



# An ORISE Fellow's Journey in Precision Public Health - 5 Important Things I Learned That Helped Me to Have a Successful Experience



OAK RIDGE  
INSTITUTE  
FOR SCIENCE  
AND EDUCATION

## Variety of Projects: Current Projects

- Additive value of polygenic risk score to family history for type 2 diabetes risk prediction
- Family history of neuropsychiatric conditions in All of Us Research Program database
- Polygenic risk score and coronary artery disease risk prediction
- Epigenome-wide association studies of prenatal maternal mental health and infant epigenetic profiles: a systematic review



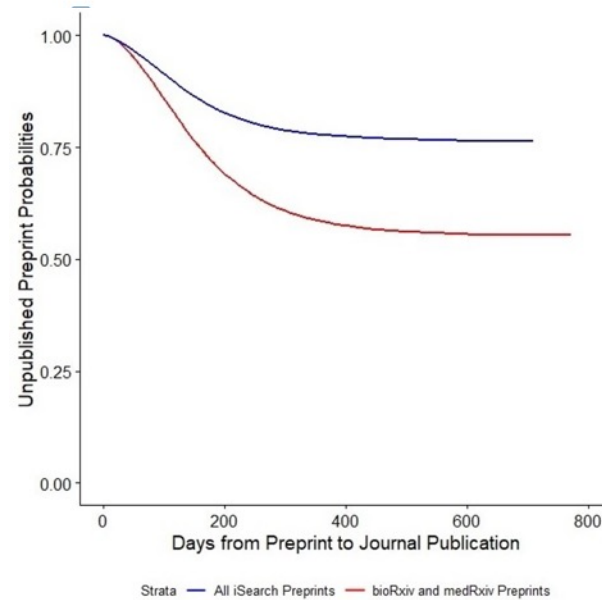


# Peer-reviewed Publications

Review Article

## COVID-19-related health outcomes in people with primary immunodeficiency: A systematic review

### COVID-19-Related manuscripts: lag from preprint to publication



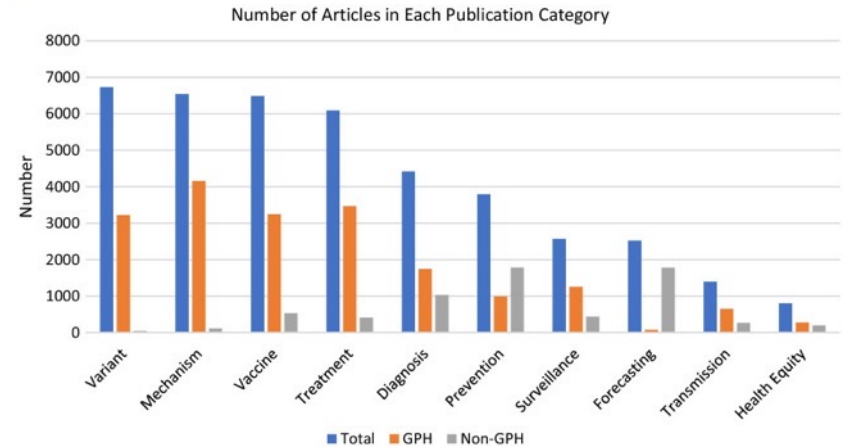
## Severity Outcomes among Adult Patients with Primary Immunodeficiency and COVID-19 Seen in Emergency Departments, United States, April 2020–August 2021

1 April 2020–31 August 2021

COVID-19 Outcome	Non-Primary Immunodeficiency Patients (n = 1,197,430)	Primary Immunodeficiency Patients (n = 853)	Adjusted Odds Ratio <sup>a</sup> (95% CI)
Hospitalization	535,663 (44.7%)	624 (73.2%)	2.36 (1.87–2.98)
ICU admission	118,566 (9.9%)	183 (21.5%)	1.53 (1.19–1.96)
Invasive mechanical ventilation	72,610 (6.1%)	121 (14.2%)	1.41 (1.15–1.72)
Death	76,594 (6.4%)	111 (13.0%)	1.37 (1.08–1.74)

Patient Characteristics		All Primary Immunodeficiencies
Total Number of Patients		459
Supplemental Oxygen	Overall	29% (76/264)
	Nasal Cannula	14% (30/218)
	Non-Invasive Ventilation	4% (8/225)
Hospitalization	Invasive ventilation	12% (32/257)
	ECMO	2% (4/264)
	Overall	49% (212/433)
Death	ICU	16% (66/424)
	Overall	9% (42/448)

## COVID-19 GPH: tracking the contribution of genomics and precision health to the COVID-19 pandemic response



## Health equity in the implementation of genomics and precision medicine: A public health imperative



# Databases and Webpages

## Public Health Genomics and Precision Health Knowledge Base (v8.7)

PHGKB

About

Office of Genomics and Precision Public Health

Genomics (A-Z)

Specialized PHGKB

Cancer PHGKB

Diabetes PHGKB

Economic Evaluation PHGKB

Environmental Health PHGKB

Family Health History PHGKB

Epigenetic Epidemiology Publications Database

Recommend Tweet Share

Last data update: Aug 7, 2023. (Total: 21442 Documents)

all Search All dataset

Filtered By: Select to fine-tune your search Download

## What is Epigenetics?

[Print](#)

Your genes play an important role in your health, but so do your behaviors and environment, such as what you eat and how physically active you are. Epigenetics is the study of how your behaviors and environment can cause changes that affect the way your genes work. Unlike genetic changes, epigenetic changes are reversible and do not change your DNA sequence, but they can change how your body reads a DNA sequence.



