

How Genomics Can Guide Clinical Care for Long COVID & Long Vax or Spikeopathies

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Wednesday September 23rd 7 pm EST



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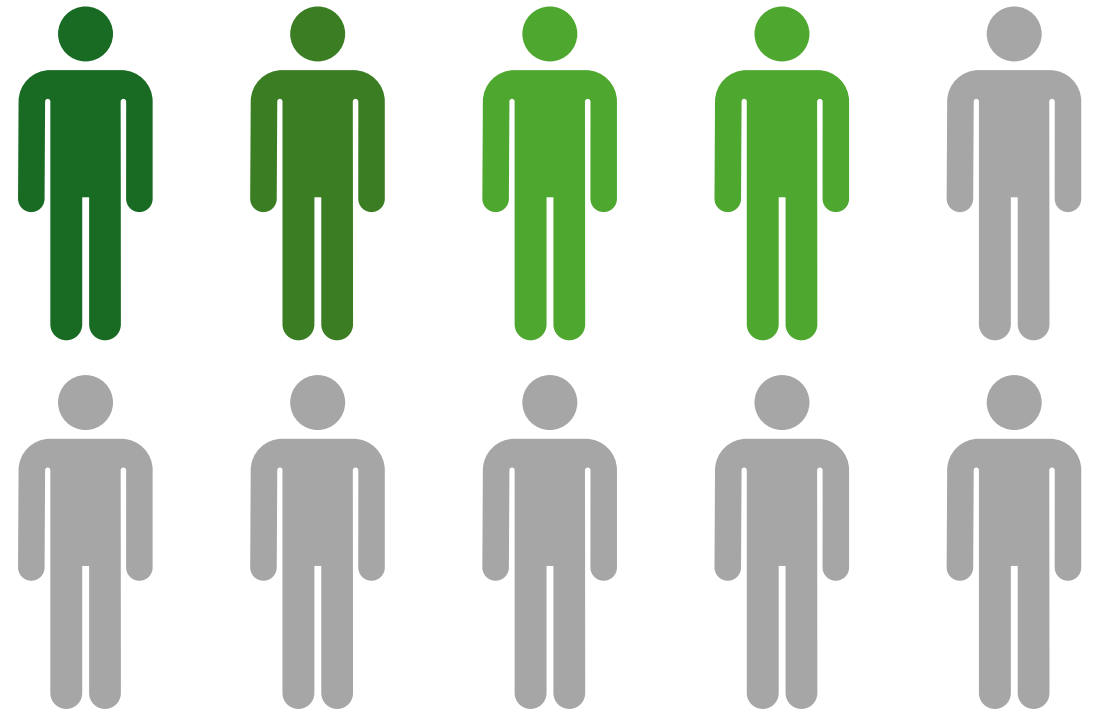
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What Do We Know About Long COVID, Long Vax, PACs or Spikeopathy?

(Whatever Your Preferred Nomenclature is)

10% - 40% of People Infected with COVID-19 Have Prolonged Symptoms

- Chronic Fatigue or ME/CFS
- Cardiac Dysfunction
 - Elevated Troponins
 - Cardiomyopathy
 - New Onset Arrhythmias
- Cognitive Changes
- Migraines
- Coagulation Driven Disease
 - Pulmonary Emboli
 - Stroke
- New Onset Autoimmune Disease



A Closer Look at Patients and their Genetic Pathways

CASE STUDIES: Shana / Cory / Vinny / Ellen



Most of these Gene Variants Shana Had, are in Less Than 10%

GPX1
Oxidative Stress

GC
Low Vitamin D

CYP2R1
Low Vit D

DHCR7
Low Vit D

CYP24A1
Low Vitamin D

MS4A2
IgE Receptor/Mast Cells

FCER1A
Mast Cells

IL-6
Inflammation

Long COVID 1

Shana's Top Contributing Factors: Oxidative Stress, Vitamin D Related, Mast Cell

GPX1
Oxidative Stress

GC
Low Vitamin D

CYP2R1
Low Vit D

DHCR7
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MS4A2
IgE Receptor/Mast Cells

FCER1A
Mast Cells

Long COVID 10 of 10 selected			
SNP	Genotype/C		

Low Vitamin D Contributes to Multiple Sxs of PACS



► Med Sci (Basel). 2025 Sep 18;13(3):199. doi: [10.3390/medsci13030199](https://doi.org/10.3390/medsci13030199)

Association Between Vitamin D Levels and Long COVID Signs and Symptoms

[Karn Matangkha](#)¹, [Vichit Punyahotara](#)¹, [Jarasphol Rintra](#)¹, [Phakkarawat Sittiprapaporn](#)^{2,3,*}

