

A graphic featuring a magnifying glass with a green handle and a dark grey frame. The lens of the magnifying glass is centered over the text 'Nutrition Update'. The background consists of a light blue, semi-transparent map of the state of Oregon, which is layered over a darker blue, slightly offset version of the same map. The entire graphic is set against a plain white background.

Nutrition Update

August 25, 2020

Today's Expert Presenter



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Recent Increase in Supplement Purchasing

Supplements for Coronavirus Probably Won't Help, and May Harm

NY Times, March 23, 2020. <https://www.nytimes.com/2020/03/23/well/live/coronavirus-supplements-herbs-vitamins-colds-flu.html>

On Amazon, Dubious 'Antiviral' Supplements Proliferate Amid Pandemic

July 27, 2020 · 4:06 PM ET
Heard on [All Things Considered](#)

NPR: July 27, 2020. <https://www.npr.org/2020/07/27/894825441/on-amazon-dubious-antiviral-supplements-proliferate-amid-pandemic>

Vitamin C by IV and an FBI raid. How hope, rather than proof, sent the antioxidant's sales soaring during COVID-19.

Brent Schrottenboer USA TODAY

Published 5:59 a.m. ET Jul. 21, 2020 | Updated 3:22 p.m. ET Jul. 21, 2020

USA Today, July 21, 2020 <https://www.usatoday.com/story/money/2020/07/21/coronavirus-vitamin-c-demand-surged-during-pandemic/5403847002/>



Objectives

- Be able to:
 - Recall common supplements that are purported to boost the immune system and whether there is any evidence to support that claim
 - Understand how aspects of a healthy lifestyle can support immune function

Outline

- Brief refresher:
 - Supplement regulation
 - Immune system
- Is there evidence to support use of popular supplements?
- Supporting a healthy immune system:
 - Diet
 - Sleep
 - Stress-reduction
 - Exercise

How are supplements regulated?

Supplement Regulation

- Regulated by the Food and Drug Administration under the Dietary Supplement Health and Education Act (DSHEA) of 1994
- Regulations less stringent as those for food, additives, or pharmaceuticals

What Are Supplements? (According to the DSHEA)

- Products taken by mouth that contain a "dietary ingredient." Dietary ingredients include vitamins, minerals, amino acids, and herbs or botanicals, as well as other substances that can be used to supplement the diet. (FDA)
- Federal law requires labeling with either "dietary supplement" or a description of the product's dietary ingredient(s) - e.g., "ginseng supplement" or "calcium supplement".

Structure Function Claims

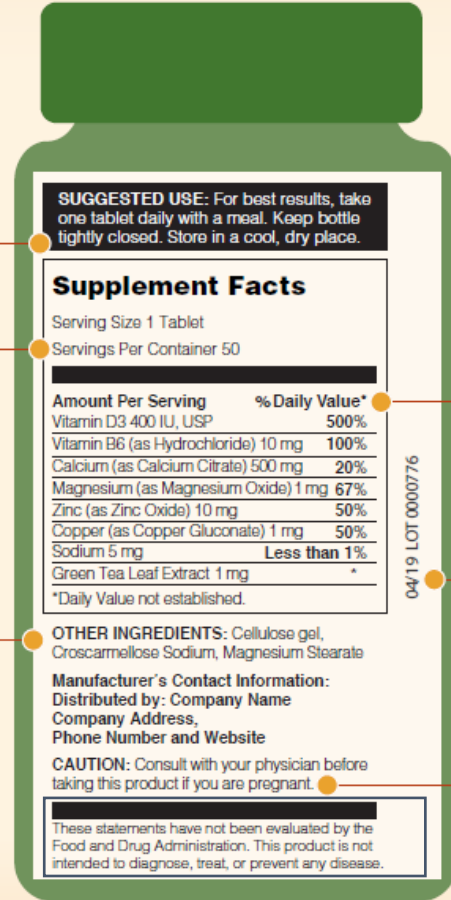
- Applies to conventional foods, dietary supplements, and drugs
- Relate to dietary deficiency- ie: Vit C prevents scurvy
 - Must indicate how widespread the disease is in the U.S.
- How the nutrient or dietary ingredient affects or maintains a structure or function in humans
 - “Calcium builds strong bones”
 - “Fiber maintains bowel regularity”

1 Suggested Use and Serving Size

Dietary supplements are regulated as food, so the recommended amount is listed in terms of "Serving Size"—often in the form of the number of tablets or capsules to be consumed. USP tests each product for **performance** to ensure it will break down and release the ingredients into the body as intended.

