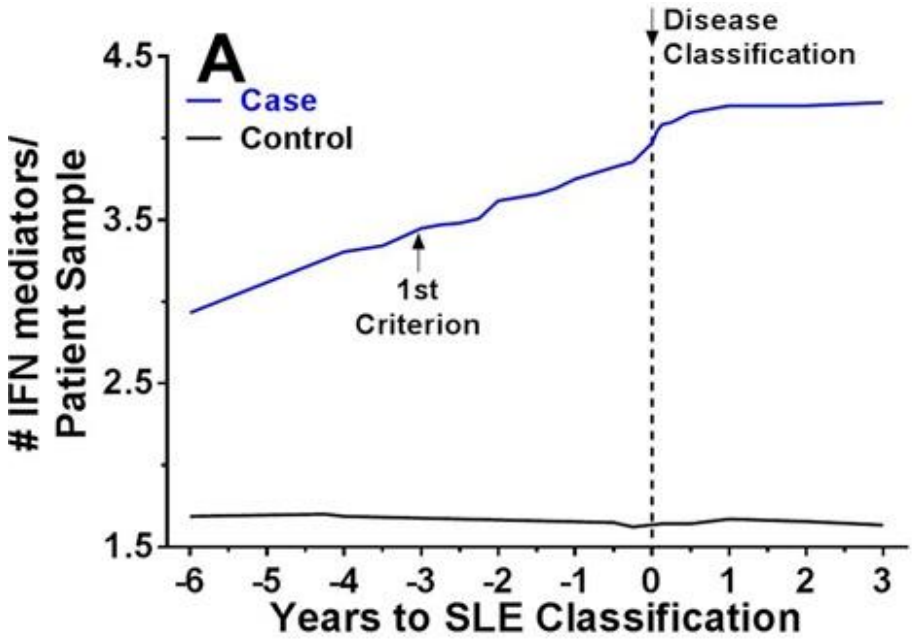
Autoantibodies and markers of inflammation (cytokines) can be detected years before disease onset



B

	Pseudo-R^2	p-value
IP-10	0.509	***< 0.001***
MIG	0.382	***< 0.001***
IFN-γ	0.287	***< 0.001***
IFN activity	0.154	***< 0.001***
BLyS	0.270	***< 0.001***
MCP-3	0.257	***0.004***
MIP-1α	0.023	*0.090*

Munroe M et al. Ann Rheum Dis. 2016 Nov;75(11):2014-2021.

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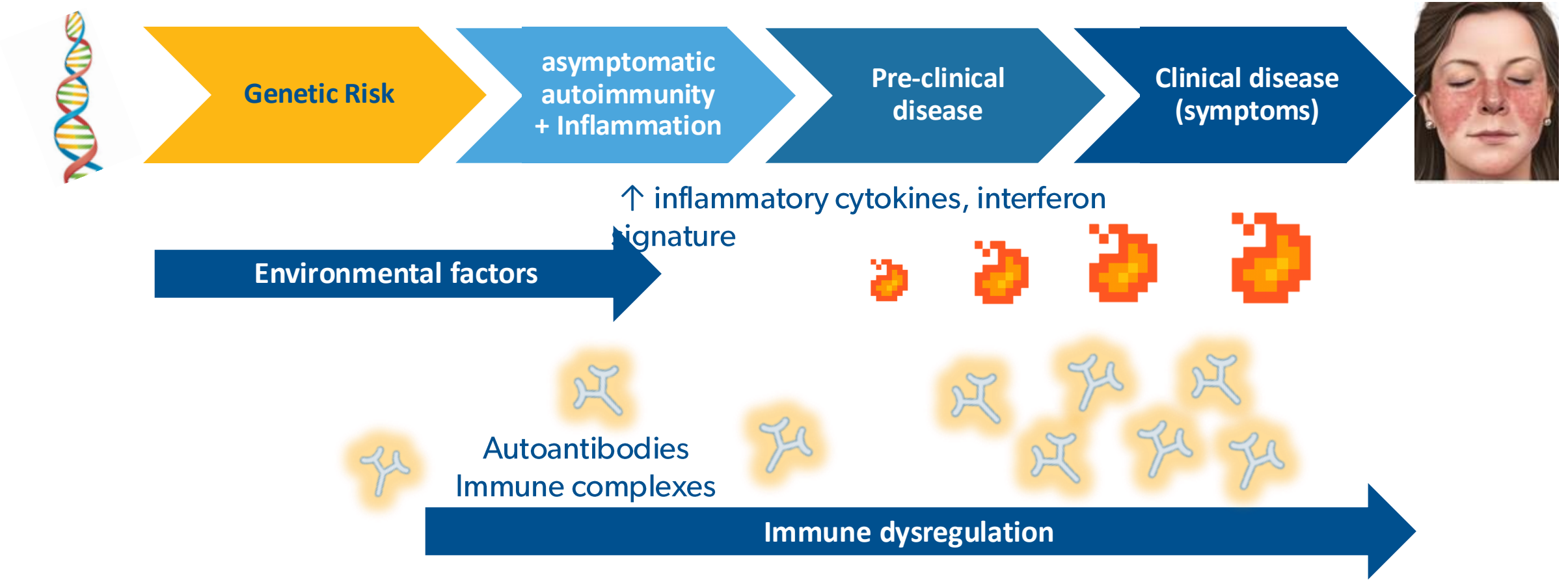
Q: Who is at risk for getting an autoimmune disease?