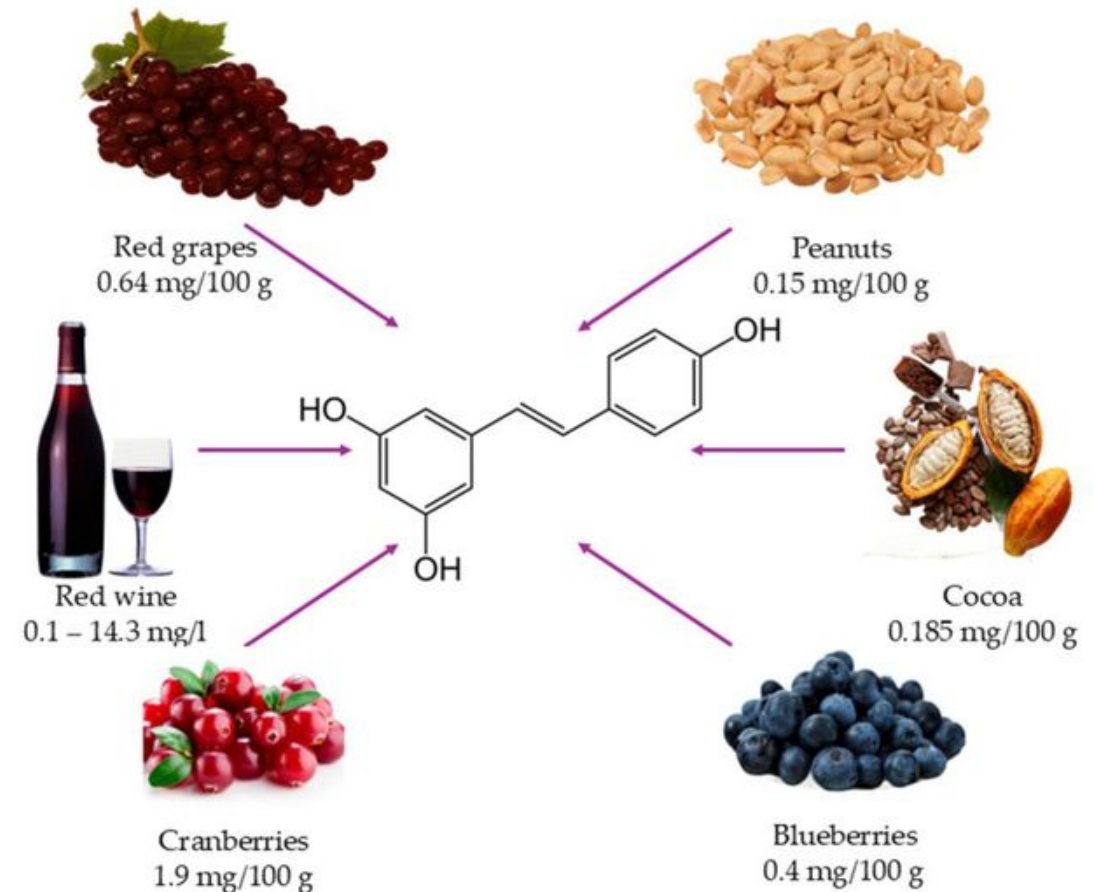
Editor: Antoni Torres

Shana Has Two Important Variants That Drive Higher IgE Signaling

MS4A2
IgE Receptor/Mast Cells

FCER1A
Mast Cells

- FCER1A and MS4A2 are the IgE receptors. Variants contribute to tighter IgE binding, which triggers prolonged mast cell activation.
- IgE levels can be normal, but patient can have amplified IgE effect.
- **Resveratrol** is a great intervention as it directly downregulates FCER1.



Cory's Top 4 Variants

Inflammation and Immune Response Were Huge Drivers

CCL2
Inflammation

INFG
Inflammation

HIF1A
Metabolic/Immune

MTHFR
High Homocysteine

IL-6R
Inflammation

Long COVID 8 of 8 selected			
SNP	Genotype/Copies & Prevalence	Odds Ratio	Key Information
Immune & Infection Response - Tissue damage at sites of inflammation			

HIF1A One of Cory's Important Variants

HIF1A
Metabolic/Immune

Also present, was the **HIF1A** gene variant, which we will discuss later...

Hypoxia Inducible Factor 1a is turning out to be a major player in spikeopathies.

