Micronutrients & The Immune System

Founder & CEO, Neal Spruce

VP Nutrition Services, Kat Barefield, MS, RD, CPT

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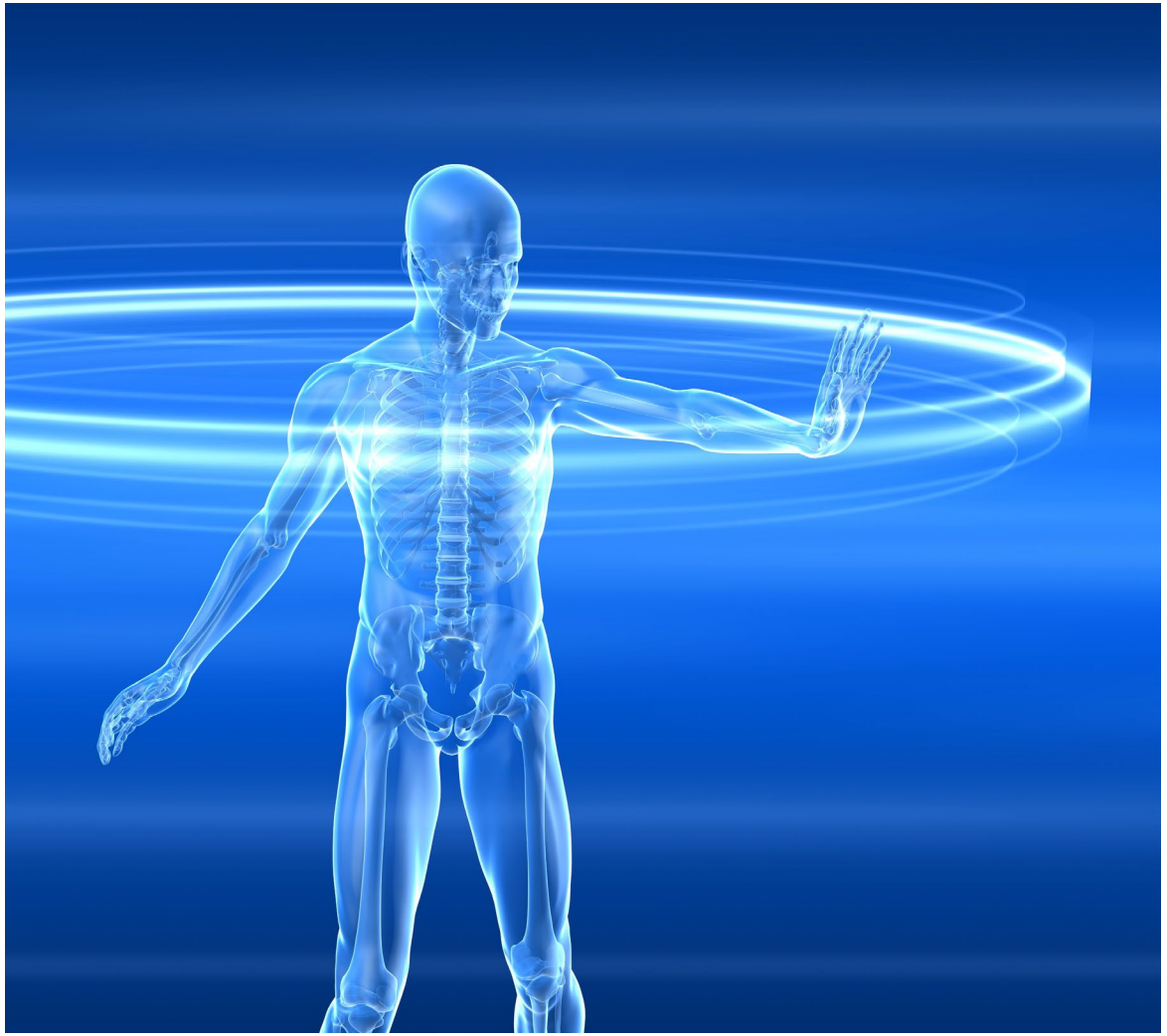
Content to be Presented:

- Unproven remedies related to the coronavirus
- Factors that weaken the immune system
- Key micronutrients involved in the immune system
- Which micronutrients most people fall short of in the US
- Why vitamin D levels are likely to be low in most people
- Which micronutrients may be beneficial in higher than current recommended amounts
- Practical ways to support your immune system now

The Truth About Your Immune System

THERE ARE NO HACKS OR QUICK FIXES



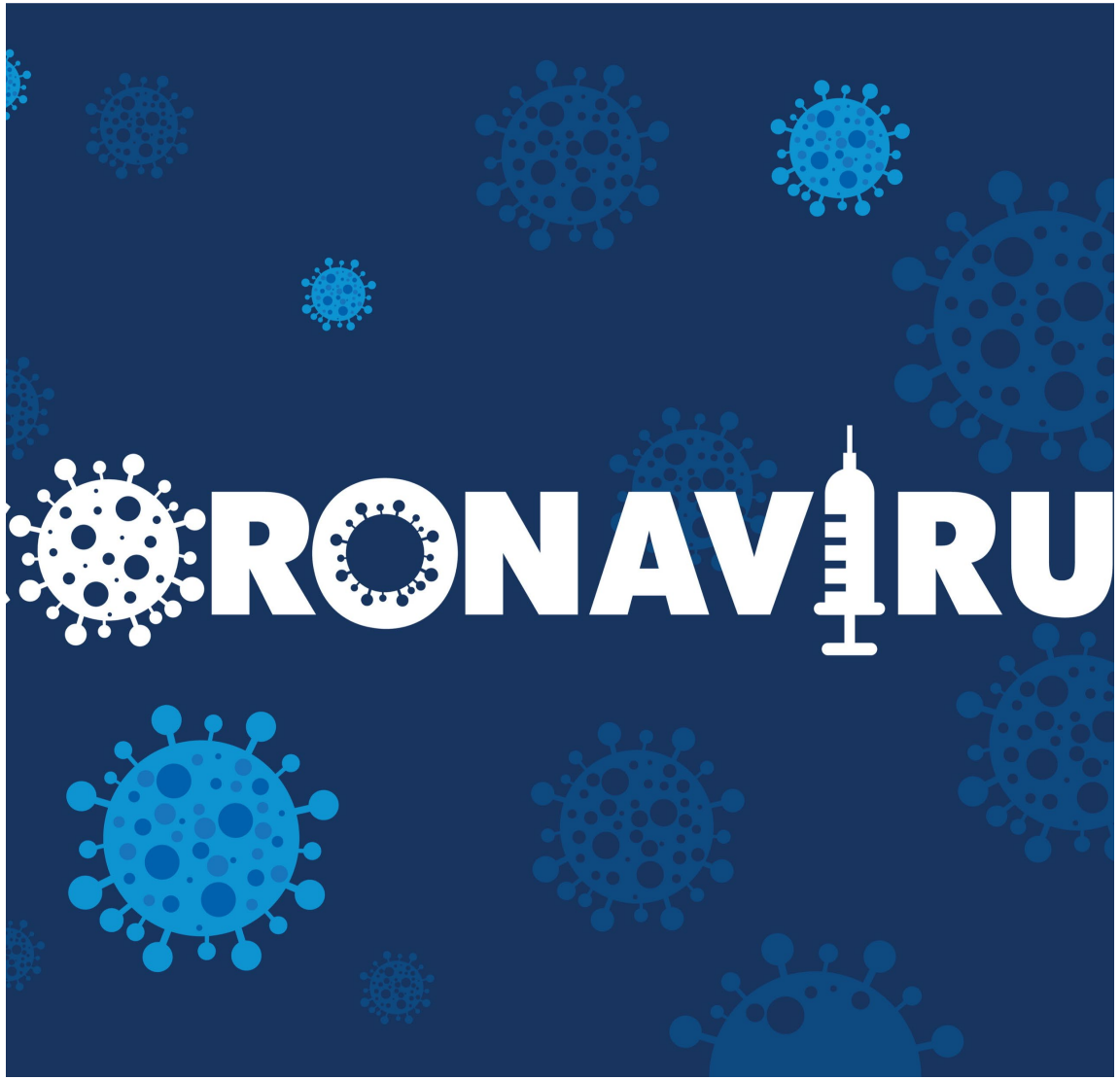
Beware of Unproven Products Related to the Coronavirus