Pathogenesis of autoimmune diseases are complex and not completely understood



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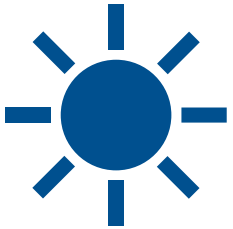
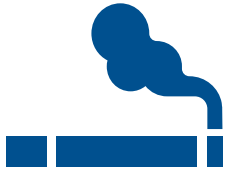
Environmental factors and lupus development

Many factors have been hypothesized to be associated with SLE development

- Cigarette smoke
- Alcohol
- Hormonal factors
- Obesity
- Infectious agents
- Ultraviolet light
- Medications
- Crystalline silica
- Vitamin D deficiency
- Pollutants





Arthritis & Rheumatology

AN OFFICIAL JOURNAL OF THE AMERICAN COLLEGE OF RHEUMATOLOGY

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Empowering Rheumatology Professionals

FULL LENGTH

A Combination of Healthy Lifestyle Behaviors Reduces Risk of Incident Systemic Lupus Erythematosus

May Y. Choi, Jill Hahn, Susan Malspeis, Emma F. Stevens, Elizabeth W. Karlson, Jeffrey A. Sparks, Kazuki Yoshida, Laura Kubzansky, Karen H. Costenbader

First published: 27 July 2021
https://doi.org/10.1002/art.41935

Nearly half of lupus risk, a disease where significant evidence of genetic involvement has been established, **might be reduced** with adherence to **modifiable healthy lifestyle behaviors.**

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Empowering Rheumatology Professionals

Original Article

Association of Sleep Deprivation and the Risk of Developing Systemic Lupus Erythematosus Among Women

May Y. Choi, Susan Malspeis, Jeffrey A. Sparks, Jing Cui, Kazuki Yoshida, Karen H. Costenbader

First published: 12 September 2022 | https://doi.org/10.1002/acr.25017 | Citations: 2

Chronic low sleep duration (≤5 hours/night) was associated with **increased SLE risk** (adjusted hazard ratio 2.47 [95% CI: 1.29, 4.75])

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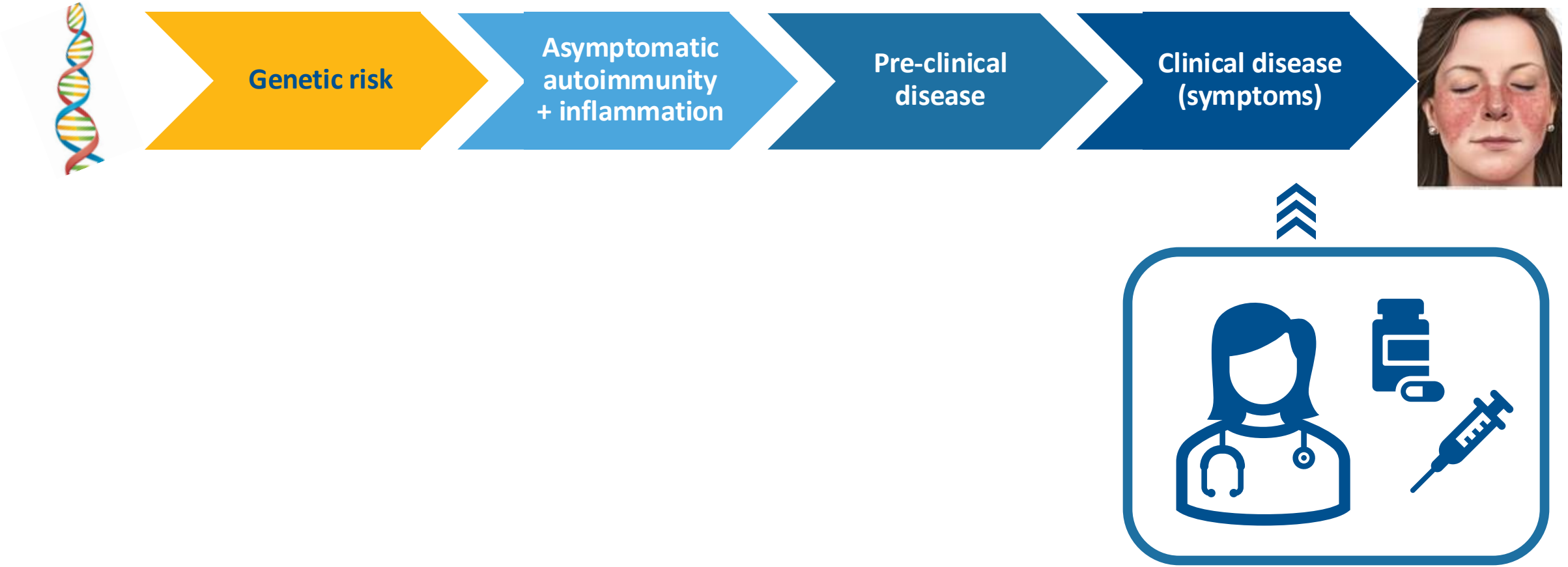
Q: Can you prevent or lower your risk for getting arthritis and other autoimmune diseases?

