

# ***How Vitamin D affects Health Outcomes with COVID-19***

## **Submission to UK COVID-19 Enquiry**

### **Module 4: Vaccines and Therapeutics**

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## 1. Overview

1. This is a submission to the UK COVID-19 Enquiry - Module 4: Vaccines and Therapeutics. It shows the ***link between poor COVID-19 health outcomes and Vitamin D Deficiency***. This is especially relevant for older people and people with dark skin.
2. Native Immunity and Acquired Immunity are described.
3. Vitamin D plays a crucial role in regulating both Native Immunity and Acquired Immunity, which contribute to the body's ability to fight off infections.
4. A scientific study published in September 2020 was the first to show how people with higher Vitamin D blood levels were less likely to catch COVID-19.
5. In the UK most people with dark skin have lower Vitamin D blood levels than people with white skin, and this can ***explain why so many people with dark skin had worse outcomes with COVID-19***.
6. Older people normally have lower than average Vitamin D levels and this can explain some of their different COVID-19 health outcomes.
7. The NICE NG187 Review published in December 2020 scrutinised the evidence concerning the role of Vitamin D in preventing, reducing and treating COVID-19. There are questions about why they dismissed some compelling evidence.
8. A Review was published in April 2020 explaining how both Native Immunity and Acquired Immunity can be improved with Vitamin C, Vitamin D, Zinc and other foods and supplements and changes to diet and lifestyle.
9. In 2020 information about links between Vitamin D and COVID-19 was sent to experts in NERVTAG and to MPs. Why was this consistently ignored ?
10. Much of this information has been known for many years, so why did NERVTAG and other experts not understand and use this knowledge for COVID-19 ?
11. Health Professionals such as Doctors and Directors of Public Health should receive training in Native and Acquired Immunity, including how to measure it and how to improve it in the whole population.

## 2. Explaining Immunity: Native and Acquired

In public health and medicine, understanding the intricacies of immunity is paramount particularly concerning the prevention and control of infectious diseases.

This section explains the concepts of native immunity, acquired immunity, and the role of vaccines and other therapeutics in enabling acquired immunity to prevent infection.

This overview can help to appreciate the benefits to public health of boosting immunity.

### **Native Immunity**

Native immunity, also known as innate immunity, serves as the body's natural and first line of defence against pathogens ( a bacterium, virus or other micro-organism that can cause disease ). It provides *immediate* protection upon encountering a foreign invader. Components of native immunity include physical barriers (e.g., skin), chemical barriers (e.g., stomach acid), and cellular defences (e.g., lymphocytes). These mechanisms act rapidly and indiscriminately to neutralize or eliminate pathogens, but they do not confer long-term immunity or memory of immunity.

### **Acquired Immunity**

Acquired immunity, also referred to as adaptive immunity, is a more sophisticated and specific form of immunity that *develops over time*. It is characterized by the ability to recognize and remember specific pathogens, and then provide a targeted and potent immune response upon subsequent exposure.

### **T-cells protect us from infection**

In our daily lives we are constantly exposed to pathogens, such as bacteria, viruses and fungi. Without T-cells ( T-lymphocytes ) every exposure could be life-threatening. T-cells can wipe out infected cells and help B-cells to eliminate pathogens.

### **B-cells create antibodies**

B-cells ( B-lymphocytes ) create a type of protein called an antibody. These antibodies bind to pathogens or foreign substances, such as toxins, to neutralise them. For example, an antibody can bind to a virus which then prevents it from entering a normal cell and causing infection. B-cells can also recruit other cells to help destroy an infected cell.

### **Role of Vaccines in Enabling Acquired Immunity**

*Vaccines - and other therapeutics such as Nutrients* – help to use the power of acquired immunity to prevent infection.

By mimicking the presence of pathogens in a controlled and safe manner, vaccines stimulate the immune system to mount a response without causing disease. This process typically involves administering either weakened or inactivated forms of the target pathogen, specific protein subunits derived from the pathogen, or genetic material encoding these proteins.

After vaccination the immune system generates an immune response, including the production of B-cells and T-cells, without a person experiencing the symptoms of the disease.

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### **Mechanisms of Vaccine-Induced Acquired Immunity**

Vaccines enable acquired immunity through several mechanisms:

#### **Vaccine - Antibody Production**

Vaccines stimulate B-cells to produce antibodies specific to the antigens present in the vaccine. These antibodies circulate in the bloodstream and can neutralize the pathogen upon re-exposure.

