



The Burden of Post-acute Sequelae of COVID-19 and Implications for Health Care Leaders and Systems

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Disclosures

- No conflict of interest
- The opinions expressed in this presentation do not represent the views of the United States Department of Veterans Affairs or the United States Government

Outline

- What led us to study long covid?
- What is long covid?
 - Post-acute sequelae
 - Covid vs flu
- Implications for health systems and communities



How do we do our part in this pandemic?



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Non-recovery from Coronavirus infection

The New York Times

OPINION

We Need to Talk About What Coronavirus Recoveries Look Like

They're a lot more complicated than most people realize.

April 13, 2020

By **Fiona Lowenstein**

Fiona Lowenstein is a writer, producer and yoga teacher.



Fiona Lowenstein

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speaker, writer, producer @nytimes @voxdotcom @guardian @USAToday @TeenVogue @Eater @Elemental @Bustle @cjr ✨ founder + prez @itsbodypolitic they/she

New York, NY fionalowenstein.com Joined August 2012

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Fiona Lowenstein @fi_lowenstein · Mar 17

Last year on this day, I was being treated for Covid-19 in the hospital. Today, I'm in touch with thousands of patients who never recovered. My latest for [@nytopinion](#) with [@ahandvanish](#) looks at why [#LongCovid](#) needs to be our focus in year 2.



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First report on long covid

Report: What Does COVID-19 Recovery Actually Look Like?


An Analysis of the Prolonged COVID-19 Symptoms Survey by Patient-Led Research Team

Originally Released: May 11th, 2020. Generated from survey data organized by decentralized team of COVID-19 patients, exported on May 2, 2020 (640 Responses)

Patient-Led Research Collaborative
www.patientresearchcovid19.com



Early reports from patient-led groups

- Weakness
 - Fatigue
 - Brain fog
 - Muscle pain
 - Other manifestations
- 
- Long covid
 - Long haulers

What is long Covid?

Accelerated Article Preview

High-dimensional characterization of post-acute sequelae of COVID-19

Received: 18 January 2021

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Accelerated Article Preview Published
online 22 April 2021

Cite this article as: Al-Aly, Z. et al.
High-dimensional characterization of
post-acute sequelae of COVID-19. *Nature*
<https://doi.org/10.1038/s41586-021-03553-9>
(2021).

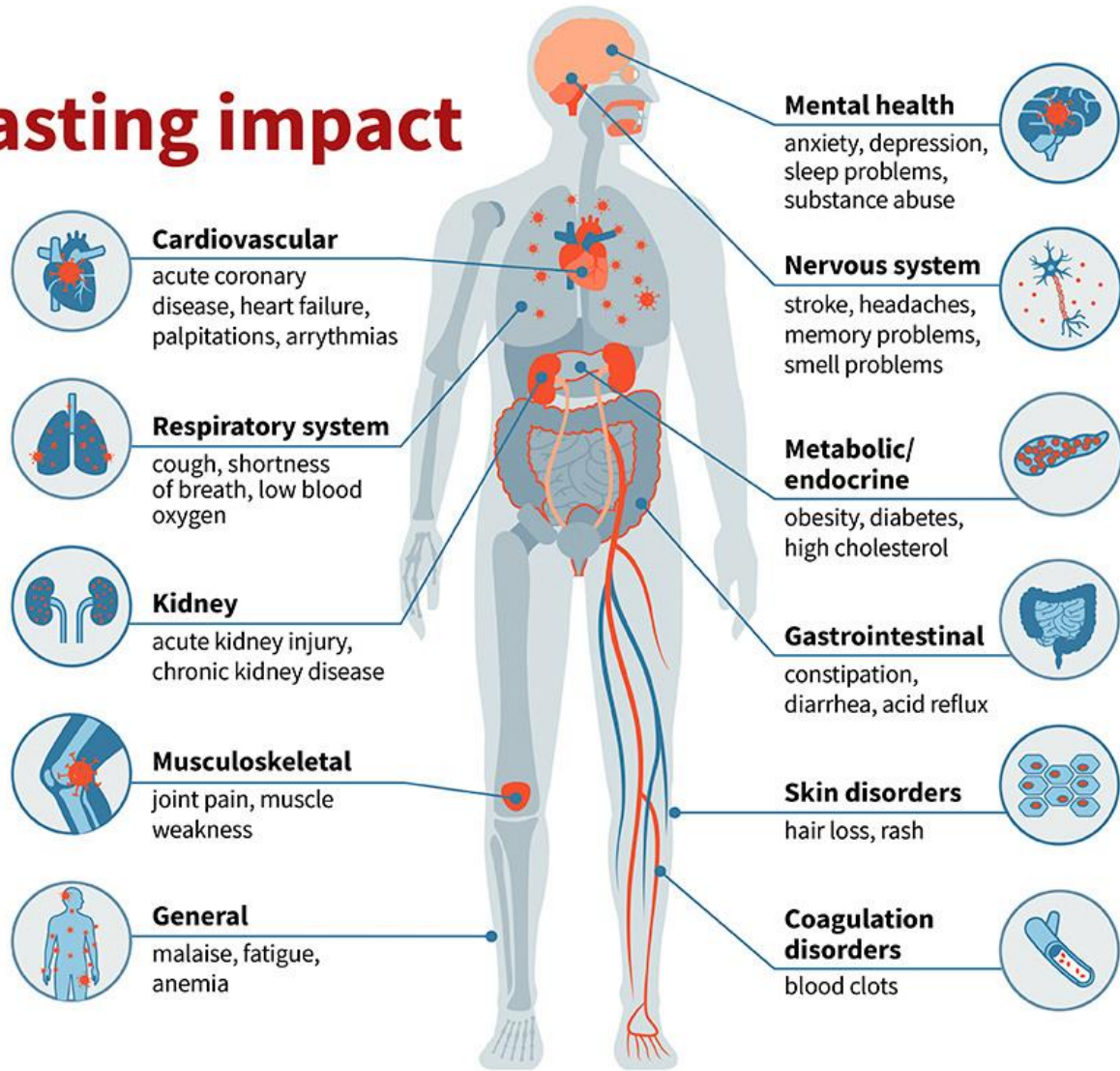
Ziyad Al-Aly, Yan Xie & Benjamin Bowe

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COVID-19: Lasting impact

Even those survivors with mild initial cases can have wide-ranging health issues for six months or more.