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COVID-19 GPH

Up to Date Genomics and Precision Health Information on COVID-19

Recommend Tweet Share

Last data update: Aug 07, 2023. (Total: 45954 Documents since 2020)

Enter a search term Search All dataset All GPH Non-GPH

Last Posted: Aug-07-2023 06:32:41

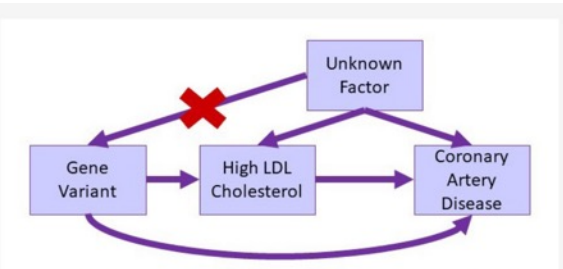
Spotlight

What is GPH/Non-GPH?

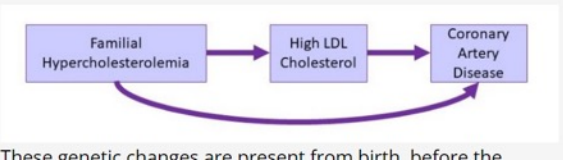
About COVID-19 GPH

COVID-19 GPH is an online, continuously updated, searchable database of published

down the toxin show higher rates of disease, this provides evidence that the toxin causes the disease. This effect would only be seen for people exposed to the toxin, and the genetic difference would have no effect on disease risk in those not exposed to the toxin. Mendelian randomization can be used to look at whether levels of a substance found naturally in a person's body is linked to disease. Measuring the levels themselves can be a problem because the levels can change in response to other factors that could be related to the disease, such as diet, smoking, or alcohol use. However, if genetic differences



For example, people with familial hypercholesterolemia have genetic changes that increase their blood levels of LDL cholesterol. These genetic changes are linked to an increased risk of coronary artery disease, which provides evidence that high LDL levels can cause heart disease.



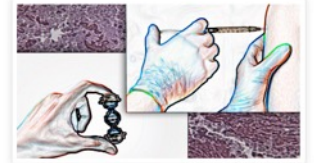
# Blogs

- Topics
  - Gene-environment interaction
  - Epigenetics
  - Mendelian randomization
  - COVID-19

## Beyond Tuberculosis: BCG Vaccine and Epigenetics

August 10, 2020 by Emily Drzymalla, Rollins School of Public Health, Emory University, Atlanta GA and Marta Gwinn, CFOL International, Atlanta GA

Tuberculosis (TB) infection is spread from person to person by respiratory droplets containing the bacterium *Mycobacterium tuberculosis*. This infection mainly affects the lungs and may be fatal if left untreated. TB remains a leading cause of death worldwide. In 1921, a live attenuated vaccine, called the BCG vaccine, was introduced to protect against TB. The vaccine provides [better effectiveness against childhood TB](#) than against adult pulmonary TB. This vaccine is one of the most used



## Rare Primary Immunodeficiency Diseases and COVID-19: Evolving Insights and Implications for Clinical and Public Health Practice

March 27, 2023 by Emily Drzymalla, Muin J. Khoury, and Marta Gwinn, Office of Genomics and Precision Public Health, Centers for Disease Control and Prevention, Atlanta, Georgia

In this post, we explore how new research on rare genetic diseases is contributing to our understanding of COVID-19 occurrence and outcomes and discuss potential clinical and public health implications. Understanding the mechanisms involved in these inherited disorders may shed light on biological mechanisms and natural history of COVID-19.

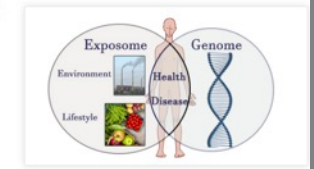


## Interplay Between the Exposome and the Genome in Health and Disease

February 17, 2023 by Emily Drzymalla, Danielle Rasooly, and Muin J. Khoury, Office of Genomics and Precision Public Health, Centers for Disease Control and Prevention, Atlanta, Georgia

A [recent review](#) assessed the interplay between environmental exposures and the human genome and showed ways that this interplay can alter disease risk.

Many diseases, such as birth defects and developmental disabilities, type 2 diabetes and cancer, are influenced by both environmental and genetic factors. The cumulative effects of



## 5 Important Things I Learned as an ORISE Fellow

- Communication
- Collaboration
- Planning
- Learning mindset
- Universality of genomics and precision public health

# 5 Important Things I Learned as an ORISE Fellow

- Communication
  - Ask questions
  - Check in with team members and keep team members informed
  - Clear and concise



# 5 Important Things I Learned as an ORISE Fellow

- Collaboration
  - No project is done alone
  - Everyone has different skills and specialties
  - Sharing of ideas and problem solving



# 5 Important Things I Learned as an ORISE Fellow

- Planning

- Identify personal workflow
- If you're not given a deadline, make a personal deadline
- Set long term goals for fellowship

## 5 Important Things I Learned as an ORISE Fellow

- Learning mindset
  - Don't forget you are still learning
  - On the job learning is part of being an ORISE fellow
  - Try to identify what unique knowledge you can bring to the group you are working with
  - Learn all you can from the projects and the people around you

## 5 Important Things I Learned as an ORISE Fellow

- Universality of genomics and precision public health
  - Can be applied to most if not every disease
    - Risk prediction: polygenic risk scores
    - Gene-environment interactions and epigenetics
    - Mendelian randomization
    - Omics: metabolomics, proteomics, transcriptomics
  - Growing awareness of area

# Thank you!

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**Centers for Disease Control and Prevention**  
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*The findings and conclusions in this presentation have not been formally disseminated by the Centers for Disease Control and Prevention and should not be construed to represent any agency determination or policy.*