It takes ~3-5 visits to a doctor before a diagnosis is made



An earlier and more accurate diagnosis is needed

Genetic risk → Asymptomatic autoimmunity + inflammation → Pre-clinical disease → Clinical disease (symptoms)

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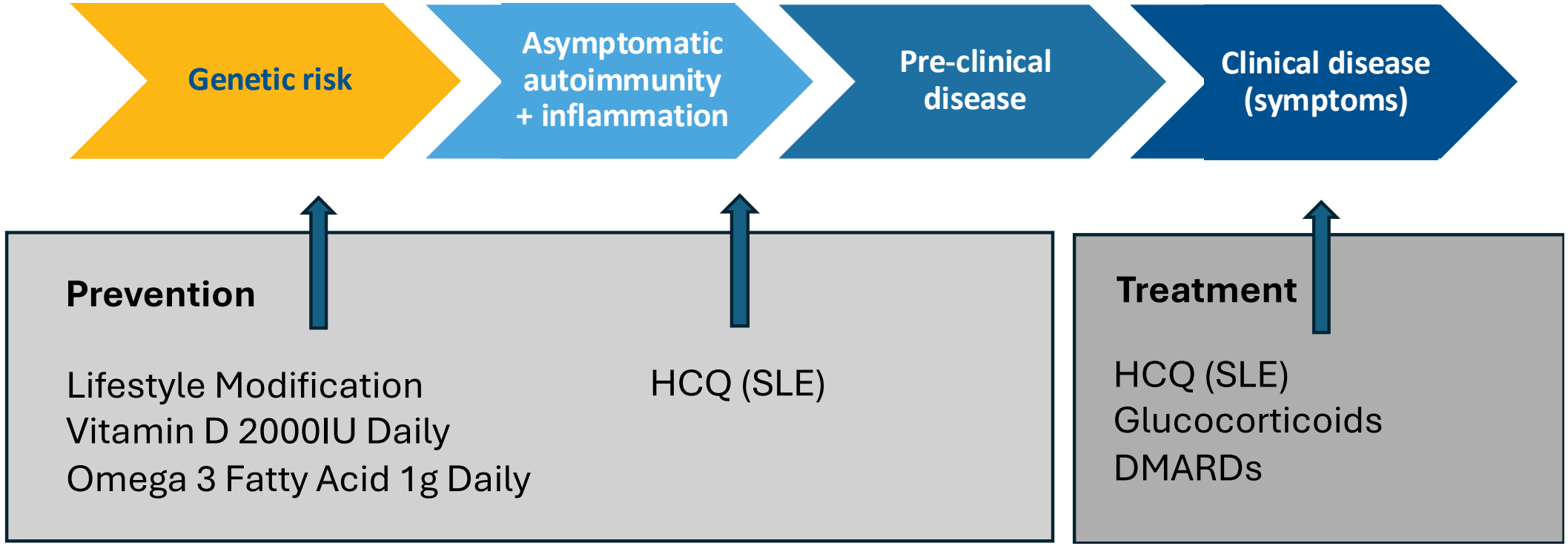
Biomarkers may help identify at-risk individuals for prevention and new drug target trials



HCQ: hydroxychloroquine; DMARDs: disease-modifying antirheumatic drugs

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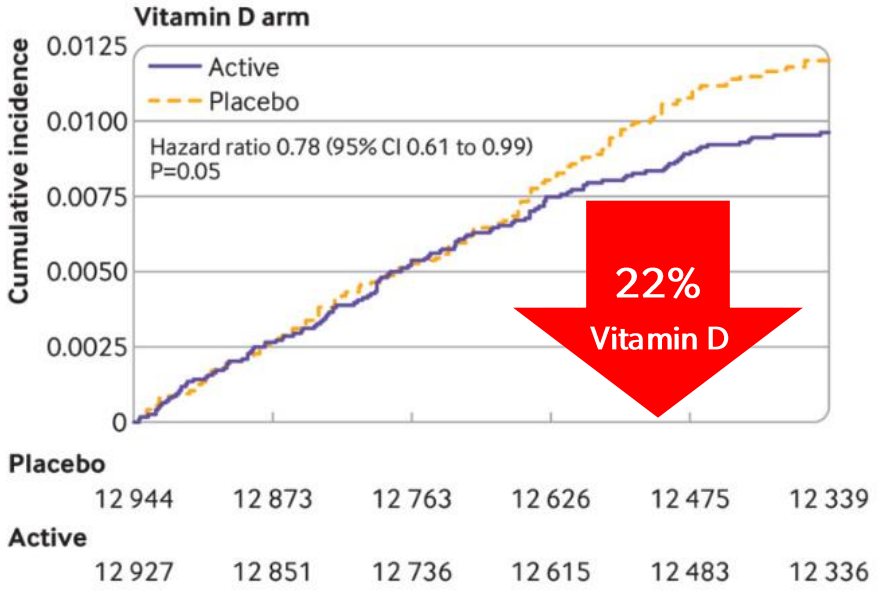
Vitamin D and marine omega 3 fatty acid supplementation and incident autoimmune disease: VITAL randomized controlled trial

Jill Hahn,[1,2,3] Nancy R Cook,[1,4] Erik K Alexander,[5] Sonia Friedman,[6] Joseph Walter,[4] Vadim Bubes,[4] Gregory Kotler,[4] I-Min Lee,[1,4] JoAnn E Manson,[1,4] Karen H Costenbader[2]

BMJ 2022;376:e066452



15% reduction between fish oil and placebo (**not significant**)

- Large (>25,000 adults) primary prevention trial in the US
- **Vitamin D** 2000 IU/day and/or **omega 3 fatty acids** (1g/day) and/or placebo for ~five years
- Incident autoimmune diseases included polymyalgia rheumatica, ANCA-vasculitis, HSP