Warning letters were sent to over 100 companies and multilevel marketers allegedly selling unapproved products by making deceptive, unproven claims about curing and treating coronavirus (Covid-19)

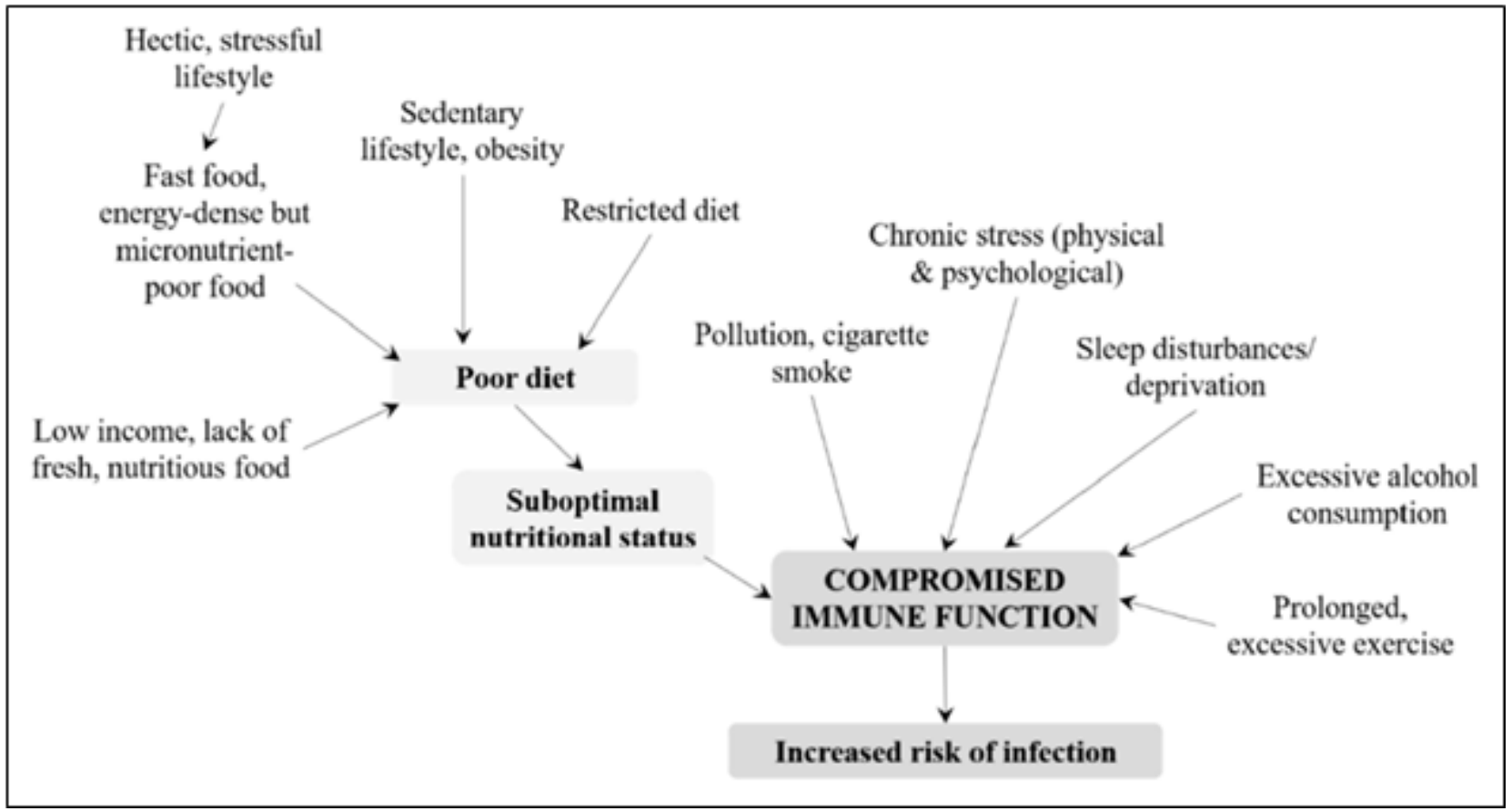
https://www.ftc.gov/coronavirus/enforcement/warning-letters

Unproven Coronavirus Claims

- Colloidal silver
- Essential oils
- Teas
- CBD
- Detoxes
- Herbs
- Supplements
- Acupuncture
- Chiropractic treatments



https://www.ftc.gov/coronavirus/enforcement/warning-letters



Factors that Weaken the Immune System

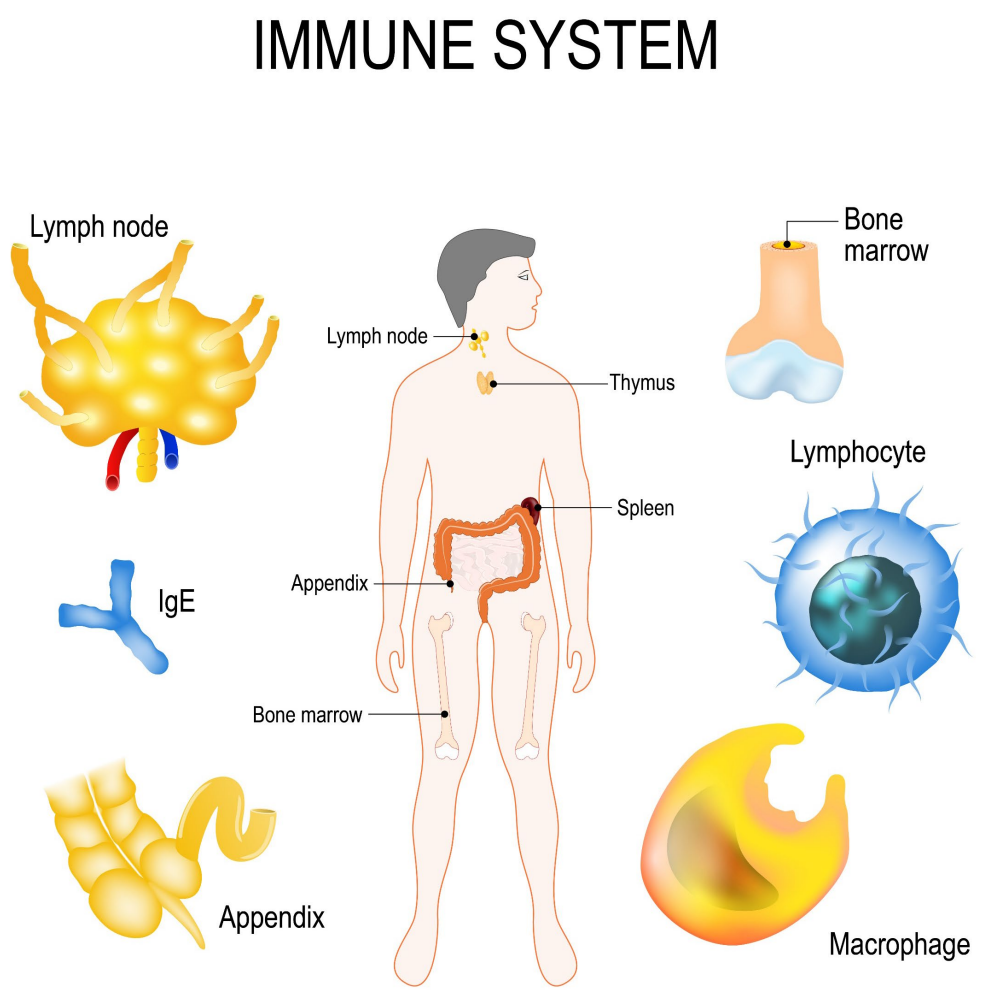
Approach Behaviors to Support the Immune System