2 Supplement Facts Panel

The supplement label lists the individual ingredients contained in each tablet or capsule. USP tests products to **positively confirm the identity and purity** of each ingredient.



3 % Daily Value

Where applicable, this value indicates the percent of the Reference Daily Intake (RDI) or Daily Reference Value (DRV) of a dietary ingredient that is in a serving of the product. USP tests each ingredient to ensure the **potency**—that is, the strength or amount of the ingredient—matches what is declared on the label.

4 Expiration Date

USP requires participants to provide expiration date information and tests the product to ensure it will contain the claimed **potency** at the date specified.

5 Cautions & Warnings

Where applicable, this information helps you understand who should avoid or take precautions when taking certain products. USP requires cautionary statements when appropriate as part of participation in our program.

* For additional information about FDA labeling requirements, see <http://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/DietarySupplements/ucm070597.htm#4-59>

***These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure or prevent any disease.**

Learn more at: www.quality-supplements.org



Safety

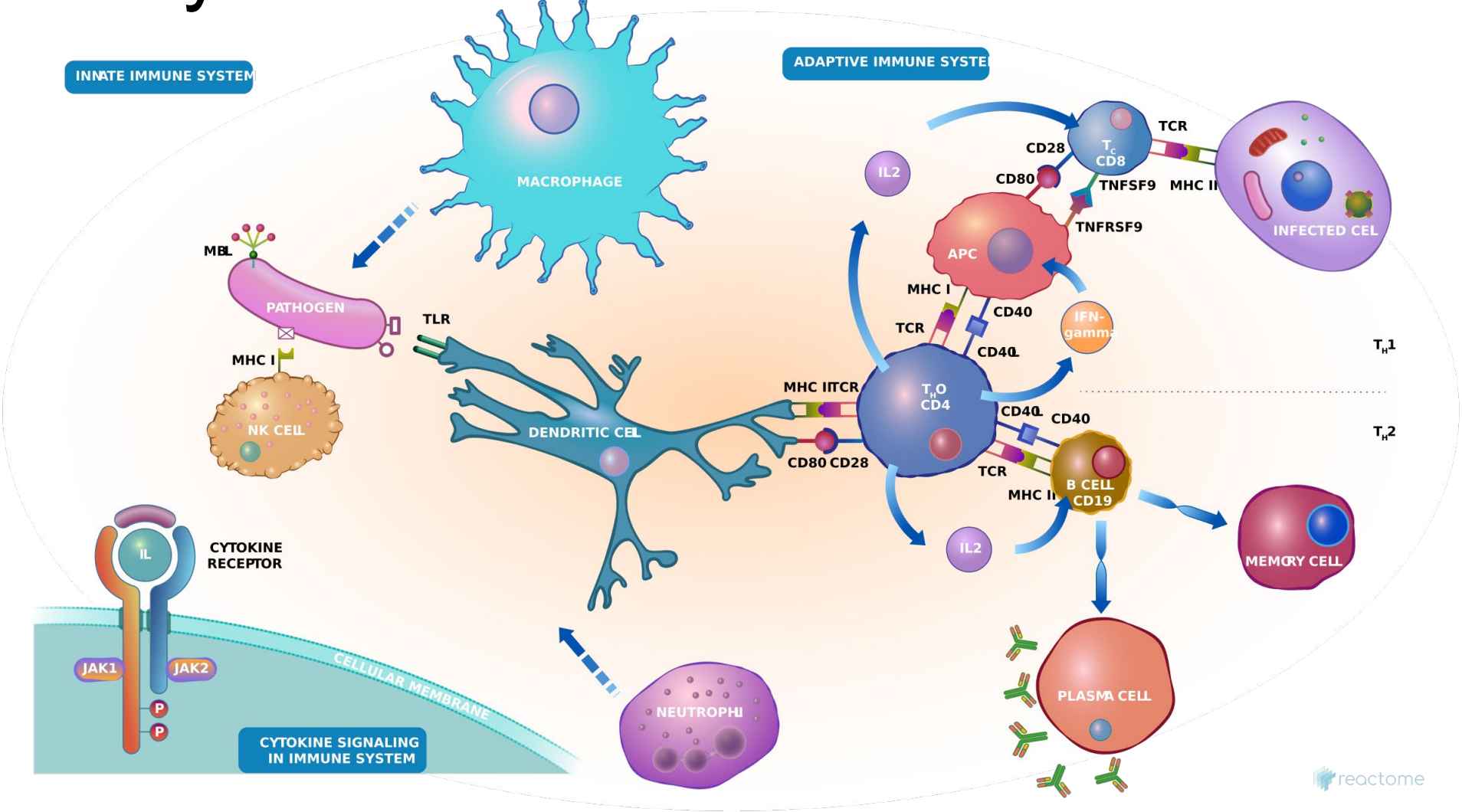
- Supplements do not need to be demonstrated as safe in advance
- Newer supplement ingredients require notifying FDA and providing evidence how it was determined to be safe
- FDA can remove supplements from the market if they are demonstrated to be unsafe
 - Example: Ephedra banned in 2004