WashU researchers link many diseases with COVID-19, signaling long-term complications for patients and a massive health burden for years to come.



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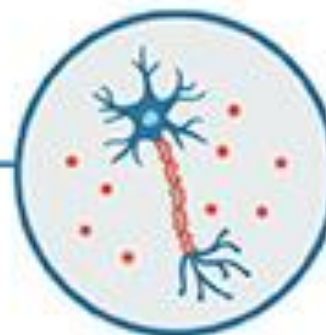
Mental health

anxiety, depression,
sleep problems,
substance abuse



Nervous system

stroke, headaches,
memory problems,
smell problems





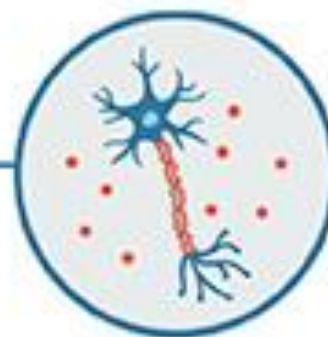
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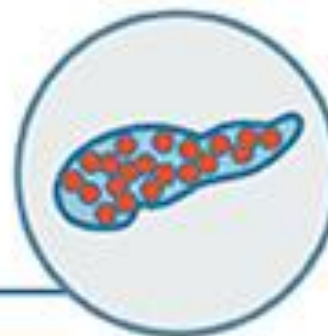
Nervous system

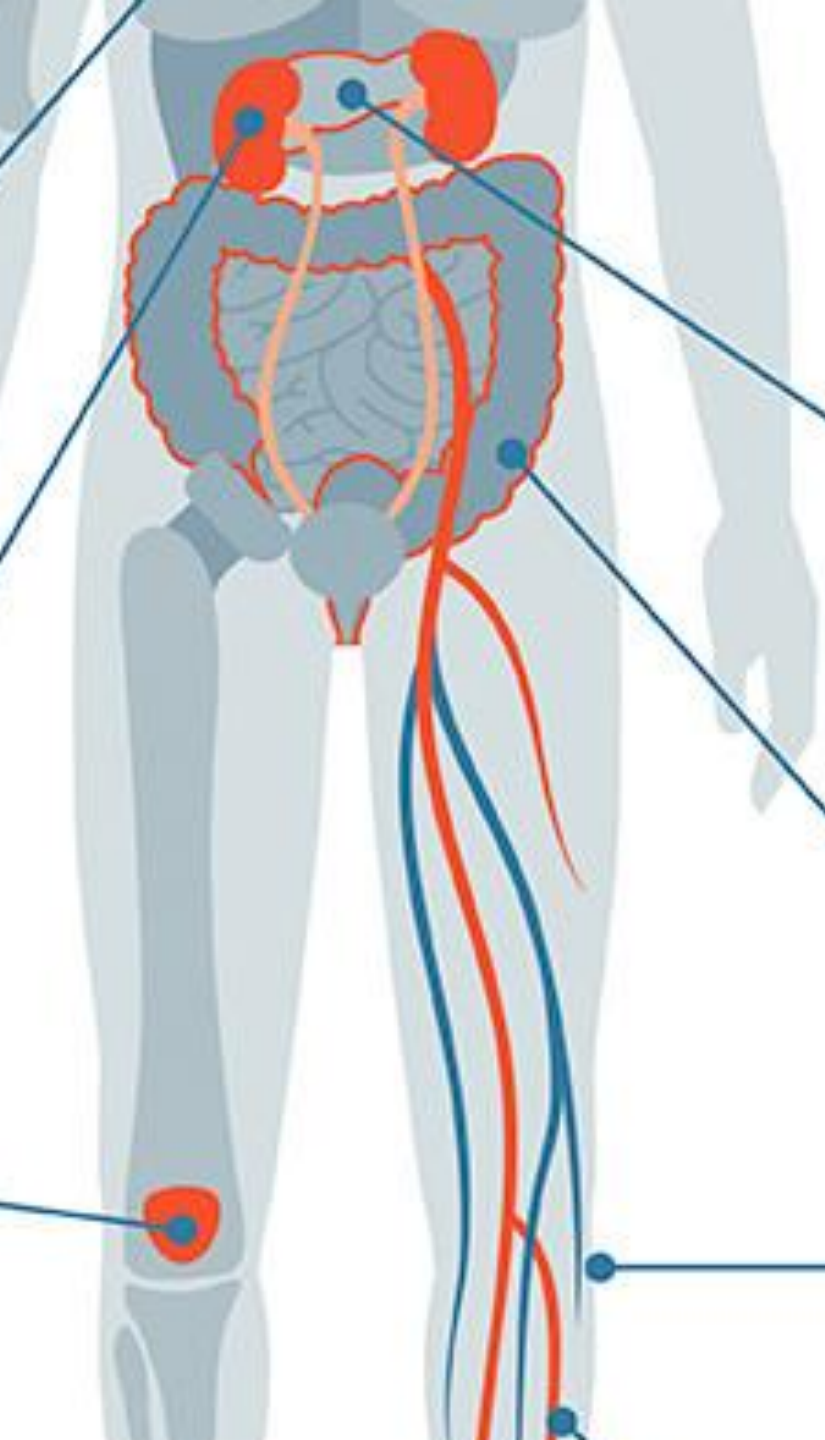
stroke, headaches,
memory problems,
smell problems