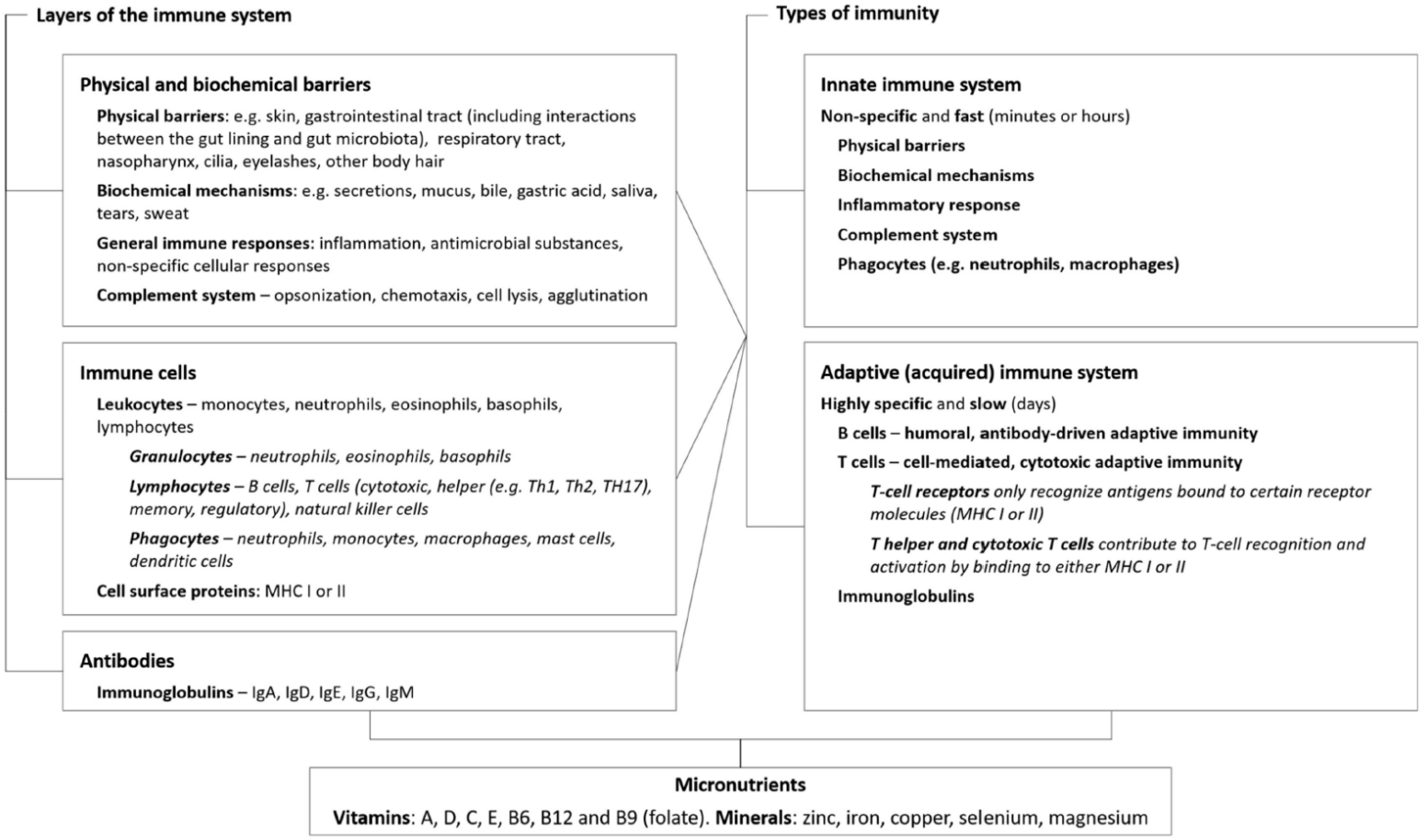
The Prevention/Risk Reduction Before Cure Approach is True Health Care

- **Limit alcohol** intake to 1 drink per day for women and 2 per day for men
- **Incorporate relaxation** techniques such as deep breathing, mediation, walks in nature, listening and/or dancing to your favorite songs
- Developing a **creative hobby** like gardening, painting, or sewing
- Include a wide variety of **fresh fruits and veggies** that you enjoy
- **Get adequate protein** from various sources include fish and seafood
- **Prioritize good sleep** hygiene such as avoiding screens an hour before bedtime
- **Increase your daily steps** by moving more throughout the day.
- **Rescue a dog** and walk it daily
- Do regular **exercise you enjoy**
- **Optimize your nutritional status by getting all your micronutrients daily**

The Layers of the Immune System

- Physical barriers – skin, GI tract, mucus membranes
- Biochemical – mucus, gastric acid, saliva, secretions, mucus
- Immune cells – phagocytes, leukocytes, lymphocytes, etc.
- Antibodies – immunoglobulins





Layers of Immune System & Types of Immunity

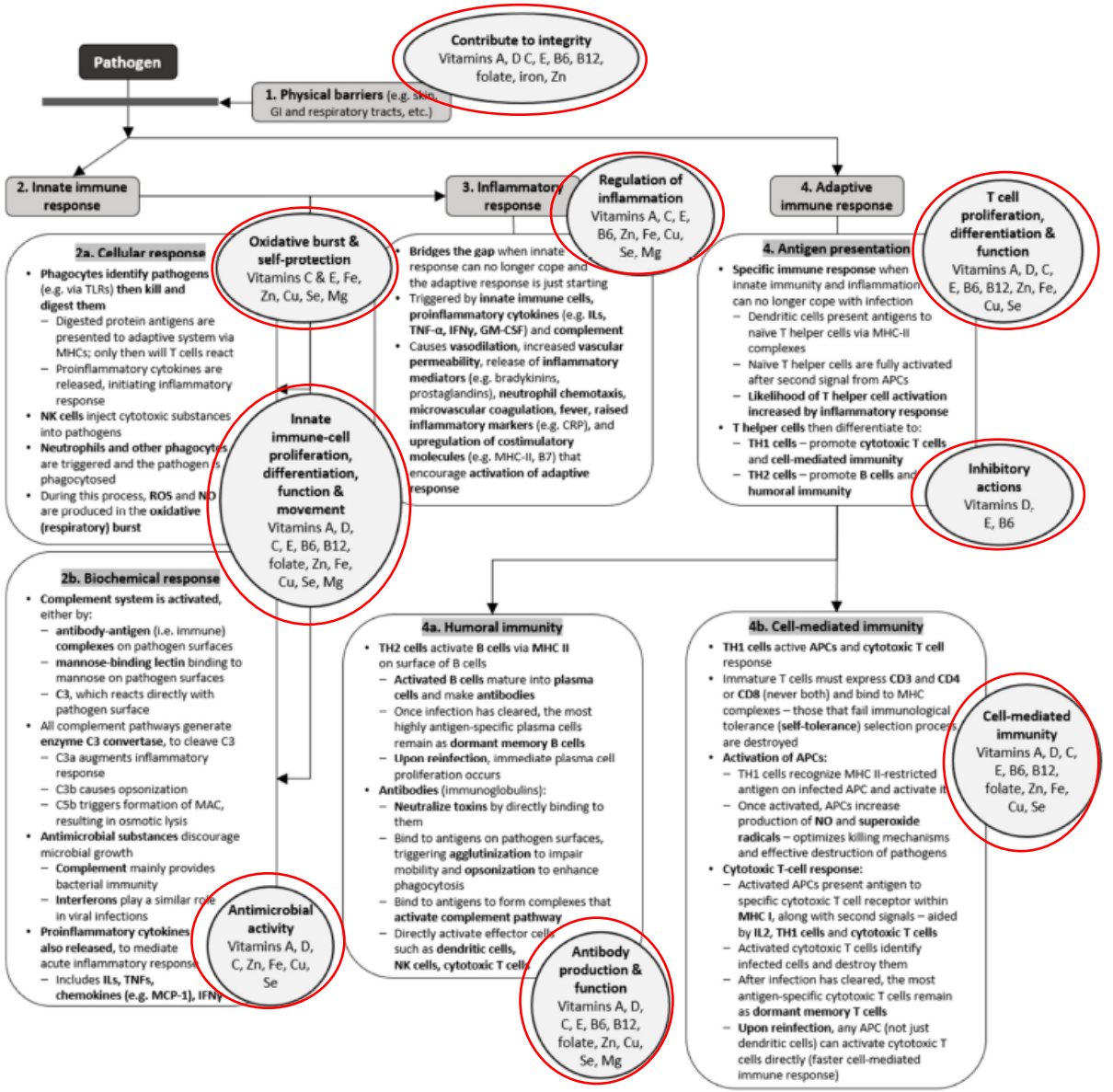
Gombart, Adrian F et al. "A Review of Micronutrients and the Immune System-Working in Harmony to Reduce the Risk of Infection." *Nutrients* vol. 12,1 236. 16 Jan. 2020, doi:10.3390/nu12010236