Long COVID 8 of 8 selected			
SNP	Genotype/Copies & Prevalence	Odds Ratio	Key Information
Immune & Infection Response - Tissue damage at sites of inflammation			
CCL2	GG 2 8.4%	N/A	This C-C motif chemokine ligand 2 (CCL2) SNP can intensify immune cell recruitment, causing excessive tissue damage at inflamed or infected sites. This can contribute to a wide variety of health issues throughout the body and brain. The GG genotype was associated with an increased long COVID risk by enhancing CCL2-mediated monocyte recruitment, which can sustain post-infectious inflammation, endothelial injury, and persistent monocyte-driven inflammation and endothelial injury.

Cory has Multiple Genetic Pathways that may Contribute to Fibromyalgia

Fibromyalgia 3 of 8 selected			
SNP	Genotype/Copies & Prevalence	Odds Ratio	Key Information
Immune & Infection Response - Tissue damage at sites of inflammation			
CCL2	GG 2 8.4%	N/A	This C-C motif chemokine ligand 2 (CCL2) SNP can intensify immune cell recruitment, causing excessive tissue damage at inflamed or infected sites. This can contribute to a wide variety of health issues throughout the body and brain. Elevated CCL2 or MCP1 has been associated with fibromyalgia.
Depression - Dampens brain IL6, but higher tissue			
IL6R	CC 2 11.2%	N/A	IL6R variant increases soluble IL6 receptor, enhancing IL-6-mediated inflammation. sIL6R crosses the blood-brain barrier, promoting neuroinflammation, and increased IL6 signaling via sIL6R has been linked to poorer outcomes after brain injury. Elevated IL-6 has been associated with increased fibromyalgia symptoms and increased pain.
Statin Response and Toxicity - Statin intolerance, low CoQ10			
COQ2	GG 2 14.6%	N/A	This SNP lowers CoQ10 production (a cellular energy cofactor) and is associated with poorer cardiovascular health, infertility, and statin intolerance/statin-induced muscle pain. Patients with fibromyalgia have only 40-50% of the typical CoQ10 levels in muscles and tissues. CoQ10 supplementation of 300mg/day for 40 days reduced pain and fatigue by more than 50% by reducing oxidative stress and inflammation.

- **CCL2 & IL6R:** Promotes inflammatory signaling
- **Detox Pathways:** Processing environmental exposures

Vitamin Vinny: Able to Recover Fully From His Long Covid and Improve his ASD



Targeted Plan Included:

- Nattokinase
- Pycnogenol
- PEA/ Luteolin (Mirica)
- Other genomically targeted supplements
- Vinny's ASD and his PACS symptoms improved significantly.

Before Long COVID, We Treated Variants Contributing to Her Migraines

Decreased NOS3 Lowers Nitric Oxide and Blood Vessel Dilation

Low Magnesium Increases Migraine Susceptibility

Decreased Vitamin C Recycling Increases Oxidative Stress

Elevated ALPL Increases Vitamin B6 Breakdown

Migraines 9 of 9 selected			
SNP	Genotype/Copies & Prevalence	Odds Ratio	Key Information
Migraines			
NOS3	TG 1 40.3%	2.1	Nitric Oxide Synthase 3 SNP lowers endothelial nitric oxide, which normally decreases platelet stickiness and relax

A Study on HIF-1 α and Long Covid

HIF1A
Metabolic/Immune

- 17.6% of Long Covid and ME/CFP patients have
- Markedly elevated HIF-1 α levels: exceeding the highest levels observed in any healthy control.
- 29.4% had higher levels than those seen in 5 out of 6 control groups.
- High HIF-1 α leads to high PINK1 protein which is a mitochondrial quality control protein. PINK1 protein levels go up when there is mitochondrial damage

Amatica Health. (2025, April 16). *HIF1a elevation correlates with mitochondrial, fibrotic, and immunosuppressive proteins in a subset of ME/CFS & Long Covid patients.*
<https://www.amaticahealth.com/blog/hif1a-elevation-correlates-with-mitochondrial/>

Apr. 16, 2025

HIF1a elevation correlates with mitochondrial, fibrotic, and immunosuppressive proteins in a subset of ME/CFS & Long Covid patients

Ivermectin Has Many Pathways to Interact

HIF1A
Metabolic/Immune

- Ivermectin has many biochemical effects. In COVID/Long COVID discussions, it has been studied for antiviral and anti-inflammatory effects.
- Ivermectin can also inhibit NF- κ B signaling, which can decrease production of pro-inflammatory cytokines, decreasing inflammation.



► Int J Mol Sci. 2023 Nov 16;24(22):16392. doi: [10.3390/ijms242216392](https://doi.org/10.3390/ijms242216392)