ARTHRITIS TALKS

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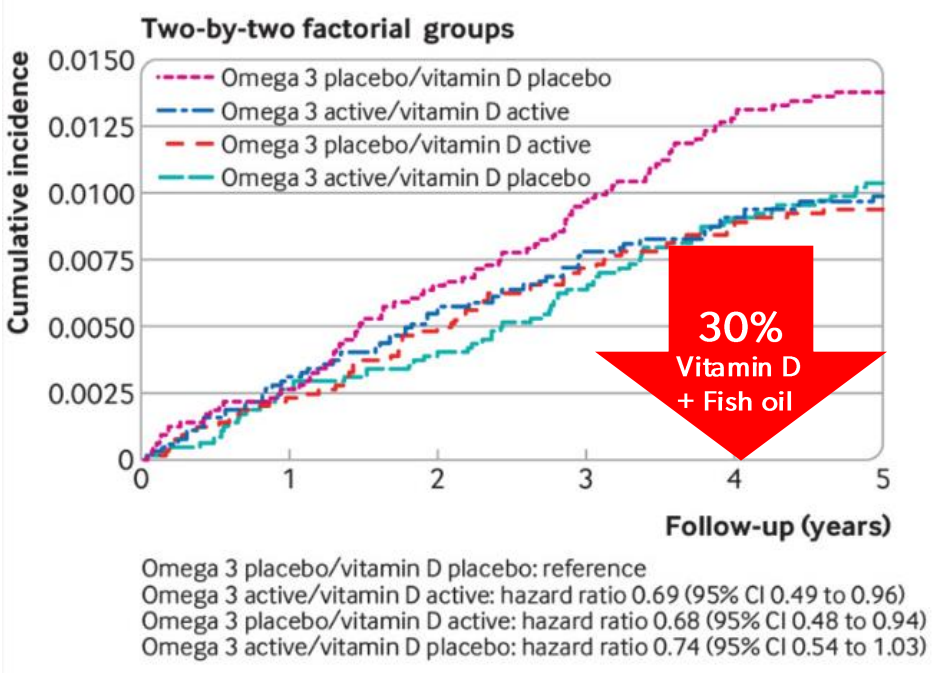