Micronutrients Have Indispensable Roles at Every Stage of the Immune Response

Shown here is a of important components and processes that are involved in different aspects of the innate and adaptive immune responses with the circles highlighting those micronutrients that are known to affect these responses, which most overlap demonstrating the importance of many micronutrients in supporting proper function of the immune system.

Therefore, there is no surprise that insufficiencies/deficiencies of any of these nutrients will impair these noted immune functions.

In other words the immune system will down-regulate all VM activities, thus immune response, to the amounts supplied rather than up-regulating to full capacity when all components (VM RDAs) are available.



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Key Takeaway

The body requires optimal levels of micronutrients for effective immune function, with different requirements throughout every stage of life.

Asses Your Nutritional Intake – B Vitamins

Micronutrient	*Daily RDA for Adults 19+ yrs*	*Good Food Sources*
Vitamin B6	Males & Females: 1.3 mg Males 51+ yrs: 1.7 mg Females 51+ yrs: 1.5 mg **35% Do Not Meet Daily Needs**	Chicken, turkey, fish, nuts, potatoes with skin
Vitamin B9, Folate	Males & Females: 400 mcg **75% Do Not Meet Daily Needs**	Beans, peas, lentils, leafy greens Fortified grains (bread, cereals)
Vitamin B12	Males & Females: 2.4 mg **30% Do No Meet Daily Needs**	Red meat, chicken, turkey, fish, shellfish

Assess Your Micronutrient Intake – Vitamins with Antioxidant Activity

Micronutrient	*Daily RDA for Adults 19+ yrs*	*Good Food Sources*
Vitamin A	Males: 900 mcg Females: 700 mcg **55% Do Not Meet Daily Needs**	Beef liver, sweet potato, carrots, spinach, pumpkin
Vitamin C	Males: 90 mg Females: 75 mg **48% Do Not Meet Daily Needs**	Citrus fruit, strawberries, broccoli, kale, tomatoes, red peppers
Vitamin E	Males & Females: 15 mg **86% Do Not Meet Daily Needs**	Nuts, vegetable oil, avocado

Assess Your Micronutrient Intake - Minerals

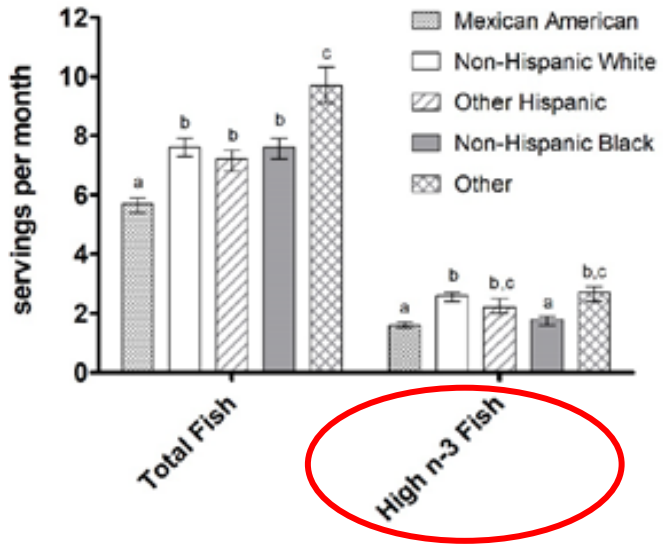
Micronutrient	*Daily RDA for Adults 19+ yrs*	*Good Food Sources*
Copper	Males& Females: 900 mcg **31% Fall Short**	Shellfish, nuts, seeds, organ meats, whole grains, chocolate
Iron	Males & Females 51+ yrs: 8 mg Females: 18 mg **34% Fall Short**	Red meat, chicken, turkey, fish, lentils, fortified foods
Selenium	Males & Females: 55 mcg **15% Fall Short**	Brazil nuts, seafoods, organ meats, grains
Zinc	Males: 11 mg Females: 8 mg **42% Fall Short**	Oysters, crab, beef, pork, beans

Assess Your Nutritional Status – Omega 3 Fish Oils

- At Least Two Servings (~8 ounces) of Fatty Fish Weekly
  - Salmon
  - Mackerel
  - Anchovies
  - Sardines
  - Herring

Omega-3 Fish Oils – Recommendations vs. Actual

Average intake is less than 3 servings/month – 5 servings short of recommendations



nutrients

MDPI

Article

Omega-3 Long-Chain Polyunsaturated Fatty Acids Intake by Ethnicity, Income, and Education Level in the United States: NHANES 2003–2014

Cave et al., Nutrients 2020

Assess Your Micronutrient Intake – Vitamin D

- ~30 minutes of UV light daily directly to skin
- Very few natural sources – trout, salmon, mushrooms exposed to UV light
- Added to foods – milk, orange juice, cheese, cereal
- RDA: 600 – 800 IU
  - More is needed for at risk individuals

