

NHR Southampton Biomedical Research Centre in nutrition | Southampton University Hospital Southampton NHS Foundation Trust

Three lessons from COVID

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IMMUNITY
 MASTERING THE MARKET

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Disclosures

Consultant/advisor
 BASF AS, DSM, Danone/Nutricia, Cargill, Smartfish, Nutrileads, Bayer Consumer Care, GSK Consumer Healthcare, Barilla, Fresenius Kabi

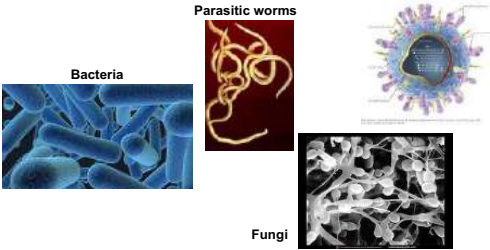
Speaking honoraria
 DSM, Danone/Nutricia, Fresenius-Kabi, B Braun, Smartfish, Bayer Consumer Care, GSK Consumer Healthcare, Biogredia, Pepsico, Proctor & Gamble

Research Support
 BASF AS (omega-3), Bayer Consumer Care (micronutrients), Tate & Lyle (fiber), DSM (materials for trials: vitamin D, probiotics)

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The immune system
 ... is a cell and tissue system that protects the individual from harmful organisms (= pathogens)

Bacteria **Parasitic worms** **Viruses**



Fungi

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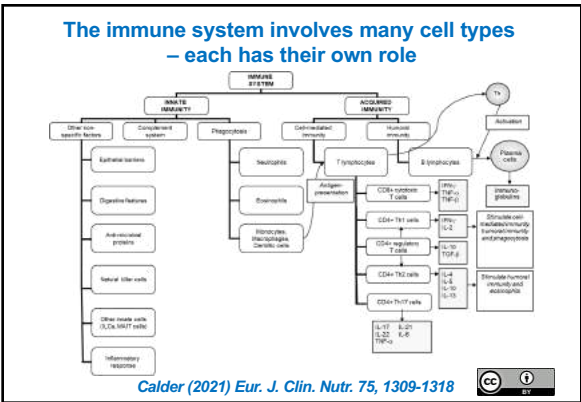
A well functioning immune system is key to providing robust defence against pathogens

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The four general functional features of the immune system

- Exclusion barrier
 - Skin, mucosal linings, acid pH of stomach, proteins in secretions ...
- Identification/recognition
 - Generic via pattern recognition receptors; specific via “antigen receptors”
- Elimination
 - Phagocytosis and digestion; Direct destruction; Killing virally-infected cells
- Memory

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Weak immunity
= Poor defence against harmful organisms
= Infection

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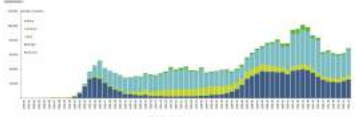
In 2020 weak immune systems were exposed as a major public health challenge!

SOMEONE IN THIS HOUSE HAS A WEAK IMMUNE SYSTEM

People with weak immune systems are more likely to catch Coronavirus (COVID-19) and more likely to suffer serious complications if they become ill. Because of this we are well isolating and self-distancing.



COVID-19 mortality by week and region




European Centre for Disease Prevention and Control

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Multiple COVID-19 vaccines available in 2021 – remember vaccines work by helping the immune response

Vaccines work by stimulating the immune response, “training” it to better recognise and respond to later infection

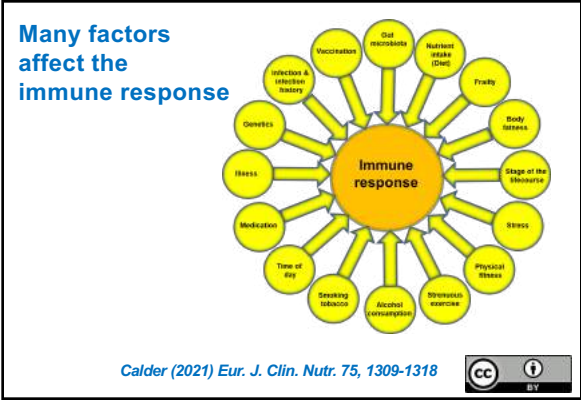
Vaccines often work poorly in those with weak immune systems



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⇒ Thinking about immunity is on-going and part of the “new normal”

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Lifestyle-related factors are important

Weaken immunity:

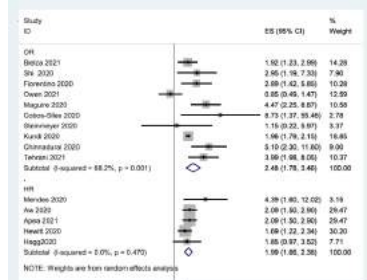
- Stress
- Sleep deprivation
- Smoking
- Excess alcohol
- Obesity
- Poor diet