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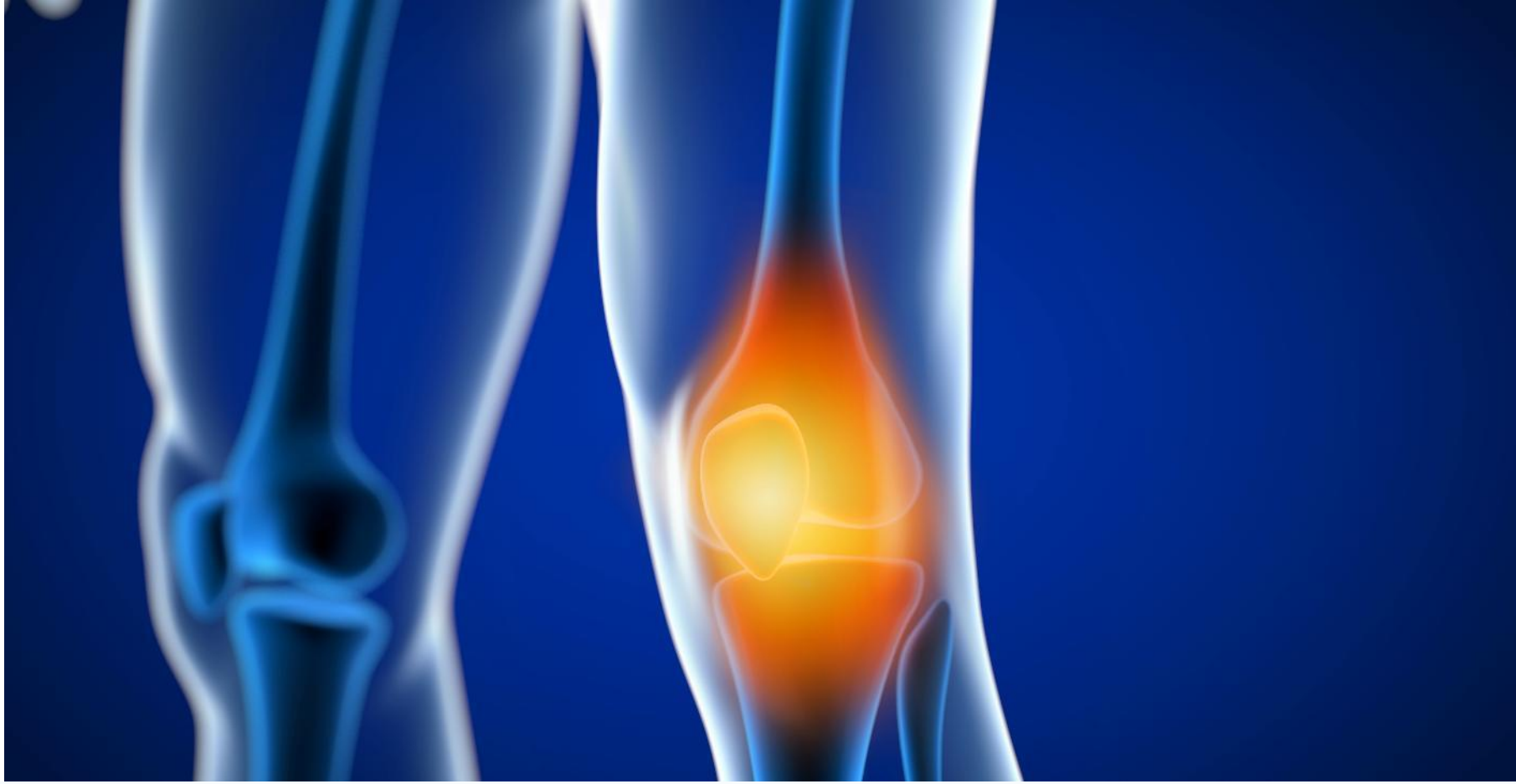
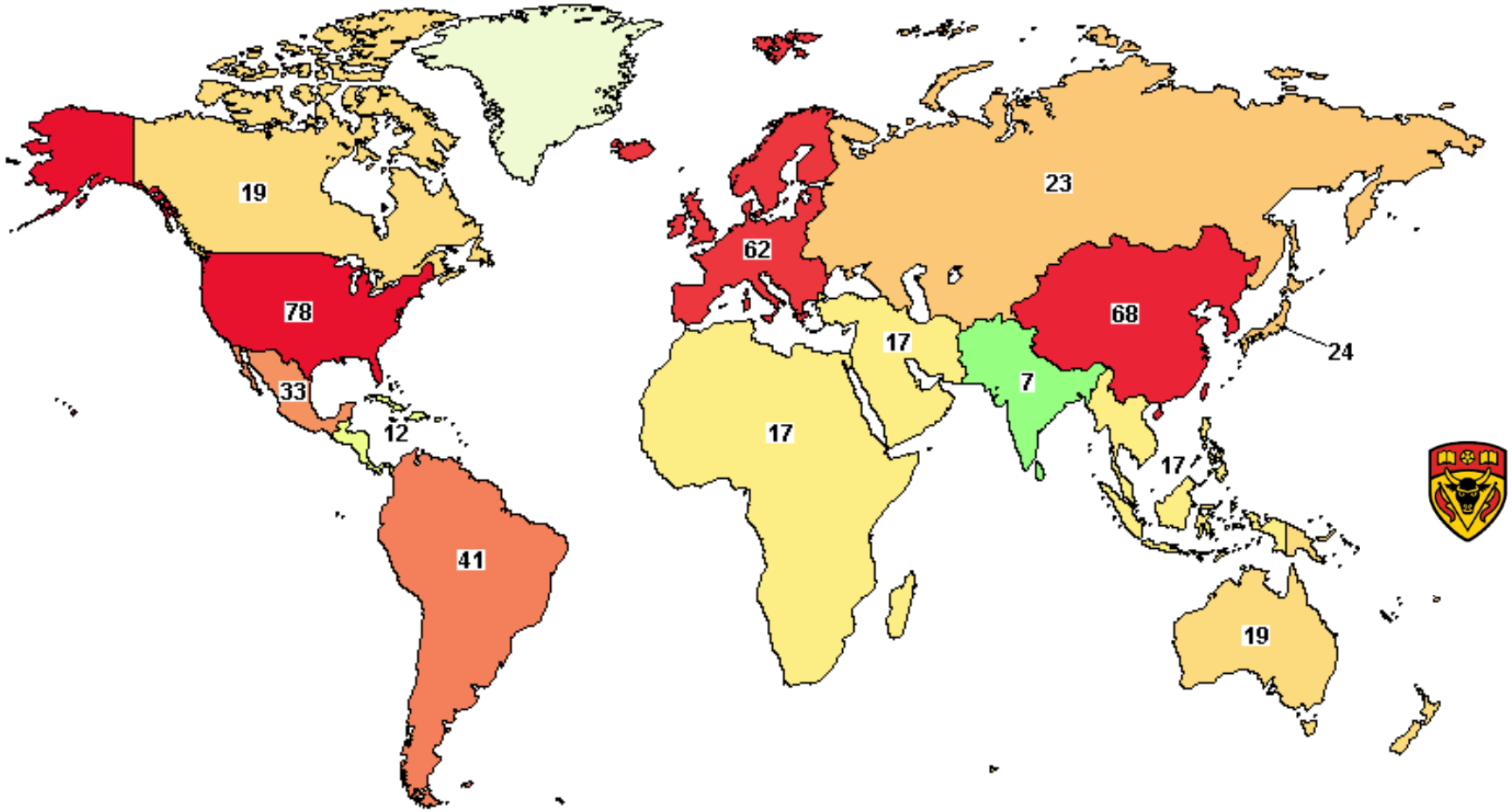