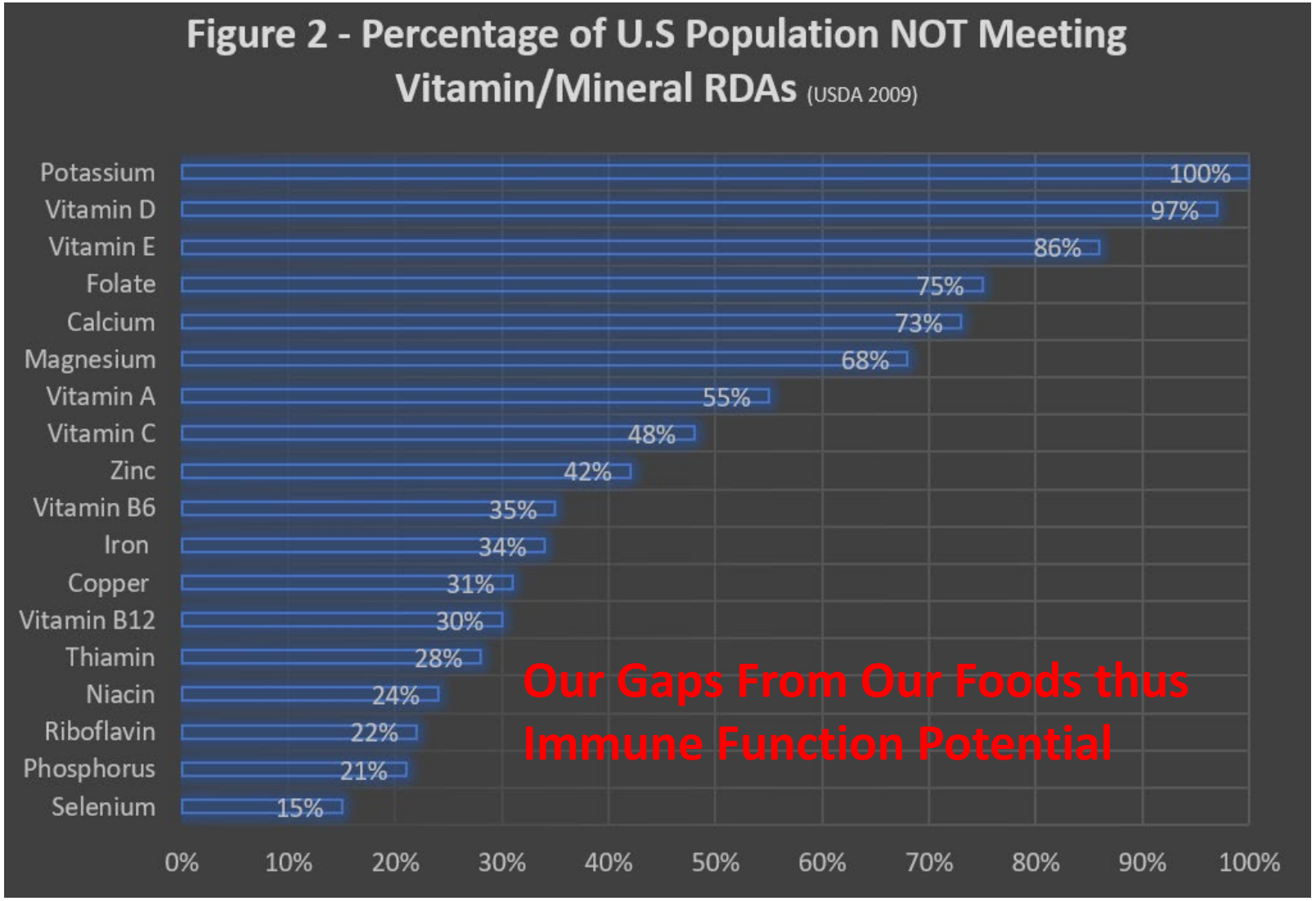
97% Fall Short

Assessing Macros vs. Micros

- Calculations for macros – if portion size is known, amounts can be easily determined
- Calculations for all ~30 essential vitamins, minerals, essential fats to meet your daily needs based on age, gender, life stage
  - Challenging due to variation of food content, inability to assess amounts of each in every food

Impact of Popular Diets & Food Restriction

Avoiding, eliminating or restricting food groups and food variety reduces micronutrient intakes.



Intakes of Micronutrients in the U.S.

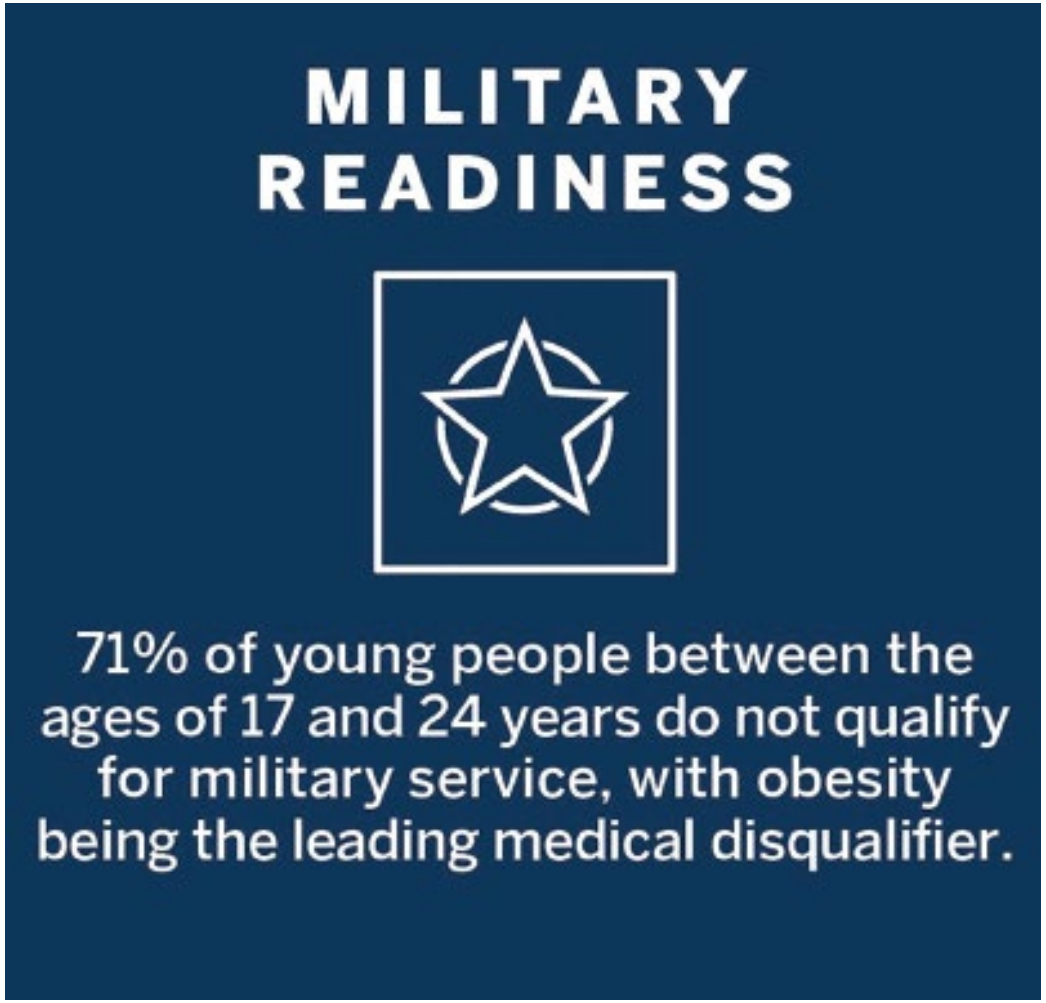
Many are lacking in key nutrients required by the immune system

Telling people they can get all the vitamins and minerals they need from food alone if they eat properly is a fool's errand, particularly in western societies and validated by the fact it hasn't worked

Diet Quality in the U.S. – "Threat to National Security"

- 2020 Report in American Journal of Clinical Nutrition
  - Poor nutrition is the leading cause of illness
  - 46% of adults have a poor-quality diet; 56% of kids

"More Americans are sick than healthy, largely from rising diet-related illnesses."



Fleischhacker et al., AJCN 2020;00:1–49

BREAKING NEWS: 2020-25 US Dietary Guidelines Scientific Report

- 20 Member Committee of scientists, physicians, dietitians and researchers from various universities
- NEW: Inclusion of Dietary Supplements as a Viable Means to Increase Nutrient Intake

