

This virtual event brought together eminent speakers to consider new and emerging understanding of the interactions between COVID-19 and obesity, immune function, vitamin D and the gut microbiome. This document provides 10 key facts from the event.

1. The risk factors for severe COVID-19 include: age (>70 years), with risk rising from age 60 years; gender (male – 46% diagnoses, 60% deaths, 70% intensive care unit, ICU admissions); obesity (Body Mass Index, BMI >40); chronic illness (e.g. cardiovascular disease, type 2 diabetes, hypertension, lung disease); ethnicity and deprivation. The immuno-suppressed ('clinically vulnerable') are also at particular risk. The pandemic has placed a spotlight on obesity as a global health problem, on the inequalities in risk associated with deprivation, and ethnicity and on nutrition's role in immune health.
2. Evidence on the impact of COVID-19 demonstrates that people living with obesity (PLWO) have an increased risk of poorer clinical outcomes including hospitalisation, intensive care unit admission, intubation and mortality. There are a number of pathways linking obesity to these outcomes including lower cardiorespiratory fitness, susceptibility to inflammation, metabolic complications, poorer immune response and increased viral exposure.
3. Unusual life events, such as quarantine and lockdown, during the pandemic have had a negative impact on the diet and health behaviours of many children and adults, further complicated for PLWO with loss of access to support and treatment. Moreover, mental health issues have been exacerbated in PLWO, due to self-isolation, disruption of usual weight control strategies, stress and stigmatisation. Evidence-based support for national and local health systems is urgently needed in developing useful tools for the treatment and long-term management of obesity during and beyond this pandemic.
4. A number of vitamins, trace elements, amino acids and fatty acids have been demonstrated to have key roles in supporting the human immune system and reducing risk of infections. Vitamin D, zinc and selenium seem to be particularly important in anti-viral immunity. Immune cells have the vitamin D receptor, some immune cells produce the active form of vitamin D, and vitamin D, zinc and selenium all support antigen presenting cells, T cells and B cells to function. Zinc has been shown to inhibit the RNA polymerase required by RNA viruses, like coronaviruses, to replicate and spread.
5. Clinical deficiencies in zinc and selenium compromise the immune system and can increase rate of infection. Zinc supplementation has been shown to decrease risk of mortality with severe pneumonia in some settings. Limited emerging evidence suggests low zinc or selenium status could be linked to more severe COVID-19 (but more research is needed). However, the evidence does not establish that inadequate intakes of zinc and selenium leading to impaired function of the immune system occur in the general population in developed countries (e.g. in Europe).
6. Low vitamin D status is associated with increased risk of COVID-19 infection, as well as hospitalisation, although this is based on observational data so does not show cause and effect. Given that BAME groups are disproportionately affected with COVID-19, further research is warranted, especially as vitamin D deficiency is particularly common in these ethnic groups. Currently there is a lack of scientific evidence to recommend vitamin D for prevention of COVID-19, but research is ongoing. As a precaution to ensure good bone and muscle health and in consideration of more limited exposure to sunlight in the pandemic (isolation), vitamin D supplements for the general population are recommended (400 IU [10 µg] per day), particularly in winter months, with caution against doses higher than the Upper Limit (4000 IU/d; 100 µg/d).

7. It has been hypothesised that there is an association between seasonal upper respiratory tract infections and low vitamin D status. In a recent systematic review and meta-analysis of individual participant data from randomised controlled trials, vitamin D supplementation reduced the risk of acute respiratory tract infections (ARTI). However, there is a great deal of heterogeneity in these studies (e.g. differences in study populations, country, latitude, age ranges, comorbidities, method of assessing outcome, dosing frequency, % participants with vitamin D status <25nmol/L) that is important and affects meaningful interpretation of evidence to date.
8. The gut microbiome is linked to immunity, inflammatory status and the ability to challenge pathogens. Emerging research shows that gut health may be compromised by COVID-19 infection and, that gut microbiome status can influence health outcome in patients with COVID-19. Probiotics and prebiotics are purported to have a potential role in supporting the gut microbiome to help reduce severity of clinical outcomes of COVID-19. However more research is needed, for example with regards to efficacy of particular strains. Trials are currently ongoing in this area.
9. Dietary approaches to achieve a healthy microbiota may also benefit the immune system. For example, high fibre foods including fruit and vegetables, wholegrain, beans and some fermented foods can help play a role in developing and maintaining a healthy gut microbiota, that will also help support the immune system.
10. The impact of nutrition on prevention and recovery from COVID-19 is an emerging and important area of research. There is no magic diet or supplement that can prevent or treat COVID-19, but there are a number of nutrients that support the normal function of the immune system. A balanced and varied healthy diet alongside vitamin D supplements in the winter months, can help provide the vitamins and minerals, and other nutrients, needed for good health.

## References

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This is a summary from the British Nutrition Foundation's virtual event 'Nutrition & COVID 19' held on 24<sup>th</sup> November 2020. Speakers were Prof Christine Williams (University of Reading & Academy of Nutrition Sciences), Prof Jason Halford (University of Leeds), Prof Philip Calder (University of Southampton), Prof Sue Lanham-New (University of Surrey), Prof Glenn Gibson (University of Reading) & Sara Stanner (British Nutrition Foundation).

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