Third party verification

- Confirm that supplements contain the ingredients listed on labels,
- Certify that there are no contaminants in the supplement.
- Do not assess efficacy of dietary supplements
- Organizations include:
 - NSF International
 - US Pharmacopeia (USP)

Quick Refresher – Immune System

Immune System



reactome

Image for "Immune System". Reactome, <https://reactome.org/content/detail/R-HSA-168256> (August 14, 2020). CC BY 4.0 License (<https://creativecommons.org/licenses/by/4.0>)

Innate and Adaptive Immunity

Innate

- Fast, not antigen-specific
- Barriers (skin, mucosa)
- Antimicrobial peptides
- Phagocytes and other cells that recognize pathogens (such as viruses and bacteria)
- Often works via inflammatory processes

Adaptive

- Initially slower, antigen-specific
- Antigen-specific cells (such as T and B lymphocytes)
- Antibodies
- Repeated exposure results in a fast and robust response to the antigen

Innate

- When you answer the phone and it's a telemarketer you have to converse with

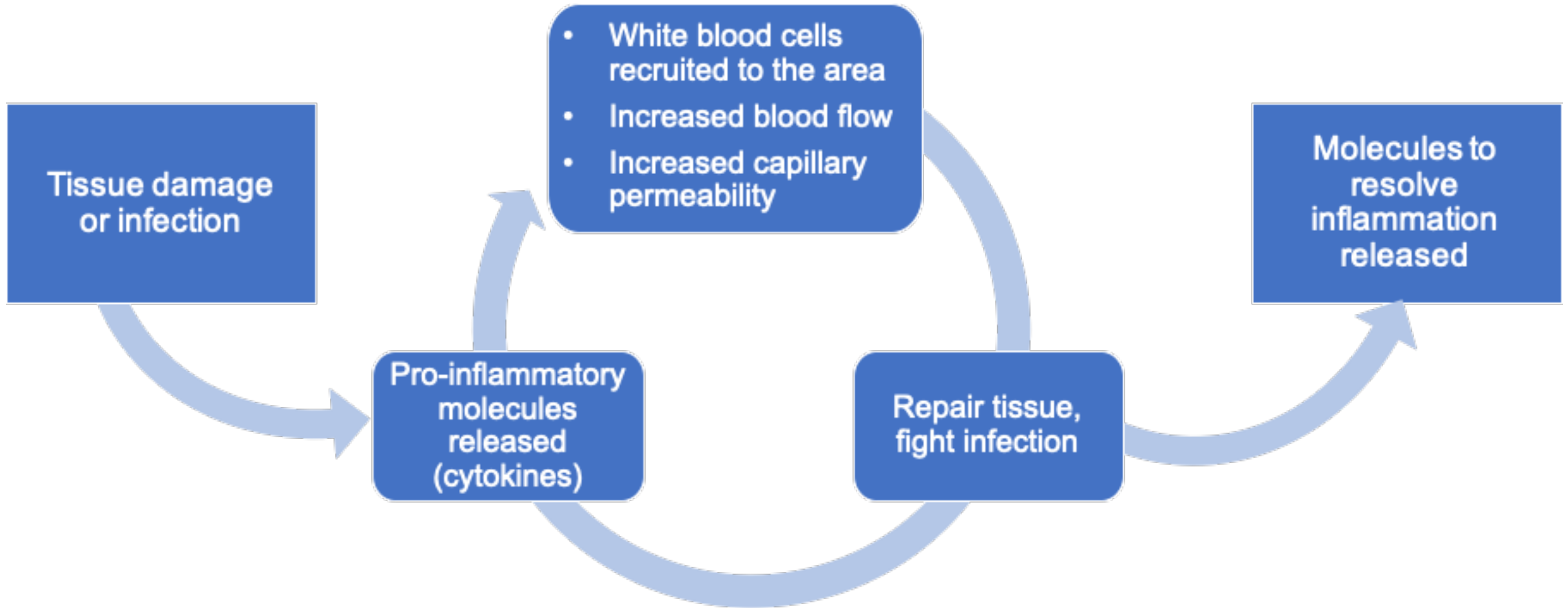
Adaptive

- When you enter the number into call-blocker and the telemarketer can't get through

Vaccine

- Spam screening service blocks telemarketer calls

Acute Inflammation



Is there evidence to support use of popular supplements?