Q: What excites you about the future for those diagnosed with arthritis today?

Many ongoing clinical trials for all types of autoimmune diseases



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Why use artificial intelligence to study autoimmune rheumatic diseases?

- Greater access to various sources of large datasets (e.g., images) and powerful computers
- Autoimmune diseases are highly complex and heterogenous

Machine learning can reveal patterns and interactions between variables in **large and complex biomarker datasets** more accurately and efficiently

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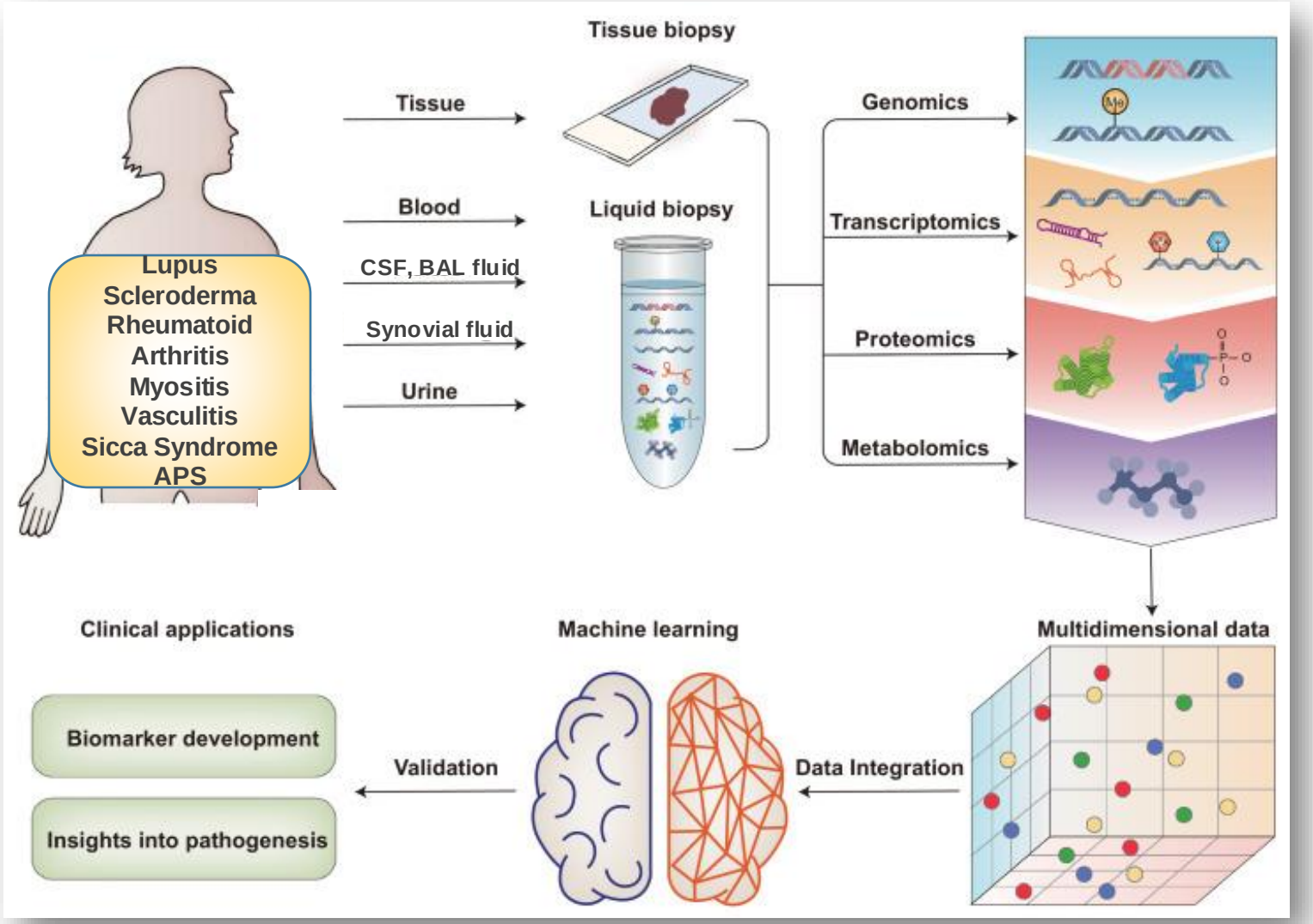
Artificial intelligence combined with **advanced cellular and molecular technologies** to study the immune system to improve diagnosis of systemic autoimmune rheumatic diseases



Adapted from Xiao Y, et al. EBioMedicine. 2022 May;79:104001

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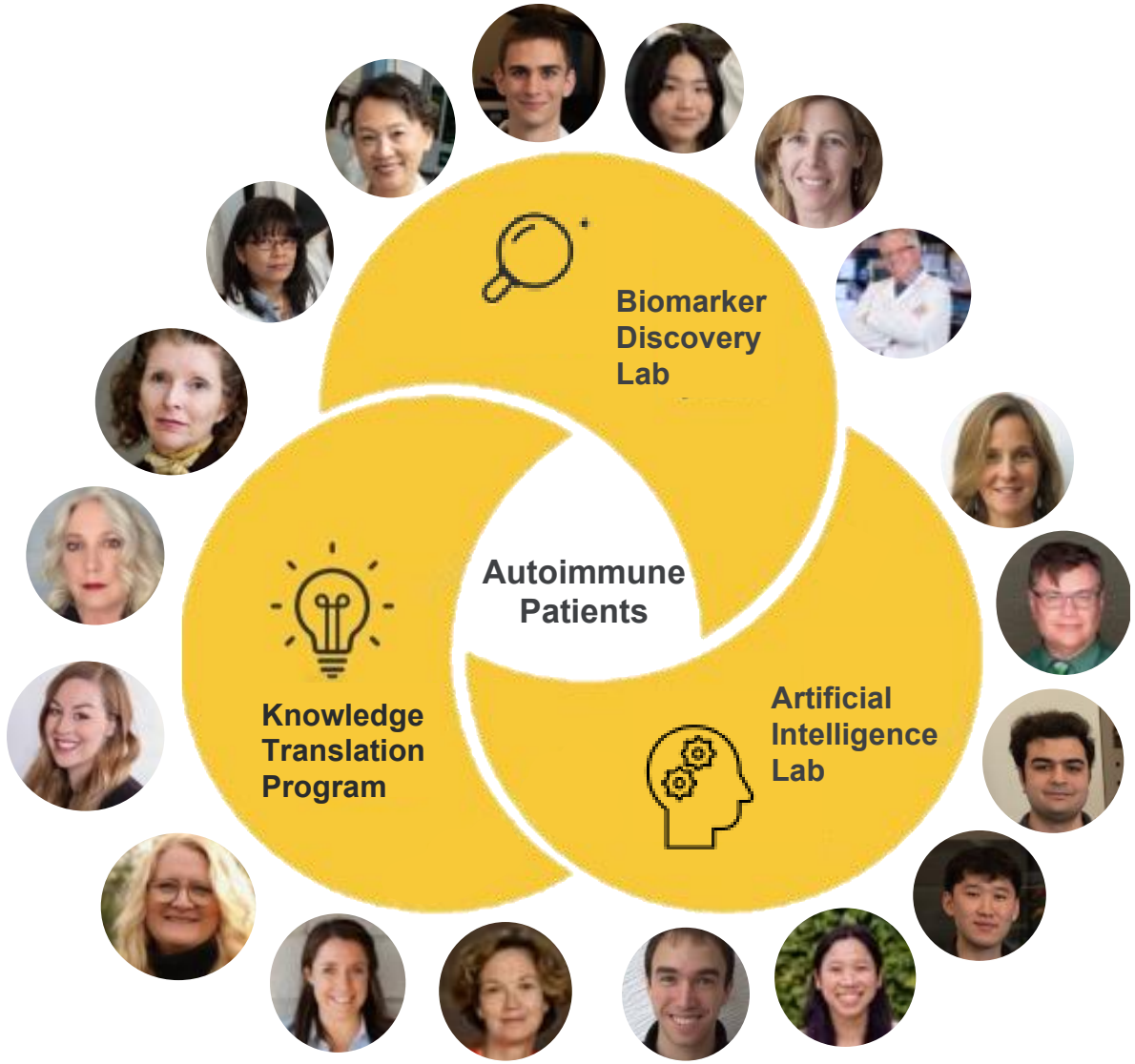
Artificial Intelligence — AutoImmune Diagnostics