Metabolic/ endocrine

obesity, diabetes,
high cholesterol





memory problems,
smell problems

**Metabolic/
endocrine**

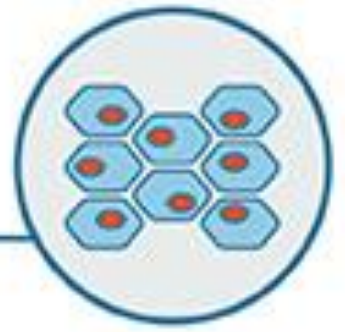
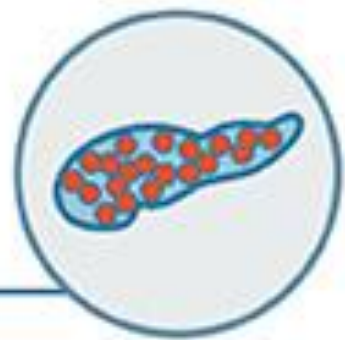
obesity, diabetes,
high cholesterol

Gastrointestinal

constipation,
diarrhea, acid reflux

Skin disorders

hair loss, rash





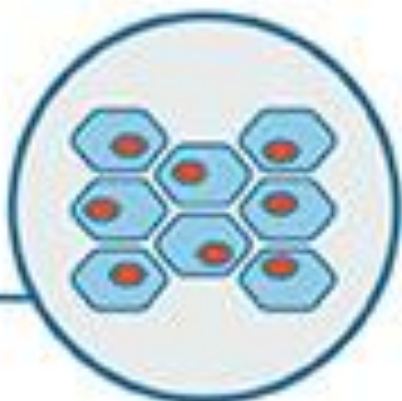
Gastrointestinal

constipation,
diarrhea, acid reflux



Skin disorders

hair loss, rash



Coagulation disorders

blood clots



Lasting impact



Cardiovascular

acute coronary disease, heart failure, palpitations, arrhythmias



Respiratory system

cough, shortness of breath, low blood oxygen