Recent Increase in Supplement Purchasing

- Compared to same time last year, purchases in the first week of March increased:
 - Elderberry up 415%
 - Echinacea up 122%
 - Vitamin C up 146%
 - Zinc up 255%
 - Vitamin D and multivitamins also up





Elderberry and Elder Flower

- Berries and dried flowers from the European elder tree
- *Sambucus nigra*
- Common products:
 - Extract
 - Syrup
 - Gummies
 - Capsules
 - Dried elder flowers
 - Elder flower teas

Elderberry and Elder Flower Evidence

- A few small studies suggest it may help reduce duration of upper respiratory symptoms, such as those from cold and flu.
- Because these studies are small, it's too early to draw any conclusions
- “The leaves, stems, raw and unripe berries, and other plant parts of the elder tree contain a toxic substance and, if not properly prepared, may cause nausea, vomiting, and severe diarrhea.”



Echinacea

- Flower native to North America, also known as coneflower
- *Echinacea purpurea*, *Echinacea angustifolia*, *Echinacea pallida*
- Common products
 - Capsules
 - Liquid drops
 - Powders
 - Teas

Echinacea Evidence

- Evidence is lacking
 - Recent meta-analysis concluded it might be able to reduce risk of upper respiratory tract infections but that over-the-counter preparations are unlikely to help
 - “Consumers should not be confident that commercially available remedies are likely to shorten the duration or effectively prevent [upper respiratory tract infection].”
- Interactions with medications
 - May decrease effectiveness of some cancer drugs
 - May cause liver damage in combination with certain medications



Licorice Root

- Plant common throughout Europe and Asia
- Common flavoring in candy and other foods and beverages
- *Glycyrrhiza glabra*, *Glycyrrhiza uralensis*, *Glycyrrhiza inflata*
- Common products:
 - Capsules
 - Liquid extract
 - Powders
 - Cut licorice root

Licorice Root Evidence

- Evidence is lacking
 - Cell culture and animal studies suggest some impact stimulating T cells
 - Human studies lacking
- Excessive intake can cause pseudohyperaldosteronism
 - Hypertension
 - Hypokalema
 - Suppression of hormones renin and aldosterone

Bupleurum

- Dried root common in traditional medicines in Japan, China, Korea
- Multiple species, including *Bupleurum chinese* and *Bupleurum falcatum*
- Also known as chaihu, Radix Bupleuri, and is a common component of herbal mixtures
- Common products
 - Capsules
 - Liquid extracts
 - Powders
 - Teas



Bupleurum Evidence

- Evidence is lacking
 - Some animal studies and cell culture studies
 - Human studies lacking
- May cause liver damage

Homeopathic *Arsenicum album*

- Homeopathy two main tenets:
 - Small amounts of substances that cause illness can treat those same symptoms;
 - Highly diluted substances can retain a memory of the original substance.
- There is no evidence to support homeopathy.
- Some homeopathic treatments may contain large amounts of dangerous substances that can cause serious harm.

Miracle Mineral Solution

- Sodium chlorite mixed with citric acid, resulting in chlorine dioxide
- Other names include Master Mineral Solution, Miracle Mineral Supplement, MMS, Chlorine Dioxide (CD) Protocol, and Water Purification Solution (WPS)
- Claims that MMS is antimicrobial, antiviral, and antibacterial; remedy for autism, cancer, HIV/AIDS, hepatitis, flu, and other conditions
- Side effects include **nausea, vomiting, diarrhea, severe dehydration, acute liver failure**

Miracle Mineral Solution

Danger: Don't Drink Miracle Mineral Solution or Similar Products

The FDA warns you not to drink sodium chlorite products such as Miracle Mineral Solution. These products can make you sick.