Support immunity:

- Being physically fit
- Good diet

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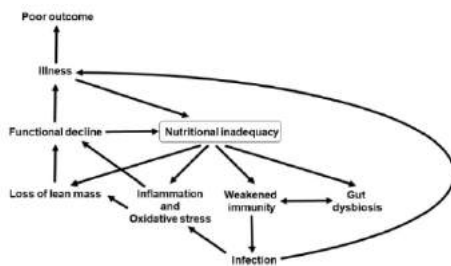
Lesson 1 : Frailty is associated with increased risk of mortality from COVID-19



Decreased mortality ← → Increased mortality
 Zhang et al. (2021) BMC Geriatrics 21, 186

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The frailty cycle



Calder (2021) Eur. J. Clin. Nutr. 75, 1309-1318

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It is important to improve immunity in those who are frail

- Protein (essential amino acids)
- Micronutrients
- Other essential nutrients
- Others? (gut microbiota as a target?)

But it is also important to maintain/regain muscle mass

- Physical activity/exercise
- Protein
- Specific amino acids (branched chain)
- Other important nutrients – vitamin D, omega-3 fatty acids, others?

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It is important to improve immunity in those who are obese

- Micronutrients
- Other essential nutrients
- Others? (gut microbiota as a target?)

But it is also important to promote weight loss and weight maintenance and to prevent weight gain

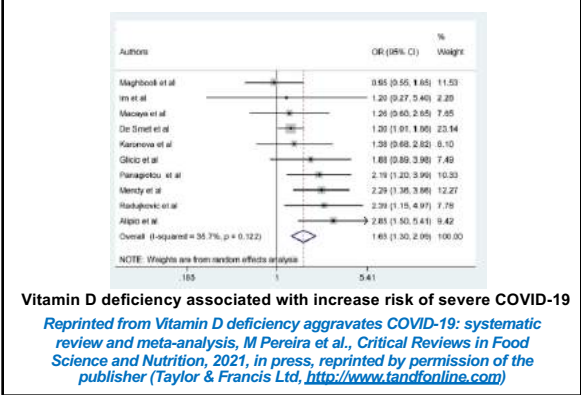
- Physical activity/exercise
- Low energy but essential nutrient rich foods

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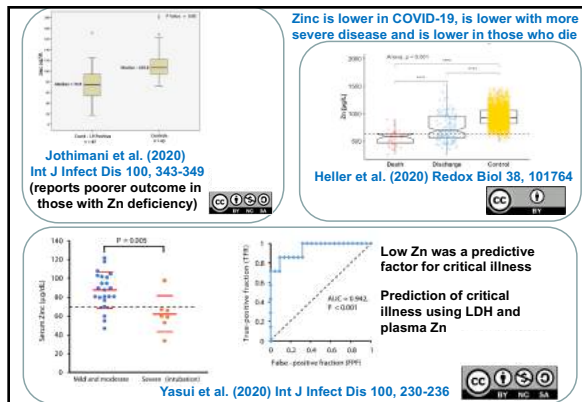
**Lesson 3:
Micronutrients (and other essential nutrients) are vital to the immune system**

Gombart et al. (2020) Nutrients 12, 236

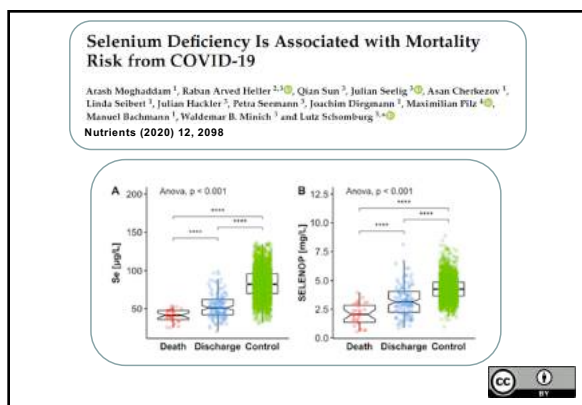
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Key nutrients that are involved in immune system support

Fat-soluble vitamins: A, D, E, (K)

Water-soluble vitamins: B6, B9 (folate), B12, C,

Minerals: Zn, Cu, Se, Fe

Some amino acids: S-containing, glutamine, arginine, leucine, taurine, and some amino acid metabolites

Several fatty acids: Essential fatty acids, Omega-3 (EPA & DHA)

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**Nutrition & immunity –
beyond “mainstream” nutrients**

- Many compounds of plant origin (phytochemicals from fruits, vegetables, seeds, nuts, spices ...)
- Beta-glucans of different origins (e.g. yeast)
- Prebiotics
- Probiotics
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Actions to support a healthy immune response

- Maintain/achieve a healthy weight
- Keep physically fit
- Reduce stress
- Sleep well

- Ensure an adequate intake of all essential nutrients
- Adopt a diet that promotes a healthy, diverse gut microbiota

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