FUNCTIONAL MEDICINE INSIGHTS

COVID-19 and Cancer: What the Latest Science Reveals and How to Protect Yourself

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> "As a physician who has walked my own healing journey…through Crohn's disease, mold illness, and cancer. I know how frightening it can be to face a health threat that feels beyond your control. But I also know this: knowledge is power, and the body has a remarkable capacity to heal when we support it at the root level. This article is for every patient who deserves the truth, delivered with both scientific rigor and compassionate care."

Imagine learning that a viral infection you survived, or a vaccine you received in good faith, may have quietly altered your immune system's ability to guard against cancer. That is the uncomfortable conversation now emerging in the peer-reviewed medical literature, and as your physician and health educator, I believe you deserve to hear it clearly, compassionately, and with the full weight of scientific evidence behind it.

A landmark 2026 systematic review published in Oncotarget, one of the most respected peer-reviewed oncology journals in the world, analyzed 69 published reports covering 333 individual cancer cases from 27 countries, along with three large population studies encompassing millions of people. The findings are nuanced, sobering, and actionable. Most importantly, they point toward evidence-based strategies that can meaningfully reduce your risk.

In this comprehensive article, I will walk you through the evidence in plain language, explain the biological mechanisms that matter clinically, and give you a clear, practical functional medicine road map for protecting your health. As always, my goal is not to create fear but to empower you with information and tools.

Part 1: The Emerging Evidence — What Large-Scale Studies Are Finding

The Oncotarget 2026 Systematic Review

Kuperwasser and El-Deiry's 2026 review in Oncotarget is the most comprehensive analysis to date of cancer signals following COVID-19 infection and COVID-19 vaccination. Their systematic review examined:

- 69 published case reports and case series from 27 countries around the world
- 333 individual cancer cases documented in association with COVID-19 infection or vaccination
- 3 large population-based cohort studies providing epidemiological context

The cancer types observed fell into three major categories. Hematologic cancers — those affecting blood cells and lymph nodes, accounted for 43% of cases in the case report literature. This category includes lymphomas, leukemias, and multiple myeloma. Solid tumors comprised 41% of documented cases, spanning lung, breast, colorectal, gastric, prostate, bladder, and other organ cancers. The remaining cases involved virus-associated cancers, particularly those linked to viral reactivation, such as Kaposi's sarcoma (HHV-8) and Merkel cell carcinoma (MCV).

Critically, clinicians submitting these cases noted several alarming patterns: unusually **rapid disease progression**, **atypical tumor presentations** not consistent with standard disease behavior, and strikingly **short latency periods** between COVID-19 exposure and cancer diagnosis; in some cases just weeks to a few months rather than the years typically expected.

Population Studies: The Larger Picture

While case reports can illuminate individual patterns, population studies give us the statistical power to understand broader trends. The 2026 review synthesized findings from three major cohort studies:

Korean National Health Insurance Database (~8.4 Million People)

This massive Korean cohort found statistically significant increases in cancer incidence following COVID-19 infection compared to uninfected controls. The hazard ratios (HR), a measure of relative risk, were elevated across multiple cancer types:

- Thyroid cancer: HR 1.35 (35% higher risk)
- Gastric cancer: HR 1.34 (34% higher risk)
- Colorectal cancer: HR 1.28 (28% higher risk)
- Lung cancer: HR 1.53 (53% higher risk)
- Breast cancer: HR 1.20 (20% higher risk)

- Prostate cancer: HR 1.69 (69% higher risk)

These are not trivial increases. A 53% higher risk of lung cancer and a 69% higher risk of prostate cancer following COVID-19 infection represent clinically meaningful signals that demand further investigation and clinical action.

Italian Cohort (~300,000 People)

An Italian population study of approximately 300,000 individuals identified elevated cancer incidence following COVID-19, with notable hazard ratios for colorectal cancer (HR 1.35), breast cancer (HR 1.54), and bladder cancer (HR 1.62). The Italian data corroborates the Korean findings across distinct populations and healthcare systems, lending greater confidence to the biological plausibility of the COVID-19 and cancer connection.

U.S. Military Cohort (~1.3 Million Service Members)

Perhaps most striking is the analysis of approximately 1.3 million U.S. military service members, a generally young, healthy, highly screened population that serves as an excellent epidemiological model. This study found an approximately 50% increase in non-Hodgkin's lymphoma (NHL) incidence after 2021. Non-Hodgkin's lymphoma is one of the most immune-sensitive cancers and a known marker of immune dysregulation, making this finding especially relevant to the mechanistic hypotheses explored below.