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Kidney

acute kidney injury,
chronic kidney disease



Musculoskeletal

joint pain, muscle
weakness



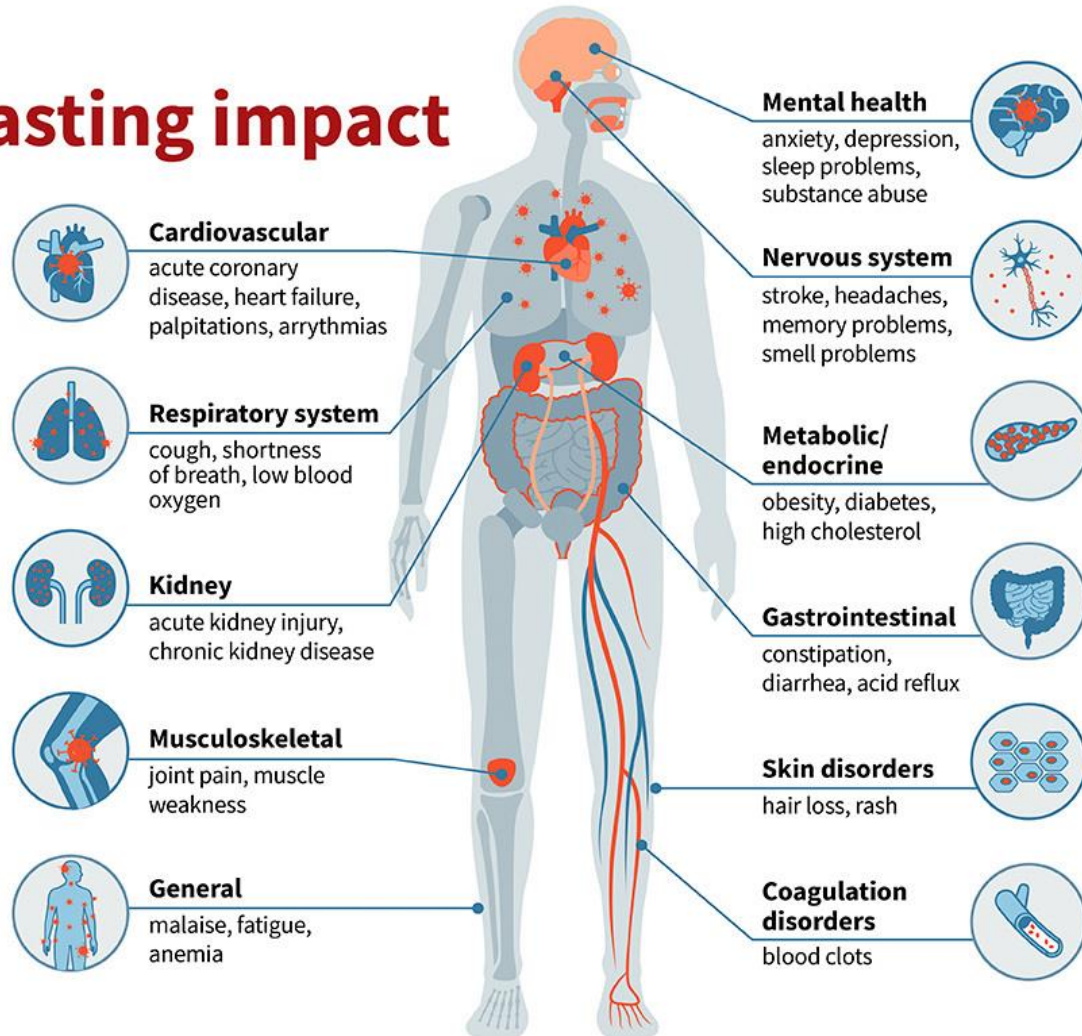
General

malaise, fatigue,
anemia

COVID-19: Lasting impact

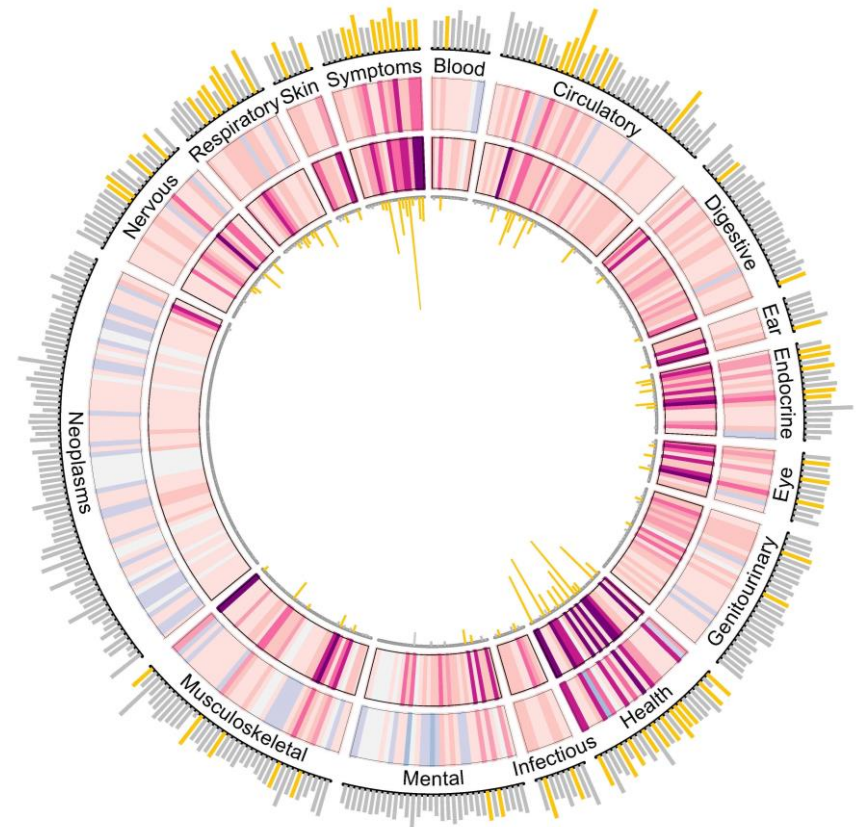
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WashU researchers link many diseases with COVID-19, signaling long-term complications for patients and a massive health burden for years to come.



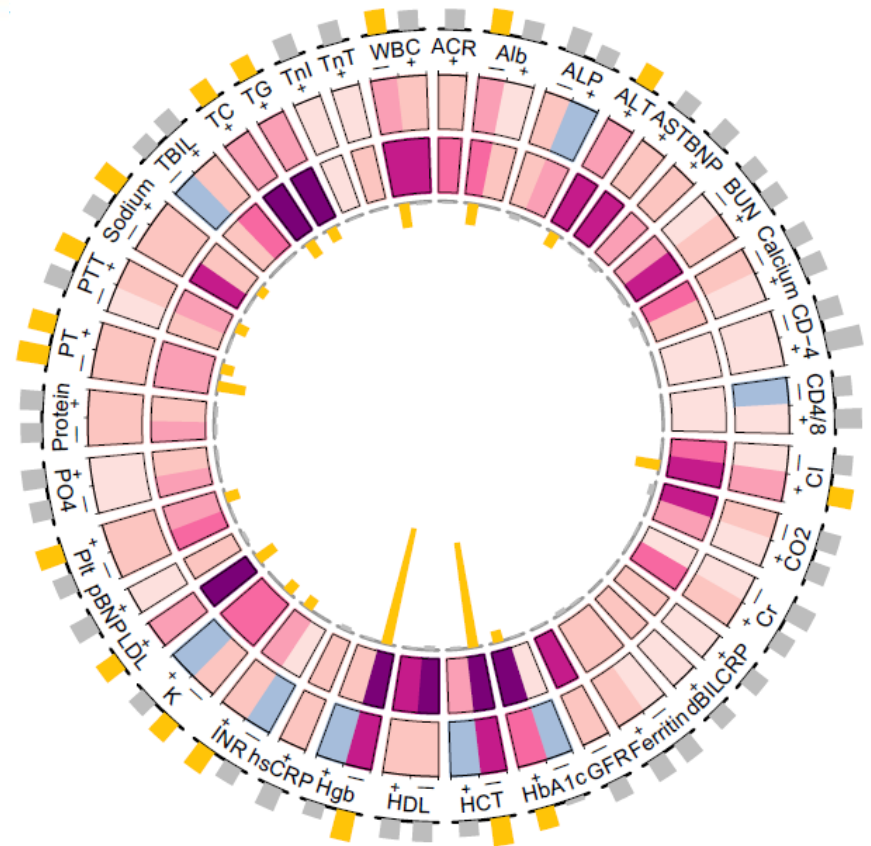
Covid vs seasonal influenza

- Magnitude of risk is higher
- Breadth of organ involvement
- It is a different kind of post-viral syndrome