2020 DIETARY GUIDELINES ADVISORY COMMITTEE MEMBERSHIP

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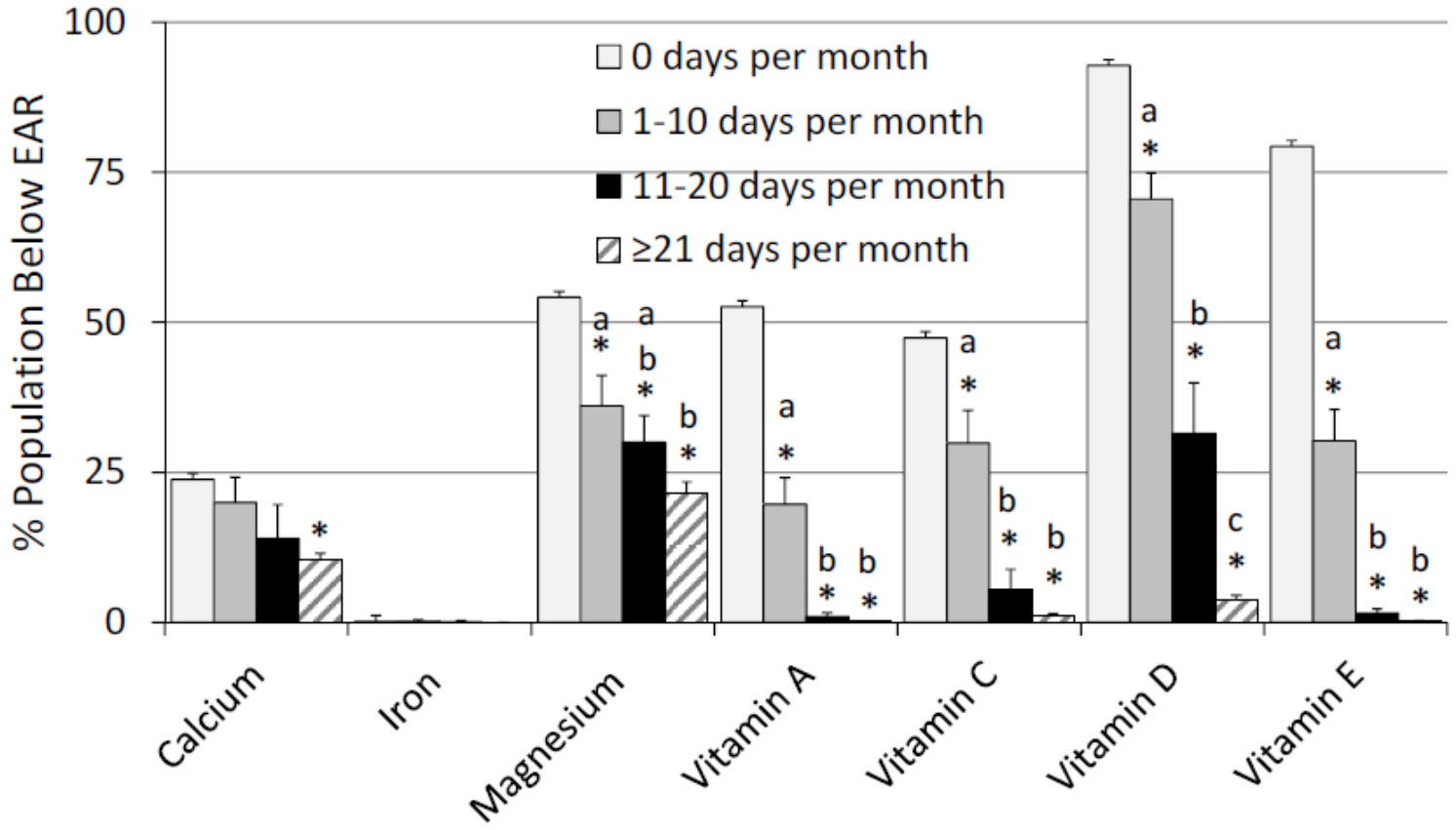
Elsie Taveras, MD, MPH
Massachusetts General Hospital, Harvard Medical School, Harvard T.H. Chan School of Public Health

Linda Van Horn, PhD, RDN, LD
Northwestern University

Link to Full Report

Nutrients. 2017 Aug 9;9(8):849. doi: 10.3390/nu9080849.

Impact of Frequency of Multi-Vitamin/Multi-Mineral Supplement Intake on Nutritional Adequacy and Nutrient Deficiencies in U.S. Adults



Blumberg et al., Nutrients 2017. PMID 28792457

Research Look:

Micronutrients from Multivitamin & Mineral Supplements Reduce Insufficiencies

Higher Frequency is More Effective

Key Takeaways

Building a Strong Immune System Requires Consistent Intake of Numerous Micronutrients

- Eat a wide variety of fresh, minimally processed foods
- Consume foods from all groups
- Use a multivitamin and mineral formula with the commonly under-consumed nutrients to ensure you're getting what you need on a consistent basis

Nutrients of Concern & Supplements to Consider

Nutrients that are significantly lacking which can result in health issues.

Nutrients which may be beneficial in amounts greater than the RDA

The Prevention/Risk Reduction before Cure Approach is True Health Care

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 indispensable and synergistic roles in the immune system

A properly nourished human body is the greatest known pharmacy. No one has been able to duplicate it or we would not need vaccines. In fact, a vaccine is a “product that stimulates a person's immune system to produce immunity to a specific pathogen and related disease, protecting the person from that disease” – i.e. the cure is created by the human body.

It is not difficult to imagine that the health of your immune system determines how a virus effects you as the virus runs its course, including leaving any subsequent infections. Like all organs/tissues in the human body, the immune system is a vitamin and mineral dependent system – i.e. it cannot create, develop or maintain its structure and function without them and therefore creates a weaker immune system when vitamins and minerals are under-consumed compared to ingesting the daily recommendations, which no one does from food alone. There are no drugs to make up for the absence of indispensable vitamins and minerals, nor their lifelong shortages.

It’s no secret that virtually everyone consumes less than the RDAs of vitamins and minerals from food alone. Depending on the deficient/insufficient nutrients, and since they work synergistically, there will be lesser amounts and activities of related immune components such as, impairment of phagocytosis and microbial killing by innate immune cells, decreases in the numbers of lymphocytes and T-cells, altered production of cytokines, compromised inflammatory response and wound healing, and reduced antibody responses.

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

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

Philip C. Calder, et al. Optimal Nutritional Status for a Well-Functioning Immune System Is an Important Factor to Protect against Viral Infections. Review**.** Nutrients **2020**, 12, 1181; doi:10.3390/nu12041181

Vitamin D – Research Look

- Review & Meta Analysis of Randomized Clinical, Placebo Controlled Trials:
  - 25 RCTs + 10,933 participants
  - Vitamin D3 & D2 supplementation reduces risk of viral and bacterial respiratory tract infections
  - Most deficient had greatest protection
  - Daily and weekly supplementation more effective than bolus doses

Research

Vitamin D supplementation to prevent acute respiratory tract infections: systematic review and meta-analysis of individual participant data

BMJ 2017 ; 356 doi: https://doi.org/10.1136/bmj.i6583 (Published 15 February 2017)

BMJ 2017;356:i6583

Vitamin D – Research Look

The bottom line is that there is no downside to increasing our intake of vitamin D to maintain serum 25(OH)D at at least 30 ng/mL (75 nmol/L), and preferably at 40–60 ng/mL (100–150 nmol/L) to achieve optimal overall health benefits of vitamin D.


Open Access Review

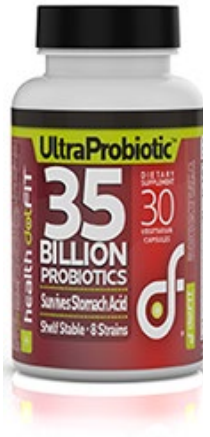
Immunologic Effects of Vitamin D on Human Health and Disease

by Nipith Charoenngam [1,2] and Michael F. Holick [1,*]

Nutrients **2020**, *12*(7), 2097; https://doi.org/10.3390/nu12072097

Immune Support Packs

- Essential: Multivitamin & Mineral Formula
  - + Omega 3 Fish Oils + Vitamin D3 if needed
- Better: + Muscle Defender (Glutamine)
- Best: + UltraProbiotic



Approach Behaviors to Support the Immune System

The Prevention/Risk Reduction before Cure Approach is True health Care

- **Limit alcohol** intake to 1 drink per day for women and 2 per day for men
- **Incorporate relaxation** techniques such as deep breathing, mediation, walks in nature, listening and/or dancing to your favorite songs
- Developing a **creative hobby** like gardening, painting, or sewing
- Include a wide variety of **fresh fruits and veggies** that you enjoy

- **Get adequate protein** from various sources include fish and seafood
- **Prioritize good sleep** hygiene such as avoiding screens an hour before bedtime
- **Increase your daily steps** by moving more throughout the day.
- **Rescue a dog** and walk it daily
- Do regular **exercise you enjoy**
- **Optimize your nutritional status by getting essential micronutrients from a daily multivitamin and mineral formula + extra vitamin D and omega-3 fish oils if needed**

WHY VITAMIN & MINERAL (VM) SUPPLEMENTATION SHOULD BECOME A LIFELONG POLICY

We're Not Alone

From the Panel of the 14 International Experts in Nutritional Science & Health Care Consensus Report:

"Achieving the nutrient RDAs is the goal for long-term health"

"Multivitamin and mineral supplements (*MVMS) can broadly improve micronutrient intakes when they contain at least the micronutrients that are consumed insufficiently or have limited bioavailability within a specified population"*

Just Do It

Vulnerable Groups for Poor Nutrition

- Food Insecurity
  - 37 million people (6 million kids) live in households uncertain of having enough food
  - Disproportionately affects:
    - Low income
    - Blacks
    - Hispanics
    - Single parent households
    - Households with young kids
- US Dietary Guidelines may help expand access to vitamins and minerals for low income and minority groups

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It's Not Just About Our Family, It's About ALL Families

Supplemental Material

Appendix

ULTRA PROBIOTIC

Basic Mechanisms of Action (cross talk throughout the body)

- Probiotics, (opposite of antibiotics, which can also kill off good bacteria) are “friendly bacteria” used to re-colonize parts of the body where they should normally be present to help maintain a healthy GI tract,[10,26]
- The human body depends on the healthy balanced colonization (predominately-friendly bacteria) of gut bacteria for multiple functions including absorbing and manufacturing of specific nutrients,[38] metabolizing foods, immunological benefits,[5] and prevention of colonization by pathogenic (bad) bacteria.[39]
- Probiotics also appears to deliver nutritional benefits including inducing growth factors while increasing the bioavailability of minerals, stabilizing the mucosal barrier, and decreasing intestinal permeability[10,40,41]

A healthy GI tract is our first line of defense and offers at least the potential for better overall health outcomes thus preventative care[1-27]

Intestinal metabolites significantly affect not only local intestinal immunity but also other organs through the lymphatic and circulatory system

New Study on Probiotics Complementary Effect on COVID-19

*Previous studies have suggested some strains of lactobacilli and bifidobacterial have a protective role against **influenza virus** , rhinovirus, **respiratory syncytial virus, adenovirus** , and pneumovirus. We know that the entry points for the virus into the body are enzymes that are linked to intestinal cells,"*

Probiotic Protective Biological Functions

"Coronaviruses constantly change their binding patterns as they evolve, and the potential target in the lungs also varies, but not in the small intestine, where it remains constant."

Rationale for test

Researchers hypothesized that infected patients using a bacterial formulation with the *"appropriate"* biochemical and immunological profile might trigger several protective biological functions.

Test probiotic

"The bacterial strains present in the test product enhance the production of both the nuclear factor erythroid 2p45-related factor 2 (Nrf2) and its target Heme oxygenase- 1 (HO-1). These molecules exert antiviral activity through a reduction of oxidative stress. It's known that Nrf2 and HO-1 have significant antiviral activity against a wide variety of viruses."

Not intended to treat, prevent, or cure any disease

Results:

Within 72HR nearly all patients supplemented showed remission of diarrhea and other symptoms, compared to less than half of the those not supplemented. The estimated risk of developing respiratory failure was eight-fold lower in the supplemented group. Both the prevalence of patients transferred to ICU and mortality were higher among the non-supplemented patients.

Potential Mechanism Explanation

The gut-lung axis' role: the lymphatic system pathway, (forms a channel between the lungs and intestine), is where bacteria can cross the intestinal barrier to reach the circulation and influence the pulmonary immune response.

"Intestinal metabolites significantly affect not only local intestinal immunity but also other organs through the lymphatic and circulatory system,"

Ex: short chain fatty acids (SCFA) produced primarily by bacterial fermentation from fiber in the gut, act in the lungs as signaling to attenuate inflammatory and allergic responses.

Conclusion:

The formulation could act as a complementary remedy to slow down the progression of COVID-19 as researchers stress the gut-lung axis.'

d'Ettorre et al. Challenges in the Management of SARS-CoV2 Infection: The Role of Oral Bacteriotherapy as Complementary Therapeutic Strategy to Avoid the Progression of COVID-19. Frontiers in Medicine. July 2020 | Volume 7 | Article 389

Lactobacillus and bifidobacterium supplementation is often used to re-colonize depleted normal flora to treat or help prevent pathogenic organisms from taking up residence (Figure 1) and causing disease or sickness[10,42-49]

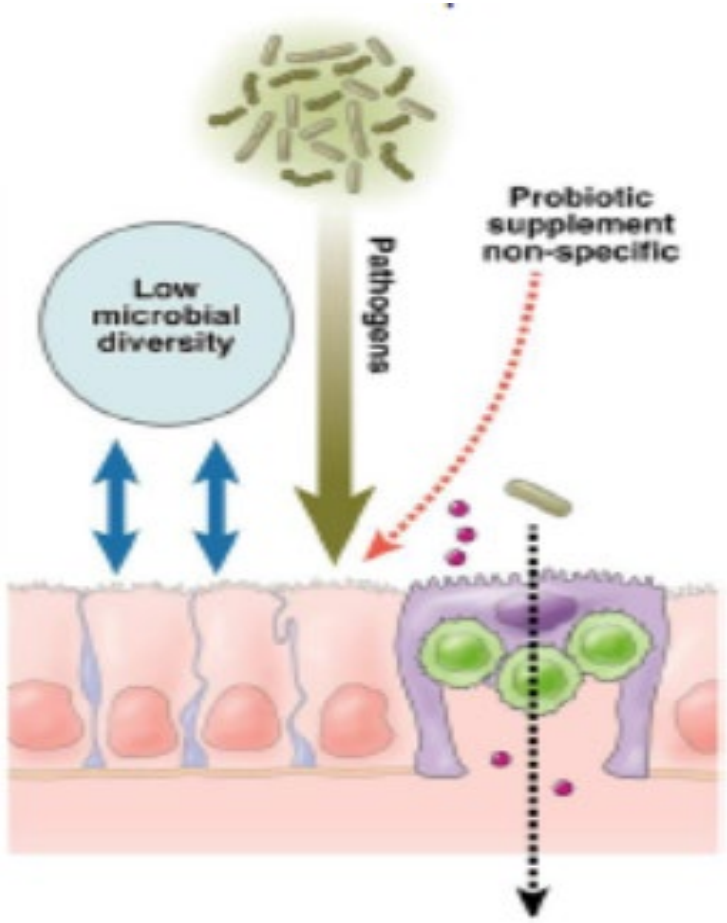


Figure 1. Preventing pathogen residence in compromised or potentially compromised flora. Influx of pathogens would otherwise limit the protective signaling from the microbiota to the host; probiotic supplementation with non-specific (friendly bacteria) probiotics such as from the lactobacillus strain can populate the host and therefore block harmful bacteria from habitation (adapted from Shanahan with permission).[44]

MUSCLE DEFENDER

Goal MuscleDefender

- To supply L-glutamine in a stable patented dipeptide form (magnesium glycyl glutamine chelate) in order to improve oral L-glutamine supplementation's many important roles in supporting cell growth and survival during times of depletion brought on by demanding stresses. Replenishment may help to maintain health (immune support) including the integrity of the intestinal tract and enhance recovery as compared to a non-supplemented state.