#### **Vaccine - Memory Cell Formation**

Following vaccination, a subset of B-cells and T-cells become memory cells. These memory cells persist long-term and "remember" the specific pathogen encountered in the vaccine, facilitating a rapid and robust immune response upon subsequent exposures.

#### **Vaccine - Cellular Immunity**

Some vaccines also induce a cell-mediated immune response, so that T-cells can recognize and eliminate infected cells.

#### **Vaccine - Prevention of Infection**

The ultimate goal of vaccination is to prevent infection by conferring acquired immunity against specific pathogens. When people who have been vaccinated encounter the pathogen in the environment, their immune system mounts a swift and effective response, neutralizing the pathogen before it can establish infection.

This process not only protects vaccinated people from disease but also contributes to community-wide immunity, reducing the overall burden of infectious diseases.

#### **Summary**

Native immunity provides immediate, general protection against many pathogens, while acquired immunity offers targeted and long-lasting defence through the generation of memory B-cells and T-cells.

*Vaccines - and some nutrients* - play a crucial role in harnessing acquired immunity to prevent infection by stimulating the immune system to recognize and remember specific pathogens.

Directors of Public Health should consider the principles of native and acquired immunity when evaluating immunisation policies and public health interventions.

Questions should be asked about why NERVTAG did not discuss or report on this.

### 3. The Impact of Vitamin D on Immunity

#### Introduction

Vitamin D, often dubbed the "sunshine Vitamin," plays a crucial role in maintaining overall health, particularly in bolstering the body's immune system.

High Vitamin D levels improve both innate immunity and acquired immunity.

Additionally, higher levels of Vitamin D are linked to a reduced risk and severity of infectious diseases like influenza and COVID-19.

#### Role of Vitamin D in Immunity

Vitamin D is known to modulate both innate and acquired immunity, playing a pivotal role in optimizing immune function.

#### Vitamin D and Innate Immunity

Vitamin D enhances the function of various components of the innate immune system. It promotes the production of antimicrobial peptides, which are natural substances that help to combat bacterial and viral infections. Additionally, Vitamin D regulates the activity of immune cells like macrophages and dendritic cells, enhancing their ability to recognize and eliminate pathogens.

#### Vitamin D and Acquired Immunity

Vitamin D also influences acquired immunity by regulating the proliferation and differentiation of B-cells and T-cells. Studies have shown that Vitamin D can modulate the production of cytokines, which are signalling molecules that help manage the body's defence responses. This modulation helps to balance the inflammatory and anti-inflammatory aspects of the immune system, thus contributing to a more effective defence against pathogens.

#### Association of Vitamin D with Infectious Diseases

Numerous studies have investigated the relationship between Vitamin D levels and the incidence and severity of infectious diseases, including influenza.

Higher levels of Vitamin D have been consistently associated with a reduced risk of contracting influenza and other respiratory infections.

People with adequate Vitamin D levels tend to experience milder symptoms and shorter durations of illness when infected.

#### Summary

Vitamin D plays a crucial role in regulating both innate and acquired immunity, thereby contributing to the body's ability to fight off infections.

Getting enough Vitamin D from the sun, food or vitamin pills can help keep the body's defence systems strong, support a robust immune system and reduce the risk of infectious diseases like influenza.

Doctors and Directors of Public Health should understand what blood level of Vitamin D provides an effective defence for innate and acquired immunity against infectious diseases like Influenza

Questions should be asked about why NERVTAG did not discuss or report on this

## 4. People with high Vitamin D levels are less likely to catch COVID-19

On September 17, 2020 the first study was published of how high levels of Vitamin D reduced the risk of catching COVID-19.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0239252>

They analysed over 190,000 COVID-19 tests performed between March and June 2020, along with corresponding Vitamin D levels from the preceding 12 months. The study aimed to determine if there is an association between circulating Vitamin D blood levels of 25-hydroxyVitamin D [ (25(OH)D ] and SARS-CoV-2 positivity rates.