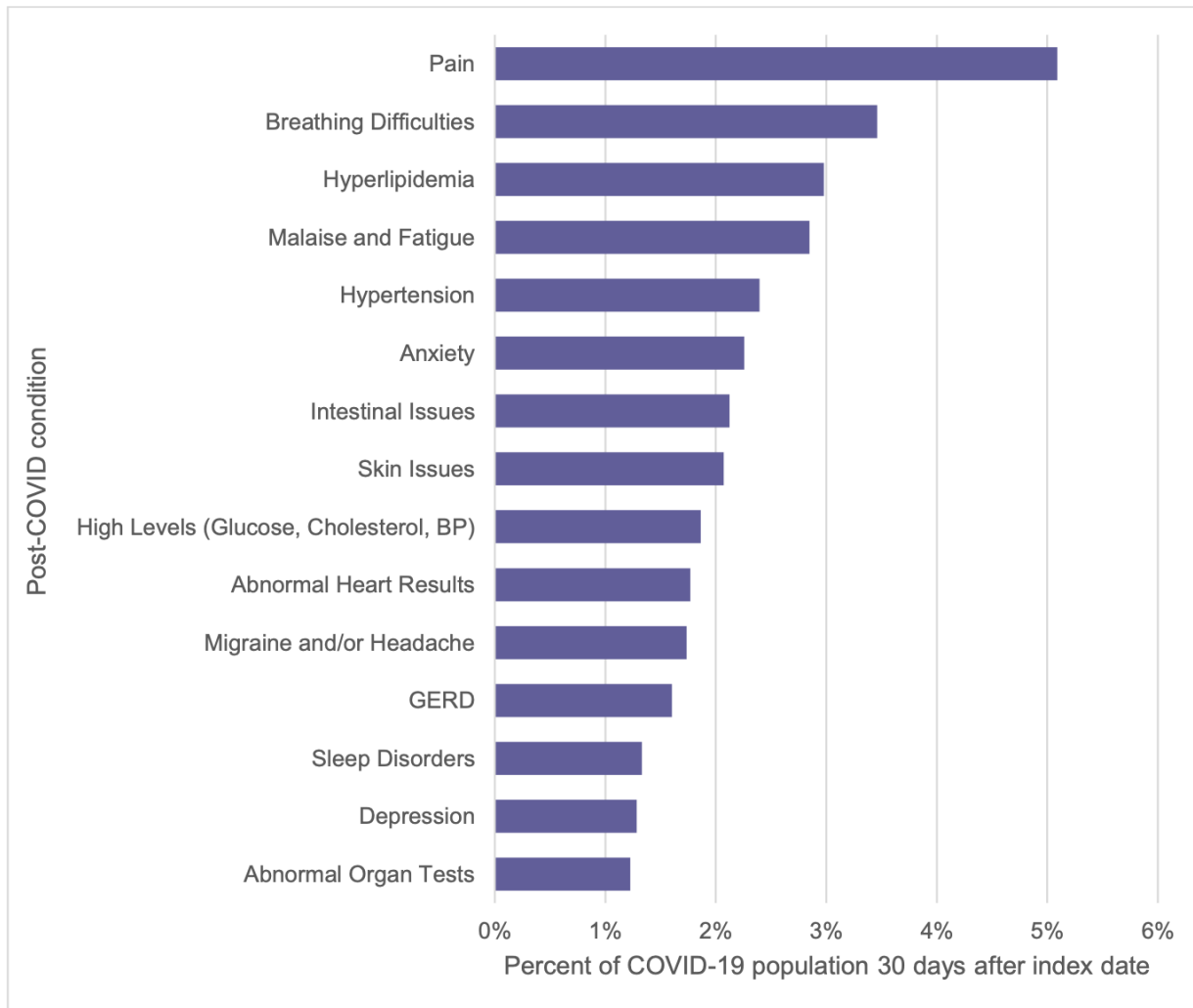


Post-acute Sequelae

- The risk is evident among non-hospitalized
- The risk increases according to the severity of the acute infection