> **Important Context for Patients**
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> Epidemiological associations do not prove causation. Many confounding factors can influence cancer incidence statistics, including changes in cancer screening patterns during the pandemic, delayed diagnoses, reporting biases, and pre-existing immune vulnerabilities. This evidence calls for heightened clinical vigilance, not panic. The appropriate response is informed awareness, proactive monitoring, and optimizing immune resilience, all areas where functional medicine excels.

For a deep dive into how COVID-19 affects immune function and contributes to long-term health consequences, I encourage you to listen to Episode #180 of Resiliency Radio featuring Dr. Bruce Patterson, one of the leading researchers in Long COVID immunology.

Part 2: Understanding the Mechanisms — Why COVID-19 May Promote Cancer

Science is most useful when it explains not just what is happening, but why. The Oncotarget review identified three major biological mechanisms through which COVID-19 infection (and potentially COVID-19 mRNA vaccination) may plausibly influence cancer development or progression. Understanding these mechanisms is essential for choosing the right preventive strategies.

Mechanism 1: Immune Dysregulation

The immune system is the body's primary cancer surveillance system. Natural killer (NK) cells, cytotoxic T lymphocytes, and regulatory T cells continuously identify and eliminate emerging malignant cells, a process called immune surveillance. COVID-19 profoundly disrupts this system in multiple ways.

The Cytokine Storm and Its Aftermath

During acute COVID-19 infection, many patients experience a cytokine storm characterized by dramatic elevations in pro-inflammatory molecules including IL-6, TNF-α, and IL-1β. This inflammatory cascade can directly damage tissues, disrupt cellular signaling, and paradoxically impair the immune system's ability to perform targeted cancer surveillance. After the acute phase, many patients enter a prolonged period of immune exhaustion in which both T cell and NK cell function are significantly reduced. This immunosuppression window may create a permissive environment for dormant cancer cells to escape surveillance and proliferate.

Galectin-3, a pro-inflammatory lectin, is a key mediator of immune dysregulation and cancer progression. Elevated galectin-3 levels promote tumor immune evasion and have been documented in post-COVID inflammatory states. I have written extensively about galectin-3's role in cancer and cardiovascular disease. Please see my dedicated article on galectin-3 and inflammation for more detail.

Viral Reactivation: EBV, HHV-8, and MCV

COVID-19-associated immune suppression can reactivate latent oncogenic viruses that were previously kept dormant by a competent immune system. The Oncotarget review documented multiple cases of cancer associated with reactivation of Epstein-Barr virus (EBV), human herpesvirus 8 (HHV-8, associated with Kaposi's sarcoma), and Merkel cell polyomavirus (MCV). EBV reactivation is particularly concerning given its known associations with Hodgkin's lymphoma, Burkitt's lymphoma, and nasopharyngeal carcinoma. For patients with a history of mononucleosis or documented EBV latency, immune optimization becomes even more critical.

This connection between viral infections and cancer is explored in depth by integrative oncologist Dr. John Oertle, whom I interviewed on Resiliency Radio Episode #245. The episode covers the fascinating and often underappreciated relationship between chronic infections and cancer initiation.

Mechanism 2: Spike Protein Biology

The SARS-CoV-2 spike protein, present both during natural infection and expressed through mRNA vaccination, interacts with several receptor systems that have direct implications for cancer biology.

ACE2 and NRP-1 Receptor Interactions

The spike protein's primary binding target, ACE2 (angiotensin-converting enzyme 2), is expressed not only in lung tissue but in numerous other organs including the gut, kidney, heart, and brain. Beyond ACE2, the spike protein also binds neuropilin-1 (NRP-1), a receptor involved in angiogenesis (blood vessel formation), tumor vascularization, and cell migration, all processes central to cancer growth and metastasis. Theoretical models suggest that NRP-1 engagement by the spike protein could enhance tumor-supportive signaling in susceptible individuals.

DNA Damage and the p53 Pathway

Several research groups have raised concerns about spike protein's potential to impair BRCA1 and BRCA2 DNA repair pathways, as well as its possible interaction with the p53 tumor suppressor pathway. While this research is preliminary, p53 is the most commonly mutated gene in human cancers and any factor that impairs its function deserves rigorous scientific attention.