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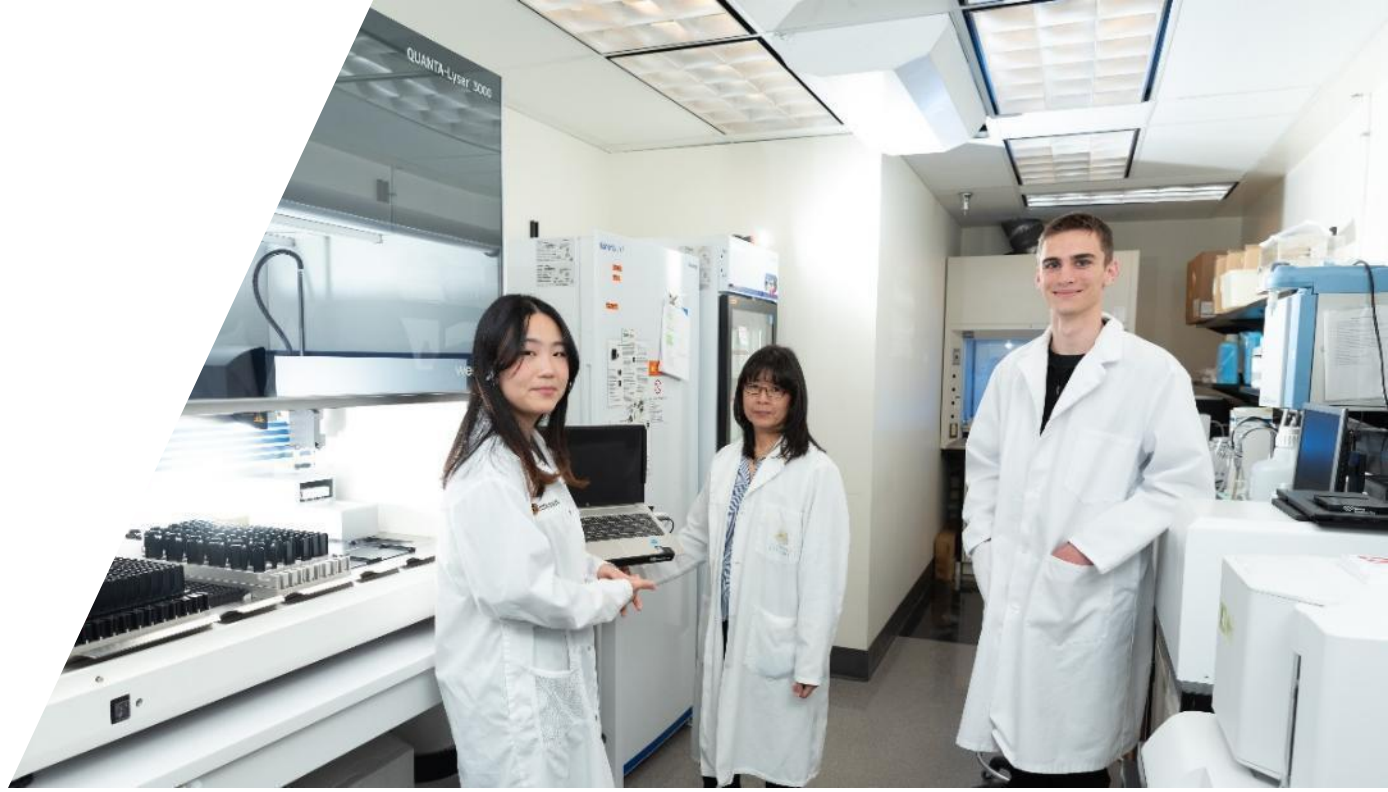
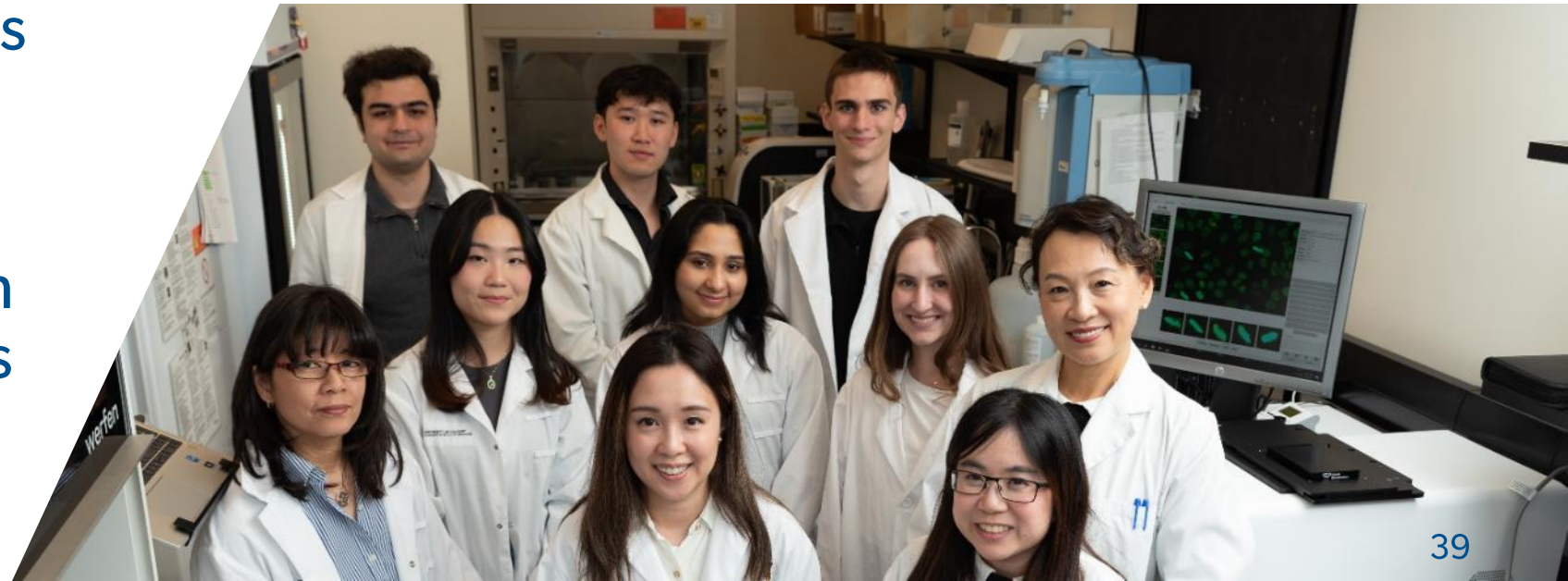
1. Enhancing precision autoimmunity through **biomarker discoveries**