Vitamin C

- Water-soluble vitamin
 - Citrus fruits, bell peppers, kiwi, potatoes
- Role in the immune system
 - Epithelial barrier function and growth
 - Function and growth of immune cells
 - Destruction of microbes
 - Migration of immune cells to sites of infection
 - Antibody production
 - Antioxidant

Vitamin C Evidence

- No impact on incidence of common cold.
- Severity and duration of cold symptoms may be modestly reduced when vitamin C is supplemented at a dose of 1-2 g daily
 - UL = 2 g/day
- High doses may cause stomach upset
- Interactions with other nutrients
 - Interfere with the absorption of copper

Zinc

- Mineral
 - Oysters
 - Beef, pork, poultry
 - Nuts, seeds, legumes
- Role in the immune system
 - Immune cell development
 - Lymphocyte proliferation
 - Immune cell function



Zinc

- Oral zinc may help reduce duration of cold symptoms when taken early
 - Lozenges, syrups
- Large doses over several weeks can cause secondary copper deficiency
 - UL = 40 mg/day
- May also reduce absorption of iron
- May reduce absorption of some medications

Vitamin D

- Fat-soluble vitamin
 - Fatty fish
 - Vitamin D-fortified foods (such as dairy)
 - Produced in the skin when exposed to UV light
- Role in the immune system
 - Supports antigen presentation
 - Regulates production of anti-microbial proteins
 - Involved in differentiation of monocytes to macrophages
 - Modulates production of inflammatory cytokines



Vitamin D

- If deficient, it can help with immune function
 - 18.6 percent at risk of vitamin D inadequacy
 - 5 percent at risk of deficiency
- High doses can be harmful
 - Can result in high blood calcium resulting in bone loss, kidney stones, calcification of organs

Potential drawbacks to supplements

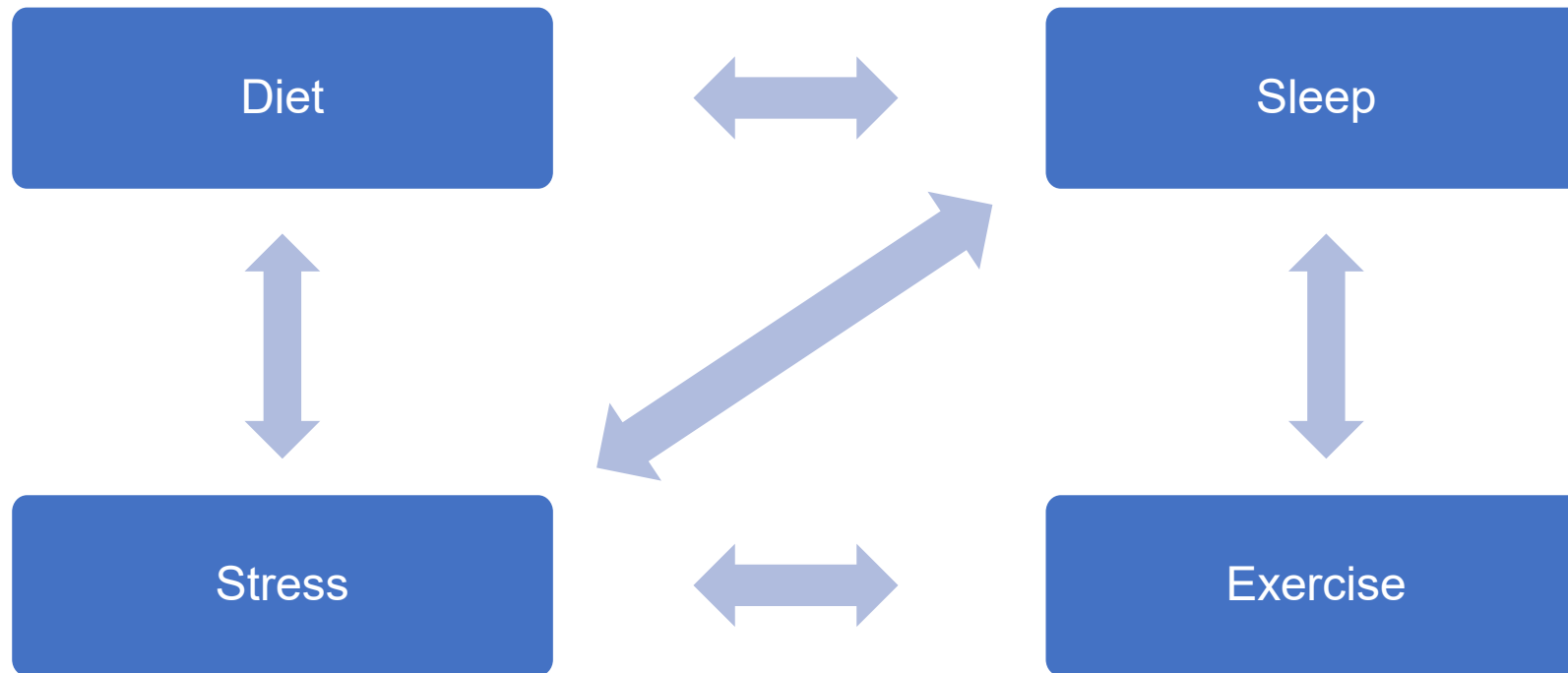
- Interactions with drugs
 - Herbal supplements may impact effectiveness or cause damage when combined with pharmaceuticals
- Interactions with nutrients
 - Large doses of single vitamins or minerals may interfere with absorption of others
- Potential contamination
 - Instances of herbal supplements contaminated with lead, pharmaceuticals
- Costly