Spike Protein Persistence

Emerging evidence suggests that spike protein (or spike protein mRNA) may persist in certain tissues longer than initially anticipated. Studies have detected spike protein in lymph nodes and germinal centers months after either infection or vaccination. The immunological implications of prolonged spike protein exposure on cancer surveillance pathways remain an active area of investigation.

Mechanism 3: DNA Contaminants in mRNA Vaccines

This third mechanism is the most controversial and the one most frequently debated in scientific circles. The Oncotarget review notes, as a factual matter, that the package inserts for the FDA-authorized mRNA COVID-19 vaccines explicitly state that these products have **not been evaluated for carcinogenicity, genotoxicity, or mutagenicity**. This is a standard regulatory disclosure reflecting the unprecedented speed of development, not an assertion that harm has been proven.

Independent researchers have reported the detection of residual plasmid DNA fragments in certain mRNA vaccine formulations, encapsulated within lipid nanoparticles (LNPs). Some analyses have noted the presence of SV40 promoter sequences in these contaminants. SV40 is a well-characterized oncovirus in animal models, and its presence in any injectable product warrants transparent investigation. Regulatory agencies have disputed the clinical significance of these findings; independent researchers argue that the question demands further study before

definitive conclusions can be drawn. As always, I believe patients deserve transparent access to all available data.

My role as your physician is not to tell you what to believe about vaccines, but to ensure you have access to the full scientific picture so you can make informed decisions in partnership with your own healthcare providers. For further discussion of COVID-19's relationship to autoimmune conditions through molecular mimicry mechanisms, please see my article on autoimmune triggers and COVID-19.

Part 3: Your Functional Medicine Protection Plan

Here is where hope and science converge. Regardless of whether you have had COVID-19, received COVID-19 vaccinations, or are simply concerned about cancer prevention, the following strategies represent the best available evidence for immune optimization, cancer risk reduction, and overall resilience. This is the approach I use with patients at Flatiron Functional Medicine, and the one I follow in my own life.

1. Optimize Immune Surveillance

Your immune system is your most powerful anti-cancer tool. Supporting its function across multiple dimensions is the cornerstone of functional medicine cancer prevention.

Immune-Modulating Supplements

Beta-glucans are among the most well-researched natural immune modulators available. Derived from yeast and mushroom cell walls, beta-glucans activate macrophages, natural killer cells, and T lymphocytes through beta-1,3/1,6 receptor binding — precisely the immune cells most critical for cancer surveillance. Clinical studies show beta-glucans can enhance NK cell cytotoxicity by 30–40% in some populations. I recommend Beta Glucan as part of a daily immune support protocol. You can learn more in my dedicated article on beta-glucans and immune modulation.

For a comprehensive immune support foundation, the Immune Boost Bundle Advanced combines multiple synergistic ingredients clinically validated for immune resilience. Additionally, ViraStat provides targeted antiviral botanical support, while Olive Leaf 500 and Monolaurin C offer additional antiviral and immunomodulatory effects.

Essential Micronutrients for Immune Function

Zinc is required for the development and function of virtually every immune cell type, including NK cells and cytotoxic T lymphocytes. Zinc deficiency — extremely common in Americans, particularly those over 50 — directly impairs cancer surveillance. I recommend Activated Zinc in a highly bioavailable form.

Vitamin D3 functions more like a hormone than a vitamin, regulating over 2,000 genes including those governing immune modulation and tumor suppression. Optimal serum 25-OH Vitamin D levels of 60–80 ng/mL are associated with significantly reduced cancer risk in multiple studies. Daily D3/K2 combines D3 with K2 to ensure proper calcium metabolism and cardiovascular safety.

Vitamin C at therapeutic doses serves as both an antioxidant and an immune activator, supporting interferon production and NK cell function. Buffered C provides a gentle, non-acidic form well-tolerated even by sensitive patients.

2. Restore Gut Health and the Microbiome-Immune Axis

Approximately 70% of your immune system resides in the gut-associated lymphoid tissue (GALT). COVID-19 profoundly disrupts the intestinal microbiome, and dysbiosis

— an imbalance of gut bacteria — has been directly linked to impaired immune surveillance, increased systemic inflammation, and elevated cancer risk. Restoring gut integrity is therefore inseparable from cancer prevention.