2. Leveraging **artificial intelligence** in big biomarker data analytics

3. Translating biomarker discoveries to transform **patient care** paradigms





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Questions

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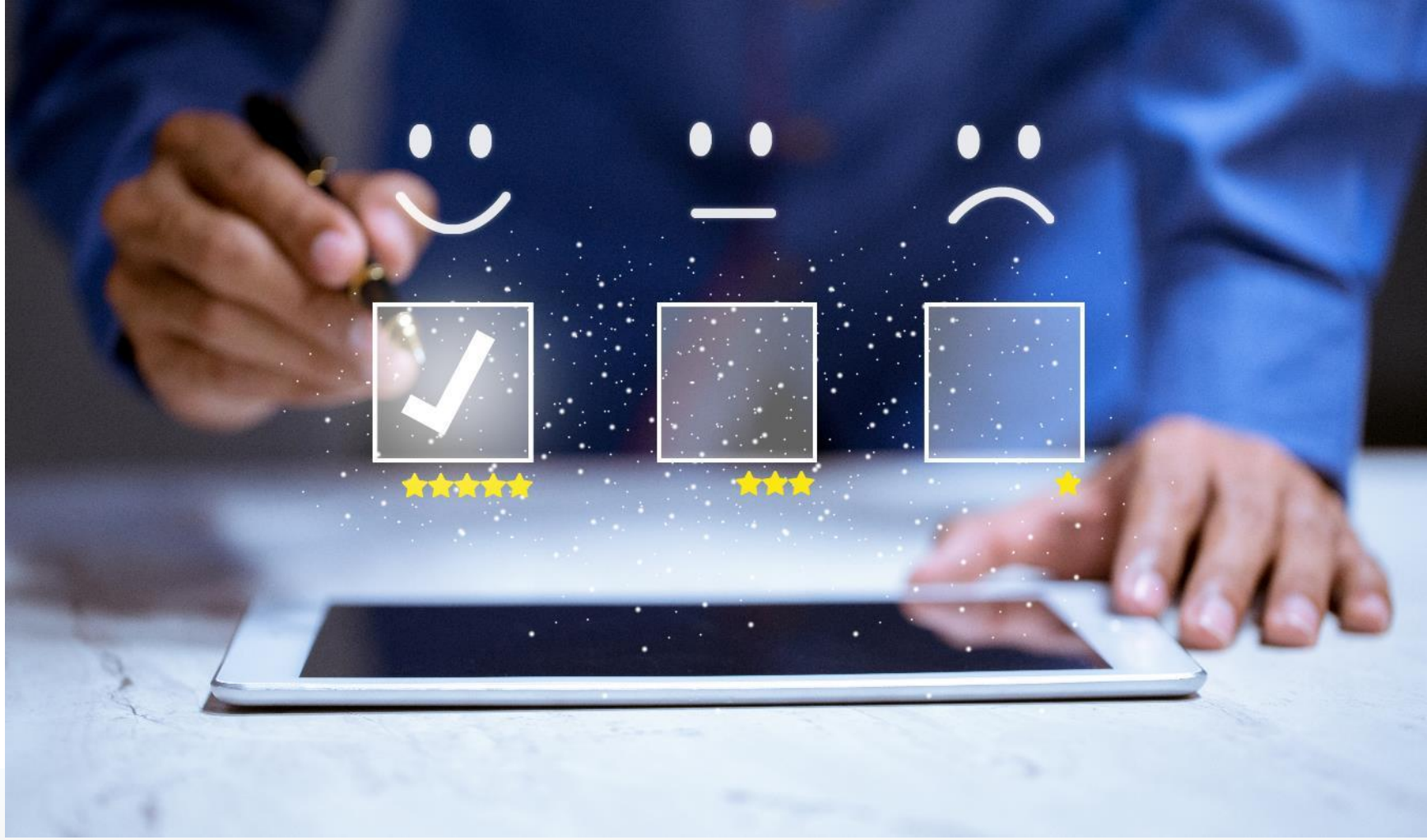

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