When might supplements help?

- Some nutrients that may provide benefits to select populations:
 - Vitamin D if at risk for deficiency
 - Iron in those who are pregnant and adolescent girls
 - Folic acid for those who are pregnant or may become pregnant
 - B12 supplements for those who follow a vegan diet
- Additional considerations
 - Consult with a physician before taking supplements
 - Look for independent, third-party verification

Supporting a healthy immune system

Inter-relatedness of diet, exercise, stress, sleep



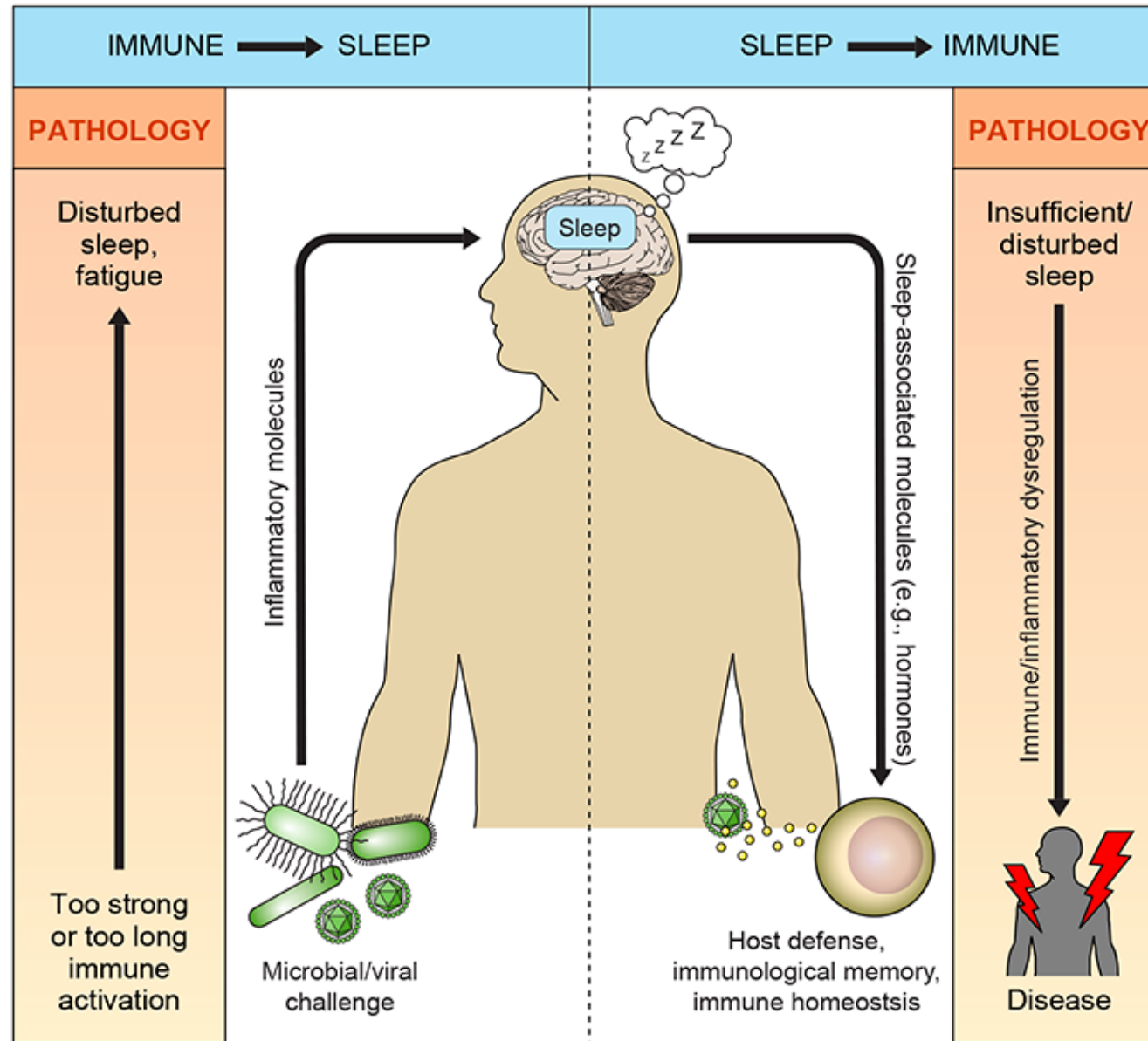
Diet and Immune System

- Nutrient deficiencies can impair immune response
 - Vitamins A, B complex, C, D, E, Folate
 - Zinc, Iron, Selenium, Magnesium, Copper
- Overweight and obesity associated with chronic low-grade inflammation
 - Chronic inflammation negatively impacts immune response
 - Visceral fat more likely to be pro-inflammatory
- Chronic inflammation increases risk of:
 - Metabolic syndrome
 - Type 2 diabetes
 - Cardiovascular disease

Dietary Patterns and Chronic Inflammation

- Western-style diet associated with increased inflammatory markers
 - C-reactive protein
 - Inflammatory cytokines
- Dietary components associated with reduced inflammation
 - Fruits, Vegetables, Nuts, Whole Grains, Fish
 - Fiber
 - Omega-3 fatty acids

Sleep





Habitual Lack of Sleep

- Less than 7 hours of sleep per night associated with:
 - Increased production of pro-inflammatory cytokines
 - Decreased adaptive immune response
- Self-reported < 5 hrs* per night associated with:
 - Increased respiratory infections in the past month
 - Increased risk of pneumonia within next 2 years
 - *Except in those who felt they were getting enough sleep

Sleep and Chronic Illness

- Habitual lack of sleep can induce an inflammatory response
- Sleeping less than 5 hours per night (compared with 7+ hours):
 - 2.5x higher risk of developing type 2 diabetes
- In women, sleeping less than 4 hours per night:
 - 2x higher risk of cardiovascular disease mortality



Sleep and Vaccine Response

- Research demonstrates that those who get adequate sleep after a vaccine have a more robust response to the vaccine
- Vaccines rely on adaptive immunity
- Sleep associated with aspects of adaptive immunity
 - Antigen-specific antibody response
- In one study, each additional hour of sleep associated with 50% increase in antibodies

What is stress?

- Emotional or physical tension that causes release of hormones
 - Cortisol, adrenaline
- Acute stress
 - Short-term – minutes to hours
 - May be helpful in some situations
 - Temporary boost in immune function
- Chronic stress
 - Longer-term – anything longer than a few days
 - Negative impacts on immune function