Immunoglobulin G (IgG) concentrate from bovine colostrum binds and neutralizes lipopolysaccharide (LPS) from gram-negative bacteria, reducing gut permeability and systemic immune activation. Gut Immune is one of my most recommended foundational supplements for post-COVID gut restoration.

Lactobacillus rhamnosus GG is among the most studied probiotic strains for gut barrier integrity, immune training, and protection against dysbiosis-driven systemic inflammation. Ther-biotic Factor 1 delivers a clinically validated dose of this keystone probiotic strain. For deeper exploration of the gut-immune-cancer connection, I highly recommend Resiliency Radio Episode #295 with Dr. Raphael Kellman on the microbiome and immune function.

3. Support Antioxidant Defense and DNA Protection

Oxidative stress — the accumulation of reactive oxygen species that damage cellular DNA, proteins, and lipids — is a fundamental driver of carcinogenesis. COVID-19 generates profound oxidative stress, and supporting the body's intrinsic antioxidant systems is directly relevant to cancer prevention.

Glutathione is the master antioxidant of the human body, present in every cell and essential for DNA repair, detoxification of carcinogens, and regulation of immune cell activity. COVID-19 dramatically depletes glutathione stores, creating oxidative vulnerability that may persist for months or years. Glutathione Essentials delivers a reduced, bioavailable form optimized for cellular uptake.

N-acetylcysteine (NAC) is the rate-limiting precursor to glutathione synthesis and independently reduces oxidative stress, supports immune function, and has demonstrated direct anti-tumor activity in preclinical models through multiple mechanisms. NAC 500 provides pharmaceutical-grade NAC at a clinically relevant dose.

4. Address Inflammation at the Root

Chronic low-grade inflammation is one of the most well-established drivers of cancer initiation and progression across all tumor types. COVID-19's tendency to create prolonged inflammatory states — often months or years after the acute infection resolves — makes anti-inflammatory strategies especially important for post-COVID populations.

Berberine is an alkaloid compound with remarkable multi-target anti-cancer properties, including activation of AMP-activated protein kinase (AMPK), inhibition of NF-κB inflammatory signaling, modulation of gut microbiota toward anti-inflammatory species, and direct anti-tumor effects documented in over 500 preclinical studies. Berberine 1000 is one of my most versatile foundational supplements for both cancer prevention and metabolic health.

Specialized pro-resolving mediators (SPMs) are omega-3-derived lipid molecules that actively resolve inflammation rather than merely suppressing it — a critically important distinction. Standard anti-inflammatory approaches often dampen immune function as a side effect. SPMs resolve inflammation while simultaneously enhancing immune clearance of pathogens and cellular debris. SPM Pro is a premium, concentrated source of these cutting-edge pro-resolution mediators.

5. Support Detoxification Pathways

The COVID-19 period has been accompanied by widespread exposure to environmental toxins — from pandemic-related chemical exposures to the residual metabolic byproducts of viral infection itself. Supporting the liver, lymphatic system, and cellular detoxification pathways removes a category of carcinogenic burden that otherwise accumulates silently.

Clinoptilolite zeolite is a naturally occurring mineral with a cage-like molecular structure that selectively binds heavy metals, mycotoxins, and other environmental carcinogens in the gastrointestinal tract, facilitating their safe elimination. ZeoBind Plus is my preferred pharmaceutical-grade zeolite for daily detoxification support.

For patients with known mold or mycotoxin exposure — a population I work with extensively at Flatiron Functional Medicine — the Miracle Mold Detox Box and Detox Bundle provide comprehensive multi-pathway detoxification support. Mycotoxin exposure independently dysregulates immune function and has been linked to lymphoma and other hematologic malignancies, compounding COVID-related immune vulnerabilities.

6. Lifestyle Foundations That Cannot Be Supplemented

No supplement protocol replaces the foundational lifestyle factors that govern cancer risk at the cellular level. I'd be doing you a disservice not to emphasize them:

- Anti-inflammatory diet: A whole-food, plant-rich diet low in refined sugars and ultra-processed foods reduces chronic inflammation, supports a diverse microbiome, and limits exposure to dietary carcinogens. My Flatiron Functional Medicine dietary protocol emphasizes organic produce, wild-caught fish, pasture-raised poultry, and generous servings of cruciferous vegetables rich in sulforaphane — one of nature's most powerful anti-cancer compounds.
- Sleep optimization: Melatonin, produced exclusively during darkness, is a potent antioxidant and direct anti-tumor agent. Circadian disruption — endemic in modern society and worsened during the pandemic — is independently associated with elevated cancer risk. I cannot overstate the importance of 7–9 hours of high-quality, dark-environment sleep.
- Exercise: Moderate aerobic exercise reduces circulating inflammatory markers, enhances NK cell activity, improves insulin sensitivity (a critical anti-cancer mechanism), and has been shown to reduce risk of 13 cancer types in large

meta-analyses. Even 150 minutes per week of moderate activity produces measurable immune benefits.