Summary:

1. The study included 191,779 patients with a median age of 54 years and a majority of female participants.
2. The overall SARS-CoV-2 positivity rate was 9.3%, indicating that about 9 out of every 100 people tested were positive for the virus during the study period.
3. People with lower levels of 25(OH)D, classified as "deficient," with <50nmol/L ( <20 ng/mL ), had a positivity rate of 12.5%
4. People with "adequate" levels of 75-85nmol/L ( 30-34 ng/mL ) had a positivity rate of 8.1%
5. People with higher levels of  $\geq 138$ nmol/L ( 55 ng/mL ) had a positivity rate of 5.9%.
6. Statistical analysis revealed a strong inverse correlation between circulating 25(OH)D levels and SARS-CoV-2 positivity rates, even after adjusting for demographic factors such as age, sex, race/ethnicity, and geographic location.
7. This inverse association persisted across different demographic groups, including various races/ethnicities, both sexes, and different age ranges.

### Key Finding

There is a simple conclusion from this report - published in September 2020 - that had major implications for the spread of COVID-19:

***If a person had a high level of Vitamin D, their chance of catching COVID-19 was HALF that of a person with a low level of Vitamin D***

This report was sent to every member of NERVTAG on September 27, 2020 and only one member responded with a trivial question and dismissal.

<https://vitaminduk.com/wp-content/uploads/2023/11/20200927-Correspondence-with-Prof-Peter-Openshaw-of-NERVTAG.pdf>

### Commentary

These findings show that high blood levels of Vitamin D are associated with a lower risk of being infected by COVID-19.

Some people will maintain that this study only shows a correlation between Vitamin D levels and COVID-19 positivity rates, and that correlation does not imply causation.

However, there are many experts who understand the underlying mechanisms and support the view that high Vitamin D levels do reduce the risk of COVID-19 infection.

## 5. Why people with dark skin had worse health outcomes with COVID-19

### Understanding Vitamin D Production

The human body produces Vitamin D when the skin is exposed to sunlight. Specifically, UVB rays from sunlight trigger a reaction in the skin, leading to the synthesis of Vitamin D. This process occurs in specialized cells called melanocytes, which produce melanin, the pigment responsible for skin colour.

### Differences in Skin Pigmentation

The amount of melanin in the skin is the primary determinant of skin colour. Melanin acts as a natural sunscreen, protecting the skin from the harmful effects of UV radiation. People with darker skin have higher concentrations of melanin, which provides greater protection against sunburn and skin cancer. This increased melanin reduces the skin's ability to produce Vitamin D in response to sunlight exposure.

### Impact on Vitamin D Levels

Due to the higher melanin content, people with dark skin require more prolonged sun exposure to produce equivalent amounts of Vitamin D compared to those with white skin.

**People with darker skin usually have lower levels of Vitamin D**, especially in the UK which has limited sunlight in the summer and low UVB radiation during the winter.

### Cultural Factors

Cultural practices such as wearing clothing that covers most of the body can further reduce sunlight exposure and production of Vitamin D. This is relevant for people who cover their body for religious reasons as well as for personal preference.

### Health Implications

Vitamin D deficiency has been linked to various health problems, including an increased risk of tuberculosis, weakened bones including rickets and osteomalacia, increased risk of fractures and mood disorders such as depression.

Low blood levels of Vitamin D compromise both the Innate Immune and the Acquired Immune function.

Studies have shown that when Vitamin D levels are equalized between people with different skin tones, their health outcomes become similar.

Therefore, addressing Vitamin D disparities is essential for promoting optimal health outcomes, particularly among populations with darker skin.

### Conclusion:

**The differences in Vitamin D blood levels can explain why people with dark skin had worse outcomes with COVID-19**

Doctors and Directors of Public Health should understand these factors as they are crucial for promoting awareness and implementing strategies to address Vitamin D deficiency, thereby improving health outcomes for all populations.

Questions should be asked about why NERVTAG did not discuss or report on this.

## 6. Why older people had worse health outcomes with COVID-19

Vitamin D deficiency is a significant concern for older adults. This is due to various factors, including reduced sun exposure, impaired skin synthesis, dietary insufficiency, and certain medical conditions.

### Reduced Sun Exposure

Older adults often spend less time outdoors leading to decreased sun exposure, which is essential for the synthesis of vitamin D in the skin.

Factors such as mobility issues, institutionalization, and fear of sun-related health risks contribute to decreased outdoor activities among older people.

### Decreased Skin Synthesis of Vitamin D

The dry skin of older people cannot normally produce adequate amounts of Vitamin D. This is due to changes in skin composition and thickness and gene deterioration, which can impair the skin's ability to produce vitamin D upon exposure to sunlight. In some cases, this can be reduced by up to 400%.