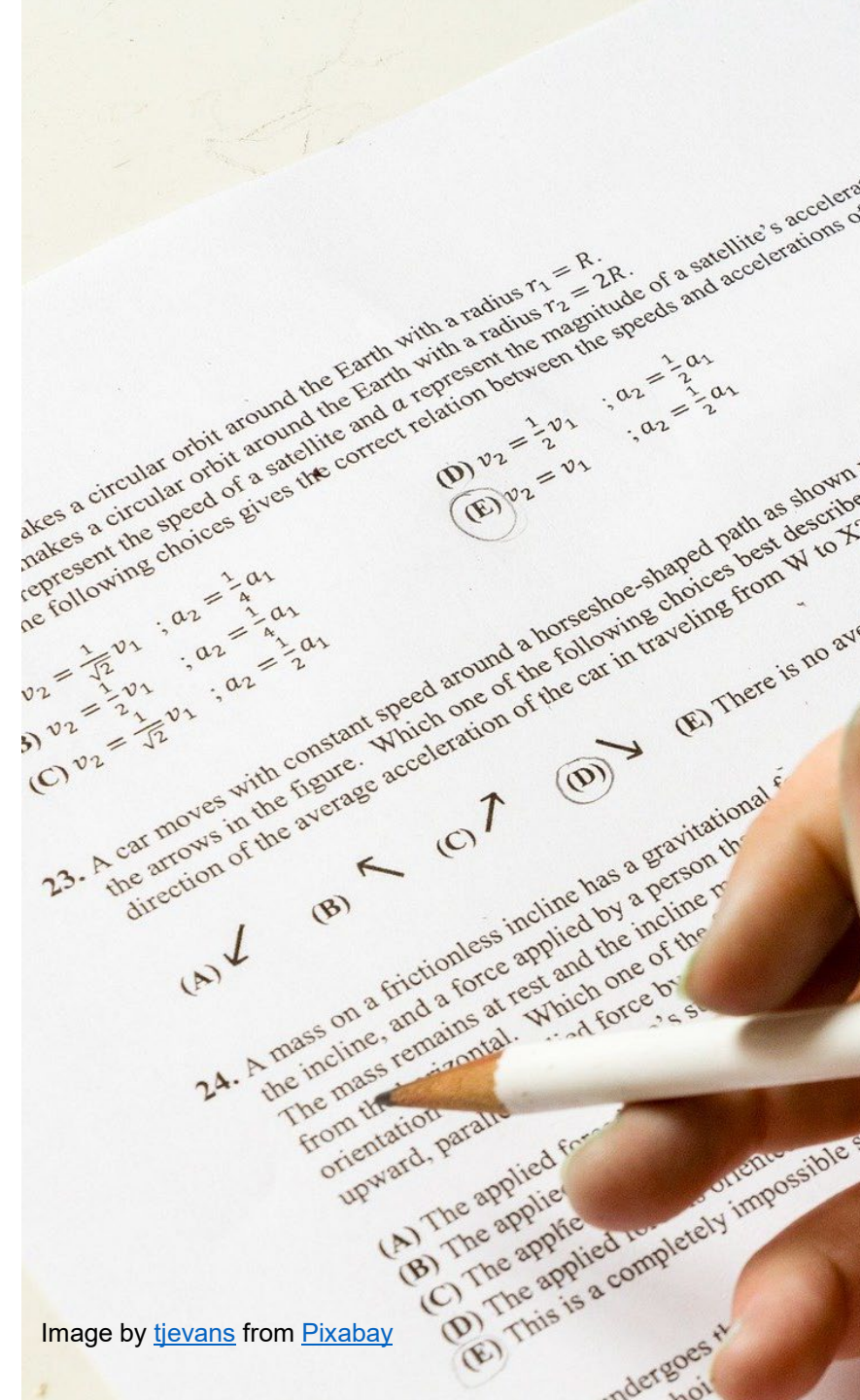


Image by [tjevans](#) from [Pixabay](#)

Chronic Stress

- Increased cortisol, which impacts cytokine production
 - May also impair sleep
- Low-grade chronic inflammation
 - Higher levels of pro-inflammatory cytokines
 - Higher levels of C-reactive protein
- Decreased antibody response
 - Decreased vaccine response
- Decreased immune cells
 - T and B lymphocytes
 - Natural Killer cells

Reducing Stress

- Recent meta-analysis concluded that stress-reducing interventions results in more optimal immune response
 - Stress management
 - Counseling
 - Cognitive behavioral interventions
 - Relaxation techniques
 - Meditation
- Relaxation techniques
 - Increased number of natural killer cells in older adults in an independent living facility
 - Prevented expected decrease in T cells with exam stress in medical students

Exercise

- Regular exercise (150 minutes per week) associated with reduced risk of :
 - Cardiovascular disease
 - Certain cancers
 - Type 2 Diabetes
 - Dementia



Photo by [Pixabay](#) from [Pexels](#)

Exercise and Immune Response

- Increase in T lymphocytes
- Moderate exercise improve vaccine response
- Anti-inflammatory effects
 - Reduction in visceral fat
 - Increase of anti-inflammatory cytokines (called myokines)
 - Decrease in pro-inflammatory cytokines
- Promotes wound healing
- Strenuous exercise can have a short-time negative effect on immune function

Other Benefits of Exercise

- Stress Reduction
 - Aerobic and anerobic exercise may reduce anxiety symptoms
 - May reduce symptoms of depression
- Sleep
 - Improves sleep quality
 - Decreases sleep latency (time it takes to fall asleep)

Bottom Line – Support a Healthy Immune System

Eating a balanced,
diet with the
nutrients you need



Regular exercise



Getting enough
sleep



Reducing stress



Thank you!

References will be shared via file download in the chat.

California's CalFresh Healthy Living, with funding from the United States Department of Agriculture's Supplemental Nutrition Assistance Program – USDA SNAP, produced this material. These institutions are equal opportunity providers and employers. For important nutrition information, visit www.CalFreshHealthyLiving.org.