- Stress reduction: Chronic psychological stress elevates cortisol, which directly suppresses NK cell function and promotes inflammatory cytokine production. Practices including prayer, meditation, and contemplative breathwork are not merely pleasant lifestyle additions — they are immunologically active interventions with documented anti-inflammatory effects. In my own healing journey, faith and prayer have been as essential as any protocol I have ever followed.

Part 4: Surveillance, Early Detection, and Clinical Monitoring

The most actionable response to the post-COVID cancer signal is not fear but vigilance. Early detection remains one of the most powerful tools in cancer outcomes. For patients who have had COVID-19, particularly severe COVID-19 or Long COVID, I recommend a proactive monitoring approach:

Age-Appropriate Cancer Screening

Do not delay routine cancer screenings. Colonoscopy, mammography, low-dose CT lung screening, PSA testing, cervical cytology, and skin examinations should be performed on schedule or accelerated in higher-risk individuals. If you have had COVID-19 and have new or unexplained symptoms, do not wait for your next scheduled appointment — contact your physician promptly.

Inflammatory Biomarker Monitoring

Post-COVID inflammatory burden can be quantified through readily available blood tests. A comprehensive panel I recommend for post-COVID monitoring includes CRP (C-reactive protein), IL-6, ferritin, galectin-3, fibrinogen, homocysteine, complete blood count with differential, and comprehensive metabolic panel. Persistently elevated inflammatory markers in a post-COVID patient should prompt thorough investigation rather than watchful waiting.

Immune Function Assessment

Specialized immune function testing can identify specific vulnerabilities in post-COVID patients. NK cell activity assays, lymphocyte subset panels, T regulatory cell function, and immunoglobulin levels can guide targeted therapeutic interventions. For patients with known history of herpesvirus infections (EBV, CMV, HHV-6), serial viral load monitoring may be warranted. The microbiome's central role in immune health is explored in depth in Resiliency Radio Episode #295 with Dr. Raphael Kellman.

Hormone Optimization

Optimal hormone balance is an underappreciated component of cancer surveillance. Estrogen metabolism, thyroid function, DHEA, progesterone, and testosterone all significantly influence immune competence and cancer risk. Post-COVID hormonal disruption is well-documented and should be evaluated in any comprehensive cancer prevention program. For women specifically, please review my three-part Breast Cancer Prevention Series at jillcarnahan.com for a deep dive into hormone optimization and breast cancer risk reduction.

Moving Forward with Clarity, Courage, and Faith

The connection between COVID-19 and cancer is not a reason for despair. It is a call to action — an invitation to take your immune health, your cellular environment, and your cancer surveillance more seriously than perhaps you have before. The science is still evolving, and honest uncertainty is part of every frontier in medicine. But what is already clear is that the strategies I have outlined in this article — immune optimization, gut restoration, antioxidant support, inflammation resolution, detoxification, and lifestyle foundations — serve you well regardless of the mechanism or the magnitude of the risk.

As a physician who has faced my own cancer diagnosis, I speak from both scientific training and lived experience when I say: your body was designed to heal. The same God who created the intricate machinery of your immune system also created the botanical medicines, the nutrients, and the cellular repair pathways that support it. We are not passive victims of our biology. We are active participants in our own resilience.

I am here as your guide, your medical detective, and your advocate. If you are concerned about your immune health or cancer risk after COVID-19, I encourage you to connect with a qualified functional medicine practitioner who can design a personalized protocol for your unique biology.

Ready to Take the Next Step?

- Visit www.jillcarnahan.com to explore my full article library and book a consultation
- Shop evidence-based supplements at www.drjillhealth.com
- Listen to Resiliency Radio for weekly expert conversations on functional medicine and resilience
- Read my book Unexpected: Finding Resilience through Functional Medicine, Science, and Faith — available wherever books are sold

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