### Dietary Insufficiency

Many older adults have inadequate dietary intake of vitamin D-rich foods, such as fatty fish, fortified dairy products, and fortified cereals.

Poor appetite, dietary restrictions, and limited access to nutritious foods can further exacerbate dietary vitamin D deficiency.

### Medical Conditions and Medication

Certain medical conditions prevalent in older adults, such as malabsorption disorders, chronic kidney disease, and liver dysfunction, can impair vitamin D absorption and metabolism.

Additionally, some medications commonly prescribed to older adults, including corticosteroids, anticonvulsants, and certain anti-inflammatory drugs, may interfere with vitamin D metabolism.

### Other Considerations

There are additional reasons why older people often have less Vitamin D

[https://vitamindwiki.com/tiki-index.php?page\\_id=5287](https://vitamindwiki.com/tiki-index.php?page_id=5287)

### Conclusion

Differences in Vitamin D blood levels can explain some of the reasons why older people had worse outcomes with COVID-19.

Doctors and Directors of Public Health should understand these factors as they are crucial for promoting awareness and implementing strategies to address Vitamin D deficiency for older people.

Healthcare providers and institutions have a duty to assess and address the vitamin D status of older adults under their care, and consider the potential implications of Vitamin D deficiency on health outcomes and quality of life.

Questions should be asked about why NERVTAG did not discuss or report on this



## 7. NICE NG187 Review: Evaluating Vitamin D and COVID-19

On September 17, 2020 there was good scientific evidence published that high levels of Vitamin D could reduce the risk of catching COVID-19 by 50%

On October 7, 2020 David Davis MP and Rupa Huq MP discussed this with the Secretary of State for Health and Social Care, Matt Hancock MP

<https://www.rupahuq.org.uk/2020/10/09/ministers-to-examine-benefits-of-vitamin-d-in-fight-against-coronavirus/>

In October 2020 Matt Hancock MP asked NICE to make a “Quick Review” of Vitamin D of

- 1) Vitamin D as a treatment for Covid-19
- 2) Vitamin D for prevention of Covid-19
- 3) Any associations observed between Vitamin D and Covid-19 outcomes.

In December 2020 NICE published their Quick Review NG187, and decided “No evidence”

This Quick Review NG187 has been withdrawn ( why ? ) and replaced with NG191, which no longer focusses on Prevention

Dr Zoe Harcombe published an analysis of the December 2020 NICE Quick Review NG187

<https://www.zoeharcombe.com/2021/02/nice-Vitamin-d-covid-19/>

Here is her Summary:

*There were 12 studies (largely population and case control studies) examining the association between vitamin D levels and incidence of Covid-19 and/or severity of Covid-19 (including survival from). The studies were conducted in many different countries by many different research teams. Vitamin D levels were reviewed as absolute levels and as deficient or sufficient levels. The two UK studies using Biobank found nothing statistically significant. The other 10 studies all concluded that higher/sufficient vitamin D levels were associated with significantly better outcomes from Covid-19. The risk ratios for lower/insufficient vitamin D levels were striking in many cases – up to 15-fold difference in one study and often beyond the 2-fold difference used as a starting point for causality with the Bradford Hill criteria.*

*Every single study, every single piece of evidence, was dismissed in the NICE document as “very low” in quality and at “serious risk of bias” or “very serious risk of bias.”*

*Look at the evidence for yourself and decide if NICE were right to dismiss it all as they did. Look at the evidence for yourself and ask – can I (or my loved ones) really risk having low or insufficient vitamin D levels right now? Ask yourself – is there anything to lose by taking a vitamin D supplement for the foreseeable future and for my loved ones to do the same?.*

*You may also like to ponder, as I found myself doing, why NICE would dismiss such a cheap, safe, and effective nutrient, which seems highly likely to help and does no harm.*

### **Opinion on NICE Review NG187**

Experts should be asked for their opinion of NICE NG187

### **Question for NICE**

Were NICE incompetent or were they “unduly influenced” to reject Vitamin D for prevention and treatment of illness from COVID-19 ?