Top 15 post-COVID conditions



FAIR Health,
June 15, 2021

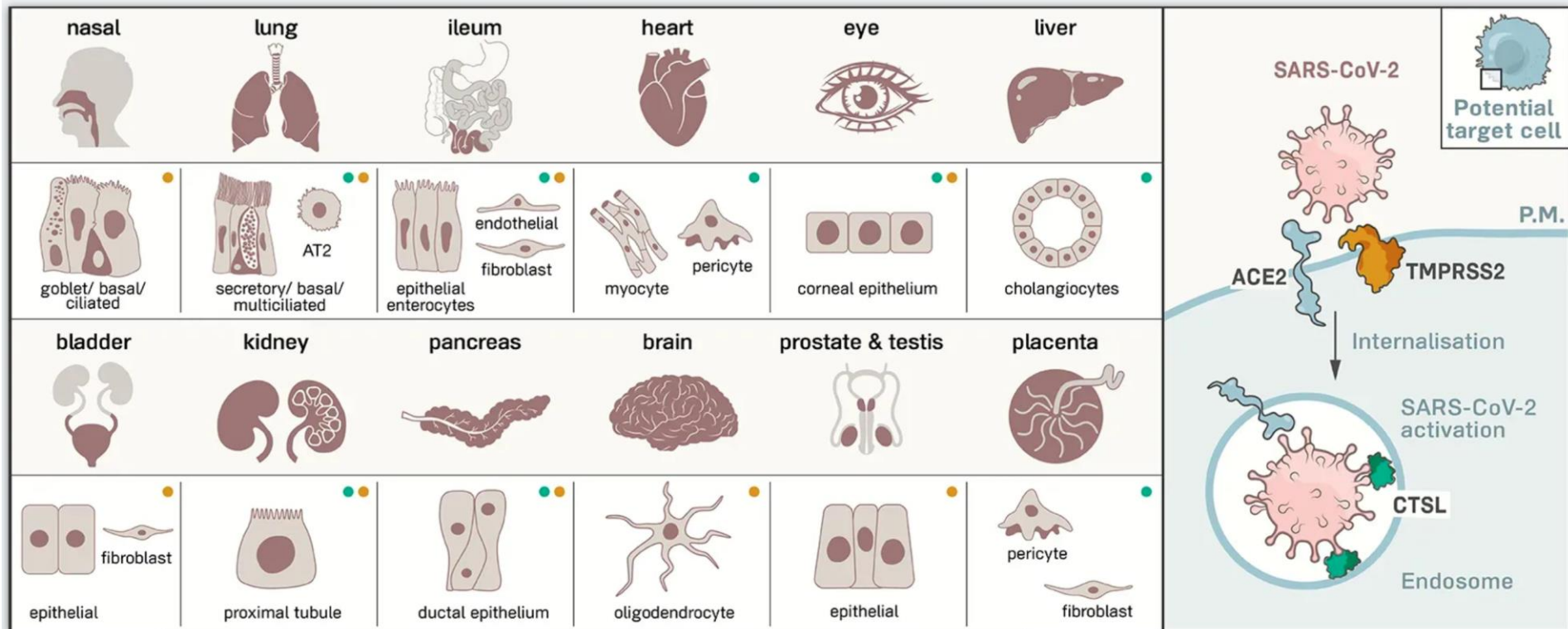


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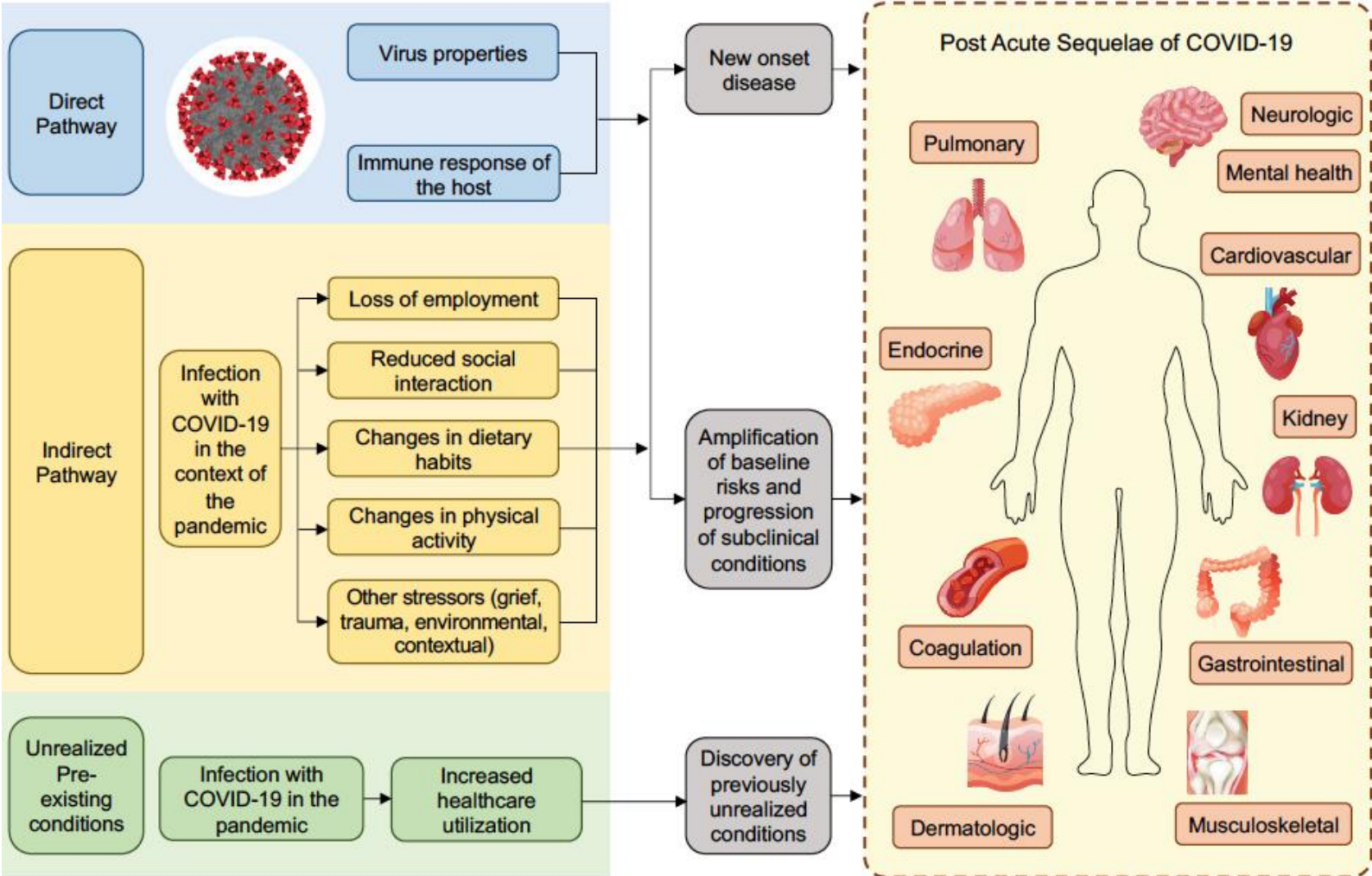
Sequelae of concern

- Mental health disorders
- Pain: Opioid use
- Cardiovascular disorders
- Nervous system and neurocognitive disorders
- Metabolic disorders