Rationale

- Glutamine (GLN) is the most abundant amino acid in the human body and central to the maintenance and growth of tissues.[1-5] GLN is rapidly depleted during demanding stresses as it works to activate cell survival and support rapid growth.[4,6-9] GLN shortages or lack of availability would be especially harmful in conditions where rapid cell proliferation and immune defenses are required.[4,12] Because of the many functions of glutamine, there is a dramatic increase in it's release from peripheral tissue (including muscle) to central tissues (e.g. liver, immune system, etc.) during physically stressful conditions, giving rise to the basis of supplementation during prolonged intense exercise[4,10-12]

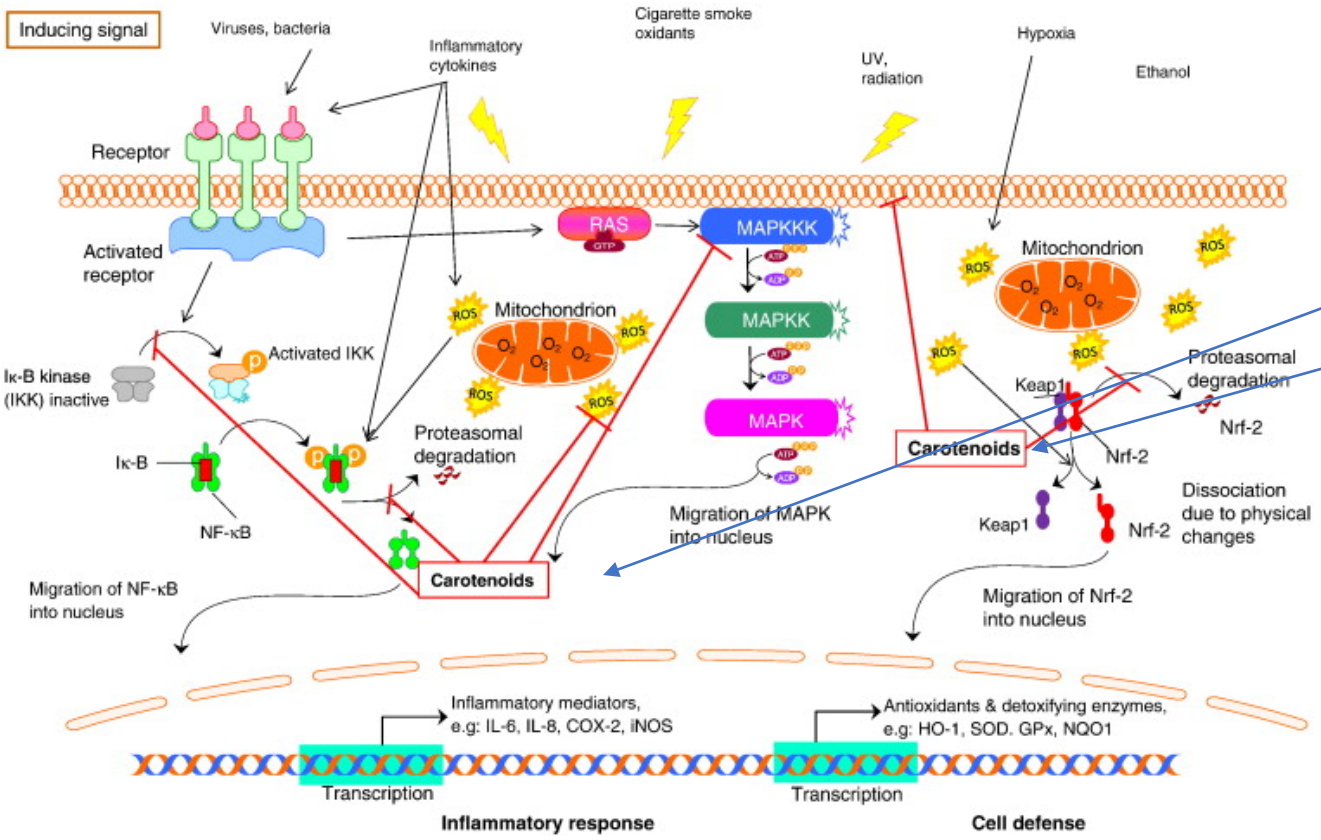
MUSCLE DEFENDER

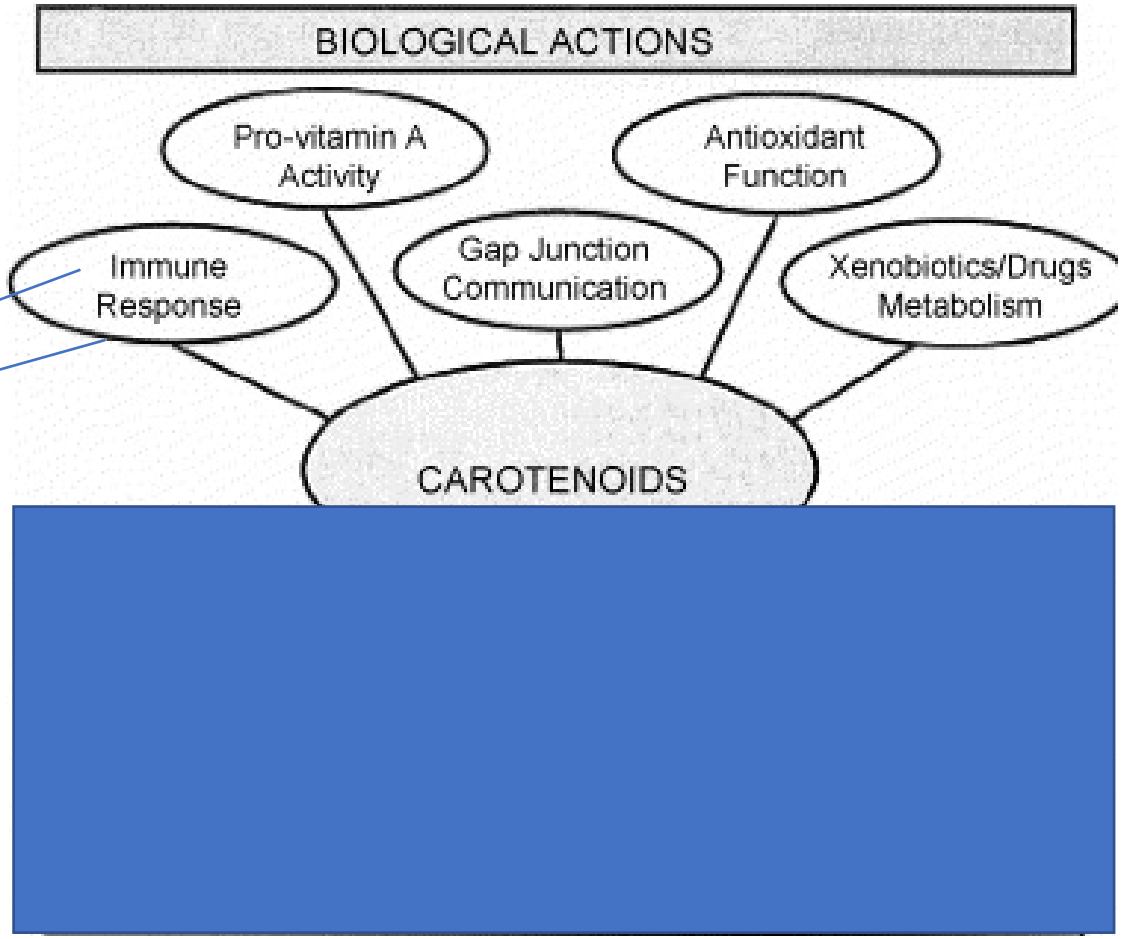
Potential Mechanisms of Glutamine to Support Stress Related Bodily Harm[4,12]

- Anti-inflammatory/immune regulation by attenuating: 1) activation of nuclear factor-κB and cytokine release and 2) decreases in immune cell f unction including neutrophils and lymphocytes
- Increase tissue concentration of GSH attenuating oxidative stress
- Provision of NADPH (stimulating intermediary metabolism and preventing apoptosis by supporting mitochondria function) to increase neutrophils and lymphocytes activity and function
- Preservation of tissue functions via maintenance of ATP levels
- Promotion of intestinal integrity[18]
- Activates heat shock factor 1 (HSF-1). Tissue protection from enhanced heat shock expression by activating nutrient receptors (sirtuin 1/human antigen R) leading to the activation of heat shock transcription factor in the nucleus favoring cell survival[8,19,20]
- Glutamine availability is a limiting step for the mTOR complex 1 activation pathway, a primary control point for cell size including skeletal muscle[21]

SuperiorAntioxidant: non-vitamin immune support

modulates oxidative stress & inflammation thru carotenoid unique mechanisms





Carotenoid Mechanisms and Target Benefits