## 8. Nutrients Essential For Immune Support Against Viral Infections

In April 2020 4 experts published this Review:

### **Optimal Nutritional Status for a Well-Functioning Immune System Is an Important Factor to Protect against Viral Infections**

<https://www.mdpi.com/2072-6643/12/4/1181>

#### **Summary**

*Public health practices including handwashing and vaccinations help reduce the spread and impact of infections.*

*Nevertheless, the global burden of infection is high, and additional measures are necessary.*

*Acute respiratory tract infections, for example, were responsible for approximately 2.38 million deaths worldwide in 2016.*

*The role nutrition plays in supporting the immune system is well-established.*

*A wealth of mechanistic and clinical data show that vitamins, including vitamins A, B6, B12, C, D, E, and folate; trace elements, including zinc, iron, selenium, magnesium, and copper; and the Omega-3 fatty acids Eicosapentaenoic acid and Docosahexaenoic acid play important and complementary roles in supporting the immune system.*

*Inadequate intake and status of these nutrients are widespread, leading to a decrease in resistance to infections and as a consequence an increase in disease burden.*

*Against this background the following conclusions are made:*

*(1) supplementation with the above micronutrients and Omega-3 fatty acids is a safe, effective, and low-cost strategy to help support optimal immune function;*

*(2) supplementation above the Recommended Dietary Allowance (RDA), but within recommended upper safety limits, for specific nutrients such as vitamins C and D is warranted; and*

*(3) public health officials are encouraged to include nutritional strategies in their recommendations to improve public health.*

#### **Commentary**

This Review was published in April 2020, so this knowledge was available early in COVID-19 and before vaccines were introduced

Why were NERVTAG and other experts not aware of this ?

## 9. Background and Correspondence

I am Rufus Greenbaum, a private citizen.

I publish a blog to inform and help improve the health of people in the UK with Vitamin D  
<https://vitaminduk.com/>

In 2006 I retired from a career in Electronics and took an interest in Preventative Health, and especially “How To Live Longer” in good health

From 2007 I was aware of significant medical research that higher vitamin D blood levels are associated with lower incidence and severity of influenza and other infectious diseases.  
[https://vitamindwiki.com/tiki-index.php?page\\_id=1304](https://vitamindwiki.com/tiki-index.php?page_id=1304)

In 2009 I wrote to the Chairman of the UK Scientific Advisory Committee on Nutrition, asking them to review the effect of Vitamin D on a number of health conditions, *including Influenza*. The letter and their response are available in their archives:  
<https://vitaminduk.com/wp-content/uploads/2021/01/20100224-SACN1008-Vitamin-D-correspondence-Rufus-Greenbaum.pdf>

In February 2020 I was aware that increased blood levels of Vitamin C, Vitamin D and Zinc would help prevent infection, reduce transmission and reduce the severity of COVID-19. I wrote about this to all members of NERVTAG in April 2020  
<https://vitaminduk.com/wp-content/uploads/2023/07/20200419-Letter-to-Prof-Peter-Horby-at-NERVTAG-re-Natural-Immunity.pdf>

In March 2020 Patrick Holford published a book: **FluFighters**

It is available free from Kindle Unlimited

*“This book should be in the hands of every ICU team fighting COVID-19 and other infections. Informative, well-written, and research-backed, it shows you how to take charge of your own immunity in the midst of this deadly world-wide pandemic.”*

<https://www.holfordirect.com/product/the-flu-fighters/>

In April 2020 I participated in a project to send **Immune Support Packs**, which included Vitamin C, Vitamin D, Zinc and **FluFighters**, to more than 1,500 workers in the NHS.  
<https://www.crowdfunder.co.uk/p/nhs-frontline-immune-support>

In July 2020 I sent a copy of **FluFighters** to every member of the UK Parliament Select Committee on Health and Social Care.  
<https://vitaminduk.com/wp-content/uploads/2023/06/20200729-Letter-to-Jeremy-Hunt-re-COVID-19.pdf>

On September 24, 2020 I hosted a Zoom conference with 4 worldwide experts on Vitamin D and health to discuss the scientific report from September 17, 2020 that high levels of Vitamin D were shown to reduce the risk of catching COVID-19 – **by half**  
<https://vitaminduk.com/vitamin-d-big-news-about-coronavirus/>

On September 27, 2020 I send a message to every member of NERVTAG informing them of the September 17 report and the Zoom video.  
<https://vitaminduk.com/vitamin-d-correspondence-with-nice-phe-sacn/>