Receptors for SARS-CoV-2 Present in Wide Variety of Human Cells

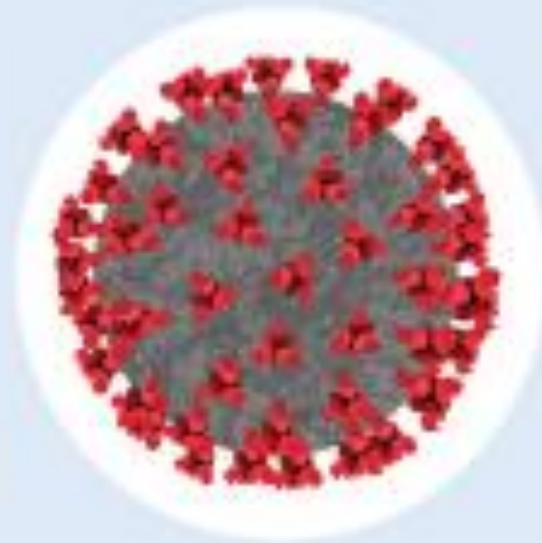


Mechanisms of Long COVID



Mechanisms

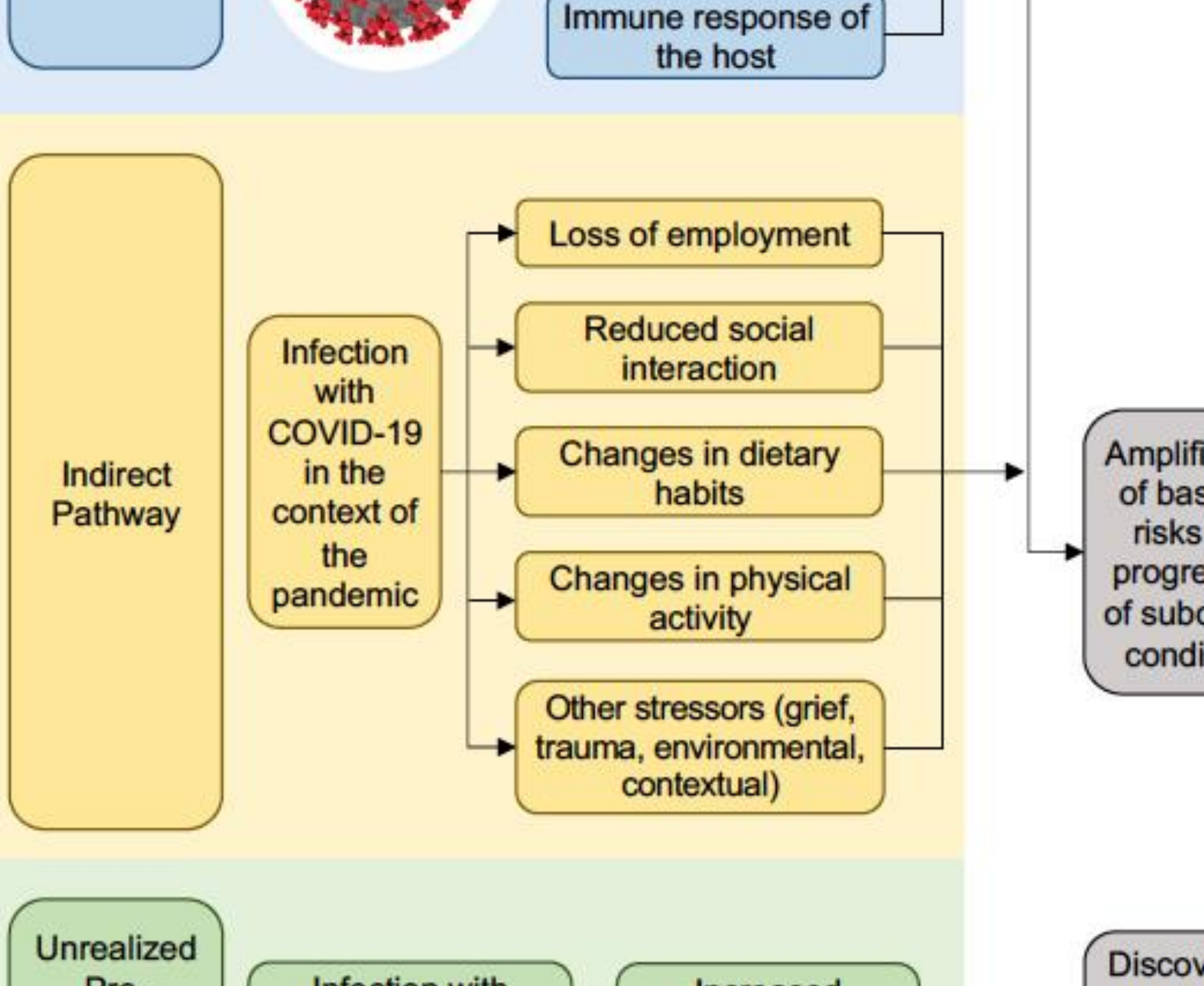
Direct
Pathway



Virus properties

Immune response of
the host

Loss of employment



Other stressors (grief, trauma, environmental, contextual)

Unrealized Pre-existing conditions

Infection with COVID-19 in the pandemic

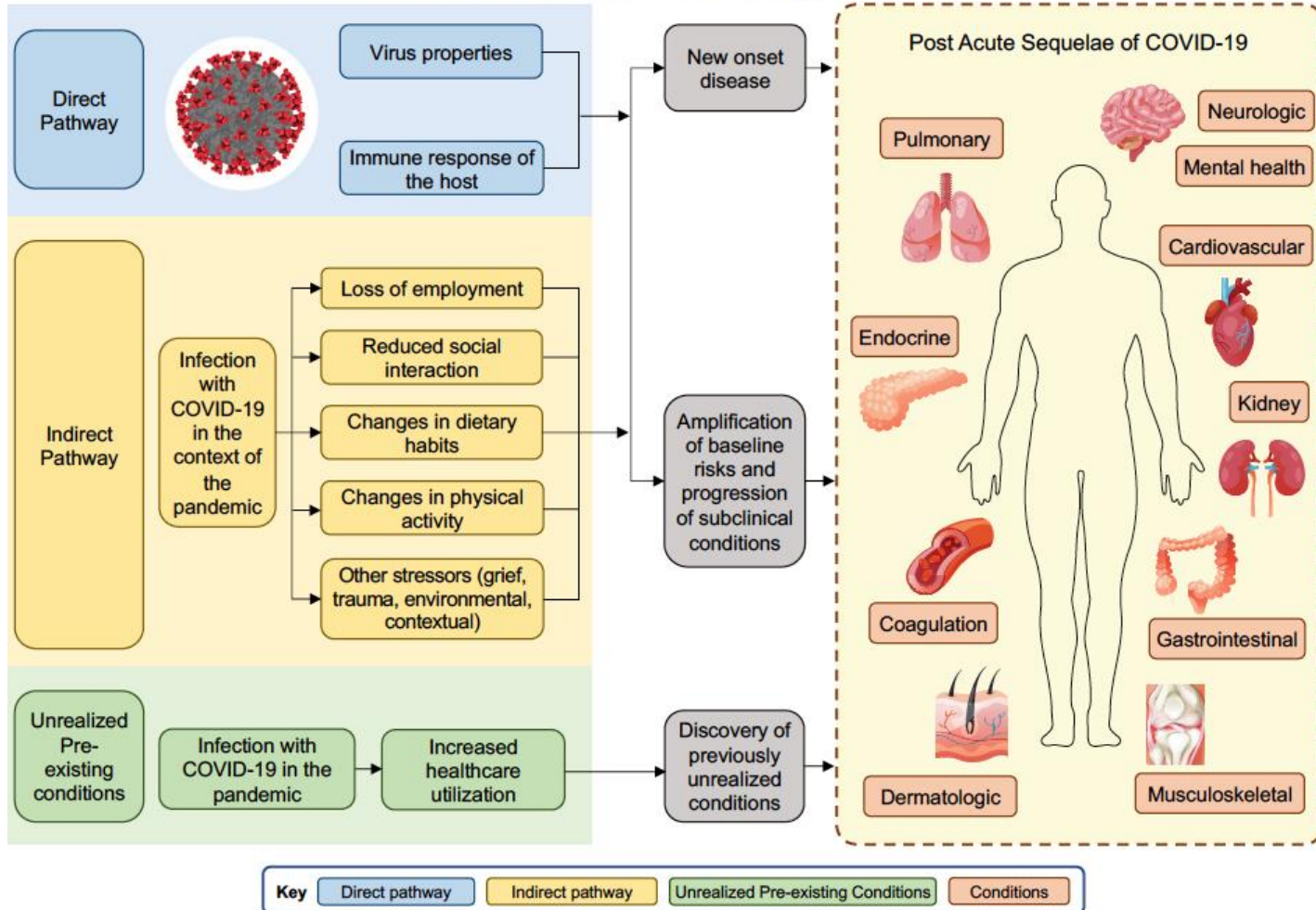
Increased healthcare utilization

Key

Direct pathway

Indirect pathway

Mechanisms of Long COVID



America's next big health crisis

The New York Times

OPINION

Long Covid Is Not Rare. It's a Health Crisis.

Lingering symptoms from the coronavirus may turn out to be one of the largest mass disabling events in modern history.

March 17, 2021

By Fiona Lowenstein and Hannah Davis

Fiona Lowenstein is a journalist and the founder of the health justice organization [Body Politic](#). Hannah Davis is an artist, researcher and founding member of [Body Politic's](#) research partner, the [Patient-Led Research Collaborative](#).

A year later, we still struggle to be taken seriously....

.....few think long Covid can happen to them, or that it will affect their post-pandemic life.

But long Covid is not a footnote to the pandemic or a curious human-interest story. It is America's next big health crisis, and we should prepare for it now.



The long shadow of Covid

- The toll of hospitalization and death from acute covid is only the tip of the iceberg
- Post-acute covid
 - Disease and disability
 - Early mortality – impact of life expectancy
 - Economic implications
 - Social implications
 - Global unrest



Interim Guidance from CDC: Evaluating and Caring for Patients with Post-COVID Conditions

- Many post-COVID conditions can be managed by primary care providers
- Objective laboratory or imaging findings should not be used as the only measure or assessment of a patient's well-being
- Lack of laboratory or imaging abnormalities does not invalidate the existence of a patient's symptoms or conditions
- Guidance will likely change over time as the evidence evolves.

Implications for health systems I

- Burden of long covid is likely substantial (4-10% of people with COVID-19)
- Long covid is a multifaceted disease that can affect nearly every organ system
- Rise in burden of non-communicable disease
 - COVID as an accelerant of underlying conditions
 - Emergence of new sequelae

Implications for health systems II

- It is imperative that governments and health systems prepare for the tide of patients in need of post covid care
 - UK National Health Service (NHS)
 - US VA Healthcare System
 - Several other health systems in the US
- Many post-COVID conditions can be managed by primary care providers, with the incorporation of patient-centered approaches
- Some patients will require multidisciplinary post-covid care
 - Optimal composition is unclear, but should include providers able to address respiratory, cardiometabolic, mental, and neurologic sequelae

Implications for communities

- Best way to prevent long covid is to prevent covid through vaccination
- Misinformation or disinformation and gaslighting
- Advocacy

Summary

- Long covid is a multifaceted disease; it can affect nearly every organ system
- The burden of long covid is evident among non-hospitalized
- Burden of long covid is increased with severity of the acute infection
- Governments and health systems must adapt quickly and establish post-covid care strategies

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Benjamin Bowe
Data Scientist

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Thank you



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